DETERMINANT ANALYSIS OF SUPPLY CHANGE OF INDONESIA'S EXPORT PRODUCT

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Abstract

This study analyzes the effects of structural economic movement on the change of Indonesia's exports and examines the validity of the Iqnacy theory concerning structural economic movement in relation to the changes of export composition. The study utilize an ordinary mechanism of WLS, namely the Wald model,

The estimation resulted through the combination of ECM and WLS shows that the price of export goods/merchandises has a positive effect and is significant in the short-term period. Yet, over the long-term period, the increase in export commodity price causes the decrease in export volumes. Meanwhile, the relationship between export volume and inflation is not significant, either in the short-term or long-term. Foreign exchange interestingly has a positive and significant relationship with the export volume over a short-term period, but in the long-term it has a reverse effect, that is, it decreases export volume. Foreign investment has a positive and significant relationship with export volume in the long-term, the significance, however, weakens over the short-term period.

The structural economic movement has a positive and significant relationship over a short-term period with export volume, but over long-term period the relationship is not statistically strong. Thus, the structural economic movement towards more on the growth of industry sector could stimulate the growth in export aggregately. This evidence provides further support on the Ignacy theory (1980) if it is applied on Indonesian international economy, especially for the period of 1983-1997.

JEL Classification: C32, F14, O24
Keyword: Weighted Least Square, Error Correction Model, Structural Economic Movement, Export.

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I. INTRODUCTION

Almost all developing countries have decided recently to make a development as a commitment to chase their in all aspects of life. One of it is an economic development which is one of the integral parts of a national development. Economic development is a process encouraging the increase of people's long-term income that is able to develop poor people's economic prosperity.

Based on the classic and the neo-classic people's points of view, the main reason of why free trade came up is a profit orientation for both countries involved in a trade. The trade happened because those countries expected to earn profit each other from the increase of production efficiency. That is why, by doing trade a country can buy a product with the lower price than producing it themselves even sell it to other countries with the higher price.

International trade done by a country also relates to a pattern of its economic movement. Whereas the pattern of an economic movement is determined by a change of production composition or primary oriented, industry oriented, and balance of both sectors. The pattern of an economic movement is also determined by a distinct timing factor in which it is occurring. So, the relative relationship between an economic structural movement and a pattern of a country can be clearly seen.
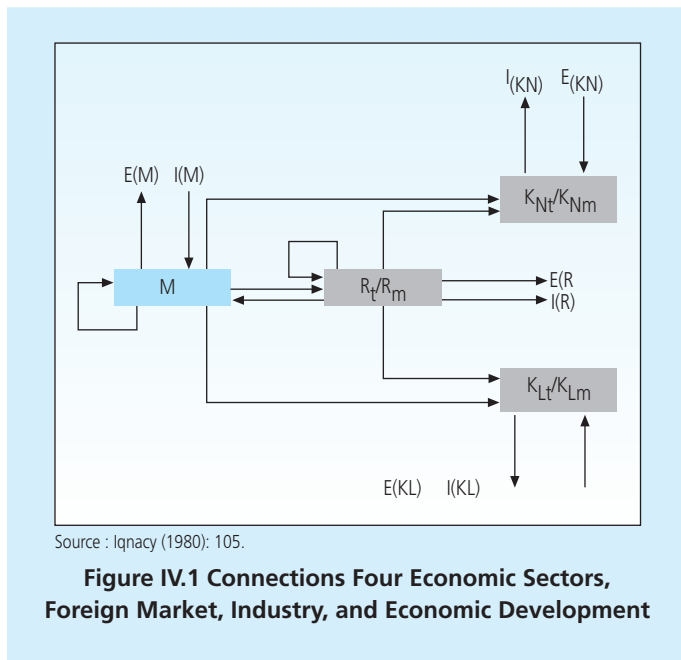
Some empirical studies regarding to export activities are: *The Supply and Demand for Exports: A Simultaneous Approach* (Goldstein and Khan, 1979: 278-286), *Export Demand and Supply for Group of Non Oil Developing Countries* (Bond, 1985: 56-77), *An Econometric Study of Primary Commodity Exports from Developing Countries Region to the World* (Bond, 1987: 191-227), *India's Manufactured Export: An Analysis of Supply Factors* (Ali, 1987: 152-163), *The Demand for LCD Export of Manufactures: Estimates from Hong Kong* (Riedel, 1988: 138-148), and *Demand and Supply Factors in the Determinants of NIE Export: A Simultaneous Error-Correction Model for Hong Kong* (Muscatelli *et al.*, 1992: 1467-1477).

