ANALYSIS OF THE FACTORS INFLUENCING THE EXPORT OF INDONESIAN PLYWOOD TO JAPAN
(1980– 2002)

A THESIS

Presented as Partial Fulfillment of the Requirements to Obtain the Bachelor Degree in Economic Departement

By

BERTY TRI SUHARYATMO

Student Number : 99 313 158

ECONOMICS DEPARTMENT

FACULTY OF ECONOMIC

ISLAMIC UNIVERSITY OF INDONESIA

YOGYAKARTA

2005

ANALYSIS OF THE FACTORS INFLUENCING THE EXPORT OF INDONESIAN PLYWOOD TO JAPAN (1980– 2002)

By

BERTY TRI SUHARYATMO

Student Number : 99 313 158

Approved by

Content Advisor,

Ery Sriandi Hamid

.....

March 23, 2005

Language Advisor,

Katarina Widiastuti, S.S

.....

March 23, 2005

ANALYSIS OF THE FACTORS INFLUENCING THE EXPORT OF INDONESIAN PLYWOOD TO JAPAN (1980– 2002)

A BACHELOR DEGREE THESIS

By

BERTY TRI SUHARYATMO

Student Number : 99 313 158

Defended before the board of Examiners
On April 29, 2005
and Declared Acceptable

Board of Examiners

Examiner 1/ Content Advisor :

Prof. DR Edy Suandy Hamid, MEc .....

Examiner 2:

Sahabuddin Sidiq, Drs., MA .....

Yogyakarta, April 29, 2005
International Program
Faculty of Economic
Islamic University of Indonesia
Dean

Drs. H. Suwarsono, MA

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. Prof.DR. Edy Suandy Hamid M.Ec for all patience, inspiration and support in guiding the researcher during the compilation process.
2. Mr. Suwarsono Muhammad, as the dean of Economic Faculty.
3. Mr. Asma'i Ishak, as the director of International Program.
4. My parents Sriyatmo and Sutini that always pray for me and also give me strength and spirit to finish this thesis.

5. To my sisters Tintien Sulistyowati and Hafid Dwi Afrina Andriyatni that always annoyed me when typed this thesis.
6. Do not forget also thanks to Mrs. Katarina .W as my language advisor.
7. To my "sister" Dyan that always give support and spirit.
8. Thanks for my classmates Riang and Andhy that always give support.
9. Thanks to my friends; Edy, Agung, Ogut, Shomad even though sometimes they are disturbing when I am typing.

Wassalamu'alaikum Wr.Wb

Yogyakarta, February 25, 2005

Berty Tri Suharyatmo

MOTTO

THE ONLY THING NECESSARY FOR EVIL TO TRIUMPH IS FOR GOOD MEN TO DO NOTHING (EDMUND BURKE)

THE ONLY WAY TO PREDICT THE FUTURE IS BY CREATE IT (ALAN KAY)

IF YOU CAN DREAM IT SURELY YOU CAN DO IT (WALT DISNEY)

YOUR BRAIN IS LIKE THE SLEEPING GIANT (TONY BUGAN)

CONTENTS

CHAPTER III RESEARCH METHOD

CHAPTER IV DATA ANALYSIS

TABLE OF APPENDICES

ABSTRACT

Berty Tri Suharyatmo (2005), "Analysis of the factors influencing the export of Indonesian plywood to Japan (1980-2002)". Economics Faculty, Economic Departement, International Program, Islamic University of Indonesia, Yogyakarta.

Indonesia's economic development before the economic crisis was remarkably succesful. Indonesia's impressive economic growth is exemplified by the increase in per capita income, from less than US$100 in 1966 to over US$1,000 in 1996. This impressive growth is driven by strong growth of manufacturing and service sectors. After the crisis the export of forestry industry as one of manufacturing sector also have important role to restructure the Indonesian industry. Plywood, textiles, and garments had emerged as the leading manufacturing exports.

In this research the writer appeared plywood as the main research because recently the export of plywood has an important role supporting the economic growth. Since 1986 Japan become the main market for Indonesian plywood export. The export of Indonesian plywood to Japan increased year by year. In this research the writer want to know what factors that affect to the demand of Indonesian plywood export to Japan. Factors that include in this research are: price of plywood, Japan GDP and exchange rate between countries. This research will use time series data at 1980 – 2002 to find the regression result.

Based on the research, from the F test we can see that price of plywood, Japan GDP and exchange rate simultaneously affect to the demand of Indonesian plywood export to Japan. And for the R-squared value is 0.858123. It means that the variation of the dependent variable can be explained by the independent variables about 0.858123 or 85.81%, while the rest 0.141877 or 14.18% are explained by factors outside the model.

ABSTRAK

Berty Tri Suharyatmo (2005), "Analisa Faktor-faktor yang mempengaruhi ekspor kayu lapis Indonesia ke Jepang (1980-2002)." Jurusan Ekonomi Pembangunan, Fakultas Ekonomi, Program Internasional, Universitas Islam Indonesia, Yogyakarta.

Pembangunan perekonomian Indonesia sebelum terjadinya krisis ekonomi berjalan cukup baik. Pertumbuhan perekonomian Indonesia meningkat pesat ditunjukkan dengan tingginya pendapatan nasional per kapita, dari US$100 pada tahun 1966 menjadi US$1000 tahun 1996. Pertumbuhan yang sangat pesat ini tidak lepas dari cepatnya perkembangan sektor jasa dan industri manufaktur. Setelah terjadinya krisis ekonomi, ekspor dari sektor hasil hutan sebagai salah satu bagian dari industri mnanufaktur masih memegang peranan penting dalam proses restrukturisasi perekonomian Indonesia. Kayu lapis, tekstil, dan garmen muncul sebagai produk ekspor andalan di sektor manufaktur.

Dalam penelitian ini penulis mengambil kayu lapis sebagai bahan penelitian dikarenakan pada saat ini ekspor kayu lapis Indonesia memegang peranan penting dalam pertumbuhan ekonomi Indonesia. Sejak tahun 1986 Jepang menjadi tujuan utama ekspor kayu lapis Indonesia yang ditunjukkan dengan peningkatan volume ekspor kayu lapis dari tahun ke tahun. Dalam penelitian ini penulis ingin mengetahui faktor apa saja yang dapat mempengaruhi permintaan kayu lapis Indonesia oleh Jepang. Faktor-faktor tersebut adalah; harga kayu lapis di pasar internasional, nilai tukar rupiah dan pendapatan nasional (GDP) Jepang. Penelitian ini menggunakan data menurut runtun waktu (time series data) dari tahun 1980-2002 untuk mencari hasil regressi.

Berdasarkan hasil penelitian, dari nilai F test menunjukkan bahwa harga kayu lapis, nilai tukar rupiah dan GDP Jepang mempunyai pengaruh terhadap permintaan kayu lapis Indonesia oleh Jepang. Dan berdasarkan nilai R-squared menunjukkan angka 0.858123. yang berarti bahwa 0.858123 atau 85.81% dari variasi himpunan variable permintaan kayu lapis Indonesia mampu dijelaskan oleh variasi himpunan variable bebasnya. Sedangkan sisanya 14.18% dijelaskan oleh faktor dari luar model.

CHAPTER I

INTRODUCTION

1.1 Background of Study

The international trade especially export can be considered as a machine of movement in the economic growth. There is a general belief among many economists, that participation in international trade increases productivity. Export is believed as an instrument to run the economic development, but in the other side it is believed that the growth of export is not always like illustrated above. For a long time the available theoretical framework predicted that increases in exports would increase the productivity levels.

Increase in exports, it was argued, increased the level of productivity through, for instance, utilization of scale economies. Recent theoretical work suggests that trade may increase not only the level of productivity but also the growth rate through its effect on technology.[1] There are three mechanism which can lead to technological change and thereby to an increased rate of economic growth. They are; increased competitive pressure , embodiment in imports and knowledge transfer through commercial contacts.

