THE ANALYSIS OF THE AUTOMOTIVE IMPORT SUBSTITUTION'S EFFECT TO THE RATE OF INDONESIA'S ECONOMIC GROWTH (1990-2003)

A S1 DEGREE THESIS

By

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Defended before the Board of Examiners

On April 29, 2005

And Declared Acceptable

Board of Examiners

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Jogjakarta, April 29, 2005

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DEVOTION PAGE

Family is everything…
For me….
When I feel so tired….
I will always come back to them…
When I feel happy….
I will share it with them…
For me….
Family is everything….
And there is nothing worth…
Other than my Family…

This thesis are devoted to my beloved family and
My concern to "Indonesia Raya"

production of the automobiles components had decreased sharply as shown in table 3. Almost all the production of the components decreased. It could a crisis affected this decrease, but it could be happened because the local producers are not ready yet or can not fulfil the quality demanded by the foreign auto makers as the consequent of import substitution policy.

Table1.3.

Production of Automobile Components in 1989/90, 1995/96, 1997/98-1998/99*

(Units)

Component	1989/90	1995/96	1996/97	1997/98	1998/99*
Shock absorber	1,202	1,729	1,816	1,903	313
Radiator	171	435	543	575	419
Exhaust system	312	1,394	1,533	1,176	193
Filter element	3.6	5,5	12	14	13
Piston	570	1,337	1,471	1,703	280
Piston ring	3,010	4,758	5,645	2,103	345
Sparkplugs	27	41	34	23	25
Diesel Engine	36	76	85	108	81
Gasoline engine	157	216	235	220	165
Cabin	128	178	187	376	64
Chassis	183	302	317	324	64
Axle	138	135	143	184	53
Propeler shaft	138	139	145	145	1
Rear body	53	107	112	37	64
Brake system	273	410	430	376	64
Wheel Rim	760	1,933	2,043	2,308	917
Fuel Tank	144	485	470	376	64
Leaf Spring	22	51	38	22	23
Seat & Seat Frame	244	741	778	376	192
Clutch System	130	546	573	376	64
Transmission	147	294	309	329	53
Steering System	134	274	287	329	53

* Temporary figures

7	Mitsubishi Krama Yudha Motors & Mfg	Gaya Motor Garmak Pantya Mota Mitsubishi Motors Mitsubishi corp. Krama Yudha, KTB	10 20 20 25.4 25.4 49.2	1975 1988	Rp. 6,377 M	634	Sheet metal automotive
8	Suzuki Indonesia Mfg.	Suzuki Motor Indokarmo utama	55 45	1976	$ 7,400 K	494	Automotive Cycle engine
9	Suzuki Engine Industry	Suzuki Motor Musyawara	49 51	1976	$ 6 M	150	Automotive Cycle Engine
10	Toyota Mobilind o	Toyota Motor Astra Int'l	56.7 43.3	1976	Rp. 3,735 M	878	Automotive Components
11	Toyota Engine Indonesia	Toyota Motor Astra Int'l	51 49	1984	Rp.4,389 M	62	Automotive components

Source: Dodwell Marketing Consultants (1990), The Structure of the Japanese Auto Parts Industry, 4th edition., Tokyo, pp.663

Table 1.5.

Exports of Automotive Components (US$ million)

Year	Exports
1993	124
1994	163
1995	221
1996	263

Source: Y. Sato., p.3-17;Y.Sato.1998.,

Seeing table 4 and 5, it can be concluded that tariff rate import of automobiles and tariff rate components decreased the number of investment of automotive industry, conversely the export of the automotive components increased due to the low domestic demand so that the producers must export the products and due to the exchange rate, however it was also showing that Indonesian automotive components could compete with other countries.

In the short time, this new policy is very painful for many automotive industries and motorcycle component manufacturers, but the medium to long term effect could be considered as beneficial for the motorcycle and its component manufacturers in preparing them for the open market of ASEAN under ASEAN Free Trade Region (AFTA). However, there is a fact that the import substitution policy was not successfully implemented in Canada and Argentina. They implemented this only to increase the revenue of budget not for improving the economic growth. And it can not be predicted what would happen in the next several years, whether will still be maintaining a good political situation, taste of the consumers and the market itself.

That is why the writer is studying the relationship between automotive import substitution and Indonesia's economic growth.