By depending on the previous empirical studies, the purposes aimed by the writer are to know the effect of economic structural movement towards Indonesia's export change, to examine validity of Ignacy theory concerning to economic structural movement in its regard of export composition; to analyze the effect of exchange rate towards Indonesia's export change, examine Poot, Kuyvenhoven, dan Jansen (1991) thesis concerning to the important role of exchange rate towards export change; analyze and examine the effect of foreign investment towards Indonesia's export change as well as stated by Booth and Cawley (1982); to analyze and to examine export supply theory concerning to the effect of export cost change towards Indonesia's export change; to analyze the effect of inflation with "***the cost push inflation***" characteristic

(Indrawati, 1996) towards Indonesia's export change; to analyze the effect of economic structural movement, change of exchange rate, foreign investment, change of export cost, and inflation occurring together towards Indonesia's export change. Nevertheless, the main focus of this research is the correlation between export quantity and economic structural movement by using Ignacy basic theory.

II. THEORY

Ignacy theory basically directs to an analysis by using 4 economic sectors, they are: sector producing engines and equipments (M sector), sector producing mineral, farming material, and input such as fertilizer, steel, (R sector), sector producing the consumer basic need product such as food (K_N sector), and sector producing consumer tertiary need or K_L sector (Ignacy, 1980: 103-105). Beside that, Ignacy also made a dichotomy among R, K_N, K_L sectors in traditional (t) and modern subsectors.

Source : Iqnacy (1980): 105.

Figure IV.1 Connections Four Economic Sectors, Foreign Market, Industry, and Economic Development

Theory about the structural movement came up initially from Neo-Classic economist. Fisher (1939) proposed a theory about economic structural movement patterns and was supported by Clark's statistical data examination. The theory focuses on production change and production factor usage used with a hypothesis that there would be a change of production

value and the use of labor production factor within the rapid economic development. Systematic examination about production structural movement and job vacancy structure accompanying an economic development started by Fisher by introducing a concept about production into primary, secondary, and tertiary activities. Primary activity includes an economic process in farming, breeding, and some versions of mining sectors. Secondary activity includes an economic process in manufacture activity that generally relates to construction and mining sector. Then tertiary activity includes an economic process in communication and transportation, wide and small scale trade, government, and personal and domestic services sectors.

Another theory regarding to the well-known structural movement is a development patterns theory by Chenery. He did some studies in many countries and it concluded that development is an increase and a change process that can be observed that the characteristics are same in all countries. Economic structural movement in a country can be distinguished based on the percentage of labor placed in primary, secondary, and tertiary sectors. Syrquin (1988:212), Taylor and Chenery (1968) divided the economic sectors into four classifications, they are: primary sector (farming and mining), industry sector, unitary sector (electric, gas, drink, transportation, and communication), and service sector. Beside the number of sectors, other difference between Chenery & Syrquin and Chenery & Taylor is on the variable of number and kinds explaining about production structural movement patterns with its affecting variables.

Clark (1949) collected a statistical data about labor working in the above three sectors. The collected data showed that the higher a country per capita income, the less role of farming sector in providing work field. Instead, industry sector got more roles in recruiting the labor. Lewis, Fei, Ranis, and Todaro (1949) explained a theory that is frequently called as *economic dualism theory*. The theory basically classified economy into two sectors: (i) traditional/village/ farming sector in one side, (ii) modern/town/ industry sector in the other hand (Ranis, 1988: 76-85; Stiglitz, 1988: development process 105-135). The theory emphasized interaction between the two sectors will occur in the economic development process and cause the change of each sector's role in the economic process. The general tendency that happens is the more develop an economy, the more it is dominated by the role of modern sector. The basic thought of the theory is assumption stating that labor in farming sector is unlimited. Labor from a farming sector will move to modern sector if there is an incentive difference in which the wage is higher than subsistent wage in traditional sector.