Up to 1986, the growth of Indonesian export was still dominated by oil and gas. The value was US$ 5.501,0 million or almost 65% of total Indonesian export. But since 1987 more than 50% of total Indonesian export has been non-oil and gas commodity with average growth 19,5% per year (1987-1995). It has changed due to some new deregulation and policies issued by the government.

[1] E.g. Grossman and Helpman (1991a, Rivera-Batiz and Romer (1991) and Young (1991).

These policies brought a significant impact on non-oil export. In 1998, the value of non-oil and gas export reached 83.88 percent of total Indonesian exports.

Meanwhile, in 1999 these export fell by 5.13 percent, from US$ 40,975.5 million in 1998 to US$ 38,873.2 million in 1999. The decrease was attributed to the economic and financial crises which has occured since the mid of 1997. In 2000, the export value for total and non-oil and gas increased by 27.66 percent became US$ 62,124.0 million for total export, and increased by 22.85 percent to US$ 47,757.4 million for non-oil and gas export.

Rapid expansion of Indonesia's non oil export contributed to an average real GDP growth rate of 5.5% annually during 1980's. Indonesia's non oil export growth has helped the country to lessen its dependence on non renewable natural resources as the main source of foreign exchange. Non oil exports earnings also allow Indonesia to import more capital goods for investment, intermediate inputs for manufacturing and agriculture, and a greater variety of consumer goods. This efforts have been done continously by the government and then manifested in the program of continously deregulation since 1985.

The products of manufacturing sector can be classified into non-primary commodities. With regard to manufacturing sector; garment, textile, and plywood showed a significant role. In 1985 plywood, textiles, and garments had emerged as the leading manufacturing exports. Real plywood earnings rose at least 23 percent per year during the 1980s, leading Indonesia to rank as the world's largest exporter by value.

Table 1.1 : The Growth of Indonesian Processed Wood Exports by Products 1992/93-2001

No	Year	Sawntimber		Plywood		Wood Working		Block Board	
		1000m^3 /CuM	Million US$	1000m^3/ CuM	Million US$	1000m^3/ CuM	Million US$	1000m^3/ CuM	Millio US$
1	1992/93	9,45	3,59	9.761,0	3.549,11	1.199,46	590,82	–	–
2	1993/94	5,04	3,98	9.626,00	4.752,42	1.597,05	1.114,92	–	–
3	1994/95	2,37	2,04	7.333,09	3.372,87	648,76	418,24	–	–
4	1995/96	0,80	0,85	8.338,82	3.854,17	649,10	454,62	–	–
5	1996/97	0,06	0,05	9.366,57	4.429,48	206,83	143,41	–	–
6	1997/98	0,30	0,48	4.800,74	2.320,38	142,11	75,62	120,63	37,10
7	1998/99	15,90	22,00	4.863,38	1.300,53	1.130,49	480,77	511,74	109,3
8	1999/00	20,50	68,76	3.372,88	1.276,41	849,14	379,71	436,66	114,7
9	2000*)	9,87	40,52	3.096,24	881,00	1.190,40	309,71	368,78	70,56
10	2001	12,31	5,19	930,35	315,21	153,90	66,52	407,95	34,05

Source : *Ministry of Forestry, Forestry Statistic of Indonesia, 2002*

Note : *)data in April up to December 2000

Many years ago, the main destination countries of Indonesian exports were Japan, United States, and Singapore. In 2002, the export to Japan increased much significant comparing to the previous year (from 53,200.1 thousand M.Tons to 53,317.3 thousand M.Tons). Among several importers of Indonesian plywood, Japan is the market that will become the object of this research. In the current year Japan became the main export destination country especially for Indonesian plywood and Japan also become the biggest importer of Indonesian plywood.

TABLE 1.2

Volume of Indonesian plywood exported to Japan

Year	Volume (tons)	Value (000 US$)	Year	Volume (tons)	Value (000 US$)
1980	5897	2907.6	1992	1.616.310,8	820.1361
1981	6007.4	2235.5	1993	2.195.894,4	1650.0531
1982	22189.2	6995	1994	1.831.749,9	1282.2449
1983	28864.6	8504.5	1995	1.725.198,9	1270.5347
1984	86.288,2	28.6513	1996	1.999.406,7	1514.5669
1985	167.352,4	55.9263	1997	1.822.137,4	1323.9747
1986	330.455,9	124.0959	1998	1.224.884,5	538.0941
1987	975.786,3	465.6911	1999	1.546.007,3	889.7919
1988	1.203.585,8	517.6107	2000	1.546.275,5	917.8864
1989	1.930.257,4	919.8284	2001	1.561.312,5	930.0750
1990	1.719.883,8	843.7897	2002	1485893.7	743750.9
1991	1.813.373,0	878.6189			

Source : Center Bureau of Statistic, Statistical Year Book of Indonesia, several years

The total wood exports of solid wood products by all countries reached $46.5 billion dollars in 1998. These exports, however, were 14 percent less than the record breaking total of $52.5 billion shipped in 1997. In 1990, the total world solid wood exports were $36.7 billion. In the intervening decade, the United States has moved from being the world's largest solid wood exporter to the

world's largest importer. The U.S surpassed Japan as the largest importer in 1998, importing $14 billion of solid wood products from the world, while Japan's imports dropped to $9 billion.

The Indonesia and Malaysia export bloc in 1999 overtook both the EU and the United States in total solid wood exports and now ranks as the world's largest exporter. Their total solid wood exports reached $6.5 billion in 1999. Their share in total exports of these nine blocs is now 24%. While remaining as a producer of tropical hardwood, Indonesia is the world's leader in softwood plywood trade, with export share rising from 41% in 1997 to 44% in 1999.

1.2 Identification of Problem

The main topic of this research is analysing the factors influencing export plywood 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 expect 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 plywood from Indonesia to Japan.

1.3 Formulation of Problem

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

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

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

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

1.4 Limitation of Research Area

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

1. The price of Indonesian plywood in the international market.
2. The exchange rate of Rupiah as our currency to US Dollar.
3. The GDP of Japan as the importer country.

This research uses data of plywood price, the exchange rate, and the GDP of Japan for the period 1980-2002.

1.5 Objectives of the Research

The purposes of this research are:

1. To analyze the factors influencing the plywood export from Indonesia to Japan.
2. To apply the method of Ordinary Least Square (OLS) theory in the real economy cases.

1.6 Contribution of Research

The final result of this research can be used:

1. As a reference for other research, writers and students who are concern with export cases.
2. As a consideration for goverment and economist in applying policies related to international trade, like export and import.
3. To show the effect of Indonesian plywood export on the government balance of trade.
4. For the writer, this research is the opportunity to apply the knowledge and theory that has been studied before.
5. As an additional information to plywood commodity so it can increase the government balance of trade.

1.7 Definitions of Terms

The non oil and gas commodities has 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 1.3

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 processing industries.

Source: Dumairy, 1997

Wood products is the largest export sector in Indonesia. One third of total Indonesian manufacturing exports consists of wood products. The Indonesian primary export commodities in industrial sector is plywood, garment, textile, rubber, and other processing woods. The total value export from these commodities above in 1995 reached US$ 11 million, almost a half of total export industrial products.

Food, textiles, clothing and rubber products are other big Indonesian export sectors. Some of the sectors have a larger share of gross output going for exports than for domestic use. For example, more than 50% of gross output in clothing, footwear, wood, furniture and other manufactures is exported.

CHAPTER II

REVIEW OF RELATED LITERATURE

2.1 Theoretical Review

Quoting from Yana van der Meulen Rodgers (1994)[2], 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.

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 neighbours 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

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

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 rivalled its regional neighbours. 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 dolars 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 risen 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.

Quoting from Prema-Chandra Athukorala and Bambang H. Santosa (1996)[3], the linkages analysis due to Hirschman (1958) was widely used as aplanning 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 investible resources by directing investment flows towards key sectors. A key sector was defined as asector 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*).

---

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

By the mid 1970s, there was sample evidence that import substitution policies had largerly 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.

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 specialise in products in which it has comparative advantage. The importation of intermediate inputs for export production, therefore, involves an implicit substitution of labour 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).

In analysing 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 (labour 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 succes 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 labour-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 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.

