# THE ANALYSIS OF THE AUTOMOTIVE IMPORT SUBSTITUTION'S EFFECT TO THE RATE OF INDONESIA'S ECONOMIC GROWTH

**(1990-2003)**

A THESIS

**Presented as Partial Fulfillment of the Requirements**

**To Obtain the S1 Degree in Economics Department**


**By**

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**ISLAMIC UNIVERSITY OF INDONESIA**

**JOGJAKARTA**


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**Defended before the Board of Examiners**

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# *MOTTO*

*"Allah Tidak Akan Mengubah Nasib Suatu Kaum, Kalau Tidak Kaum Itu Sendiri Yang Mengubah Nasib Mereka."*
*(Qs. Ar Ra'ad : 11)*

***The Difference Between A Successful Person And Others***
***Is Not A Lack Of strength, Not A Lack Of Knowledge, But Rather A Lack Of Will.***

***(Vincent T. Lombard)***

The key of success is 1% of inspiration and 99% hard work.

(Anonymous)

**BEING FREE**

**AND SMART**

**IS AN OPTION**

## ACKNOWLEDGEMENTS

**Assalamu'alaikum, wr, wb.**

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# ABSTRACT

Susi Erlinasari (2005), **"The Analysis Of The Automotive Import Substitution's Effect To The Rate Of Indonesia's Economic Growth"** Jogjakarta: Economics Department. Faculty of Economic. International Program. Islamic University of Indonesia

The industrial sector becomes a very important sector in increasing the economic growth of Indonesia since Indonesia changed its economic structure from agriculture to the industrial sector in 1990s. Some industrial sectors that have significant roles are textile, steel, chemical, cement, fertilizer and other basic industries. Automotive as one kind of industry is not so significant to the economic growth of Indonesia because Indonesia is a small market for automotive compared to Malaysia, Thailand and Philippine. The production of automotive is smaller than those countries. It fluctuated and tended to decrease in 1998 when economic crisis hit Indonesia and affected the economic growth. The main problem of automotive production in Indonesia is the availability of the components. Indonesia does not have many producers so that it imports from other countries which will cost more. In order to solve this, the government implemented an international trade policy i.e., import substitution in 1970s to encourage the local producers to be more competitive. The policy was then renewed in 1999. This research aims to analyze the factors causes the fluctuation of the automotive production involving tariff rate on import and components in 1999, exchange rate and the value of the automotive components import (1990 – 2003). It also analyzes the causality between the automotive production and the rate of the Indonesian economic growth (1990 – 2003). By using the tariff rate on import and components in 1999 as the dummy variable, the exchange rate and the value of the automotive components import as the independent variable and the automotive production from 1990 - 2003 as the dependent variable, the researcher uses Dummy Model as the econometric model to analyze the relationship among those variables. While to analyze the causality relationship between the automotive production and the rate of economic growth, the researcher uses Error Correction Model Engle Granger (ECM – Engle Granger). As the result, the exchange rate has an insignificant and negatively influence to the automotive production in Indonesia. The value of the automotive import has a significant and positive relationship with the automotive production. And the tariff rate on import and components has a significant and positive influence to the automotive production. It means that the independents variables are influence the automotive production simultaneously. There are short – run and long – run and feedback causality between automotive production and the rate of the Indonesian economic growth.

# ABSTRAK

Susi Erlinasari (2005), **"Analisis Akibat Kebijakan Otomotif Subtitusi Impor Terhadap Pertumbuhan Economi Indonesia (1990 – 2003)"** Jogjakarta: Jurusan Economi Pembangunan. Fakultas Ekonomi. International Program. Universitas Islam Indonesia

Sektor Industri merupakan salah satu sector yang paling penting dalam meningkatkan pertumbuhan ekonomi terutama sejak Indonesia merubah struktur ekonominya dari agriculture menjadi industrial pada tahun 1990an. Beberapa sector industri yang memiliki peranan yang sigifikan diantaranya adalah industri tekstil, baja, bahan kimia, semen, pupuk dan industri dasar lainnya. Otomotif sebagai salah satu subsektor perindustrian Indonesia tidak terlalu memberikan peranan yang besar terhadap pertumbuhan ekonomi Indonesia karena Indonesia pasar otomotif Indonesia sangat kecil bila dibandingkan dengan Malaysia, Thailand dan Philipina. Jumlah produksi otomotif Indonesia sangat kecil bila dibandingkan dengan negara – negara tersebut. Jumlah produksi otomotif Indonesia berubah – ubah dan cenderung terus menurun pada tahun 1998 ketika krisis menimpa Indonesia dan mempengaruhi pertumbuhan ekonomi Indonesia juga. Masalah utama dari sedikitnya produksi otomotif Indonesia adalah masalah ketersediaan komponen. Indonesia tidak memiliki banyak produser sehingga produser tersebut impor dari negara lain yang akan mengeluarkan banyak biaya. Untuk mengatasi hal ini, Pemerintah Indonesia mengeluarkan kebijakan perdagangan dunia yaitu subtitusi impor pada tahun 1970an untuk mendorong produser local agar dapat lebih berkompetisi. Kebijakan ini kemudian di perbarui pada tahun 1999. Penelitian ini bertujuan untuk menganalisa factor – factor yang menyebabkan perubahan pada produksi otomotif dengan menggunakan variabel tingkat tariff impor dan komponen sejak tahun 1999, nilai tukar rupiah terhadap dolar dan nilai impor komponen otomotif (1999-2003). Penelitian ini juga bertujuan untuk menganalisa factor-faktor yang mempengaruhi pertumbuhan ekonomi Indonesia (1990-2003). Untuk menganalisa hubungan antara tingkat tarif impor dan komponen 1999 sebagai *Dummy variable*, nilai tukar rupiah dan nilai impor komponen otomotif sebagai variable tidak bebas dan jumlah produksi otomotif sebagai variable bebas, peneliti menggunakan metode *Model Dummy* sebagai alat analisa hubungan antara variable –variabel tersebut. Sedangkan untuk menganalisa hubungan antara produksi otomotif Indonesia dan pertumbuhan ekonomi Indonesia, penulis menngunakan *Error Correction Model Engle Granger*. Hasil dari penelitian ini adalah, nilai tukar rupiah tidak mempengaruhi jumlah produksi otomotif dan bahkan memiliki hubungan terbalik dengan jumlah produksi otomotif Indonesia. Nilai impor komponen otomotif memiliki hubungan positif dan terbukti mempengaruhi jumlah produksi otomotif Indonesia. Sedangkan tingkat tariff impor

memiliki hubungan positif dan terbukti mempengaruhi jumlah produksi otomotif Indonesia. Hal ini berarti semua variable tidak bebas mempengaruhi jumlah produksi otomotif Indonesia terus menerus. Selain itu, ada hubungan sebab antara jumlah produksi otomotif dan pertumbuhan ekonomi Indonesia dalam jangka pendek maupun panjang. Hubungan yang terjadi antara jumlah produksi otomoyif dan pertumbuhan ekonomi Indonesia adalah hubungan timbal balik dan positif.

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*Wabillahittaufiqwalhidayah*

**Wassalamu'alaikum, wr, wb.**

Jogjakarta, March 10, 2005

Writer,

Susi Erlinasari

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# CHAPTER 1
# INTRODUCTION

## 1.1 Background of Study

The economic growth of Indonesia is now better compared to the the situation in 1960s. The Indonesian Bureau Of Statistics (Badan Pusat Statistik) recorded that the economic growth of Indonesia was 4.08% in 2003. Even though it is less than before the crisis (i.e., 7%) it is a good indication that income per capita of Indonesia has rised especially after the crisis hit this country and collapsed many economic sectors. The employment rate increased and the poverty line decreased. The direct impact of this that the rate of investment increased not only in the main sector such as manufacturing or industrial but also in other sector such as fisheries and agricultures.

The manufacturing sector especially industrial sector becomes a very important sector in increasing the economic growth of Indonesia. Since 1990s, the economic structure of Indonesia changed from agricultural to the industrial. Indonesia began to use high technology and more focus on the industrial sector. Some industries that have significant role are textile, steel, chemical, cement, fertilizer and other basic industries. Automotive as one kind of industry is not so significant to the economic growth of Indonesia because Indonesia is a small market of automotive compared to

Malaysia, Thailand and Philippine. The production of automotive is smaller than those countries It increased sharply from 22,118 units in 1972 to 212,669 units in 1981, but then dropped drastically to 139,438 units in 1985. Production increased again sharply to 271,712 units in 1990, then dropped to 172,234 units in 1992 and increased again rapidly to 387,541 units in 1995. But due to the financial crisis, which started in mid 1997, automobile assembling production dropped drastically to only 16,110 units in 2000.

The fluctuations of the number of automobiles production are caused by many factors, one is the trade policy implemented by the government i.e., import substitution. This policy has been implemented since 1970s in the hopes that it will protect the domestic market, encourage the local embassy and increase the output of the local producers. There will be two conditions when this policy is implemented i.e., import substitution means high tariffs for the automotive component products. It causes the foreign investor to lose not interest in building their plants here due to high production cost. At the other side, it will encourage the capabilities of the domestic firms so that they can compete with other countries especially since the Asean Economic Minister (AEM) Meeting had decided to accelerate the automotive sector of Indonesia in aiming with the aim of economic integration. An other fact is that the automotive industry of Indonesia faces many restrictions. Because Indonesia is a wide country and it consists of many islands while the infrastructure of the roads are not supported, the technological is poor and the capability of the human resource is also poor, the automotive industry will be impossible to develop well. Even though

Indonesia has already had investors from Japan, Korea and China such as PT. Astra Honda Motor ( The merger between PT. Federal Motor and PT. Honda Federal effective on January 1, 2001 ), PT. Indomobil Suzuki International, PT. Yamaha Indonesia Motor Mfg., PT. Kawasaki Motor Indonesia and PT. Dan Motor Vespa Indonesia, there will have no influence if there is a bad trade policy imposed by the government.

Back to 1979, during this year, a "deletion program" was implemented to ban the import of all components from other countries. In 1983, more restrictions were placed only on certain main local components. Under this deletion program, the Ministry of Industry set a time schedule for the substitution of locally imported on an items basis. Though the schedule had to be revised several times, the program continued up to 1993. Due to import substitution policy, government had imposed tariffs for certain automotive products. However, under the pressure of global trade liberalisation, the Indonesian government eventually had to free the non-tariff trade regulations and the compulsory deletion program in 1993. Manufacturers are now free to determine the kind of components they want to produce, and it is not compulsory any more to manufacture a certain component to a fixed time schedule. The import ban on passenger vehicles was also applied and the deletion program was subsequently substituted by an incentive system, in which higher content ratios were compensated with lower tariffs for CKD imports.

The government provided import duty exemption for minibuses if the local content portion is at least 40 percent and for sedans 60 percent. This policy has

motivated carmakers, in particular Japanese, to develop their own automobile components and thus boost the production of minibuses in order to benefit from the duty exemption and to sell relatively cheap minibuses in the market. Because the TRIMs agreement and the WTO guidelines prohibit all local content policies, the Ministry of Industry and Trade subsequently lifted the local content regulation in 1999 (Sato, 2001: 3-19). In March 1971 the government banned imports of CBU cars in order to protect the domestic automobile assembling industry, but levied a high import tariff rate for imports of CKD components making price of automobiles in Indonesia very expensive. Later on, this import ban on CBU cars has been uplifted and substituted by high import tariffs. This policy is necessary to protect the local automobile assembling industries because imports of CKD parts are still subject to equally high import tariff rates. For the government, this is a source of income, because the government can lower the import tariffs and still protect the domestic automobile assembling industry as long as the import tariff rates for CKD components are lower than the import tariff rates for CBU cars.

The tariff rate policy for imports of CKD vehicles and automotive components can be seen from Table 1. The maximum tariff for imports of components was 40 percent, but in case the local content proportion exceeded 40 percent, the tariff rate became zero. In the June 1995 regulation, imports of CBU cars are free, but import tariff rates were very high. For sedans it was 200 percent, and for commercial vehicles was 105 percent, while for vehicles for public utility purposes the rate was set at only 5 percent. According to Faisal H. Basri, the government has

pursued a wrong policy by relating the tariff incentive system with the local content proportion rate, because no country has ever succeeded in developing its automotive industry by way of increasing the local content proportion. On the contrary, some countries like Spain, Belgium and Mexico have succeeded in developing their own automotive industry after they have abandoned the local content requirement policy. The point is to increase the production of automobiles itself, in order to create an attractive captive market for component production, then investors will come. A small market is not attractive for an automotive component manufacturer (Tarmidi, 1998: 91-2).