Kuznets (1965) with other writers had done an on going research regarding to economic structural movement in development process. Kuznets didn't only observe the percentage of people working in any sectors and sub sectors, but also showed the contribution change of any

sectors toward national production (Chenery and Srinivasan, (1988:198). Meanwhile, to know how the change of structural movement patterns in the past time, Kuznets had collected data regarding to contribution of any sectors toward national development in 13 countries that are included in developed countries group. A conclusion that can be obtained is the role of farming sector decreases while development process, industry sector increases in manufacturing national production, contribution from service sectors in creating national production changes and is inconsistent.

Chenery and Syrquin (1975) described how an economic structural movement pattern occurring in some developing countries' development process. The theory relates to the sectoral transformation in a developing economy supported by empirical evidences based on their own examinations. Those examinations basically show that the increase of a country's per capita income will be accompanied by a sectoral output composition change (Syrquin, 1988: 205-214). The sectoral output composition change is the increase of per capita income including: (i) net production proportion of primary sector tends to decline, (ii) production proportion of industry sector tends to increase, (iii) production proportion of service sector tends to increase with the slower speed compared by the speed on industry sector.

Two important strategies relating to trade is production for domestic market to substitute importing product or import substituting industrialization and production for international market or export-oriented industrialization. Many developing countries start their industrialization process by implementing Import Substituting Industrialization (ISI). According to Nafzieger (1997 : 506-508), the reasons why those developing countries implement Import Substituting Industrialization are to:
1. Save foreign exchange use
2. Fix balance of payment
3. Self fulfill the need of industrial product
4. Develop domestic economic activity

Export-oriented came up because of the failure of ISI strategy. Neo-Classic follower stated that the implementation of Import Substituting Industrialization would give a better result in meaning of allocation efficiency and economic development. (Gammel, 1994: 102-103).

A study done starting from Tyler (1981), Jung and Marshall (1985), Basmani-Oskooee and Alse (1993), Dodaro (1993), and other economic experts supported a hypothesis that export is a locomotive for economic development of a country. Increasing export activities is an incentive for development of any sectors. Export development create a new demand in exporting countries either the input of production exchange or the result of the income increase of

production factors. Export extension can create an economic development through demand stimulus on other sectors. (Balassa, 1985; Wong, 1986; Sprout dan Weaver, 1993).

Krugman (1994) stated that the purpose of a country doing international trade is to gain profit and to achieve economies of scale in production. Trade can give profit by giving a chance to export any product with the huge resources. Trade also enables each country to do production specialization on a certain products to gain a higher efficiency level and a larger scale of production.

Referring to the trade problems, theory of Heckscher-0hlin (H-0) often become an empirical testing object to estimate the effect of trade towards income distribution and trade pattern. Based on the intensity of production factor, H-O (1933) showed two models of production from two countries with two commodities that are labor intensive commodity and capital intensive commodity. A relative welfare of physical capital will make production and export be dominated by labor intensive commodity. Beside that, a country with a very skillful labor will have a comparative excellence in production and export of skill intensive commodity. (Ballasa, 1988:10).