Quoting from Steve E. Johnson, Michael Adams and Masaki Miyake (2003)[4], the Asia Pacific region has rapidly replaced log exports with the export of processed primary products, spurred by Indonesian plywood exports and Malaysian export of sawnwood , veneer and plywood. Asian log exports made up 25% of total Asian export volume in 2001 and 2002 (about 15% of log production). Indonesia was the second largest log exporter in 2001 at almost 3,5 million m^3. Following IMF guidance, Indonesia resumed log exports in1999 after a 13 year moratorium. Indonesia has now re-implemented its log export ban to attempt and to reduce illegal exports and ensure sufficient log supplies for domestic mills, it has requested trading partners to assist in stopping the flow of smuggled logs.

The different price trends experienced by log exporters in the African and Asian region reflects the differing impact of their two distinct major markets of Europe and Japan/ China. In Asia, log prices have been seriously and negatively affected by the continue weakness of demand for wood products in Japan and by the leadership in price setting in the Asian log trade now exerted by China, a leadership dominated by demand for low prices. Agreements aimed at stemming the flow of illegal logs, signed between Indonesia and the Governments of China and Malaysia, it appear to be having an impact with exporters hoping for a positive influences on prices.

---

[4] Steve E. Johnson, Michael Adams and Masaki Miyake "Trends in The Tropical Timber Markets, 2002-2003"; *www.unece.org*

In 2001, International Tropical Timber Organization (ITTO) producer exports of tropical plywood declined 8.3% to 11 million m^3, dropping further to 10.7 million m^3 in 2002. Indonesia continues to dominate the trade in tropical plywood with the 6.3 million m^3 exported in 2001 constituting 57% of total ITTO producer member exports. Indonesia's exports were estimated to have increased slightly in 2002to 6.5 million m^3. The restriction on Indonesia's log exports imposed in 2002 led to decreased production and exports from these mills.

The year 2002 was not particularly a good year for tropical plywood exporters and in early 2003 has brought new hurdles to market acces. Since market prices for commodity plywood are still extremely weak, having never recovered to the levels seen prior to the Asian financial crisis, the prospect for tropical hardwood plywood are not bright. In fact, at the end of May 2003 prices for Asian export plywood were still at only 45.55% of the pre-crisis levels.

Attempts to halt the illegal trade of logs and to promote value-added processing of timber in tropical countries will continue to reduce the volume of tropical industrial roundwood in trade.one way to ascertain if logs and other products exported are sustainably produced is to implement a chain of custodylog tracking and/or certification system. Timber certification therefore remains a topical issue for many tropical countries, with several tropical forestry operations continuing to seek form of certification. It is likely that increasing volumes of tropical timber products (both primary and secondary) in world markets will soon bear certificates attesting to their legality and sustainability.

Quoting from Muh. Yusram Massijaya and Hariadi Kartodiharjo (2000)[5], tropical forests in Indonesia are essentially public lands, managed and protected by the Government of Indonesia. Natural forest utilization in Indonesia was started in the 1970s as a national development program. For the purpose of increasing national revenue to support development programs, a vast utilization program in the natural forest was implemented. Wood was the main product to be utilized.

In its early days of forest utilization, Indonesia's forest covered about 140 million ha of forest, which amounted to about 73 percent of its 192 million ha land base. However, only 64.3 million ha of these forests were classified as production forest, 22 percent of which were classified as limited production forest and the balance as regular production forest. Most of the production forest is natural forest. Plantations on production forests are mainly found on the island of Java, which is mostly dominated by teak forest. Forest utilization activity is carried out by State Owned Enterprises (BUMN) in conjunction with the private sector using a system called Forest Concession Rights (HPH).

During recent years, forest areas in Indonesia have decreased significantly, both in surface area and in quality, and are currently not all forested. Compared to the 140 million hectares of forest area that was available in the early era of forest utilization, at present it is now estimated that the total forest area is only 113 million hectares. This consists of the following: (1) 34 million hectares (22.2%) of protection forest, (2) 20 nillion ha of park and reservation forest, (3) 23.9 million

[5] Muh. Yusram Massijaya and Hariadi Kartodiharjo "Forest Resources and the Forest Product Industry in Indonesia, 2005" www.iges.or.jp

ha of limited production forest, (4) 34.8 million ha of regular production/non convertible forest (Directorate General of Forest Inventory and Land Use Planning, 1998).

According to the Indonesian Forestry Community (1998) there are about 22.1 million hectares of former areas that are not being forested. In several cases, the Government of Indonesia converted the degraded forests to concessions for industrial plantation of forest (HPHTI). Types and total for HPHTI areas are as follows (1) 0.7 million ha towards transmigration purposes, (2) 2.9 million ha for pulp production and (3) 1.8 million ha for wood production (F. Febrianto and Y.S.Hadi, 1999).

The utilization of forests in Indonesia should be based on the "Sustainable Yield for Multiple Use Principle." This principle is known as Indonesian basic forestry principle. Theoretically, this principle indicates a strong intent to enforce and implement very constructive forest management practices. In practice, however, implementation of the principle is weak and not properly applied.

Log production activity in Indonesia is carried out by State-Owned Enterprises (BUMN) in conjunction with the private sector using a Forest Concessionaire system (HPH), under direct control of the Ministry of Forestry and Estate Crops. Average annual log production from natural forest is about 26 million meters. this figure is much less than the raw material that would be required to support a forest products industry in Indonesia, if it were operating at full capacity. In order to address this problem, the Government of Indonesia is promoting and speeding up its plantation program. By the end of 1999, forestry

plantations had reached about 2.3 million ha, especially through the demand for fiber and sawn timber production.

The major forest products in Indonesia are from the wood based industries. These kinds of operations use raw materials from domestic natural and planted forests. This has helped Indonesia counterbalance of the recent economic crisis. Plywood is the most popular wood product in Indonesia. The plywood industry grew rapidly after 1973. At that time, there were only two plywood companies in the country with a total annual production capacity of 28,000m^3. In January 1995, there were 120 different plywood companies with a total annual production capacity 10.4 million m^3. In order to be more efficient, most of the plywood corporations are integrated with the blockboard industry.

In 1996/1997 before the economic crisis, plywood production was 10,95 million m^3. During the economic crisis of 1997/1998, the production and export of plywood dropped. However, in the third quarter of 1998,the demand of plywood from Asian market had again begun to rise, as evidence by an increase in the foreign market price of plywood. The situation, therefore, is expected to improve and, at the same time, stimulate local plywood companies to increase their production (APKINDO, 1998).

Technically, the present plywood industry can be summrized as follows: (1) decreasing supply of raw materials, qualitatively and quantitatively; (2) recovery rate relatively low (averaging 52%); (3) main type of product is concrete panel (i.e, plywood used for concrete forms in construction); (4) most of the raw

materials come from natural production forests; (5) several plant operations have been using small diameter peelers to increase processing recovery rate.

More than 80 percent of the produced plywood exported to Japan, United States, Canada, Singapore, Middle East countries, and others. However, most of the exported plywood is raw plywood. This type of plywood is usually reprocessed in the importing countries to produce finished products with a higher price. In order to gain better returns from the plywood industry, the government has been encouraging plywood manufacturers to produce and exports finished plywood. It would therefore seem that the export of fancy veneer overlaid plywood, especially teakwood veneer, will increase in the coming years.

The development of the forest products industry in Indonesia have some ecnonomic aspects, which the aspects as follows;

- Job opportunities are currently one of the most critical issues in Indonesia. Due to the economic crisis, the number of unemployed persons increased sharply at all levels. The forest products industry in Indonesia has helped to create many job opportunities, both for Indonesian and foreign workers in various disciplines and specializations. In 1999 a total of 441,091 persons worked in the forest products industry. This scale of employment not only has strategic economic significance, but also helps to address the employment crisis in the rest of society.
- The added value of forest products changes from time to time according to the efffect of the market price and production levels. The

added value of a certain industry depends upon its effectiveness in dealing with market competition and the market price. Based on statistical data for 1999, the plywood industry is the most highly rated added value industry, followed by laminated plywood.