In February 1996, Suharto, the President, signed a decree appointing the Timor Putra Nasional company (the owner was his youngest most beloved son) as the sole manufacturer of the national car, named Timor. The company in a joint venture with KIA Motor from Korea then started building factories to manufactured the cars in Indonesia, but meanwhile the cars were being produced wholly in Korea and exported as a CBU car.

## Table 1.1

## Tariff rates for imports of CKD automobiles and components in 1993 and 1999

| Vehicle Category | Year Decree | Import tariff rates for CKD Automobiles (%) | | | | Tariff rates for Automotive Components (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | LC <20 | 20<LC <30 | 30<LC< 40 | LC>40 | LC< 20 | 20<LC<30 | 30<LC<40 | LC>40 |
| Category I | 1993 | 40 | 30 | 20 | 0 | 40 | 30 | 20 | 0 |
| | 1995 | 25 | 15 | 10 | 0 | 25 | 15 | 10 | 0 |
| Category IV (jeep) | 1993 | 40 | 30 | 20 | 0 | 40 | 30 | 20 | 0 |
| | 1995 | 25 | 15 | 10 | 0 | 25 | 15 | 10 | 0 |
| Sedan | 1993 | 100 | 80 | 60 | 40<LC< 60 40 LC>60 0 | 40 | 30 | 20 | 0 |
| | 1995 | 65 | 50 | 35 | 40<LC< 50 20 50<LC< 60 10 LC>60 0 | 25 | 15 | 10 | 0 |
| Category II | 1993 | 40 | 20 | LC>30 0 | | LC<1 0 | 10<LC<20 20 | 40 | 0 |
| | 1995 | 25 | 15 | 0 | | 40 25 | 15 | 50 | 0 |
| Category IV | 1993 | 40 | 20 | 0 | | 40 | 10<LC<20 20 | 40 | 0 |
| | 1995 | 25 | 15 | 0 | | 25 | 15 | 50 | |

LC= local Contents, *Sources*: SK Menteri Perindustrian No. 114/M/SK/6/1993 dan no. 108/M/SK/5/1995

As the effect of this import tariff rates policy, the production and the sales of the motor vehicles by brands had decreased sharply as shown in table 2. Almost all brands of vehicles had a decreasing of the production and sales, even though the total production and sales increased. Observing brand by brand, only several brands had increased the production such as Toyota, Suzuki, and Honda. This because those brands are familiar with the Indonesian people. They get a trust from the Indonesian people. They can fulfil what the people need and want. Conversely for sedan, due to high tariff import for the luxurious car, and due to the crisis, the production and sales of this kind of car had decreased sharply for all kinds of brands car.

**Table 1.2.**

**Production in 1983 and sales of Motor Vehicles by brands in 1991,1995,1996**

| Brand Name | 1983* | 1991 | 1995 | 1996 | 2001 |
|---|---|---|---|---|---|
| Toyota | 5,214 (21.6) | 10,678 (23.4) | 11,692 (30.8) | 8,612 (19.6) | 12,056 (34.3) |
| Suzuki | - | 3,479 (7.6) | 1,837 (4.8) | 2,534 (5.8) | 4,558 (13.0) |
| Daihatsu | 1,785 (7.4) | 4,285 (9.4) | 542 (1.4) | 205 (0.5) | - |
| Mitsubishi | 3,145 (13.0) | 3,732 (8.2) | 2,942 (7.8) | 1,993 (4.5) | 1,338 93.80 |
| Honda | 7,014 (4.3) | 8,205 (18.0) | 4,870 (12.8) | 6,357 (14.5) | 6,656 (18.9) |
| Mazda | 1,035 (4.3) | 4,402 (9.6) | 1,193 (3.2) | 744 (1.7) | 2 |
| Nissan | 48 (0) | - | 960 (2.5) | 1,000 (2.3) | 91 (0.3) |
| Subtotal | 18,241 (75.4) | 34,781 (76.2) | 24,036 (63.3) | 21,445 (48.9) | 24,701 (70.2) |
| Ford | 1,229 (5.1) | 2,242 (4.9) | 2,880 (7.6) | 3,651 (8.3) | 54 (0.2) |
| BMW | 141 (0,6) | 3,131(6.9) | 3,151 (8.3) | 3,788 (8.6) | 2,704 (7.7) |
| Mercedes | 639 (2.6) | 1,223 (2.7) | 3,936 (10.4) | 3,829 (8.7) | 1,690 (4.8) |
| Hyundai | - | | 1,291 (3.4) | 2,056 (4.7) | 2,960 (8.4) |
| Timor | - | | | 6,042 (13.8) | 2,101 (6.0) |
| Volvo | 128 (0.5) | | | | 132 (0,4) |
| Fiat | 276 (1.1) | | | | - |

| | | | | | |
|---|---|---|---|---|---|
| Citroen | 27 (0) | | | | - |
| Peugeot | 914 (3.8) | | | | 350 (1.0) |
| Renault | 847 (3.5) | | | | - |
| Holden | 1,035 (4.3) | | | | - |
| Others | 445 (1.8) | 4,314 (9.4) | 2,627 (6.9) | 3,103 (7.1) | 496 (1.4) |
| Sedans | 24,179 (100) | 45,691 (100) | 37,921 (100) | 43,914 (100) | 35,188 (100) |
| | (15.6) | (17.4) | (9.9) | (13.0) | (11.7) |
| Toyota | 26,829 (20,5) | 65,462 (30.1) | 86,220 (24.9) | 67,047 (22.9) | 64,088 (24.2) |
| Suzuki | 20,075 (15.3) | 39,138 (18.0) | 69,167 (20.0) | 55,869 (19.0) | 48,632 (18.4) |
| Daihatsu | 24,972 (19.1) | 39,491 (18.2) | 62,701 (18.1) | 38,438 (13.1) | 20,587 (7.8) |
| Mitsubishi | 41,000 (31.3) | 47,698 (21.9) | 70,767 (20.4) | 74,261 (25.3) | 64,767 (24.5) |
| Isuzu | 4,681 (3.6) | 16,538 (7.6) | 42,966 (12.4) | 42,967 (14.6) | 31,299 (11.8) |
| Hino | 1,294 (0.1) | | | | 3,035 (1.1) |
| Nissan | 372 (0) | | | | 3,972 (1.5) |
| Honda | | | | | 4,767 (1.8) |
| Mazda | | | | | 240 (0.1) |
| Subaru | | | | | 25 |
| Subtotal | 119,223 (91.0) | 208,327 (95.8) | 331,821 (95.8) | 278,582 (94.9) | 241,412 |
| Volvo | 150 (0) | | | | (91.3) |
| Citroen | 587 (0) | | | | - |
| Mercedes | 2,664 (2.0) | | | | - |
| Chevrolet | 7,236 (5.5) | | | | 1,322 (0.5) |
| Others | 602 (0) | 9,055 (4.2) | 14,707 (4.2) | 14,903 (5.1) | 531 (0.2) |
| | | | | | 21,176 (8.0) |

* Production figures

*Source*: Gaikindo

Another effect of this policy is the production of the automobile components which is done by the local producers. Although the aim of the import substitution policy is to increase the capability of local producers so that they must increase the quality of the products, it seems that it can not be achieved. Conversely, the

*Sources: RI, Lampiran Pidato Kenegaraan Presiden RI di Depan Sidang DPR 16 Agustus 1997, Pelaksanaan Tahun Ketiga Repelita, Jakarta, p.XI 37*
*RI, Lampiran Pidato Kenegaraan Presiden RI di Depan Sidang DPR 16 Agustus 1995, Pelaksanaan Tahun Ketiga Repelita, Jakarta, p.XI 3*
*Departemen Penerangan RI, Lampiran Pidato Kenegaraan Presiden RI di Depan Sidang DPR 16 Agustus 1999, Pelaksanaan Reformasi Pembangunan, Jakarta, p.42*

**Table1.4.**

**The Japanese Foreign Investment In The Automotive Components Industry in Indonesia in 1990**

| No | Company Name | Share owner | Equity (%) | Year | Capital | Workers | Products |
|---|---|---|---|---|---|---|---|
| 1 | Daihatsu Indonesia | Daihatsu Motor<br>Nichimen Corp.<br>Astra Int'l | 20<br>10<br>70 | 1979<br>1985 | $ 8 M | 230 | Components of commercial vehicles |
| 2 | Daihatsu Engine Mfg. Indonesia | Daihatsu Motor<br>Nichimen Corp.<br>Astra Int'l | 30<br>10<br>60 | 1978 | $ 3 M | 115 | Automotive engine |
| 3 | Imora Honda | Honda Motor<br>Kanematsu<br>Imora Motor | 45<br>15<br>40 | | - | 132 | Chairs, engine, and tanks |
| 4 | Honda Prospect Engine Mfg. | Honda Motor<br>Knaematsu<br>Imora Motor<br>Hino Motor | 55<br>15<br>30 | 1986 | Rp. 7,544 M | 56 | Automotive engines |
| 5 | Hino Indonesia Mfg | Sumitomo Motor<br>National Motor, etc. | 30<br>30<br>40 | 1982 | $ 5 M | 10 | Diesel engine |
| 6 | Mesin Isuzu Indonesia | Isuzu Motors<br>C. Itoh % Co<br>Toyo Mnka | 25<br>8<br>8 | 1985 | Rp. 4,432 M | 95 | Diesel engine and components |

of implementing import substitution policy, the production of the automotive industry could decrease. And this will affect the rate of Indonesia's economic growth.

## 1.4 Research Objectives

1. To explore and measure the significance of the exchange rate (overvalued of currencies, rupiah) to the automotive production.
2. To measure whether the value of the imported automotive components would affect the automotive production.
3. To analyze whether the tariff rate on import and components would affect the automotive production.
4. To measure the causality between the automotive production and the rate of Indonesia's economic growth.

## 1.5 Research Contribution

1. **Economist**

   Hopefully this research would give benefits for the economists who want to know whether the automotive import substitution is effective in increasing the economic growth of Indonesia.

**2. Writer**

The research would give so many positive contributions for the writer, mainly concerning to the influence of the import substitution to the economic growth of Indonesia.

**3. Other Parties**

The research might also give contribution for other parties who want to make similar reports. It can be a reference to them in making those report.

## 1.6 Definition of Terms

Economic growth means there is a lower unemployment, high income per capita, lower poverty line, and high output of the goods and services. A country has a positive economic growth when it is better than last year. Not only the economic agents included to the growth but also the income of the people are supposed to be high. People get the job and they get the fixed earning every month and they could fulfill their basic needs.

Import substitution is a trade and economic policy based on the premise that a developing country should attempt to substitute products which it imports (mostly finished goods) with locally produced substitutes. This usually involves government subsidies and high tariff barriers to protect local industries and hence import substitution policies are not favored by advocates of absolute free trade. In addition import substitution typically advocates an overvalued currency to allow easier

purchase of foreign goods and capital controls. In order to build up their manufacturing bases, many countries imposed high tariffs on manufactured goods, so that multinational companies would instead produce or assemble them locally. One example of this was in the motor industry, in which manufacturers exported vehicles in 'completely knocked down' (CKD) kit form, for local assembly. This often resulted in products that were of poorer quality and more expensive than those imported 'completely built up'. It also became increasingly inefficient for manufacturers to have identical products assembled locally in several countries in the same region, which only served to duplicate resources and reduce economies of scale.

Automotive Industry means one kind of industries in Indonesia beside chemical, wood, engine, food e.tc., that produces the automotive products such as cars, motorcycles, trucks, buses by hopefully using the local components and use high technology. The automotive industry of Indonesia is not the main industry in increasing the economic growth because Indonesia lacks of high technology.

Production means the process of using the services of labor and capital together with other inputs such as land, materials, and fuels to make goods and services available.

Automotive components are the inputs of the automotive production. In order to produce a car we need the car components such as engine components, drive systems, body part, fuel system, brake systems etc, so that the country can produce a completely car. Indonesia imports some components from other countries.

Exchange rate is the value of the home currencies to the foreign currencies. The depreciation or appreciation of the currencies usually affected by the interest rate. For example the value of Rupiah to the Dollar now is Rp. 9080/$.