Technological gap hypothesis was proposed by Postner in 1961 by using the innovation and imitation integration influencing export. When a product starts to be profitable in domestic market, a company doing innovation can gain a monopoly profit temporarily, so it can easily get into the international market because of entry lag problem. The more increasing profit will stimulate other countries to imitate, especially when the innovation has been dissimilated. To have a competitive excellence in exporting, a country involved should persevere on an innovation. As well as Linder thesis, Postner hypothesis can be implicitly classified as spillover theory which is export can be occurred when domestic consumption has been fulfilled. Many evidences prove that the pattern doesn't always occur. Other weaknesses, either Postner or Linder can't give a specific explanation regarding to the steps from innovation to imitation and the estimation how long the process will take time. (Basri, 1991 :23)

Furthermore, Vernon generalized the opinion in Product Life Cycle Theory (PLC). The theory doesn't consider variables in economy as fixed and exogenous, but those variables always change and their change occur in the model and use those variables as driving motives for the international trade. That's why PLC theory is called as a dynamic theory.

II. METHODOLOGY

Data used in this research is secondary data obtained from any institutions such as *Nota Keuangan Rencana Anggaran dan Belanja Negara, Statistik Ekonomi dan Keuangan Indonesia-*

BI, Statistik Indonesia-BPS, International Financial Statistics-IMF and any publications supporting and relating to this research. All data obtained are quarterly series data for the observation from 1983 quarter 1 until 1997 quarter 4.

Empirical model specification of export supply is formulized as follow:

$$X = \beta_0 + \beta_1 PX + \beta_2 INF + \beta_3 ER + \beta_4 TSE + \beta_5 INV + \varepsilon t$$

Notification:

X	=	export product value
PX	=	export product cost
INF	=	inflation
ER	=	foreign exchange rate
TSE	=	economic structural movement variable
INV	=	foreign investment
e_t	=	error term

Except the inflation variable, all variables on the above formula is given in natural logarithm form. The transformation brings some benefit such as elasticity number can be recognized from the first derivation level which has the same value with the variable, and the second benefit is to improve the statistical testing . As a note, INF variable is not included to be transformed into natural logarithm form because inflation is a change form of a cost variable that could be negative so it is not logarithmic.

Estimation technique that can be done is Ordinary Least Square (OLS) if linearity assumption, homoscedasticity, no co-relation serial and multi co-linearity can be fulfilled (Eagle and Granger, 1987; Mekherjee and Naka, 1995; Masih and Masih, 1996). In situation in which the assumption can't be fulfilled, for instance homoscedasticity case, estimation technique Weighted Least Square (WLS) can be a preferred choice.

Before doing estimation, stationary testing is applied for all variables involved in the model, by using Dickey-Fuller (DF) and Philip-Perron (PP) method. Along with the variable, stationary testing can have a trend influence or ADF (T,n), Constanta ADF (C,n), and there is white-noise error term atau ADF (N,n) (Gujarati, 1995:718). In situation in which variable is not stationer, preferred standard procedure that can be applied is to differentiate those variables, it is useful to avoid *spurious regression*.

It is possible that those variables that are not stationer in level could have a long-term connection. In this case, those variables are co-integrated. Co-integration testing can be done

by Eagle-Granger Co-integration Regression Durbin-Watson testing (CRDW). If differentiation degree of each variable is same, the model specification will direct to *Error Connection Model* (ECM) for each dependent variable or Vector Error Correction Model (VECM) for equation series with more than one dependent variable. In other words, co-integration testing can become a base of determination of equation estimation used that has either long-term balance or not. If the equation passes the testing, the estimation equation has a long-term balance. (Thomas, 1997:425).

In connection with the stationary aspect, another possibility is when all variables involved are stationer in different differentiation degree. In this situation, preferred alternative model that can be applied is *Autoregressive Distributed Lag* (ARDL). This model is also developed to be ARDL-ECM model to examine more about the short-term and long-term characteristic differences from the observed variable.

Model validation can be done by CUSUM testing that tests model stability. Beside that, model validation can be done by observing on the ability of the model and replicate the actual occasion (model fitting), prediction effort of past time occasion (back casting), and ability to forecast the future (forecasting).

IV. RESULT AND ANALYSIS

Stationary testing shows that variables have different stationary degree. As stated mentioned before, degree difference scan cause OLS estimation equation keep having a stationary character in the equation (Gujarati, 1995: 726-727). That is why the next step is to do co-integration testing which is stationary testing on the estimation equation.