- The contribution of the forest products industry to Indonesia's exchange earnings increases significantly from time to time, with the most dramatic increases in the plywood sector. Since 1983 until now the contributions to Indonesia's foreign exchange earnings have been dominated by the plywood industry.

In order to stabilize raw materials of the forest product industry, the Government of Indonesia should make serious efforts to ensure sustainability of their supply by enforcing the following: (1) continuing efforts to increase the efficiency of wood utilization by increasing recovery rates, utilization of wood waste, productivity and utilization of lesser used species; (2) improving implementation of existing regulations; (3) creating support and alternative raw materials for the forest products industry; and (4) facilitating the implementation of eco-labeling in forest concessions and the chain of custody in the forest products industry.

In order to improve the state of the forest products industry, the following actions are needed: utilize raw materials more efficiently, implement total quality management principles, conduct research and development on their products, and establish a wood data center for production and marketing needs.

2.2 Theoretical Framework

2.2.1 International Trade Theory

Trading can be exist because every individual wants to fulfill their needs or to get profit (Todaro, 1998:16). Trading is the interaction result between demand and supply which is always competed (Lindert, 1994).

International economics deal with the economic interdependence among nations. It analyses the flow of goods, services, and payments between a nation and the rest of the world, the policies directed at regulating this flow, and their effect on the nation's welfare. This economic interdependence among nations is affected by, and in turn influences, the political, social, cultural, and military relations among nations.

Specifically, international economics deals with international trade theory, international trade policy, foreign exchange markets and the balance of payments, and open economy macroeconomics[6].

International economics had enjoyed a long, continuous, and rich development over the past two centuries, with contributions from some of the world's most distinguished economist, including Adam Smith and David Ricardo.

---

[6]Salvatore, Dominick. (1993). *International Economics: Fourth Edition.* New York. p. 6.

2.2.1.1 Classical Approach

Absolute Advantage

Basically absolute advantage theory explains that each country which are doing international trade will be pushed to have specialization in producing commodities which have absolute advantage and exporting to other country. But in reality not every country have absolute advantage. This absolute advantage only owned by one party (Sih Prapti, 1991;31).

According to Adam Smith, the trade between two nations is based on absolute advantage. When one nation is more efficient, or it has an absolute advantage, than another in the production of one commodity, but it is less efficient, or it has an absolute disadvantage, with respect to the other nation in producing a second commodity, then both nations can gain by each specializing in the production of the scommodity of its absolute advantage, and it exchanging part of its output with the other nation for the commodity of its absolute disadvantage[7]. By this process, resources are utilized in the most efficient way and the output of both commodities will rise. This will increase in the output of both commodities and measures the gains from specialization in production available to be divided between the two nations through trade.

[7]Salvatore, Dominick. (1993). *International Economics: Fourth Edition.* New York. p.24.

Comparative Advantage

Comparative advantage is the solution from the weaknesses of absolute advantage theory. In absolute advantage theory, absolute advantage only own by one country, for example international trade between Northern and Southern countries, where almost all of absolute advantage owned by Northern countries (Sih Prapti, 1991;32)

According to David Ricardo in this situation the trade still can be done, bacause the basic of the trade is comparative advantage not absolute advantage. All of absolute advantage assumption also can be consider as comparative advantage assumption. So absolute advantage by Adam Smith can be consider as comparative advantage by David Ricardo.

In 1817, Ricardo published his *Principles of Political Economy and Taxation*, in which he presented the law of comparative advantage. According to the law of comparative advantage, even if one nation is less efficient, or it has an absolute disadvantage with respect to the other nation in the production of both commodities, there is still a basis for mutually beneficial trade. The first nation should specialize in the production and export the commodity in which its absolute disadvantage is smaller and import the commodity in which its absolute disadvantage is greater.

2.2.1.2 Neo Classical Approach

Known as one of the Neo Classical approach, Hecksher-Ohlin Theory improve the theory of classical Comparative Advantage. This theory state that every country has different factors of production. This condition will make different price for the same commodity among countries. Hecksher-Ohlin theory state that countries tend to export the commodities which have abundant factor of production intensively.

Product Life Cycle theory become an improvement of the theory before. The content of this theory has change from comparative statistic become dinamic statistic.

There are some assumption in PLC theory;

1. In the PLC theory, the demand and supply of the commodities always change, because the influence of factors also change/ mobile.

   (In H-O theory the condition of demand and supply is constant because of ceteris paribus assumption).

2. In PLC theory, the quantity of the production factor is changing from time to time.

   (In H-O theory assuming constant).

3. In PLC theory the trade competition change from monopoly become oligopoly in short period called RSG (Rapid Sales Growth).

   (In H-O theory the condition assuming perfect competition)

4. In PLC theory international trade should not be free trade, import tariff is allowed.

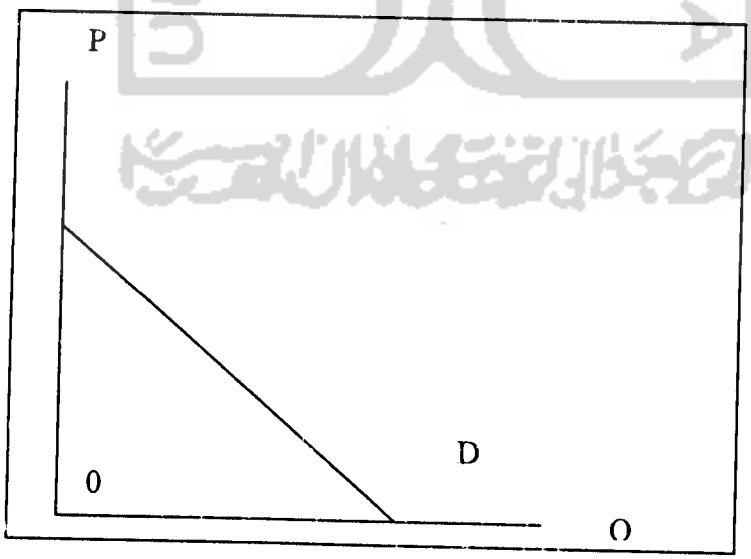
   (In H-O theory international trade assuming to be free trade).

2.2.2 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 2.1

Demand curves



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.

2.2.3 The Factors Influencing Demand

The most influencing factor in demand is the price of the commodity itself. The demand curve fulfilled this assumption and assuming that the other factors will be constant. If the factors except the price change, it will cause the demand curve shift to the left or right. The factors that influence demand except the own price is the taste or

consumer preference of the commodity, the quantity of the consumers, consumer income, the price of other goods (substitution or complement), and consumer expectation about the price in the future.

The function as follows :

$$D = f(S, P_s, P_1, Y, B, K)$$

Where :

D = The demand of a commodity as the function of S (consumer preference).

S = Consumer preference.

P_s = Price of other goods (substitution or complement).

Y = Consumer income.

B = The quantity of the consumer.

K = Consumer expectation.

The demand curve of a commodity shows the relationship between the quantity demanded with the price and assuming that the other thing being equal/ constant. It can be written as follows ;

$$D = f(p)$$

$$D = f(S, P_s, P_1, Y, B, K)$$

Bar signs (-) shows that the variables being constant/ unchanged.

2.2.4 The Concept of Elasticity

Elasticity is the explanation from changing effect of the quantity demanded to the influence factors like: price of commodity, price of other commodity, or consumer income (Boediono, 1991). Measurement of elasticities aimed to see how the demand response to the change of their determinants (Mankiw, 2000;105). Elasticity point measure the degrees of sensitivity from the quantity demanded to the factor that influence demand or supply as big as 1%.