Tariff is a tax imposed on a goods as it crosses a national boundaries. Tariff has been commonly used type of trade restriction. Tariff usually to protect the local products in order to prevent the foreign goods enter the domestic market. However, the use of tariff is now declined there is a GATT (General Agreement of Trade and Tariffs) which regulated how much the tariff should be applied by the countries.

## 1.7. Hypothesis Formulation

Hypothesis is something that is expected to be true for maintaining an argumentation or state some argumentations even though the rightness of that statement is temporary. The behaviors of all variables in the model are tested by statistic test and econometric test.

The hypothesis that is tested on analysis regression towards independent variable which influence the total of automotive production in Indonesia and to the Indonesia's economic growth are:

1. There is a positive and significant relationship between Foreign exchange Indonesia (Rp) against USA (US $) to the production of automotive in Indonesia.
2. There is a positive and significant relationship between tariff restructurization to the automotive production in Indonesia.

3. There is a positive and significant relationship between the number of imported automotive imported and the production of automotive in Indonesia.
4. There is a causality relationship between automotive production in Indonesia to the rate of Indonesia's economic growth.

# CHAPTER II

# REVIEW OF RELATED LITERATURE

## 2.1 Previous Researcher

### Dr. Lepi T. Tarmidi

The former researcher that had already researched about automotive industry in Indonesia was done by Dr. Lepi T. Tarmidi (2001), in his research titled *Indonesian Industrial Policy for the Automobile Sector with Focus on Technology Transfer.* The reality that there is smaller number of automotive component manufacturers in Indonesia than those in Malaysia or Thailand was not caused by later development of the industry, but rather was due to government policies, foreign investment inflow, and local potential manufacturers' capabilities to response. The import substitution policy implemented by the government since 1970s was not succeeded. Because the capability of the local agents is low so they can not fulfil the demand of the automobiles components from the foreign producers. The point is to increase the production of automobiles itself, in order to create an attractive captive market for component production, then investors will come. A small market is not attractive for an automotive component manufacturer. (Tarmidi, 1998: 91-2).

This research purpose is to review and analyze that the import substitution policy will not be effective if there is no sophisticated technology, however, it seems that the Indonesian people have not been ready yet to use the high technology since

the price for purchasing new technologies might be too high. The new technology might need large investments, and firms in developing countries generally are short in capital. On the other hand, there are also limitations for developing countries to absorb the modern advanced technologies. First, the price for purchasing new technologies might be too high. The new technology might need large investments, and firms in developing countries generally are short of capital. The big question for technology adoption is, whether the human resources in the receiving country are qualified and ready for absorption. The last constraint to invest in new technologies is the market size, and local automotive component manufacturers are generally not allowed to export their products (Jusmaliani and Ruky, 1993: 47)

## Cristina Echevarria

She did a research to estimate value added in agriculture as a constant returns to scale function of the three factors of production—land, labor and capital—using Canadian data. Her research is entitled ***A Three-Factor Agricultural Production Function: The Case Of Canada.*** Macroeconomic and development studies typically use two factors of production—capital and labor—implicitly equating land to capital. However, land and capital are intrinsically different because capital can be accumulated while land cannot. Although the contribution of land in manufactures and services is probably negligible and there is no harm in equating land to capital in these two sectors. She constructed a series of value added using two sets of series

The main results of this paper are, first, that in Canada agriculture has less labor intensive than both services and industry, but capital intensity is similar in the three sectors. The shares of land, capital, and labor in value added are 16%, 43% and 41% respectively, while the shares of capital and labor are 41% and 59% in industry and 49% and 51% in services, according to previous estimations (Echevarria 1997). Second, the rate of technological change in Canadian agriculture for the period 1971-91 has been 0.3%, very similar to the rate of technical change in Canadian industry according to the above estimations.

## Yumiko Okamoto & Fredrik Sjöholm

They did a research about the automotive productivity in Indonesia related to the protection policty of automotive industry. The title of their research is *Protection and The Dynamics of Productivity Growth: The Case of Automotive Industries in Indonesia.* The productivity has been poor in several of the automotive sectors. The performance may be caused by various factors such as poor technological development in existing establishments, by entry of establishments with low productivity or exit of establishments with high productivity. There has recently been an increased interest in the microeconomics of productivity analysis. One branch of studies aims at exploring the heterogeneity among plants to see how individual establishments move within an industry,bwhich establishments account for most of the productivity growth, and how important entry and exit are to the overall

performance. Following Baily, Hulten and Campbell (1992), they examine TFP growth of the automobile and motorcycle industries using the following equation:

$\Delta \ln TFPt = \Sigma(it \ln TFPit - \Sigma\phi it\text{-}\mu \ln TFPit\text{-} \mu) + (\Sigma\phi jt \ln TFPjt - \Sigma\phi\phi\text{-}\mu \ln TFPkt\text{-}\mu)$, (1)

where iεS, jε, and kεE.

TFP industry growth between $t$ and $t$-$\mu$ is decomposed into contributions of the plants which continued to operate in the same business line for the observed period (stayers), those which entered (entrants), and those which exited (exits) during the period. $S$, $N$ and $E$ are the stayers,entrants, and the exits respectively. $\phi it$ is the share of the $i$th plant in total gross output in year $t$.

The productivity growth among stayers can be decomposed further: improvement in each plant separately holding output shares constant, and changes in output shares.

$\Sigma(\phi it \ln TFP\ it - \phi it\text{-}\mu \ln TFP\ it\text{-}\ \mu) = \Sigma\phi it\text{-}\mu\ \Delta \ln TFP\ it + \Sigma\ [(\phi it - \phi it\text{-}\mu) \ln TFP\ it]$, (2)

where iεS. The former is called fixed effect, and the latter share effect. Industry labor productivity growth (gross output per employee and value added per employee) was calculated along the same line. Exits of establishments with relatively high levels of productivity explain most of the negative productivity growth. Entrants of relatively productive establishments have had a positive albeit insufficient effect on total productivity growth. In addition, the negative figures of almost all of the fixed effects show that there was little improvement or even deterioration among the assemblers in the automobile industry.

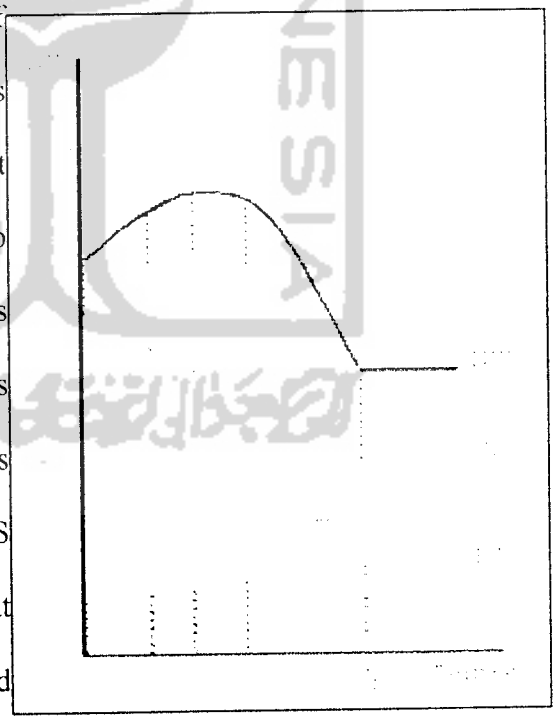
There are some possible explanations to the difference in industry performance. Firstly, the size of the market. A car is beyond reach for most Indonesians whereas the market for motorcycles is much larger. Motorcycles constitute the bulk of motor vehicle sales in Indonesia. For instance, 69 per cent of the 12.8 million motor vehicles registered in Indonesia in 1995 were motorcycles (Thee 1997: 95). Table 5 shows the number of cars (including commercial vehicles) and motorcycles produced in Indonesia since 1990; the volume of cars is still small and has not increased as rapidly as the volume of motorcycles. A second explanation could be the high fragmentation of the automobile industry, with a large number of assemblers, producing a large number of brands and models for arelatively small domestic market (Thee 1997: 117). The motorcycle industry has a largermarket and a smaller number of firms. There has been a deliberate policy from the government in minimizing the number of firms and models in the sector. For instance, in 1981 it was decided that each motorcycle assembler was not allowed to produce more than five different models. A limited number of assemblers and models together with the large market made it possible to operate at a relatively larger scale in the motorcycle industry. The number of assemblers in the automobile industry is two to three times higher than in the motorcycle industry, and the size of each assembler is far smaller in the former than in the latter.

The fragmented industry may also be an obstacle for the development of an automobile body and parts industry, since it prevents the utilization of scale economies.

Different cars use different bodies and parts, and few attempts have been made to standardize different brands. Again, the situation for motorcycle parts suppliers is different, with a less fragmented market due to fewer producers and a larger market. Finally, the technology in themotorcycle industries may be less sophisticated or more suited to local conditions in comparison to technologies in the automobile industries.

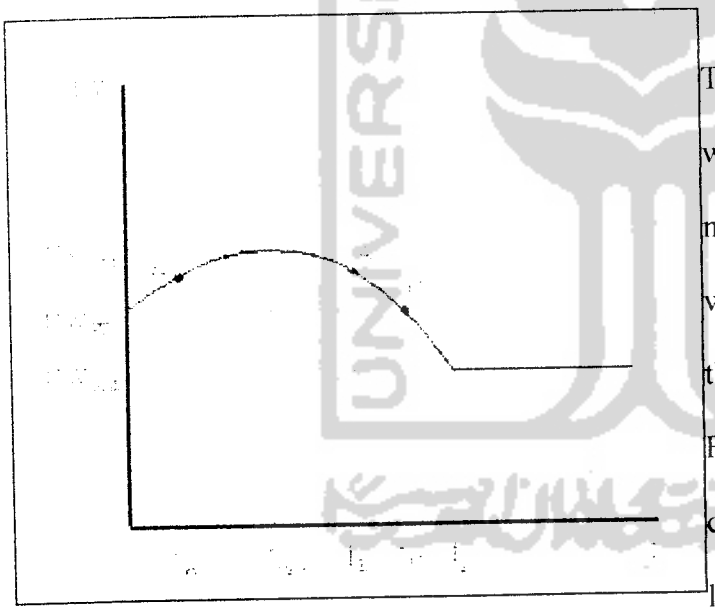
## Steven Suranovic

Suranovic did a research related to the optimal tariff. He studied the relationship between optimal tariff rate and national's welfare that represents by consumer surplus, production surplus and tariff revenue. His research titled *The Optimal Tariff.* Suranovic use a curve to explaining this relationship. Consider the adjoining diagram plotting the levels of consumer surplus (CS), producer surplus (PS), and tariff revenue (TR) at different tariff rates. The origin corresponds to a zero tariff rate, or free trade. As the tariff is increased from zero consumer surplus falls since the domestic price rises. This is shown by the solid declining (green) CS line. When the tariff becomes prohibitive at tp, the price settles at the autarky price and



any further increases in the tariff have no effect upon consumer surplus. Hence the CS line becomes flat above $t_p$.

Producer surplus (PS), rises as the tariff is increased from 0, however it rises at a lower rate than consumer surplus falls. This occurs because, for an importing country, producer surplus increases are less than the change in consumer surplus for any increase in the tariff. When the prohibitive tariff is reached, again the price settles at the autarky price and any further increases in the tariff rate has no effect upon producer surplus.



The basic shape of the national welfare line is redrawn in the next diagram. Note that national welfare first rises then falls as the tariff is increased from zero. For one tariff rate ($t_{opt}$), the country can realize the highest level of national welfare ($NW_{opt}$), one that is higher than that achievable in free trade. We call that tariff rate the "optimal tariff."

It is possible, in fact, to get carried away with the technical aspects of the production function and to spend time in detailed examination of its various possible forms (Cobb Douglas, CES, etc.) and their implications. A more charitable, and perhaps more enlightening, way to interpret the growth theory literature is as "an invitation to a conversation." The conversation is about the best way to describe "economic progress." This is clear from the very start. In the above formulation, Solow is unable to account for the growth observed in (measured) output by considering inputs of (measured) $K$ and $N$ alone. As a result he must look to something else to explain the "residual." In this case it is A(t) the "technical change" parameter. So growth is a result of inputs of capital, labor and technical progress. The subsequent conversation is basically about what this means and what these things (capital, labor and technical progress) really are. The conversation has, indeed, been considerably broadened in recent years with a revival of growth theory that has concentrated on these questions, the so called New Growth Economics. Because it has turned to an explanation of technical progress in terms of economically motivated decisions, rather than as an "exogenous" (unexplained) shift parameter, it has been called "endogenous growth theory" (for surveys see Grossman and Helpman 1990, 1994; Lucas 1990; Romer 1990, 1994; Solow 1994). In the process, the meaning and nature of the production function and its arguments (capital, labor and technical change) have come under closer scrutiny.