Table IV.1. Co-integration Test Result by Engle-Granger			
Variable	Coefficient	t-Statistic	Prob.
C	6.7181	8.6270	0.000
LPX	0.1430	2.1381	0.037
INF	0.0004	0.0716	0.943
LER	0.0223	0.2816	0.779
LTSE	1.6393	11.8601	0.000
LINV	0.0284	1.0695	0.289
R-squared	0.971	**F-statistic**	356.90
Adjusted R-squared	0.967	**Prob(F-statistic)**	0.000
Durbin-Watson stat	0.458		

Description: Statistical Number CRDW 1% = 0.511; 5% = 0.38; 10% = 0.322

Table IV.1 shows that OLS equation LX= f (LPX,INF,LER,LTSE, LINV) shows a tendency to be co-integrated on 5% level. The conclusion is based on Durbin-Watson statistical number on estimation equation that is equal with 0,458. So LX LX= f(LPX,INF,LER,LTSE, LINV) equation is a long-term balance equation that has equation form:

$$LX = 6.718 + 0.143LPX + 0.0004INF + 0.022LER + 1.639LTSE + 0.028LINV$$

$$(8.63) \quad (2.14) \quad (0.07) \quad (0.28) \quad (11.86) \quad (1.07)$$

$$(p=0.00) \quad (0.04) \quad (0.94) \quad (0.78) \quad (0.00) \quad (0.29)$$

In co-integration testing, there is a few differences between Eagle-Granger CRDW and Johansen co-integration. Johansen model focuses on co-integration in equation system and not in the single equation as well as Eagle-Granger CRDW. Compared to Eagle-Granger CRDW, Johansen model doesn't insist a normal data leaflet (Phillips, 1991; Mukherjee and Naka, 1995).

Tabel IV.2. Johansen Co-integration Testing Recapitulation		
Type of Johansen Co-integration	H_0: No Cointegration Estimation	H_a: Cointegration Estimation
Test assume no deterministic trend in data: no intercept or trend in CE	Reject	Do not reject (2 cointegrating equation)
Test assume no deterministic trend in data: with intercept (no trend) in CE	Reject	Do not reject (2 cointegrating equation)
Test allows for linear deterministic trend in data: intercept (no trend) in CE	Reject	Do not reject (2 cointegrating equation)
Test allows for linear deterministic trend in data: intercept (no trend) in CE	Reject	Do not reject (1 cointegrating equation)
Test allows for quadratic deterministic trend in data: intercept and trend in CE	Reject	Do not reject (1 cointegrating equation)

From the result of Johansen co-integration testing using some assumptions, we can see that those results have consistency in either existence or inexistence of co-integration.

IV.1. Estimation Result of Error Correction Model (ECM)

Dynamic model concerned by some economist recently is the Error Correction Model (ECM). In a reality, we can clearly observe that economic agent don't react spontaneously in responding an action. This is the reason why the dynamic model especially error correction model is formed. Existence of error correction generate error correction coefficient showing

a phenomenon of corrected deviation to equilibrium. By ECM, we can see whether those observed variables are co-integrating. It showed by the significant error correction term, or in other words, error correction model is valid and the observed variables are co-integrating. The result of an estimation using ECM as follow:

$$d(LX) = -0.259 + 0.02 \ d(LPX) - 0.0001 \ d(INF) - 0.063 \ d(LER) + 0.632 \ d(LTSE)$$
$$(-0.45) \quad (0.709) \quad\quad (-0.004) \quad\quad\quad (-1.041) \quad\quad\quad (3.843)$$
$$(p=0.655) \quad (0.482) \quad\quad\quad (0.999) \quad\quad\quad\quad (0.303) \quad\quad\quad (0.00)$$

$$+ \ 0.013 \ d(LINV) - 0.047 \ LPX(-1) - 0.06 \ INF(-1) + 0.016 \ LER(-1)$$
$$(-0.989) \quad\quad\quad (-0.791) \quad\quad\quad (-1.134) \quad\quad\quad (-0.211)$$
$$(0.328) \quad\quad\quad\quad (0.433) \quad\quad\quad (0.263) \quad\quad\quad (0.834)$$

$$+ \ 0.079 \ LTSE(-1) + 0.059 \ LINV(-1) + 0.073 \ ECT$$
$$(0,973) \quad\quad\quad\quad (1.038) \quad\quad\quad (1.261)$$
$$(0.335) \quad\quad\quad\quad (0.304) \quad\quad\quad (0.214)$$