Price elasticity of demand

Price elasticity of demand measure how much the quantity demanded of commodity change as a response to the change of price. (Mankiw, 2000;105). Coefficient of the price elasticity demanded (e) also be able to measure the percentage of change of quantity demanded per time unit that caused by the percentage change of the price commodity itself (Salvatore, 1982;41)

In other words, elasticity means the sensitiveness of the dependent variable with the independent variables. Elasticity of demand is measuring how much the quantity demanded of good changes when its prices changes. The price elasticity of demand is the percentage change in the demand divided by the percentage change in price.

$$E_D = \frac{\%\text{ change in the demand}}{\%\text{ change in price}}$$

$$E_D = \frac{\%\,\triangle Qx}{\%\triangle Px}$$

$$= \frac{\triangle Qx}{\triangle Px} \times \frac{Px}{Qx}$$

When the price of a good rises, the demand decreases. If the percentage change in price is positive, the percentage change in the demand will be negative. As a result, the price elasticity of the demand will be a negative number. Because the price elasticity of the demand is always negative, it adopts the convention of dropping the minus sign and the magnitude of elasticity. Price elasticity demand (E_D) is the ratio of the percentage change in the demand to the percentage change in price.

They are three things about the calculation of the price elasticity of demand:

a. The change in price and the change in the demanded are both recorded as positive numbers
b. The changes in prices and demands are expressed as percentages of the average price and average demand.
c. Although it is convenient to think of elasticity as the ratio of the percentage change in the demand to the percentage change in the price, it is the same as the proportionate change in the demand divided by the proportionate change in the price.

Explanation of the elasticity result:

- Inelastic, if elasticity is between 0 and 1
- Elastic, if elasticity is greater than 1
- Unit elastic, is the dividing line between inelastic and elastic
- Perfectly elastic, if elasticity is equal to zero

(Samuelson, Microeconomics Seventeenth Edition)

Income elasticity of demand

Income elasticity of demand is the percentage change of commodity demanded which caused by the increase of real consumers income with 1% (Boediono, 1991;32). The function is as follows :

$$E_p = \frac{\%\text{ change of good X}}{\%\text{ change in real income}}$$

Income elasticity of demand also refers to measure how much the quantity demanded change in response to the change of consumer income (Mankiw, 2000;131). If the value of Ep negative, the commodity can be called inferior goods, and if the value of Ep positive, this commodity can be called normal goods (Salvatore, 1982;44). Whereas primary goods usually have Ep<1, if the value of Ep<1 this commodity called as superior goods (Boediono, 1991;32).

2.3 Hypothesis

Hypothesis is an opinion or conclusion which is still temporary, and it can not be called as a thesis (Soereatno & Arsyad, 1999;22). Hypothesis defines as something that temporary considered valid to express some opinion about the variable and the model that will prove later on trough statistical test or econometric.

The hypothesis that will be tested at regression analysis for the independence variable which influence the export are:

1. The price of plywood (P), will negatively affect the export of Indonesian plywood to Japan.
2. The exchange rate of Rupiah vis-à-vis US Dollar (ER), will negatively affect the export of Indonesian plywood.
3. Gross Domestic Product of Japan (GDP), will positively affect the export of Indonesian plywood.

CHAPTER III

RESEARCH METHOD

3.1. Research Method

3.1.1. Data and source of data

The data of this analysis is a time series secondary data taken from books and report, such as:

a. Statistik Indonesia (Indonesian Statistic) published by Bureau of Statistic Centre.
b. Economic Indicators by Bureau of Statistic Centre.
c. International Financial Statistics (IFS) published by International Monetary Fund.
d. Other sources, either books or reports relevant to this research.

3.1.2 Types of Data

The research is using quantitative method and the data that the researcher used in this research consist of volume of Indonesian export of plywood, the price of Indonesian plywood in the international market, the exchange rate of Rupiah (Rp) as our currency to US Dollar (US$), and the GDP of Japan as the importer country. This research uses data of plywood price, the exchange rate, and the GDP of Japan for the period 1980-2002.

3.2 Hypothesis and Analysis Method

3.2.1 T Test

This test is used to detect the impact of independents variable individually upon the dependent variable. In this research, the researcher uses one tail test positive or negative because this research has a strong theoretical expectation, such as:

a. One tail test (positive):

The hypotheses are as follow:

$H_0 = \beta_1 = 0$; $H_a = \beta_1 > 0$

If t-test > t-table, Ho is rejected, it means that the individual independent variable significantly influences the dependent variables.

If t-test < t-table, Ho is accepted, it means that the individual independent variable does not significantly influence the dependent variables.

b. One tail test (negative):

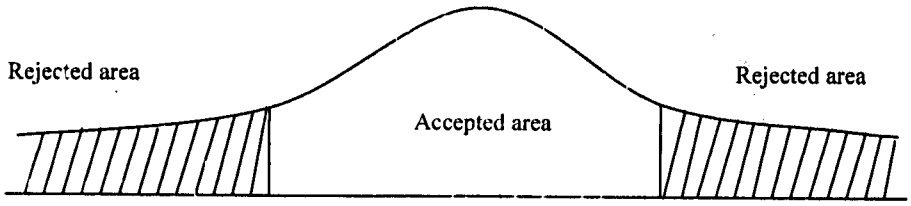
The hypotheses are as follow:

$Ho = \beta_1 = 0$; $H_a = \beta_1 < 0$

Ho is accepted if t-test > t-table, partial independent variable do not influence the dependent variables.

Ho is rejected if t-test < t-table, partial independent variable influence the dependent variables.

Test criteria:



3.2.2. F test

This test is simultaneous test to show the impact of all independent variables upon dependent variable. The testing of F test is the same as the testing for t test. If computed F value > critical F value, so we reject Ho. All independent variables affect simultaneously to dependent variable.

The hypothesis is formulated as follow:

$H_0 : \beta_1 = \beta_2 = \beta_3 = 0$, hence the independent variables do not affect the dependent variable.

$H_a : \beta_1 \neq \beta_2 \neq \beta_3 \neq 0$, hence independent variables affect the dependent variable

3.2.3. R^2

An important property of R^2 is that it is a non-decreasing function of the number of explanatory variables or regresses presented in the model, as the number of repressors increase. R^2 almost invariably increases and never decreases. R^2 is used to detect how far the independent variables influence the dependent variable in the model. The number of R^2 is between 0 – 1.

3.2.4. Classical Assumption

3.2.4.1. Multicolinearity

Multicolinearity means the existence of a perfect or exact linear relationship among some or all-explanatory variables of a regression model. The consequences of multicollinearity are if there is perfect collinearity between the X's. Their regression coefficients are indeterminate and their standard errors are not defined. If collinearity is high but not perfect, estimation of regression coefficients is possible but their standard errors tend to be large. As a result, the population values of coefficients cannot be estimated precisely. However, if the objective is to estimate linear combination of these coefficients, the estimable functions can be done even in the presence of perfect multicollinearity.

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.

3.2.4.2. Autocorrelation

The term autocorrelation may be defined as correlation between residual of one observation ordered in time (as in time series data) or space (in cross sectional data). If there is autocorrelation in the model

standard error is not minimum, than the usual *t* and *F* test of significance are no longer valid, and if applied will give seriously misleading conclusions about the statistical significance of the estimated regression coefficients [7]. Because in the first regression we have found an autocorrelation, we use the Cochrane-Orcutt treatment or healing method to eliminate the autocorrelation. The steps is :

1. Estimating the empirical model, LogX=f(logP,logER,logGDP)
2. To find the value U(-1), we estimate using this formula;

   $U_t = \rho\, u_{t-1} + e_t$
3. Estimating this formula:

   $(LogX_t - \rho LogX_{t-1}) = a_0 (1- \rho) + a_1 (LogP_t - \rho\, LogP_{t-1}) -$

   $a_2 (LogER_t - \rho\, LogER_{t-1}) + a_3 (LogGDP_t - \rho LogGDP_{t-1}) + \mu_t$
4. And then comparing the computed D-W Statistic with the critical D-W Statistic to make the decision.