Consider a CRS production function in three arguments, land, labor and capital ($L$, $N$, and $K$), so that:

$$(2)\ Q = f(K,N,L)$$

and $lQ = f(lK,lN,lL)$, where l is a positive scalar.

Call this a *complete production function.* It is complete in the sense that it includes every relevant and necessary input for the production of the product. Now if one were to mistakenly omit one of the arguments, say land, $L$, and write the function;

$$(3)\ Q = q(K,N),$$

Then this function would have diminishing returns to scale. Call this a *partial production function.* This suggests the following proposition: *Proposition 1: It is inconceivable that any actually observed (measured)production function should be a complete production function.*

Proposition 1 rests on the compelling idea that it is inconceivable that one could specify *each and every* constituent component to any production process, including intangible resources like tacit knowledge, team synergies, etc. When we use a production function to make inferences from observed data, we are, no doubt, hoping that the partial function we have postulated behaves, in some crucial respects, like a complete one. In equation (3) doubling $K$ and $N$ would less than double Q since $L$ is not doubled. Some "growth" would then be unaccounted for. If we attributed it to a shift parameter A(t), as in the Solovian function,

$$(4)\ Q = A(t)q(K,N),$$

then it would appear as though growth were in part due to some "exogenous" cause (technical progress), when, in fact, it is due to the contribution of $L$. The same exercise

can be applied to a situation in which some input, call it *H* (human capital), acts on output Q by enhancing the productivity of *N*. Then a complete function,

$$(5)\ Q = f(K,N,H)$$

that omits *H*, as in,

$$(6)\ Q = q(K,N)$$

will be "shifted" by "external" changes in *H*. A related consideration is the question of nonrival inputs (for example Romer 1990: 97, 1994: 12). Non-rival inputs, of which there are many examples, "are valuable inputs in production that can be used simultaneously in more than one activity" (Romer 1990: 97). Chemical processes, computer chip design, a mechanical drawing, a metallurgical (or other) formula, computer software, etc. are examples of nonrival inputs (Ibid). They may be excludable (appropriable) or not. If *H* is a set of nonrival inputs and *R* is a set of rival inputs (like *K*, *N*), then,

$$(7)\ Q = f(H,R)$$

has the properties that,

$$(8)\ f(lH,l\,R) > f(H,l\,R) = l\,f(H,R)$$

that is, there are *increasing* returns to scale because of the "external" benefits to the private accumulation of *H*. The A(t) in Solow's basic equation (1) above can also be understood as the expression of nonrival inputs. Identifying and talking about them renders them "endogenous."

**Table 2.1**

**The Summary Of The Previous Research**

| Researcher | Title | Purposes | Variables were used | Method was used | Results |
|---|---|---|---|---|---|
| **Dr. Lepi T. Tarmidi** | Indonesian Industrial Policy for the Automobile Sector with Focus on Technology Transfer | This research purpose is to review and analyze that the import substitution policy will not be effective if there is no sophisticated technology | Automobile component production and volume of automotive export | Regression analysis | The developing countries need some adjustment in order to sophisticated its technology especially the human resources |
| **Cristina Echevarria** | The three-factor agricultural production function: | To estimates value added in agriculture as a constant returns to scale | Capital stock, number of employment, | Regression approach Cobb-Douglas Production | The results of this paper are, first, that in Canada agriculture is less labor intensive than both services and industry, but capital intensity is similar |

| | | | | | |
|---|---|---|---|---|---|
| | The case of canada | function of the three factors of production—land, labor and capital—using Canadian data. | amount of employed land | function | in the three. The total factor productivity growth in Canada has been roughly the same--0.3%--in agriculture and manufactures over the period 1971-91 |
| **Yumiko Okamoto & Fredrik Sjöholm** | Protection and the dynamics of productivity Growth: 'the case of automotive industries in Indonesia | To answer whether the rigorous protection and state interventions have lifted the industry from its "infant industry" status, would expect to see stable growth in output and productivity if the automotive sector has | Number assembler, automotive production, price of automobiles production | The Simultaneity Equation Model | The automotive industry in Indonesia would not be able to achieve international competitiveness the automotive industry has not only failed to achieve international competitiveness and positive productivity growth, it is even showing a negative productivity growth after 30 years of protection and government support. |

| | | | | | |
|---|---|---|---|---|---|
| | | become a more mature industry. The roles of foreign multinational enterprises (MNEs) in the development of the automotive sector in Indonesia | | | |
| **Steven Suranovic** | The Optimal Tariff | Studied the conditions under which a tariff will be national welfare (the sum of consumer surplus, producer surplus and tariff revenue) improving in a variety of perfectly competitive models | Consumer Surplus, Producer Surplus and Tariff Revenue Curves | The curve of production and consumer surplus and National Welfare | As the tariff in increased from zero, imports fall at a slower rate than the increase in the tariff rate, hence revenue rises. Eventually imports begin to fall faster than the tariff rate rises and tariff revenue declines. At even higher tariff rates, national welfare will fall below the free trade level. The higher the tariff is raised, the lower will be the |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | level of imports |
| **Peter Lœwin** | Firms, Resources and Production Functions: The Relevance of the New Growth Economics for the Theory of the Firm (The Production Function Approach) | To answer the question; what factors account for the observed growth in the economy and to what extent? As such it also answers the question: what explains the earnings of the various inputs and thus of their owners? | - | Production Function Cobb – Douglas, Solov Production Function | The concept of the production function has recently undergone some subtle changes that render it much more compatible with theories of strategic behavior. the traditional assumption of identical and universal CRS functions has much less plausibility in the light of the New Growth Economics. |

# CHAPTER III

## THEORETICAL REVIEW

### 3.1. International Economics

International economics studies how a number of distinct economics interact one another in the process of allocating scarce resources to satisfy human needs. Whereas general economic theory deals with the problems of a single closed economy, international economics focuses on the problems of two or more economics; it examines the same problems as general economic theory, but discusses them in their international setting. Clearly, international economics is more general than the economics of a closed economy, the latter being a special case of international economics in which the number of trading countries is reduced from many to one. The study of general economic theory as it deals with the problems of a closed economy is only a first (but necessary) step toward the study of the behavior of a real economy. Surely, there is no closed economy in the real world except the world economy.

Parallel to the breakdown of economic theory into microeconomics and macroeconomics is the division of international economics into two major branches: (1) International trade and (2) International finance. The former is a long-run static-equilibrium theory of barter in which the short-run monetary-adjustment process is assumed completed, with money assuming its true classical role as a veil. The

approach of international trade theory is basically microeconomic in nature. International finance theory is centered upon the monetary aspects of international monetary relations. Its approach is mainly macroeconomics in nature, and it deals particularly with the short-run problems of balance-of-payment disequilibrium and adjustment (Krugman, Paul R. (1994). *International Ecnomics.* McGraw-Hill. USA)

## 3.2. International Trade Theory

International trade is the exchange of goods and services among residents of different countries. Countries cannot live alone any more effectively than an individual can. Each country tends to specialize in the production of those commodities. It can produce goods more cheaply than other countries. This process brings about an international division of labor that makes it possible for all nations to consume more of goods and services than in the absence of such specialization.

The commodities of a country imports can be divided into two categories: (1) those commodities that other countries produce more cheaply than the importing country does and (2) those commodities that the importing country cannot produce at all. For instance, the United States may import textiles from Taiwan because Taiwan produces textiles more cheaply than the United States, not because the United States cannot produce textile domestically. In contrast, Japan imports oil from Saudi Arabia simply because Japan does not have any oil fields.

In the same way that the division of labor (specialization) within a single closed economy increases the standard of living of all its residents. The international division of labor (specialization among nations) increases the standard of living of all countries, only as specialization within a single closed economy necessarily implies the existence of domestic trade and cannot occur without it, international specialization necessarily implies the existence of international trade and cannot occur without it either.

Given the proceeding discussion on the mutual gains from trade, one would expect the flow of commodity trade across national frontiers to be free from government interference. Yet, for hundreds of years the nations of the world have impeded the free flow of international trade by means of tariff, quotas, technical or administrative rules and procedures, and exchange control. In general these policies are influenced by political, sociological, and economic considerations, and they reduce world efficiency and welfare.

Being aware of the existence and importance of the gains from trade, nations often move to liberalize international trade. Basically, there are two approaches to international trade liberalization: the international approach and the regional approach. The former involves international conferences under the aegis of the General agreement on Tariffs and Trade (GATT) such as The Uruguay Round of multilateral trade negotiations, whose purpose is to promote free trade among their selves while maintaining barriers to trade with the rest of the world.

Classical economists, such as Adam Smith and David Ricardo have given contribution to international trade where they suggest that international trade is as the growth of economy because of many reasons. First, international trade pushes productivity and will broaden the market, where it can make division of job, increase the skill of workers, gain technology improvement, and give change to countries that trade to increase surplus and therefore it will create growth. Second, with Rent theory, a country that plays role in international trade will have lots of production excess. This is because of the demand in a country is inelastic to the products that can be exported. International trade overcomes the limit of domestic market and gives place for that excess of products. Third, international trade can open the possibility for a country to relocate the sources that it has efficiently. It can be from production point of view for domestic needs and export based on price relativity.

### 3.2.1. Absolute Advantage

Adam Smith (1937) emphasized the importance of free trade in increasing the wealth of all trading nations. Mutually beneficial trade is based on the principle of absolute advantage. It was a criticism from the mercantilism policy. Smith gave the first reason that international trade will be the foundation of classical analysis

According to Adam Smith, a country may be more efficient in the production of some commodities and less efficient in the production of other commodities relative to another nation. Irrespective of the cause of the difference efficiency, both

countries can benefit if each specializes in the production of what it can do more efficiency than the other country. For instance, the United States is more efficient than Brazil in the production of computers and Brazil in coffee. Then the United States can export to Brazil its surplus production of computers in exchange for Brazil's surplus production of coffee. This pattern of International specialization and exchange (or international division of labour) is efficient and leads to increased output of both computers and coffee. Herein lays the essence of the gains from trade: *With increased outputs of both commodities both countries can enjoy higher standard of living.*

Whereas the mercantilists believed that one nation could benefit only at the expense of another nation and advocated a national policy of protectionism. Adam smith argued correctly that all countries would benefit from free trade and championed a policy of *laissez-faire* (that is absence of governmental interference in economic affairs). With free trade, the resources of the world would be allocated efficiently, generating gains for each and every trading nation. Any interference with the free flow of trade would impede the efficient allocation of resource worldwide and would deny to the world community the opportunity to enjoy the potential gains from trade.

Adam Smith stated "Every country really has enough Absolute Advantage beyond its trade partner, to make export as much as import possible, when trade is not being bordered and organized". This explains that trade avoid restriction and a country will

get advantage from international trade even though that country does not have any specialty than other country. However, absolute advantage has many analytic weaknesses, what happen if the country does not have any absolute advantage in their commodity because the assumption of this theory is far from the reality (Kindleberger, Lindert. *(1998). International Economy,* McGraw-Hill. USA)

### 3.2.2. Comparative Advantage

David Ricardo is the pioneer of the birth of comparative advantage theory. David Ricardo is concerned with the typical case in which one country is more efficient than another in every line of production. Ricardo (as well as Robert Torrens) showed that free trade could still benefit both countries. Obviously, Adam Smith's principle of absolute advantage can no longer offer any guidance for international specialization. Ricardo had to develop a new concept, which is the principle of comparative advantage. This important law, which has remained unchallenged for almost two centuries, finds many practical applications outside the domain of international economics.

Law of Comparative Advantage: *When each country specializes in the production of that commodity in which the nation has a comparative advantage, the total world output of every commodity necessarily increases (potentially) with the result that all countries become better off (save the limiting case of a " large"*

trade is comparative advantage not absolute advantage. Absolute advantage is special case from comparative advantage.

## 3.3. Entrepreneurship Theory

Import substitution also is supported by entrepreneurship theory. The relevant question here is "how do individuals stimulate regional development?" The answer provided by the theory is that entrepreneurs act in situations of uncertainty to fill available niches in the economic landscape. Where there is incomplete or asymmetric information, unconnected markets, or uncertain market forces, entrepreneurs act to expose information, connect markets, and reveal needs in the local economy that can be filled by local businesses.