R-Sqr = 0.613;   DWR = 1.594;   F   = 6.760 (0.000)
Jarque-Bera (χ^2) = 4.007 (0.135)   *Serial Correlation (F-Test) = 1.340 (0.270)*
ARCH (F-Test) = 1.190 (0.326)   *White's Test (F-Test) = 2.432 (0.009)*
Ramsey RESET = 1.162 (0.287)

It can be concluded from ECM estimation that the ECM model has a weakness in its diagnostic testing, especially in Jarque-Bera normality test and Heteroskedastisitas White test.

Assumption based on weakness of the diagnostic test is a strong indication that homoschedascity assumption is not fulfilled, as well as OLS basic model shown in the previous part. So, as well as heteroscedasticity problem solving, WLS procedure is preferred for both of ECM models.

IV.2. Weighted Least Square on ECM Model

From the appeared indication, ECM estimation model also experiences heteroscedasticity symptoms, so ECM model will be done by using WLS procedure to eliminate heteroscedasticity effect. The result of estimation using WLS for ECM model is as follow:

$$d(\textbf{WLX}) = 0.055 + 0.423 \, d(\textbf{WLPX}) - 0.002 \, d(\textbf{WINF}) + 0.847 \, d(\textbf{WLER})$$
$$\quad (0.050) \quad (6.253) \qquad\qquad (-0.261) \qquad\qquad (16.138)$$
$$\quad (p=0.960) \quad (0.000) \qquad\qquad (0.795) \qquad\qquad (0.000)$$

$$+ \, 0.899 \, d(\textbf{WLTSE}) + 0.003 \, d(\textbf{WLINV}) + 0.256 \, \textbf{WLPX}(-1)$$
$$(9.021) \qquad\qquad (0.024) \qquad\qquad (-5.708)$$
$$(0.000) \qquad\qquad (0.981) \qquad\qquad (0.000)$$

$$- \, 0.599 \, \textbf{WINF}(-1) - 0.145 \, \textbf{WLER}(-1) + 0.065 \, \textbf{WLTSE}(-1)$$
$$(-6.336) \qquad\qquad (-2.969) \qquad\qquad (0.735)$$
$$(0.000) \qquad\qquad (0.005) \qquad\qquad (0.466)$$

$$+ \, 0.032 \, \textbf{WLINV}(-1) + 0.603 \, \textbf{WECT}$$
$$(1.595) \qquad\qquad (6.264)$$
$$(0.087) \qquad\qquad (0.000)$$

R-Sqr = 0.99;   *DWR = 1.499;*   *F = 10.447*

Jarque-Bera (χ^2) = 0.756 (0.685)   *Serial Correlation (F-Test)) = 1.261 (0.300)*

ARCH (F-Test)   = 1.114 (0.360)   *White's Test (F-Test)   = 0.238 (0.101)*

Ramsey RESET (F-Test) = 0.731 (0.575)

The interpretation of ECM estimation result with WLS can be done by long-term and short-term interpretation distinction. In short-term, the interpretation focuses on analysis variables derived on the first level that is d(LPX), d(INF), d(LER), d(LTSE), and d(LINV). Whereas in long term, variables is treated as operator lag backward that is LPX(-1), INF(-1), LER(-1), LTSE(-1) and LINV(-1). However, special for long-term, the interpreted coefficient has to be divided with ECT coefficient.