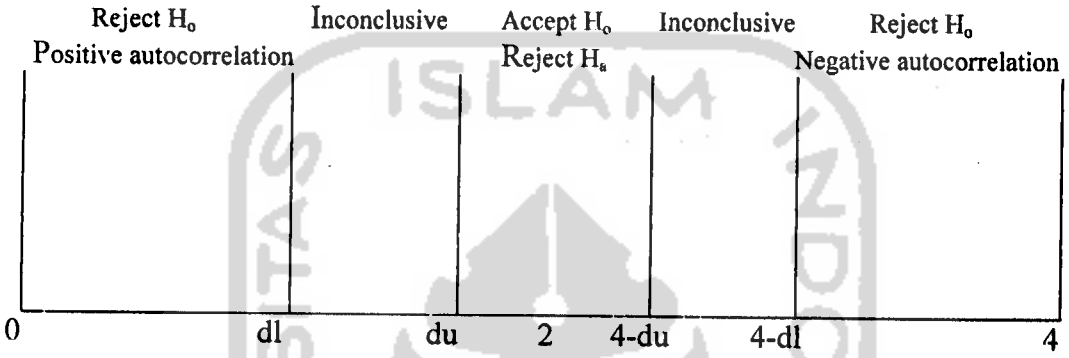
Null hypothesis	Decision	If
- No positive autocorrelation	→ Reject	→ $0 < d < d_L$
- No positive autocorrelation	→ No decision	→ $d_L \leq d \leq d_U$
- No negative correlation	→ Reject	→ $4 - d_L < d < 4$

[7] Damodar N, Gujarati. (2003). *Basic Econometric: Fourth Edition*. New York. p.455.

- No negative correlation → No decision → $4 - d_U \leq d \leq 4 - d_L$

- No autocorrelation, positive → Do not reject → $d_U < d < 4 - d_U$

or negative



3.2.4.3. Heterocedasticity

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 method; that is the White test. The White model is:

$$E^2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \delta_1 X_1^2 + \delta_2 X_2^2 + \delta_3 X_3^2 + \delta_4 X_1 X_2 + \delta_5 X_1 X_3 + \delta_6 X_2 X_3 + \varepsilon$$

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:

$$n.\ R^2 = X^2\ df$$

If the chi-square value obtained in 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 $\alpha_2 + \alpha_3 + \alpha_4 + \alpha_5 + \alpha_6 = 0$

3.3. Technique of Data Analysis

Based on this research, we can form the model as follow:

$$X = f(P, ER, GDP)$$

Where: X = The volume of export plywood (tons)

P = The price indices of plywood (US cents/sheet)

ER = The exchange rate Rupiah vis-a-vis US Dollar (Rp/US$)

GDP = The GDP of Japan

The econometric model is:

$$X = \beta_0 + \beta_1 P + \beta_2 ER + \beta_3 GDP + e$$

Where;

β_0 = Constant.

$\beta_1 \ldots \beta_3$ = Regression coefficient of each variables.

X = The volume of export plywood (tons)

P = The price indices of plywood (US cents/sheet)

ER = The exchange rate Rupiah vis-a-vis US Dollar (Rp/US$)

GDP = The GDP of Japan

To choose the best model the researcher use a test proposed by McKinnon, White, and Davidson, which for brevity we call MWD test. To illustrate this test, assume the following:

Ho : linear model : Y is a linear function of regressors that is the X's.

H_1 : log – linear model : ln Y is a linear function of logs of regressors, the logs of X's.

The MWD test involves the following steps[8]:

Step I : Estimate the linear model and obtain the estimated Y values.

Step II : Estimate the log-linear model and obtain the estimated lnY values.

Step III : Obtain Z1 = (ln Yf – ln f).

Step IV : Regress Y on X's and Z1 obtained in Step III. Reject Ho if the coefficient of Z1 is statistically significant by the usual t test.

Step V : Obtain Z2 = (antilog of ln f – Y f).

Step VI : Regress log of Y on the logs of X's and Z2. Reject H1 if the coefficient of Z2 is statistically significant by the usual t test.

---

[3] Damodar N, Gujarati. (2003). *Basic Econometric: Fourth Edition.* New York. p.281.

CHAPTER IV

DATA ANALYSIS

4.1 Research Description

The aims of this research is to analyze the demand of Indonesian plywood export to Japan in the statistical year 1980-2002. The dependent variable is the volume of Indonesian plywood export and the independent variables consist of three variables, which are the exchange rate of Rp. Vis-à-vis US$, price indices of plywood in international market, nominal Gross Domestic Product by expenditure at current prices of Japan.

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 1980 until 2002. 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

4.1.1 Choosing Regression Model

To choose the best model for this research, the writer runs the MWD ((McKinnon, White, Davidson, (1983)) Test. After getting the result of the estimation, the decision to choose the best model is shown by

the value of Z in which provided through MWD test. MWD test shows that the probability of Z value on the linear model is statistically insignificant. It means that we reject the null hypothesis that says rejected the linear model.

From the result of MWD test, it is seen that by using MWD test both models are significant. This research uses log model because by using log model the result is better than using linear model.

4.2 Research Findings

4.2.1 Regression Result Analysis

The first step in analysing the data is by regressing the data with the support from 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. The regression result of log linear model is shown in table 4.2 below :

Table 4.2

Regression Result

Dependent variable	*coefficient*	*Standard error*	*t-statistic*
Constant	-7.057086	5.330788	-1.323835
LogP	0.918911	0.360259	1.248049
LogER	-0.262284	0.227906	-1.150845
LogGDP	2.911016	1.218917	2.388198
R-Squared	0.822696		
Adjusted R^2	0.559811		
D-W statistic	1.363800		
F-statistic	9.902278		

Notes: Significant at α=5%

Based on the regression result, the regression estimation model for the demand of Indonesian plywood export to Japan (X), price of plywood (P), the exchange rate between countries (ER) and GDP of Japan (GDP) is :

$$\text{Log (X)} = -7.057086 + 0.918911\text{logP} - 0.262284\text{logER} + 2.911016\text{logGDP} + \mu_i$$

$$\text{Se} = (5.330788) \quad (0.360259) \quad (0.227906) \quad (1.218917)$$

$$\text{t} = (-1.323835) \quad (1.248049) \quad (-1.150845) \quad (2.388198)$$

4.2.2 Statistical Result Analysis

4.2.2.1 T test

This t test is used to test the correlation between the dependent variable with independent variable individually. From the regression result, it shows the computed t value of each independent variable compared 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

In this research the writer estimated the critical t value with α = 0.05 and df = 20 the value in the t table is 1.725.

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 regression result, it can be seen that the significance or insignificance from each computed t value of independent variables.

Table 4.3

The Comparison Value of t-statistic and t-table

Variable	t-statistic	A	t-table	Result
P	1.248049	5%	1.725	Significant
ER	-1.150845	5%	1.725	Significant
GDP	2.388198	5%	1.725	Significant

a. T Test on Price of Plywood

$H_o : \beta_i < 0$

$H_a : \beta_i > 0$

Computed t value is 1.248049

Critical t value with $\alpha = 5\%$ and $df = 20$ is 1.725

After observing 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 the price of plywood has a negative effect on the demand of plywood export from Indonesia significantly.

b. T Test on Exchange Rate

$H_o : \beta_i < 0$

$H_a : \beta_i > 0$

Computed t value is -1.150845

Critical t value with α = 5% and df =20 is 1.725

After observing 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 the exchange rate has a negative effect on the demand of plywood export from Indonesia significantly.

c. T Test on GDP of Japan

$H_o : \beta_i > 0$

$H_a : \beta_i < 0$

Computed t value is 2.388198

Critical t value with α = 5% and df = 20 is 1.725

After observing the data above, it can be concluded that the computed t value is higher than the critical t value, so the H_o is accepted or H_a is rejected statistically. It means the GDP of Japan has a positive effect on the demand of plywood export from Indonesia significantly.

4.2.2.2 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. Hypothesis is 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 variable.

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

a. If F-statistic < 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 we must get the degree of freedom for numerator (k-1) and the degree of freedom for denominator (n-k). With the level of significance $\alpha = 5\%$, the degree of freedom for numerator is 2 (3-1) and the degree of freedom for denominator is 20 (23-3), therefore it can be found that the value of f table is in point (2:20) that is 3.49. When look above, already know that the f value from the regression is 9.902278, after that we compare between computed f values with critical f value. From the comparison the writer can conclude that the computed f value is higher than the critical f value, it means H_o is rejected

and H_a is accepted the independent variables simultaneously impact on dependent variable. In other words, the price of plywood, exchange rate and GDP of Japan simultaneously and significantly has impact on the demand of the Indonesian plywood export to Japan.