1.2 Problem Formulation

Based on the study background and the analysis of the effect of the import substitution and its relationship with the economic growth of Indonesia, the writer formulates the following problems;

1. Can import substitution encourage the production of the automotive production?
2. How significant is the exchange rate (overvalued of currencies, rupiah) in affecting the automotive industry as one of the import substitution indicator?
3. How significant is the value of the imported automotive production in the automotive production?
4. Can the automotive production cause the change of the Indonesia's economic growth?

1.3 Problem Limitation

This study focuses on whether automotive industry causes the changing of the economic growth and the overvalued of currencies affects the production of the automotive production. The automotive industry within high tariff import of automobiles products and high tariff on automotive components will reduce the production of the automotive industry. By imposing high tariffs as the consequence (matrices) called "Income of Farm Operators" and "Farm Operating Expenses and Depreciation Charges". This second matrix provides information on wages, rent and operating surplus. The method used in this paper is the same as Solow's (1957). If we assume three factors of production (capital, labor and land) and allow for neutral technical change, the agricultural production function can be expressed as

$$Y_t = A_t f(K_t, L_t, N_t)$$

where Y_t is the value added in the agricultural sector in year t, and K_t, L_t and N_t are capital, labor, and land used in the sector in period t. Thus, A_t is a coefficient that denotes the level of technology, usually called "total factor productivity" or "Solow residual". It is assumed that the production function is constant returns to scale. Assuming perfect competition, the factors receive their marginal product. Let us call a the share of value added that remuneration of capital represents; b the share of value added that remuneration of labor represents; and g the share of value added that remuneration of land represents. These shares should add up to unity and can be calculated from the data. By differentiating the production function with respect to time , t, and dividing by Y, the growth rate of the Solow residual or total factor productivity growth can be estimated as;

$$\frac{dA}{dt}\frac{1}{A} = \frac{dY}{dt}\frac{1}{Y} - \alpha \frac{dK}{dt}\frac{1}{K} - \beta \frac{dL}{dt}\frac{1}{L} - \delta \frac{dN}{dt}\frac{1}{N}$$

If the tariff is raised above the optimal rate, as with an increase from t_{opt} to t_B, then national welfare will fall. The terms of trade gain, which rises as low tariffs are increased, will begin to fall at a higher tariff rate. Since the deadweight losses continue to rise, both effects contribute to the decline in national welfare. Note, however, that at a tariff level like t_B, national welfare still exceeds the free trade level. Eventually, at even higher tariff rates, national welfare will fall below the free trade level. In the diagram this occurs at tariff rates greater than t_C. The higher the tariff is raised, the lower will be the level of imports. At a sufficiently high tariff, imports will be eliminated entirely. The tariff will prohibit trade. At the prohibitive tariff, t_p in the diagram, there is no tariff revenue, which implies that the previously positive terms of trade gain is now zero. The only effect of the tariff is the deadweight loss. The economy is effectively in autarky, at least with respect to this one market, hence national welfare is at NW_{Aut}. Note that any additional increases in the tariff above t_p, will maintain national welfare at NW_{Aut} since the market remains at the autarky equilibrium

Peter Lewin

The title of his research is *Firms, Resources and Production Functions: The Relevance of the New Growth Economics for the Theory of the Firm as the development of the Cobb- Douglas Production Function and Solov*. The production function is essentially a metaphorical device (Lewin 1995: 288- 90). It is a mathematical shorthand expression for an input-output process.1 Its modern usage was motivated originally primarily by an attempt to account for the way in which economies grow. It is the basis of modern growth theory and of growth accounting, of the attempt 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?

To answer these questions aggregate output, Q, is assumed to result invariably and inexorably from the application of aggregate inputs *K* (capital) and *N* (labor). All three have been identified with various statistical aggregates. The classic treatment is Solow's seminal article (Solow 1956). The basic production function is given by equation (1).

$$(1)\ Q = A(t)f(K,N)$$

where the "multiplicative factor A(t) measures the cumulated effect of shifts over time" (Solow 1956: 402). These shifts in the production function imply "technical change." The exact same approach is used, quite unselfconsciously, at the firm level, where the factors of production are understood to be those under the control of the individual firm. It might be thought that this disaggregation would render the approach somewhat more realistic and, therefore, defensible, but, as we shall see, the way in which it has been used at the firm level implies that the very same difficulties of interpretation and relevance apply there as at the economy or industry level and for the same reasons. Briefly, this is a result of the use of the production function as a technical device representative of a real world technological relationships, rather than as a conceptual organizing tool.

country). Free trade is mutually beneficial if and only if a comparative advantage exists. If not, then there is no basis for trade.