As niche-fillers, entrepreneurs typically engage in import substitution. Niches are available because there is a local need for certain products, services, or information that is not being supplied locally. The relationship between import substitution and entrepreneurship is two-sided: entrepreneurs often engage in or further the cause of import substitution, whereas the process of import substitution helps make a region more diverse economically, which creates opportunities for and attracts entrepreneurs. Entrepreneurship theory is gaining popularity in economic development practice in the United States and around the world. It is, however, not the only way in which import substitution can be enacted. Established businesses or new large firms can practice import substitution effectively as well. In many cases,

what is needed to encourage import substitution is merely the establishment of a link between existing local suppliers and local producers.

**Heckscher-Ohlin Model**

Two famous Swedish economists named Eli Heckscher and a college student named Bertil Ohlin develop heckscher-Ohlin theory. Therefore, this theory is well known as Heckscher-Ohlin. According to Heckscher-Ohlin, a country has comparative advantage in those commodities that use its abundant factors intensively. They assume that technology and taste are similar between countries and attributes comparative advantage to differences in factor endowments.

The Heckscher-Ohlin theory is based on the following assumptions (Salvatore, Dominick. (1993). *International Economics.*McGraw-Hill. USA).

a) There are two nations (Nation 1 and Nation 2), two commodities (commodity X and commodity Y), and two factors of production (labor and capital).
b) Both nations use the same technology in production.
c) Commodity X is labor intensive and commodity Y is capital intensive in both nations.
d) Both commodities are produced under constant returns to scale in both nations.
e) There is incomplete specialization in production in both nations.

and capital, , are depicted on the horizontal axes. We ought to now warn that henceforth, throughout all our sections on the theory of production, *all capital is assumed to be endowed*, i.e. there are *no* produced means of production. The hill-shaped structure depicted in Figure 1 is the *production set*. Notice that it includes all the area *on* the surface and *in* the interior of the hill. The production set is essentially the set of technically feasible combinations of output Y and inputs, K and L.

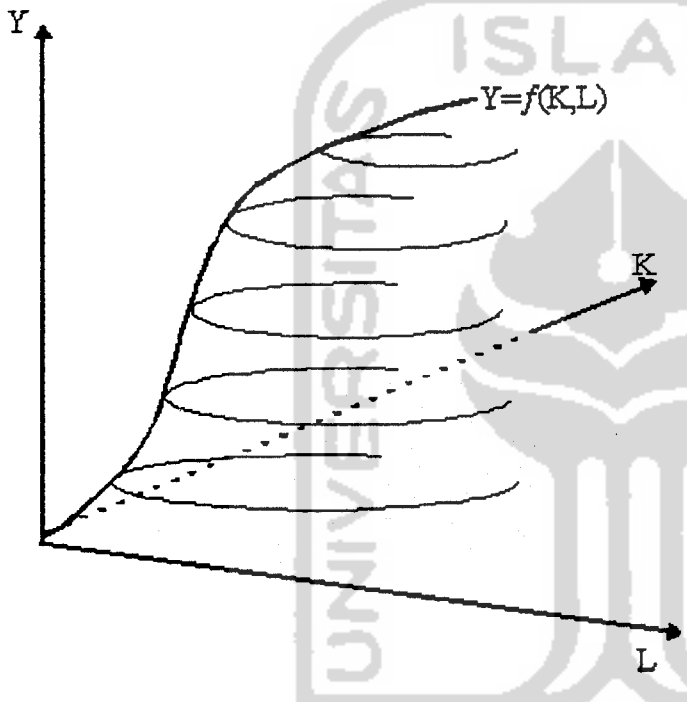



Figure 1. Production function for one-output/two-inputs.

A *production decision* -- a feasible choice of inputs and output - is a particular point on or in this "hill". It will be "on" the hill if it is technically efficient and "in" the hill if it is technically inefficient. Properly speaking, the *production function* Y = f (K, L)

is *only* the surface (and not the interior) of the hill, and thus denotes the set of *technologically efficient* points of the production set (i.e. for a given configuration of inputs, K, L, output Y is the maximum feasible output).

Obviously, the hill-shape of the production function indicates that the more we use of the factors, the greater output is going to be (at least up to the some maximum, the "top" of the hill). The round contours along the production hill can be thought of as topographic contours as seen on maps and will serve as isoquants. The *slope* of the hill viewed from the origin captures the notion of returns to scale.

### 3.4.1 The Law of Diminishing Returns

The idea of diminishing marginal productivity was simultaneously introduced for applications of factors to a fixed plot of land by T.R. Malthus (1815), Robert Torrens (1815), Edward West (1815) and David Ricardo (1815). It was applied more generally to other factors of production by proto-marginalists such as J.H. von Thünen (1826), Mountiford Longfield (1834) and Heinrich Mangoldt (1863). The apotheosis of the concept is found in the work of John Bates Clark (1889, 1891, 1899) and, more precisely, in Philip H. Wicksteed (1894). It was originally called the "*Law of Diminishing Returns*", although in order to keep this distinct from the idea of decreasing returns to scale, we shall refer to it henceforth as the "*Law of Diminshing Marginal Productivity*"

It will be clear about the definition of the *marginal productivity* of a factor. Letting $\Delta x_i$ denote a unit increase in factor $x_i$, then the marginal product of that factor is $\Delta y/\Delta x_i$, i.e. the change in output arising from an increase in factor i by a unit. Mathematically, however, it is more convenient to assume that x is infinitesimal. This permits us to express the marginal product of the factor $x_i$ as the first partial derivative of the production function with respect to that factor -- thus the marginal product of the ith factor is simply $dy/dx_i = f_i$. If we do not wish to assume that factor units are infinitely divisible or if we do not assume that the production function is differentiable, we cannot express the marginal product mathematically as a derivative.

## 3.5 Economic Policy

Trade restriction is anything, which interferes with the free flow of international trade. Tariff is one of trade restrictions. A tariff is a tax imposed on imports as they enter the country. An *ad valorem* tariff, much like a sales tax, it is a percentage charge against the value of the imported goods. A *specific* tariff is a fixed charge per unit of the commodity. Both types of tariffs raise the price of the imported commodity to the domestic consumer.

The most obvious result of a tariff is revenue for the government, that is revenue tariffs, have become increasingly rare, as governments have found other and better ways to collect revenues. Today most tariffs are intended to reduce the volume

of imports. It is easy to see how both an *ad velorem* tariff and a specific tariff achieve this purpose. By adjusting either the *ad valorem* percentage or the amount of the specific tariff, the government can presumably reduce imports by the amount deemed desirable. This leads to increased welfare if the resulting decline in trade volume does not outweigh the price increase.( Klaus, Friedrich. (1974). *International economic concepts and issues*, McGraw-Hill. USA).

## 3.6. Theory of Regression

Term of regression is introduced by Francis Galton in universal law of regression. To reach the target of research and hypothesizing examination in this research, the researcher uses the analysis regression with the method OLS (ordinary least square) or smallest square method opened by Carl Friedrich Gauss.

Carl Friedrich Gauss, earlier approach has indicated that according to certain assumption smallest square method yield the linear estimating, do not deflect and in class of all linear estimating and do not deflect to have the variants which is minimum. Shortly, mentioned appraiser of BLUE.

In this research data analysis uses the log linear analysis regression that connects some independent variable (X) to one dependent variable (Y). In doubled linear model regression for the population in general is shown by the following equation:

$$Y = \alpha_o + \alpha_1.X1 + \alpha_2.X2 + ... + \alpha_3.Dm + ei$$

Where:

Y = variable which is the level of dependent price X1, X2.....Xd

X1, X2 = Independent variable

Dm = Dummy variable

Ao = intercept

α1, α2,α 3 = coefficient of regressor

ei = disturbances variable which is in its price calculation assumed 0.

Price of coefficient regression in the model referred to the parameter from model which its prices are countable if the entire population price from variable Y, X1, X2... Xd known (Gujarati, Damodar, (2003). *Basic Econometrics: Fourth Edition.* McGraw-Hill. New York).

# CHAPTER IV

## RESEARCH METHOD

### 4.1. Research Method

Referring to the research done by Steven Suranovic, The writer of this research uses the same hypothesis of Suranovic but different method and variables. Suranovic analyzes the optimal tariff rate and national's welfare that represents by consumer surplus, production surplus and tariff revenue. Suranovic uses a curve to show this relationship. As the tariff is increased, the consumer surplus falls since the domestic price rises. Producer surplus (PS) rises as the tariff is increased. The national welfare first rises then falls as the tariff is increased. While, the writer uses two kinds of econometric; first, he uses Dummy Variables Model to analyze the relationship between exchange rate, the value of the imported automotive components and the tariff rate on import and components to the automotive production. Second, he uses Engle Granger Error Correction Model to analyze the causality between automotive production and rate of Indonesian economic growth and the short – run and long – run relationship between those variables and to avoid the *spurious regression.* He uses qualitative and quantities data for the research method. Morris (1981: 1086) mentions the meaning of the qualitative analysis means the chemical determination to differentiate the amount and other. This research method uses

literature study. Literature study is meant to get theory to solve the problem in the research by learning the literature and books related to analysis.

## 4.2. Research Subject

The writer uses five variables i.e., the number of automotive production (Y) as the dependent variable to the regressor of exchange rate, the value of imported automotive components and the new tariff rate on import and components. In doing the Engle Granger Error Correction Model, the writer uses Indonesian automotive production (Y) and the rate of Indonesia's economic growth (Z). These data are taken from Industrial and Trade Department and Statistical yearbook of Indonesia and GAIKINDO (Association of Indonesia Automotive) from 1990 to 2003

## 4.3. Research Variables

The researcher uses Dummy Variable Model to analyze the relationship between independent variables (X1, X2, and X3) to the dependent variable (Y). Because it is involving the qualitative data i.e. the rate on import and components, the researcher uses this model. While to analyze the causality between automotive production (Y) and rate of Indonesian economic growth, the researcher uses Error Correction Model Engle Granger. Because the researcher wants to know the short – run and long – run relationship between those variables and to avoid the *spurious*

*regression* of the data. To analyze the Dummy Variable, the researcher uses one dependent variable and three independent variables;

The dependent variable is the Indonesian automotive production (Y). This data is taken from GAIKINDO and Industrial and Trade Department from 1990 up to 2003. In this data it is stated that before Indonesian crisis in 1997, the production was high but fall down after the crisis hit Indonesia and increased in 2000s.

The first independent variable is foreign exchange rate rupiah against dollar (X1). This data is taken from International Financial Statistics from 1990 up to 2003. In this data it is stated that before Indonesian crisis in 1997, the foreign exchange Indonesia against dollar was relatively stable, but after that year the condition of Indonesian currency is always fluctuating.

The second independent value of automotive components import in Indonesia. This data is taken from GAIKINDO from 1990 up to 2003 (X2). In this data it is stated that before the new tariff rate import 1999, the number of automotive production not so many compared to the time after the new tariff imposed.

The third independent variable is dummy variable (DM). Dummy variable also expresses new tariff rate of import and components of automotive in Indonesia 1999 (DM). In regression analysis the dependent variable is frequently influenced not only by variables that can be readily quantified on some well-defined scale (e.g., income, output, prices, etc.), but also by variables that are essentially qualitative in nature. If dummy variable shows 1, it indicates post reconstruction period (after the

Based on this research, the following model can be formed:

$$Y = f(X1, X21, Dm) \quad (1)$$

Where:

Y = Number of Automotive production in Indonesia (units)

X1 = Foreign exchange rate of rupiah (Rp) against dollar (US$)

X2 = Value of automotive components import in Indonesia (Rp)

Dm = Variable Dummy (the new tariff rate import and components 1999)

Then, the model above can be estimated by using square least ordinary (OLS) with equation form in the following log linear model.