4.2.3 Goodness of Fit (R^2)

From the regression run by the writer, the value of coefficient determination (R^2) is 0. 822696 . This value shows a high measurement for the independent variables to explain their impact on the dependent variable in the model. It means that the variation of the dependent variable can be explained by the independent variables about 82.2696%, while the rest 17.7308% are explained by factors outside the model.

4.2.4 Classical Assumption Test

4.2.4.1 Multicollinearity

To test the multicollinearity the writer uses correlation matrix test. In this test the writer detect multicollinearity by comparing the correlation among the independent variables. The decision from this test is when r value is smaller than R^2 value, it means that there is no multicollinearity. With the help from Eviews computer program the writer can search the value of each r and the result is shown on table 4 .4 below:

Table 4.4

Correlation Matrix Multicollinearity Result

	P	ER	GDP
P	1	0.142357	0.505134
ER	0.142357	1	0.672978
GDP	0.505134	0.672978	1

From the table above it can conclude that the values of the correlation among the independent variables are relatively high. According to the data result above that $r < 0.822696$, it means that there is no multicollinearity on the model.

4.2.4.2 Autocorrelation

Because in the first regression we have found an autocorrelation, we use the Cochrane-Orcutt treatment or healing method to eliminate the autocorrelation. The steps is :

1. Estimating the empirical model, LogX=f(logP,logER,logGDP)
2. To find the value U(-1), we estimate using this formula;

$$U_t = \rho\, u_{t-1} + e_t$$

3. Estimating this formula:

$(LogX_t - \rho LogX_{t-1}) = a_0 (1 - \rho) + a_1 (LogP_t - \rho LogP_{t-1}) -$

$a_2 (LogER_t - \rho LogER_{t-1}) + a_3 (LogGDP_t - \rho LogGDP_{t-1}) + \mu_t$

4. Compare the computed D-W Statistic with the critical D-W Statistic to make the decision.

After applying the regression steps of Cochrane-Orcutt treatment method, the result is the computed D-W statistic =1.363800, D-W table (α =5%, k=3, n=23) dl = 1.078 du = 1.660 4-du = 2.34 4-dl = 2.922

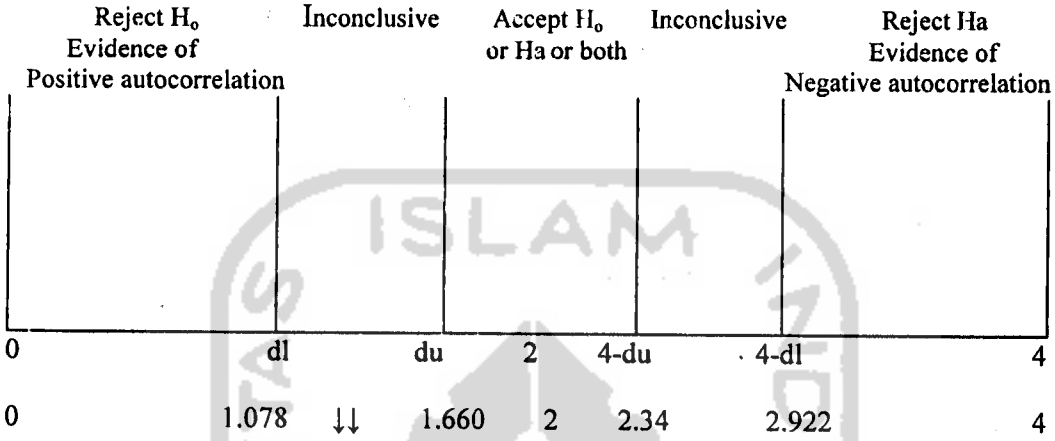
Table 4.5

The Result of The Cochrane-Orcutt Treatment Method

Dependent variable	***coefficient***	***Standard error***	***t-statistic***
Constant	-7.057086	5.330788	-1.323835
LogP	0.918911	0.360259	1.248049
LogER	-0.262284	0.227906	-1.150845
LogGDP	2.911016	1.218917	2.388198
R-Squared	0.822696		
Adjusted R^2	0.559811		
D-W statistic	1.363800		
F-statistic	9.902278		

Table 4.6

D-W Statistic



Legend : H_0 = No Positive autocorrelation

Ha = No Negative autocorrelation

From the result we can see that the D-W Statistic placed between dl<d<du it means the decision is inconclusive, there is no positive autocorrelation.

4.2.4.3 Heterocedasticity

To detect whether there are heterocedasticity or not, the writer use White Test. White test decision is based on comparison between computed chi-square (χ^2) value with the critical chi-square value. If computed χ^2 > critical χ^2, mean that we accept heterocedasticity. If computed χ^2 < critical χ^2, mean that we reject heterocedasticity.

The calculation is based on table 4.7:

Table 4.7

Heterocedasticity Test

Dependent variable	*coefficient*	*Standard error*	*t-statistic*
Constant	-1149.249	681.7602	-1.685709
LogP	90.73867	25.09250	3.616167
LogER	-18.48067	16.69016	-1.107280
LogGDP	298.3919	243.8026	1.223908
R-squared	0.619380		
Adjusted R-squared	0.429070		
Sum squared resid	10.15917		

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

$$ESS = 0.61938\left[\frac{10,15917}{(1-0.61938)}\right]$$

$$ESS = 16.1531939$$

$$\chi^2 = \frac{ESS}{2} = 8.265969$$

With df = 7, α = 5%, it will obtain critical χ^2 value = 14.0671.

Since 8.265969< 14.0671, it means that we reject Heteroscedasticity.

4.3 Research Discussion

4.3.1 Price of Plywood

The price of plywood 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 demand of the good itself.

The hypothesis for this variable is prices of plywood influencing the demand on Indonesian plywood export to Japan negatively. It means that the increase in price of plywood makes the Japan demand of plywood 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.*"

The statistical test supports this hypothesis correctly. The resulted coefficient from the regression for price of plywood is 0.918911 the value shows the impact of price of plywood on the demand of Indonesian plywood export to Japan. When the price of plywood increases by 1 % the quantity demand of Indonesian plywood export will be decrease by 91.8911% holding all variables held constant. This statistical result fits the previous hypothesis that stated a negative relationship between the price of plywood and the demand of Indonesian plywood export to Japan.

4.3.2 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 -0.262284. This value represents that when exchange rate increase by 1% the demand of Indonesian plywood export will be decrease by 26.2284 % holding all variables are constant. It agrees with the previous hypothesis in this research about the negative relationship between both variables exchange rate and demand of Indonesian plywood export to Japan.

4.3.3 The GDP of Japan

Another factor used in this research is the GDP of Japan. Using GDP we can see that the income of a country can make change in the export demand. Based on the statistical test, the coefficient value of GDP of Japan is 2.911016. This value represent that when GDP of Japan increases by 1% the demands of Indonesian plywood export to Japan increases by 29.11016% holding all variables constant. It agrees with the previous hypothesis in this research about the positive relationship between both variables GDP of Japan and the demand of Indonesian plywood export to Japan.

CHAPTER V

CONCLUSION AND IMPLICATION

1. Conclusion

Based on the research, concerning the factors that influence the export of Indonesian plywood to Japan by using the method of Log Linear Model it has create some conclusions:

a. From examination result as a whole (F test), Computed f value is higher than critical f value. This indicate that all independent variable influence simultaneously to the change of dependent variable.

b. Based on the result of examination to independent variable individually indicates that the price of Indonesian plywood is statistically significant and has a negative effect to dependent variable.

c. Based on the result of examination to independent variable individually indicates that the variable of exchange rate is statistically significant and has a negative effect to dependent variable.

d. Based on the result of examination to independent variable individually indicates that the variable of Indonesian GDP is statistically significant and has a positive effect to dependent variable.

e. Based on the result of the regression, the value of coefficient determination (R^2) is 0.822696. It means that the variation of the dependent variable can be explained by the independent variables

about 0.822696%, while the rest 17.7308% are explained by factors outside the model.

f. Based on the result of the regression, there is no multicollinearity, autocorrelation and heterocedasticity in the model of this research. It means that all independent variables (price of plywood, exchange rate and GDP of Japan) affect the dependent variable (the volume of Indonesian plywood export to Japan) significantly.