An advanced country may be more efficient than a developing nation in every line of production, but the formers degree of superiority may be different from one commodity to another. According to Ricardo, the advanced country is said to have a comparative advantage in the commodity in which that nation's degree of superiority is higher, and a comparative disadvantage in the commodity in which its degree of superiority is lower, relative to the developing country. For instance, America's degree of superiority in food (given by the ratio 4F: 1F) is greater than its degree of superiority in clothing (given by the ratio 8C: 6C). Accordingly, America has a comparative advantage in the production of food and a comparative disadvantages in the production of clothing because 4F: 1F>8C: 6C).

Similarly, the developing nation is said to have a comparative advantage in the commodity in which its degree of inferiority is lower, and a comparative disadvantage in the commodity in which its inferiority is higher, relative to the advanced country.

This is the way out from the failure of absolute advantage theory in explaining the situation if all the comparative advantage in the good that it produce is handled by one country. In reality these condition always appears in relation to developing country and less in developed countries. The developed country has more absolute advantage. According to David Ricardo trade can be continued because the basic

f) Tastes are equal in both nations.

g) There is perfect competition in both commodities and factor markets in both nations.

h) There is perfect factor mobility within each nation but no international factor mobility.

i) There are no transportation costs, tariffs, or other obstructions to the free flow of international trade.

j) All resources are fully employed in both nations.

k) International trade between the two nations is balanced.

From above we know that Product Life Cycle theory consider the entire dynamic variable that could be changed in a time.

3.4 The Production Function

Describes the relationship between any combination of input services and the maximum attainable output from that combination. It was first proposed by Philip Wicksteed (1894):

$y = f(x_1, x_2, ..., x_m)$

which relates a single output y to a series of factors of production $x_1, x_2, ..., x_m$. For heuristic purposes, the production technology for the one-output/two-inputs case is (imperfectly) depicted in Figure 2.1. Output (Y) is measured on the vertical axis. The two inputs, which we call L and K which, for mnemonic purposes, can be called labor new tariff rate on import and components 1999); and if it shows 0, it indicates reconstruction period (before the new tariff rate on import and components 1999). In analyzing the Engle Granger Error Correction Model, the researcher uses two variables;

The first 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 second variable is the rate of Indonesia's economic growth (Z). This data is taken from Statistical Year Book of Indonesia from 1990 to 2003. The rate of Indonesia's economic growth was very high before the crisis but was very low when the crisis hit Indonesia even reached -13 in 1998.

4.4. Technique of Data Analysis

This research uses multiple regression models. To determine the parameter, the method being used is Ordinary Least Square (OLS). By using this method, expectedly the writer will get the Best Linear Unbiased Estimator (BLUE).

The First Model (Dummy Variable Model)

This model is used to analyze the relationship between the exchange rate, value of imported automotive components, the tariff rate of import and components 1999 and the automotive production in Indonesia.

2. One tail test (Negative):

The hypotheses are as follows:

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

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

4.6.2. F-test

F-Test is a test of the overall significance of the observed or estimated regression line, whether all independent variables collectively have an effect on dependent variable by using F distribution.

Computed F value:

$$F = \frac{R^2 / (k - 1)}{(1 - R^2) / (n - k)}$$

Where R^2 = the value of the regression result in the repressors

k = the number of independent variables including constanta

n = the number of data

4.7.3. Heterocedasticity

An important assumption of heterocedasticity shows that the conditional of X increases as Y increases. Here the variances of X are not the same. It is a situation where the variance is not constant for all the free variables. To detect this, the researcher uses of the method of white heterocedasticity with cross term.