Consider the following model, known as the exponential regression model:

$$Y = \alpha_0 \, X1^{\beta 1} \, X2^{\beta 2} \, e^{Dm\,\beta 3} U \quad (2)$$

Second Model (Engle – Granger Model):

$$EcGrwth = \Sigma\acute{\alpha} \, Prod_{t-1} + \Sigma\beta \, EcGrwth_{t-1} + Vt$$

$$Prod = \Sigma\lambda \, Prod_{t-1} + \Sigma\delta EcGrwth_{t-1} + Wt \quad (1)$$

It can be expressed:

$$Z_t = \Sigma\acute{\alpha} \, Y_{t-1} + \Sigma\beta Z_{t-1} + Ut$$

$$Y_t = \Sigma\lambda \, Z_{t-1} + \Sigma\delta Z_{t-1} + Wt \quad (2)$$

Where:

$Z_t$ = The rate of economic growth of Indonesia (%)

$Y_t$ = Value of Automotive production in Indonesia (unit)

Ut, Wt = Disturbance variable

This model is showing the relationship between automotive production and economic growth. It is used to measure the causality between those variables whether the number of automotive production causes the changes of the rate of economic growth of Indonesia from 1990 to 2003 or conversely, the rate of economic growth causes the automotive production in Indonesia

## 4.5 Variables of Terms

This research uses three independent variables and two dependent variables.

- The number of automotive production is one of the dependent variables (Y). It is used to analyze the Dummy variable and as the first variable in the Engle Granger Error Correction Model also. The range of the data is from 1990 to 2003. This data is taken from GAIKINDO (The association of Automotive Indonesia) and the Industrial and Trade Department. It is used as one of the economic growth indication. The data is in unit.
- The exchange rate of Rp against Dollar is the first independent variable. It is ranged from 1990 to 2003. The data is taken from International Financial Statistics. It is used as one of the inputs in automotive production. The writer

considers this variable because it is the best proxy of the price of raw materials which is automotive components.

- The second independent variable is the value of imported automotive components(X2). This data is in Rupiah. It is ranged from 1990 to 2003. The data is taken from Statistical Year Book of Indonesia in the Import's chapter. This data is also showing how much the number of the automotive components imported is after the new tariff rate on import and components imposed.
- The third independent variable is the rate of tariff on import and components (Dm). This data is taken from GAIKINDO. It is also ranged from 1990 to 2003. The rate of tariff on import and components is the best proxy for the import substitution. Import substitution means high tariff rate on import and commodities.
- The second variable that is used in the Engle Granger Error Correction Model is the rate of the Indonesia's economic growth (Z). This data is taken from The Year Statistical Book of Indonesia from 1990 to 2003. It is in percentage shows the fluctuation of the economic growth of Indonesia after the new tariff rate on import and components of automotive imposed by the government.

## 4.6. Statistical Test

### 4.6.1. T-test

T-test is used to detect whether independent variables influence dependent variables individually by using the t distribution. In this research, the researcher uses one tail test positively and negatively because this research has a strong theoretical expectation.

T-table formula: $t = \frac{\beta_1 - \beta_2}{Se\ (\beta_2)}$

Follows the t – distribution with n – 2.

The decisions are as follows:

1. One tail test (Positive):

The hypotheses are as follow:

Ho : $\alpha_1 \leq 0$; Ha : $\alpha_1 > 0$

- If t-computed value > t-critical value, Ho is rejected, it means that the individual independent variable has significantly influenced the dependent variable.
- If t- computed value ≤ t-critical value, Ho is accepted, it means that the individual independent variable does not have a significant influence to the dependent variable.

- ❖ All independent variables do not influence simultaneously on variable dependent

  Ho : $\beta 1 = \beta 2 = \beta 3 = 0$

- ❖ All independent variables influence simultaneously on variable dependent

  Ha : $\beta 1 \neq \beta 2 \neq \beta 3 \neq 0$

The decisions are as follow:

1. If F-computed value ≤ F-critical value

   Ho is accepted and Ha is rejected

2. If F-computed value > F-critical value

   Ho is rejected and Ha is accepted

### 4.6.3. Coefficient of Determination ($R^2$)

$R^2$ is measure total proportion of variable dependent that explained by model regression (Gujarati: 1978,44). $R^2$ is used to detect how far the independent variables explain the dependent variable in the model.

$R^2$ formula: $1 - \dfrac{\Sigma \hat{u}i^2/(n-k)}{\Sigma yi^2/(n-1)}$

Where k = the number of parameters in the model including the intercept term

n = the number of data

$\Sigma\hat{u}i$ = the number of regressor

$\Sigma yi$ = the number of independent variable

$R^2$ behavior :

1. $R^2$ is always taken to be positive.
2. Border is among, $0 < R^2 < 1$

- $R^2 > 1$: Perfectly match
- $R^2 < 0$: No relation between independent variable with dependent variable
- $R^2 = 1$: Dependent Variable explains as much 100% by variable independent
- $R^2 = 0$: Dependent Variable has nothing explained by independent variable

## 4.7. Classical Assumption Test

### 4.7.1. Autocorrelation

The term autocorrelation is 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, it will raise the value of residual and the impact is the number of t test, f test and $R^2$ will decline (Aliman.(2002). "*Modul Ekonometrika terapan.*" Disampaikan pada pelatihan metodologis empiris 6-10 maret 2000. Studi Ekonomi UGM. Yogyakarta).

The tool of analysis used to detect autocorrelation is LM test (Langrange Multiplier test). This test uses the level of degree ($X^2$). Ho expresses that there is no autocorrelation, with the guidance if $X^2$ statistic is bigger from the value of $X^2$ tables, hence Ho is denied, and also on the contrary. Besides that, to get the fittest lag is by estimating the smallest number of Akaike Info Criteria.

### 4.7.2. 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 the Multicolinearity, the zero order correlations (r) can be used as the best one. If r higher than 0.85 there is a multicollinearity, conversely if r less than 0.85 there is no multicollinearity (Damodar Gujarati; 1995)

## 4.8 Time Series Analysis

### 4.8.1 Unit Root Test

Unit Root Test is used to know whether the data is stationer or not. Stationer means there is no spurious regression that is the data is not biased. The regression is;

$\Delta Y = \delta Y_{t-1} + \mu_t$.....(1)

$\Delta Y = (Y_t - Y_{t-1}) = \mu_t$.....(2)

$\delta = (\rho - 1)$ and $\Delta$ is the first difference.

If $\delta = 0$, then $\rho = 1$, there is non-stationer, or

Dickey Fuller shown under the null hypothesis $\delta = 0$, the estimated t value of $Y_{t-1}$.

If Computed DF value < Critical DF value ⟹ do not reject Ho, Nonstationer

If Computed DF value > Critical DF value ⟹ reject Ho, stationer

### 4.8.2 Testing For Degree of Integration

In order to know in what degree or order the data will be stationer this test is used. It is done when the result of the unit root test is not stationer.

The model is as follows:

$DDXt = e0 + e1DX_{t-1} + \Sigma f DDX_{t-1}$

$DDXt = g0 + g1T + g2DX_{t-1} + \Sigma f DDX_{t-1}$

Where $DX_t - DDX_{t-1}$

If e1 and g2 equal to one, then $X_t$ variable is stationer at first degree or integrated at one degree I = (1), conversely if e1 and g2 are equal to zero, means that it is not stationer at first difference (Insukindro, 1993:131)

### 4.8.3 Cointegration Test

Before doing this test, it must be known that the data are stationer at first degree or difference. Component X has a cointegration to the d, b degree ~ (d, b) if:

1. Every component from X cointegrated on one degree d or I(d)
2. Has $\alpha \neq 0$ so that $Zt = \alpha^1 X \sim I(d,b)$ where b, 0 and $\alpha$ are the vectors of the cointegration.

It can be told that if two variables have a different degree of integration then it is not cointegrated. Insukindro used ADF and DF statistic test to test the hypothesis.

### 4.8.4 Engle Granger Error Correction Model

The previous data sometimes could not influence the present data or the future data. To know this relationship or the causality between the variables, the researcher uses the Error Correction Model Engle-Granger.

If there is a cointegration between the variables, the data must have the short and long-run relationship. The model of the ECM Engle –Granger by using the *Ordinary Least Square (OLS)* is;

$X_t = \alpha 0 + \beta 0 Y_t + \mu 1_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$

$Y_t = \alpha 1 + \beta 1 Y_t + \mu 2_t$.....(1)

If the residuals ($\mu 1_t$ and $\mu 2_t$) are stationer, then it will be applied the Error Correction Model.

$DX_t = \alpha - \delta 1 DY_t + \delta 2 DY_{t-1} + \delta 3 Resid1_t$.....(a)

$DY_t = \beta - \rho 1 DX_t + d\rho 2 DY_{t-1} + \rho 3 Resid2_t$.....(b)

The decisions are as follow:

1. One Directional Causality ($X \rightarrow Y$ ) if $\rho 3$ and $\rho 1 \neq 0$ or statistically significant in equation (b) while if $\delta 3$ and $\delta 1 = 0$ or statistically insignificant in eq. (b).
2. One Directional Causality ($Y \rightarrow X$ ) if $\delta 3$ and $\delta 1 \neq 0$ or statistic insignificant in eq. (b) while if $\rho 3$ and $\rho 1 = 0$ or statistically all significant in eq. (a).
3. Feedback or Bilateral Causality ($X <=> Y$) if $\delta 3$, $\delta 1$, $\rho 3$ and $\rho 1 \neq 0$ or statistically significant.
4. Independent Causality ($Y \approx X$) if $\delta 3$, $\delta 1$, $\rho 3$ and $\rho 1 = 0$ or statistically all insignificant.

# CHAPTER V

# RESEARCH FINDINGS AND DISCUSSION

## 5.1. Data Description

The Variables used in this thesis are:

$Y = f(X_1, X_2, Dm, \mu t)$

Where:

Y = Number of automotive production (units)

Z = The rate of Indonesian Economic Growth (%)

$X_1$ = Foreign exchange rate (Rp/US $)

X2 = Value of automotive components import of Indonesia (Rp)

Dm = Dummy variable as expressed the import and components tariff rate that started in 1999. In which before 1999 = 0, at 1999 and after 1999 =1

$\mu_t$ = Error term

## 5.2. Research Findings of Dummy Variable Model

The researcher uses the aid of computer program E-views 4.0 and the result of estimation is gathered by using Ordinary Least Square (OLS). Through this test, line regression equation is found that is created from series data observation and the level of data influence including all independent variables toward dependent variables.

level of data influence including all independent variables toward dependent variables.

The reason of choosing linear for this analysis is because the researcher uses the MWD test (MacKinnon, White, Davidson). It is done by doing regression to both model, linear and log linear. Then after getting the results, it can be detected which is the best model. Because Z-value in both linear model and log-linier model is statistically insignificant, it means the hypothesis explain that both linear and non-linier are accepted (Aliman.(2002). "*Modul Ekonometrika terapan.*" Disampaikan pada pelatihan metodologis empiris 6-10 maret 2000. Studi Ekonomi UGM. Yogyakarta). But the linier model shows smoother regression than non-linier model

**The linear regression can be written as follows:**

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_1 X_2 + \alpha_3 Dm + \mu$$

Where Y = Independent variables

$\alpha_o$ = Intercept

$\alpha_1, \alpha_2, \alpha_3$ = Coefficient of regression of each variable

Hypothesis testing can be summarized as shown in table 5.1

**Table 5.1.**

**Regression result**

Dependent Variable: Y1

Method: Least Squares

Date: 02/21/05 Time: 12:24

Sample: 1990 2003

Included observations: 14

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 16.73987 | 22.59973 | 0.740711 | 0.4759 |
| X1 | -0.000911 | 0.006161 | -0.147897 | 0.8854 |
| X2 | 6.447337 | 3.072527 | 2.098383 | 0.0622 |
| DM | 172.1079 | 41.84498 | 4.112987 | 0.0021 |

| | | | |
|---|---|---|---|
| R-squared | 0.905358 | Mean dependent var | 121.4874 |
| Adjusted R-squared | 0.876965 | S.D. dependent var | 120.9621 |
| S.E. of regression | 42.42908 | Akaike info criterion | 10.56850 |
| Sum squared resid | 18002.27 | Schwarz criterion | 10.75109 |
| Log likelihood | -69.97951 | F-statistic | 31.88700 |
| Durbin-Watson stat | 2.529809 | Prob(F-statistic) | 0.000020 |

The last column shows that probability of drawing t-statistic of the magnitude of the one previous column from a t-distribution. With this information, it can tell at a glance if the data reject or accept the hypothesis that the true coefficient is zero. From the result above, the probability shows the one tail test. Because not all independent variables have strong theoretical expectation then the researcher decided to use the t-table that exactly measures rather than probability, to check the

hypothesis is accepted or rejected (Gujarati, Damodar,(2003). Basic Econometrics: Fourth Edition.McGraw-Hill. NewYork)

## 5.2.1 Statistical test

## 5.2.2. T-test

T-table = $t_{\alpha}$ df (n-k)

Where: $\alpha$ = Level of significance

h = The number of data = 14

k = The number of variables = 3

df = 11

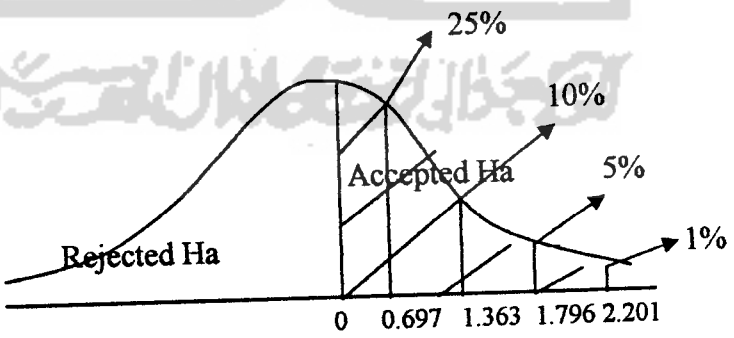
**Testing on Constanta (C)**

T-test of explanatory variable uses one tail positive t-test.