2. Implication

1. Based on the analysis of the price of plywood, it shows that the variable is negatively effect to the volume of Indonesian plywood exported to Japan. It means that when the price of plywood increases, the export of plywood to Japan will be decreases.
2. Based on the analysis of the exchange rate between Rupiah to US$, it shows that the variable is affected negatively to the volume of Indonesian plywood export to Japan. It means that when Rupiah appreciates, it will make the price of plywood getting expensive so the demand of plywood by Japan will also decrease.
3. Based on the analysis of Japan GDP, it shows that the variable is affected positively to the volume of Indonesian plywood export to Japan. It means that when income of Japan increases, the demand of Indonesian plywood also increases.

BIBLIOGRAPHY

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

E.g. Grossman and Helpman (1991a, Rivera-Batiz and Romer (1991) and Young (1991).

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

Hirschman, Albert O (1958) "The Strategy of Economy Development, New haven :Yale University Press

Insukindro ; Maryatmo, R ; Aliman: "Basic Econometric and Main Economic Indicator Arrangement", 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

Makridakis. S ; Wheelwright. S.C and McGee.V.E : "Forecasting: Methods and Applications", Second Edition, 1999

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?";*www.econpapers.hhs.se*.

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

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

Salvatore, Dominick. (1993). *International Economics: Fourth Edition.* New York. p. 6.

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

Statistical Year Book of Indonesia, various editions, 1985 – 2002.

Steve E. Johnson, Michael Adams and Masaki Miyake "Trends in The Tropical Timber Markets, 2002-2003"; *www.unece.org*

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

APPENDICES

RESEARCH DATA

Linear Model

Year	Quantity Demand X (Ton)	Price of Plywood P (US Cent/sheet)	Exchange Rate ER (Rp/US$)	Japan GDP GDP (Million Yen)
1980	5897.000	273.8400	628,00	240,176
1981	6007.400	245.4600	644,00	257.963
1982	22189.20	234.3500	692,00	270.601
1983	28864.60	229.8700	994,00	281.767
1984	86288.20	227.0300	1074,00	300.543
1985	167353.2	210.9100	1125,00	320.419
1986	330455.9	274.1500	1641,00	334.609
1987	975786.3	398.7200	1650,00	348.425
1988	1203586.	358.8400	1731,00	371.419
1989	1930257.	350.3200	1797,00	396.197
1990	1719880.	354.8700	1901,00	424.537
1991	1813373.	372.3800	1992,00	451.297
1992	1616311.	380.7700	2062,00	463.145
1993	2195894	661.4200	2110,00	465.972
1994	1831750.	599.5000	2200,00	469.240
1995	1752199.	584.4400	2308,00	482.930
1996	1999407.	592.5200	2383,00	510.802
1997	1822137.	484.9600	4650,00	521.862
1998	1224884.	374.5600	8025,00	515.835
1999	1546007.	440.5600	7100,00	511.837
2000	1546276.	448.2300	9595,00	513.534
2001	1561312.	409.6500	10400,00	503.304
2002	1485894.	402.7500	8940,00	501.245

Regression Result Log Linear Model

Dependent Variable: LOGX

Method: Least Squares

Date: 05/06/05 Time: 15:04

Sample(adjusted): 1981 2002

Included observations: 22 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEWC	-7.057086	5.330788	-1.323835	0.2021
LOGP	0.918911	0.360259	1.248049	0.0201
LOGER	-0.262284	0.227906	-1.150845	0.2649
LOGGDP	2.911016	1.218917	2.388198	0.0281

R-squared	0.822696	Mean dependent var	5.007566
Adjusted R-squared	0.559811	S.D. dependent var	0.382591
S.E. of regression	0.253836	Akaike info criterion	0.258712
Sum squared resid	1.159793	Schwarz criterion	0.457084
Log likelihood	1.154163	F-statistic	9.902278
Durbin-Watson stat	1.363800	Prob(F-statistic)	0.000444

MWD TEST

Dependent Variable: X
Method: Least Squares
Date: 01/12/05 Time: 14:00
Sample(adjusted): 1981 2002
Included observations: 22 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2747235.	873384.9	-3.145503	0.0059
P	1048.619	959.4201	1.092972	0.2897
ER	-92.15423	37.06176	-2.486504	0.0236
GDP	9116.606	2611.700	3.490679	0.0028
Z1	138348.8	203137.9	0.681059	0.5050

R-squared	0.870112	Mean dependent var	1221187.
Adjusted R-squared	0.839550	S.D. dependent var	750086.0
S.E. of regression	300456.4	Akaike info criterion	28.26071
Sum squared resid	1.53E+12	Schwarz criterion	28.50867
Log likelihood	-305.8678	F-statistic	28.47038
Durbin-Watson stat	0.731995	Prob(F-statistic)	0.000000

Dependent Variable: LOG(X)
Method: Least Squares
Date: 01/12/05 Time: 14:02
Sample: 1980 2002
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-46.76860	4.309093	-10.85347	0.0000
LOG(P)	-0.495774	0.633637	-0.782426	0.4441
LOG(ER)	-1.030473	0.284252	-3.625214	0.0019
LOG(GDP)	11.84582	1.412323	8.387474	0.0000
Z2	-1.09E-06	2.04E-07	-5.357726	0.0000

R-squared	0.945321	Mean dependent var	13.14817
Adjusted R-squared	0.933171	S.D. dependent var	1.954315
S.E. of regression	0.505218	Akaike info criterion	1.662005
Sum squared resid	4.594407	Schwarz criterion	1.908852
Log likelihood	-14.11306	F-statistic	77.79906
Durbin-Watson stat	1.023306	Prob(F-statistic)	0.000000

The Cochrane-Orcutt Treatment Method

Test For Autocorrelation

Dependent Variable: LOGX

Method: Least Squares

Date: 05/03/05 Time: 15:04

Sample(adjusted): 1981 2002

Included observations: 22 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEWC	-7.057086	5.330788	-1.323835	0.2021
LOGP	0.918911	0.360259	1.248049	0.0201
LOGER	-0.262284	0.227906	-1.150845	0.2649
LOGGDP	2.911016	1.218917	2.388198	0.0281

R-squared	0.822696	Mean dependent var	5.007566
Adjusted R-squared	0.559811	S.D. dependent var	0.382591
S.E. of regression	0.253836	Akaike info criterion	0.258712
Sum squared resid	1.159793	Schwarz criterion	0.457084
Log likelihood	1.154163	F-statistic	9.902278
Durbin-Watson stat	1.363800	Prob(F-statistic)	0.000444

HETEROCEDASTICITY

White Test

Dependent Variable: U2

Method: Least Squares

Date: 05/06/05 Time: 15:32

Sample(adjusted): 1981 2002

Included observations: 22 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEWC	-1149.249	681.7602	-1.685709	0.1140
LOGP	90.73867	25.09250	3.616167	0.0028
LOGER	-18.48067	16.69016	-1.107280	0.2868
LOGGDP	298.3919	243.8026	1.223908	0.2412
LOGP2	-13.11741	4.715429	-2.781806	0.0147
LOGER2	6.541219	2.584663	2.530782	0.0240
LOGGDP2	-65.36767	57.71527	-1.132589	0.2764
LOGPERGDP	-4.666767	1.956892	-2.384785	0.0318

R-squared	0.619380	Mean dependent var	0.628175
Adjusted R-squared	0.429070	S.D. dependent var	1.127388
S.E. of regression	0.851854	Akaike info criterion	2.792484
Sum squared resid	10.15917	Schwarz criterion	3.189227
Log likelihood	-22.71733	F-statistic	3.254581
Durbin-Watson stat	1.631341	Prob(F-statistic)	0.028660