The White test is thus a two-stage procedure. In the first stage it runs the OLS regression disregarding the heterocedasticity question. The researcher ε_i from this regression, and then in the second stage the researcher runs the regression as follows:

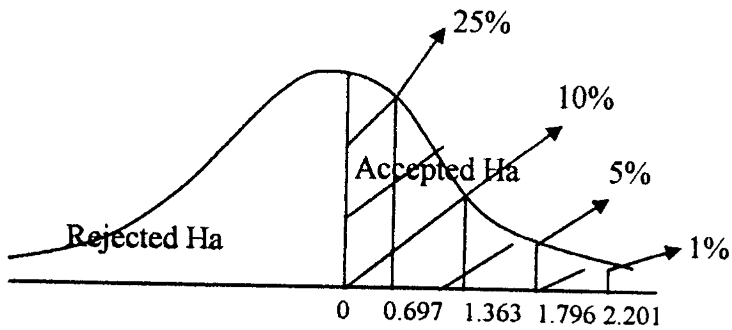
$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_i \ldots\ldots (1)$$

From the regression above, then a regression is done with auxiliary regression, the model is:

$$\varepsilon^2_i = \acute{\alpha}_0 + \acute{\alpha}_{0\,1} X_1 + \acute{\alpha}_0 X_2 + \acute{\alpha}_0 X^2_1 + \acute{\alpha}_0 X^2 2 + \acute{\alpha}_0 X_1 X_2 + U_i \ldots\ldots (2)$$

The decisions are as follow:

- If the Obs*R-squared is less than X^2-table at level $\acute{\alpha}$ = 5%, df= (k-1), there is heterocedasticity in variance disturbance term in this model; otherwise there is no heterocedasticity.



Ha is accepted, value of automotive components import in Indonesia has a positive and significant influences on the automotive production in Indonesia at α = 1%. It means that the hypothesis is proven.

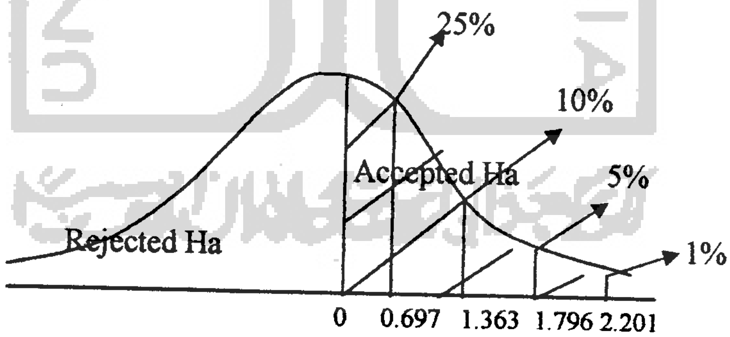
Testing on Dummy Variable (Dm)

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

$Ho : \alpha_1 \geq 0$

$Ha : \alpha_1 < 0$

Computed t-value = 4.112987



Ha is accepted, Import tariff rate and components have a positive and significant influences the automotive production in Indonesia at α = 1%. It means that the hypothesis is proven.

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

Table 5.3

Autocorrelation Test With LM Method

Test	X^2 stat	$X^2_{(df=2)\ 0,05}$ table	Autocorrelation
Obs*R-squared	1.197652	5.99147	No autocorrelation

Results of autocorrelation test at table 5.3 shows that there is no autocorrelation.

5.2.7. Multicollinierity Test

Multicollinearity refers to the existence of more than one exact linear relationship among some or all explanatory variables X1, X2, and Dm. In this research, the researcher uses the *Correlation matrix* (Damodar Gujarati; 1995) in understanding whether the model used has serious multicollinierity problem or not. If there is a problem, a healing utilize is required to obtain a good result.

The way to detect Multicollinearity:

- If (r) > 0.85 → Multicollinearity
- If (r) < 0.85 → No Multicollinearity

The complete results are shown at table 5.4

Table 5.4.

Multicolliniertity 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

From the result above, all independent variables have r (zero order correlations) less than 0.85. It means that there is no Multicollinearity.

5.2.8. Heterocedasticity Test

To detect whether there is heteroscedasticity or not, the writer used *White Heterocedasticity Test(no cross term).*

The decisions is as follow:

If the Obs*R-squared is less than *X*-table at level = 5%, df = (k-1), there is heterocedasticity in variance disturbance term in this model; otherwise, there is no heterocedasticity.

Table 5.5.

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

Table 5.6.