Ho : $\alpha_1 \leq 0$

Ha : $\alpha_1 > 0$

Computed t-value = 0.740711



Ha is accepted, constanta has a positive and significant influence on the automotive production in Indonesia at $\alpha = 10\%$.

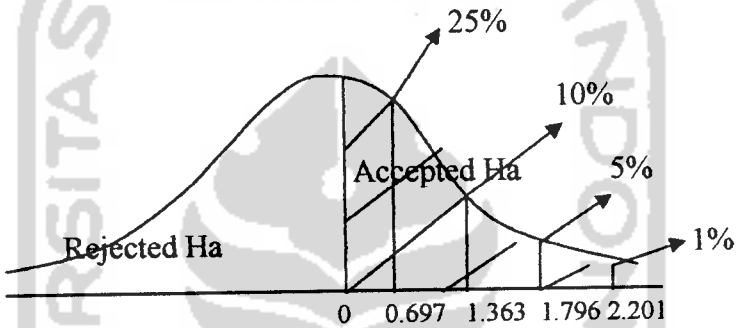
**Testing on Foreign Exchange Rate (X1)**

T-test of explanatory variable uses one tail positive t-test.

Ho : $\alpha_1 \leq 0$

Ha : $\alpha_1 > 0$

Computed t-value = -0.147897




Ha is rejected, foreign exchange rate has a negative and insignificant influence on the automotive production in Indonesia at $\alpha = 25\%$. It means that the hypothesis is not proven.

**Testing on Indonesia of value automotive components import ($X_2$)**

T-test of explanatory variable uses one tail t-test

Ho : $\alpha_1 \leq 0$

Ha : $\alpha_1 > 0$

Computed t-value = 2.098383

### 5.2.3. F- test

- All independent variables do not influence the dependent variable.

  Ho: 1 = α2 = α3 = 0

- All independent variables influence the dependent variable.

  Ha: α1 # α2 # α3 # 0

Computed F value is equal to 31.88700 (table 5.1.), while Critical F value is equal to 3.59 by using α = 5 %, df nominator (4 - 1= 3) and df denominator (14 - 4 = 11). Computed F value 31.88700 > Critical f value 3.59. Ha is accepted. It means that all independent variables influence the automotive production in Indonesia simultaneously

### 5.2.4. Coefficient of Determination ($R^2$)

$R^2$ is 0.905358. It means that independent variables explain the variation of dependent variable by 90.5 % while the other 9.5 % is explained by variables outside of the model.

### 5.2.5 Classical Assumption Test

### 5.2.6. Autocorrelation test

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

The tool of analysis used to detect autocorrelation is LM test (Lagrange Multiplier Test). This test uses the level of degree ($X^2$), Ho expresses that there is no autocorrelation, with the guidance if $X^2$ statistics are bigger than the value of $X^2$ tables, hence Ho is denied, and also the contrary. Besides that, to get the fittest lag is by estimating the smallest number of akaike info criteria.

**Table 5.2.**

**Autocorrelation Test (LM Method)**

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 0.374197 | Probability | 0.699272 |
| Obs*R-squared | 1.197652 | Probability | 0.549456 |

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 02/21/05 Time: 12:36

Presample missing value lagged residuals set to zero.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.343498 | 25.09755 | 0.093376 | 0.9279 |
| X1 | -0.002512 | 0.008548 | -0.293874 | 0.7763 |
| X2 | 1.450690 | 4.375502 | 0.331548 | 0.7487 |
| DM | -1.091744 | 44.76901 | -0.024386 | 0.9811 |
| RESID(-1) | -0.349738 | 0.420764 | -0.831199 | 0.4300 |
| RESID(-2) | -0.121488 | 0.488002 | -0.248949 | 0.8097 |

**Result of White Heterocedasticity Test**

| Test | $X^2$ stat | $X^2_{(8)\ 0,05}$ table | Result |
|---|---|---|---|
| Obs*R-squared | 13.37263 | 15.5073 | No Heterocedasticity |

Results showed at tables 5.6. above means that there is no heteroscedasticity problem.

## 5.2.9 Interpretation of Research Findings

Based on the table 5.1. The regression result is:

**Y = 16.740 - 0.001*X1 + 6.447*X2 + 172.107*DM**

The interpretation of this regression are:

1. Constanta has a positive coefficient. It means that the automotive production will increase as 16.7399 while the others are constant (ceteris paribus).
2. Exchange Rate (X1) has a negative coefficient but close to zero - 0.001.and insignificant. It means that exchange rate does not influence the Indonesian automotive production and it does not fit the hypothesis
3. The variable of the value of the automotive components import in Indonesia (X2) has positive coefficient 6.447 units. It means every 1million increases of automotive components imported causes the increase of Indonesian automotive production by 6.4473% with the assumption other variables in ceteris paribus condition and it fits the hypothesis.

5. All independents variables are significant and positively influences the automotive production of Indonesia except for the exchange rate simultaneously.

6. It needs more investment to increase the automotive production such as the technology, qualified workers and capability of the local producers (entrepreneurship) beside the government policy and the international trade policy

7. As Suranovic did, it is proven that tariff could influence the output, consumption and the welfare of a country

## 5.3 Research Findings of Causality between Indonesian Automotive Production and The Rate of Indonesia's Economic Growth (Time Series Analysis)

The researcher uses the aid of computer program E-views 4.0 where about the result of estimation by using Ordinary Least Square (OLS). Through this test, we will equation that is created from series data observation and the level of data influence including all independent variables toward dependent variables.

The reason of choosing Engle Granger Error Correction Model (Insukindro, 1998: 1-14) is avoiding the spurious regression of the data and analyzing the causality between the automotive production and rate of Indonesian economic growth and to know the short run and long – run. The way is with do regression to the model. First

it must known that the data is not containing the spurious regression and must be stationer by using unit root test. Because the data is not stationer uses this model, it must use the degree of cointegration test. If the data is stationer at this test, it will continue to the next test i.e the Engle Granger Error Correction Model.

### 5.3.1 Unit Root Test

Unit Root Test is used to detect the stationary data by using Dickey Fuller Test or Augmented Dickey Fuller Test. The value of DF and ADF for the hypothesis at any level is shown in the table. If computed DF value exceeds critical DF value, Ho is accepted, it means that there is non-stationer. If computed DF value less than critical DF value, Ho is rejected , it means there is stationer (Insukindro, 1993: 129-130). The same things happened to the ADF value.

**Table 5.7**

**Result Of Unit Root Test**

| Variables | DF value | ADF value |
|---|---|---|
| Y | 0.016577 | -1.576852 |
| Z | -2.510104 | -2.54353 |

The value of DF and ADF table with $\alpha = 5\%$ and N = 14 are -3.00 and -3.60

Based on the result in table 5.7, it can be concluded that at $\alpha = 5\%$, variables y and z are non-stationer at level.

### 5.3.2 Testing For Degree of Integration

Because both variables are non stationer at level, it should be tested by the first degree integration test to get the stationarity of the data (Insukindro, 1993: 129-130).

The decisions are as follows

a. DFcomputed < DF table ⟹ Stationer

   DFcomputed > DF table ⟹ Nonstationer

b. ADFcomputed > ADF table ⟹ NonStationer

   ADFcomputed < ADF table ⟹ Stationer

**Table 5.8**

**Result Of Testing For Degree of Integration**

| Variables | DF value | ADF value |
|---|---|---|
| DY | -3.016524 | -3.216920 |
| DZ | -4.651732 | -3.866216 |

The value of DF and ADF table with $\alpha = 5\%$ and N = 14 are -3.00 and -3.60

Based on the result in table 5.7, it can be concluded that at $\alpha = 5\%$, variables y and z are stationer at first degree integration I(1).

### 5.3.3 Cointegration Test

Cointegration Test is used to know whether the residual cointegration is stationer or not. It is very important if we want to know the short – run and long- run

### 5.3.4 Engle-Granger Error Correction Model

To know the relationship between those variables (dependent and independent variables) in the short-run and long-run and the causality between them, it uses Engle Granger ECM Engle Granger Error Correction Model Test means that the previous data could not influence the present or the future data (Aliman, 1998: 33-42).

The decisions are as follow;

a. The Engle Granger Error Correction Model is valid when the coefficient residual is negative
b. By using T-test, it is known whether the residual is significant or not. If it is significant, means that the model can be used to estimate the causality among the variables
c. The short run and long run relationship among the variables are shown by each coefficient of the independent variables

**Table 5.10**

**Error Correction Model Result With Dependent Variable D(Z)**

Dependent Variable: D(Z)
Method: Least Squares
Date: 03/06/05 Time: 13:09
Sample(adjusted): 1991 2003
Included observations: 13 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.715076 | 2.545511 | -0.280917 | 0.7851 |

| | | | | |
|---|---|---|---|---|
| D(Y) | 0.008122 | 0.038184 | 0.212696 | 0.8363 |
| Y(-1) | 0.003283 | 0.016011 | 0.205051 | 0.8421 |
| RESID01(-1) | -0.678693 | 0.368547 | -1.841537 | 0.0987 |

| | | | |
|---|---|---|---|
| R-squared | 0.368387 | Mean dependent var | -0.153846 |
| Adjusted R-squared | 0.157850 | S.D. dependent var | 6.685758 |
| S.E. of regression | 6.135437 | Akaike info criterion | 6.713699 |
| Sum squared resid | 338.7922 | Schwarz criterion | 6.887530 |
| Log likelihood | -39.63905 | F-statistic | 1.749746 |
| Durbin-Watson stat | 1.941432 | Prob(F-statistic) | 0.226420 |

**Table 5.11**

**Error Correction Model Result With Dependent Variable D(Y)**

Dependent Variable: D(Y)
Method: Least Squares
Date: 03/06/05 Time: 13:16
Sample(adjusted): 1991 2003
Included observations: 13 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 38.26785 | 19.49244 | 1.963215 | 0.0812 |
| D(Z) | 0.615826 | 2.895332 | 0.212696 | 0.8363 |
| Z(-1) | -4.471806 | 3.456148 | -1.293870 | 0.2279 |
| RESID02(-1) | -0.012677 | 0.139726 | -0.090725 | 0.9297 |

| | | | |
|---|---|---|---|
| R-squared | 0.264214 | Mean dependent var | 21.92646 |
| Adjusted R-squared | 0.018952 | S.D. dependent var | 53.93973 |
| S.E. of regression | 53.42615 | Akaike info criterion | 11.04214 |

| | | | |
|---|---|---|---|
| Sum squared resid | 25689.19 | Schwarz criterion | 11.21597 |
| Log likelihood | -67.77390 | F-statistic | 1.077273 |
| Durbin-Watson stat | 2.940253 | Prob(F-statistic) | 0.406643 |

**Table 5.12**

**The result of OLS Engle Granger Error Correction Model**

**For The Causality between Y and Z; 1990 – 2003**

| Z | | Y | |
|---|---|---|---|
| Constanta | -0.715076 | Constanta | 38.26785 |
| DY | 0.008122<br>(0.212696) | DZ | 0.615826<br>(0.212696) |
| Y(-1) | 0.003283<br>(0.205051) | Z(-1) | -4.471806<br>(-1.293870) |
| Resid01 | -0.678693*<br>(-1.841537) | Resid02 | -0.012677*<br>(-0.090725) |
| $R^2$ | 0.368387 | $R^2$ | 0.264214 |
| D-W Stat | 1.941432 | D-W Stat | 2.940253 |
| F-Stat | 1.749746 | F-Stat | 1.077273 |

*Significant at 5%, T-Table = 1.771

From the result above, it can be concluded that:

# CHAPTER VI

# CONCLUSIONS AND IMPLICATIONS

## 6.1. Conclusions

Based on the research about the impact of the import substitution to the Economic growth of Indonesia in 1990-2003, it can be concluded that:

1. The result of examination (T-test) to automotive production in Indonesia indicates that the foreign exchange rate ($X_1$) has insignificant and negative influence on the Indonesian automotive production. The hypothesis is not proven. It because most of the automotive components are imported so the price is influenced by the exchange rate that causes the automotive production will decrease when the exchange rate appreciates. Means that exchange rate has a negative relationship with the automotive production in Indonesia.
2. The result of examination (T-test) to automotive production in Indonesia indicates that the value of the Indonesian automotive components ($X_2$) has significant and positive influence on the Indonesian automotive production. The hypothesis is proven.
3. The Result of examination (T-test) to automotive production in Indonesia indicates that the new tariff rate on import and components 1999 ($D_M$) has significant and positive influence on the Indonesian automotive production. The hypothesis is proven

4. From the examination result as a whole (F test), Computed F value is bigger than critical F value at 5% level of significance. This indicates that all independent variables positively influence the change of Indonesian automotive production.
5. The data indicates that there is causality between Indonesian automotive production and the rate of Indonesia's economic growth in the short and long run.
6. The data shows that the independent variables influences the dependent variable simultaneously not partially.