4. The result model shows the number of dummy coefficient variable as 172.107; statistically significant, this will change the regression line that explained the impact of the new tariff rate on import and components of automotive.

The regression line before the new tariff rate on import and components of automotive in Indonesia (before 1999):

Y = 16.740 - 0.001*X1 + 6.447*X2 ....(1)

The regression line after the new tariff rate of import and components of automotive in Indonesia (after 1999):

Y = (16.740+ 172.107)- 0.001*X1 + 6.447*X2

or

Y = 188.848 - 0.001*X1 + 6.447*X2 ....(2)

In the (1) regression notation for the dummy variable is 0, the intercept result is 16.740 and in the (2) regression where notation for variable dummy is 1, the intercept result, 188.848 when other independent variables is zero. This number is taken from summing of (1) intercept and the coefficient of variable dummy, which is 188.848.

Hence, the increase of Indonesian automotive production after the new tariff rate on import and components in 1999 is 188.8485 or as much as the coefficient variable dummy. And it fits the hypothesis.

relationship and avoiding the *spurious regression* by using Engle Granger Error Correction Model (Insukindro, 1993: 132)

If the variables are stationer, it is possible that those variables have the cointegration.

The decisions are as follow:

a. DFcomputed < DF table ⟹ Stationer

   DFcomputed > DF table ⟹ Nonstationer

b. ADFcomputed > ADF table ⟹ NonStationer

   ADFcomputed < ADF table ⟹ Stationer

Table 5.9

The result Of Cointegration Causality between The automotive Production (Y) And The Indonesian Economic Growth (Z)

Dependent Var = Z		Dep. Var = Y	
Ind. var	Coefficient and T-stat	Ind.var	Coefficient and T-sta
Constanta	-3.923699 (1.817264)	constanta	-0.931410 ((3.024428)
Y	-0.001841 (-0.143582)	Z	-0.231282 (-0.143582)
DF = -2.638634 ADF = -2.389753		DF = -0.231282 ADF = -0.529077	

Value of DF and ADF table with n = 14, α = 5%, each are -3.00 and -3.60

Based on the table above, it can be concluded that the variables are stationer at one degree at 5%.

1. The results of T-statistic of resid01, resid02, D(Y) and D(Z) are statistically significant, it means that there is a feedback causality between Indonesian automotive production and the rate of Indonesia's economic growth.
2. The coefficient of resid01 and resid02 are negative. It means that there is a short and long run causality relationship between Indonesian automotive production and the rate of Indonesia's economic growth.
3. The coefficient of DY is positive. It means that there is a positive relationship between the Indonesian automotive production and the rate of Indonesia's economic growth. When the production increases by 1% the economic growth will also increase as 0.008 in the short – run and as 0.988 during the period of the research.
4. The coefficient of DZ is positive, it means that there is a positive relationship between the rate of Indonesia's economic growth and the Indonesian automotive production. When the rate of Indonesia's economic growth increases by 1% the Indonesian automotive production will also increase as 0.615 in the short – run and as 47.578 in the long run during the period of the research.

competitive and improve their quality. It is shown by the increase of the Indonesia's automotive production.

5. The local contents must able to increase their quality so that they can compete with the foreign contents. By the Import Substitution, the local contents have cheaper price than foreign contents that is why the local producers must take this as the opportunity to produce more qualified products, hire more workers and increase the output of automotive production which will affect the economic growth of Indonesia and this country can compete with other countries in the automotive industry sub sector.
6. In supporting this competition, the local producers should give more contribution to the automotive industry such as by using sophisticated technology in order to increase the quantity and quality of the products (automotive components). The inability of the local producers to fulfill the demand of the automotive production makes the automotive producers import the components from other countries.

January.2005.*INDONESIA*.Http://www.unesiap.org/tid/publication/part-two2223-Indo.pdf

January 2005. Tarmidi T. Lepi. *Indonesian Industrial Policy for the Automobile Sector with Focus on Technology Transfer.*
Http://www.unctad.org/trans/2003/670Indonesia.html

January 2005. Wiens G. Elmer. *Production Function.*
Http://www.Egwaldwebservices/Economic/Ltd.pdf

January 2005.Echevarria Cristina. *AThree-Factor Agricultural Production Function: The Case of Canada.* Http://www.ita.doc.govt/td/auto/production402.pdf