## 6.2. Implications

From the conclusions above, the implications policy related to the results of this research are:

1. The automotive production still needs the components import to support its growth e.g. Rp 1 million of components import could encourage the automotive production as 5.45 billion per unit.
2. The Import Substitution Industrialization of automotive could sustain better with new tariff scheme 1999. The automotive production increased since the new tariff has been implemented.
3. The automotive industry would have a significant role in increasing the Indonesia's economic growth. And the economic growth would encourage the automotive industry of Indonesia.
4. Indonesia has implemented the right policy concerning the international trade. Import Substitution Policy has encouraged the local contents to be more

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## The Observation Data

| obs | Y | X1 | X2 | X3 | Z |
|---|---|---|---|---|---|
| 1990 | 37.00000 | 1842.000 | 1.910100 | 6511123. | 6.000000 |
| 1991 | 47.00000 | 1950.000 | 1.847700 | 55662777 | 6.000000 |
| 1992 | 30.00000 | 2029.000 | 2.231300 | 55667634 | 6.000000 |
| 1993 | 32.00000 | 2078.000 | 2.238300 | 4972363. | 6.500000 |
| 1994 | 44.00000 | 2160.000 | 3.310288 | 35377286 | 6.700000 |
| 1995 | 50.00000 | 2248.000 | 2.086431 | 6573233. | 7.500000 |
| 1996 | 32.54940 | 2342.000 | 6.809511 | 5467632. | 7.000000 |
| 1997 | 38.99000 | 2909.000 | 8.596020 | 3246556. | 4.000000 |
| 1998 | 58.06100 | 10013.00 | 8.825199 | 3345656. | -13.70000 |
| 1999 | 123.2360 | 7855.000 | 6.017892 | 3154546. | 0.000000 |
| 2000 | 307.3990 | 8421.000 | 7.922887 | 4145643. | 4.800000 |
| 2001 | 279.1870 | 10260.00 | 13.53268 | 4676877. | 3.300000 |
| 2002 | 299.3570 | 9311.000 | 17.50000 | 4864645. | 3.700000 |
| 2003 | 322.0440 | 8577.000 | 21.32700 | 5674264. | 4.000000 |

## The Regression Result

Method: Least Squares
Date: 02/21/05 Time: 17:36
Sample: 1990 2003
Included observations: 14

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 16.73987 | 22.59973 | 0.740711 | 0.4759 |
| X1 | -0.000911 | 0.006161 | -0.147897 | 0.8854 |
| X2 | 6.447337 | 3.072527 | 2.098383 | 0.0622 |
| DM | 172.1079 | 41.84498 | 4.112987 | 0.0021 |

| | | | |
|---|---|---|---|
| R-squared | 0.905358 | Mean dependent var | 121.4874 |
| Adjusted R-squared | 0.876965 | S.D. dependent var | 120.9621 |
| S.E. of regression | 42.42908 | Akaike info criterion | 10.56850 |
| Sum squared resid | 18002.27 | Schwarz criterion | 10.75109 |
| Log likelihood | -69.97951 | F-statistic | 31.88700 |
| Durbin-Watson stat | 2.529809 | Prob(F-statistic) | 0.000020 |

## Autocorrelation Test (LM Method)

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 0.374197 | Probability | 0.699272 |
| Obs*R-squared | 1.197652 | Probability | 0.549456 |

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 02/21/05 Time: 12:36

Presample missing value lagged residuals set to zero.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.343498 | 25.09755 | 0.093376 | 0.9279 |
| X1 | -0.002512 | 0.008548 | -0.293874 | 0.7763 |
| X2 | 1.450690 | 4.375502 | 0.331548 | 0.7487 |
| DM | -1.091744 | 44.76901 | -0.024386 | 0.9811 |
| RESID(-1) | -0.349738 | 0.420764 | -0.831199 | 0.4300 |
| RESID(-2) | -0.121488 | 0.488002 | -0.248949 | 0.8097 |

| | | | |
|---|---|---|---|
| R-squared | 0.085547 | Mean dependent var | 1.78E-15 |
| Adjusted R-squared | -0.485987 | S.D. dependent var | 37.21276 |
| S.E. of regression | 45.36275 | Akaike info criterion | 10.76479 |
| Sum squared resid | 16462.23 | Schwarz criterion | 11.03867 |
| Log likelihood | -69.35351 | F-statistic | 0.149679 |
| Durbin-Watson stat | 1.993963 | Prob(F-statistic) | 0.974394 |

## White Heterocedasticity Test

White Heteroskedasticity Test:

| | | | |
|---|---|---|---|
| F-statistic | 34.10460 | Probability | 0.000034 |
| Obs*R-squared | 13.37263 | Probability | 0.020126 |

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 02/21/05 Time: 12:42

Sample: 1990 2003

Included observations: 14

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -8083.037 | 1380.863 | -5.853614 | 0.0004 |
| X1 | 5.133804 | 0.781307 | 6.570790 | 0.0002 |
| X1^2 | -0.000409 | 6.03E-05 | -6.779471 | 0.0001 |
| X2 | -169.0301 | 183.9324 | -0.918979 | 0.3850 |
| X2^2 | -11.49068 | 7.250736 | -1.584760 | 0.1517 |
| DM | 2726.507 | 927.8207 | 2.938614 | 0.0187 |
| R-squared | 0.955188 | Mean dependent var | | 1285.876 |
| Adjusted R-squared | 0.927180 | S.D. dependent var | | 2772.770 |
| S.E. of regression | 748.2356 | Akaike info criterion | | 16.37084 |
| Sum squared resid | 4478853. | Schwarz criterion | | 16.64472 |
| Log likelihood | -108.5959 | F-statistic | | 34.10460 |
| Durbin-Watson stat | 2.726871 | Prob(F-statistic) | | 0.000034 |

## Multicollinierity test with Correlation matrix

| | X1 | X2 | DM |
|---|---|---|---|
| X1 | 1.000000 | 0.763041 | 0.806502 |
| X2 | 0.763041 | 1.000000 | 0.726779 |
| DM | 0.806502 | 0.726779 | 1.000000 |

## Regression Results Of Testing For Degree of Integration

### Regression Y on Z

Dependent Variable: Y
Method: Least Squares
Date: 03/21/05 Time: 01:28
Sample: 1990 2003
Included observations: 14

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 124.9336 | 41.30818 | 3.024428 | 0.0106 |
| Z | -0.931410 | 6.486951 | -0.143582 | 0.8882 |

| | | | |
|---|---|---|---|
| R-squared | 0.001715 | Mean dependent var | 121.4874 |
| Adjusted R-squared | -0.081475 | S.D. dependent var | 120.9621 |
| S.E. of regression | 125.7933 | Akaike info criterion | 12.63872 |
| Sum squared resid | 189887.5 | Schwarz criterion | 12.73002 |
| Log likelihood | -86.47105 | F-statistic | 0.020616 |
| Durbin-Watson stat | 0.233890 | Prob(F-statistic) | 0.888213 |

### Regression Z on Y

Dependent Variable: Z
Method: Least Squares
Date: 03/21/05 Time: 01:28
Sample: 1990 2003
Included observations: 14

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 3.923699 | 2.159124 | 1.817264 | 0.0942 |
| Y | -0.001841 | 0.012824 | -0.143582 | 0.8882 |

| | | | |
|---|---|---|---|
| R-squared | 0.001715 | Mean dependent var | 3.700000 |
| Adjusted R-squared | -0.081475 | S.D. dependent var | 5.378304 |
| S.E. of regression | 5.593114 | Akaike info criterion | 6.412513 |
| Sum squared resid | 375.3951 | Schwarz criterion | 6.503807 |
| Log likelihood | -42.88759 | F-statistic | 0.020616 |
| Durbin-Watson stat | 1.444723 | Prob(F-statistic) | 0.888213 |

## Regression of Resid02 Cointegration

Dependent Variable: D(RESID02)
Method: Least Squares
Date: 03/21/05 Time: 01:22
Sample(adjusted): 1992 2003
Included observations: 12 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| RESID02(-1) | -0.099953 | 0.188920 | -0.529077 | 0.6083 |
| D(RESID02(-1)) | 0.281188 | 0.340753 | 0.825197 | 0.4285 |

| | | | |
|---|---|---|---|
| R-squared | -0.085441 | Mean dependent var | 22.76510 |
| Adjusted R-squared | -0.193985 | S.D. dependent var | 58.84789 |
| S.E. of regression | 64.30288 | Akaike info criterion | 11.31610 |
| Sum squared resid | 41348.60 | Schwarz criterion | 11.39692 |
| Log likelihood | -65.89659 | Durbin-Watson stat | 1.988444 |

## Error Correction Model Engle Granger Result With Dependent Variable D(Z)

Dependent Variable: D(Z)
Method: Least Squares
Date: 03/06/05 Time: 13:09
Sample(adjusted): 1991 2003
Included observations: 13 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.715076 | 2.545511 | -0.280917 | 0.7851 |
| D(Y) | 0.008122 | 0.038184 | 0.212696 | 0.8363 |
| Y(-1) | 0.003283 | 0.016011 | 0.205051 | 0.8421 |
| RESID01(-1) | -0.678693 | 0.368547 | -1.841537 | 0.0987 |

| | | | |
|---|---|---|---|
| R-squared | 0.368387 | Mean dependent var | -0.153846 |
| Adjusted R-squared | 0.157850 | S.D. dependent var | 6.685758 |
| S.E. of regression | 6.135437 | Akaike info criterion | 6.713699 |
| Sum squared resid | 338.7922 | Schwarz criterion | 6.887530 |
| Log likelihood | -39.63905 | F-statistic | 1.749746 |
| Durbin-Watson stat | 1.941432 | Prob(F-statistic) | 0.226420 |

## Error Correction Model Result With Dependent Variable D(Y)

Dependent Variable: D(Y)

Method: Least Squares

Date: 03/06/05 Time: 13:16

Sample(adjusted): 1991 2003

Included observations: 13 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 38.26785 | 19.49244 | 1.963215 | 0.0812 |
| D(Z) | 0.615826 | 2.895332 | 0.212696 | 0.8363 |
| Z(-1) | -4.471806 | 3.456148 | -1.293870 | 0.2279 |
| RESID02(-1) | -0.012677 | 0.139726 | -0.090725 | 0.9297 |

| | | | |
|---|---|---|---|
| R-squared | 0.264214 | Mean dependent var | 21.92646 |
| Adjusted R-squared | 0.018952 | S.D. dependent var | 53.93973 |
| S.E. of regression | 53.42615 | Akaike info criterion | 11.04214 |
| Sum squared resid | 25689.19 | Schwarz criterion | 11.21597 |
| Log likelihood | -67.77390 | F-statistic | 1.077273 |
| Durbin-Watson stat | 2.940253 | Prob(F-statistic) | 0.406643 |