In sort-term, ECM estimation result with WLS can be interpreted as follow:

- If the variable of export price level experience change up to 1 %, there will be an increase of export volume by 0,42% (inelastic) with significance of 0%. (Strong)
- If variable of domestic inflation decline by 1%, there will be less affection on export volume because the coefficient is very small and not significant (p=0.79).
- If the decline of Rupiah exchange rate on dollars occurs, there will be an increase of export volume by 0,847% (inelastic) with the strong significance (0%).
- If the economic structural movement occur by 1% which means industry sector change is more than 1% compared to farming sector, there will be strong affection on export volume by 0,899% (elastic) with the strong significance.
- Whereas variable of foreign investment change affect positively on export quantity but the effect is statically insignificant (p = 0.98).

In long-term ECM with WLS can be formulized as follow:

$$LX = 0.091 + 0.425\,WLPX - 0.994\,WINF - 0.239\,WLER + 0.1079\,WLTSE + 0.005\,WLINV$$

The estimation can be interpreted as follow:

- If the increase of export product cost by 1% occurs, the export volume will increase by 0.425%
- If the increase of inflation by 1% occurs, the export volume will decline by 0,994%
- If the increase of Rupiah exchange rate on Dollars occurs, the export volume will decline by 0.239%
- If the structural change caused by the increase of industry sector by 1 % higher than farming sector occurs, the export volume will increase by 0.018%
- Foreign investment variable shows a positive affection and significance in 8% level. If the investment increase by1%, it will affect the increase of export volume by 0.54%

IV.3. Discussion

Export connection on export cost level in short-term shows positive connection, it can be interpreted that in short-term the increase of cost in the international market will affect on the increase of export volume. The increase of export volume could be from the increase of cost that might be faster than other variable change that might affect oppositely, so it needs extra time to reach the new equilibrium. In long-term, the increase of cost will tend to decrease the export change. This point of view shows that international market is stronger than exporter bargaining process.

Inflation level plays its role in export volume development. If the inflation becomes index change of consumer cost, so supporting factor of the decrease of export cost is demand domestic pull. If the increase of domestic demand is higher than the increase of foreign demand, commodity will fill the domestic market. It is based on the consideration of the relative increase of domestic demand towards foreign demand or commodity production will cause the increase of domestic commodity cost. Regarding to the possibility of wage rigidity, the important element in production, the commodity cost increase is not followed by production cost increase. So the producer profit margin is considered as a support for producer to increase his supply in domestic market. The limit of production capacity in short-term, following the market development that will cause the supply increase in domestic market can only occur if we decrease the supply of the commodity export. This is the cause of short-term export declining.

In long-term, the effect of inflation can be considered as a factor that will increase production cost level, with the affected wage level and other input variables. The increase of production cost is interpreted as the increase of commodity cost, therefore, the incentive of domestic cost can not be longer retained in long-term period. If producers increase their access in international market, they will face a relatively higher price than before.

The explanation remains an important question that is if the export cost and export volume in short-term shows positive connection, why the connection between inflation-export volumes is negative, whereas inflation has a positive affection or will courage the cost increase. The answer is there is an assumption in short-term that the ability of producer to increase the capacity of production is limited because the existence of cost change rigidity or the use quantity of extra input, but the increase flexibility of producer capacity can be achieved if producer work on higher capacity than demand. In other words, producer applies reserve capacity as a way to anticipate the change of urgent consumer demand. At the same time, when the international price increase and there is domestic inflation increase, the producer will be able to adjust production capacity fast without any difficulties because price rigidity factor is useful to increase domestic and international supply at once.

Connection between export and exchange rate change in long-term period is negative. Negative effect of the decline of Rupiah exchange rate on Dollars is felt by producer if their input product depends much on import product. Because of Rupiah exchange rate depression, producer pays much more in Rupiah currency than before. Difficulty to gain international input will finally hamper production development. However, the obstacle of export happens in long-term period, because producers enjoy how cheap Rupiah while they have import input stock. Short-term change on exchange rate affects on competitive effort of Indonesian products cost. If Rupiah exchange rate on Dollars decline, the Indonesia's export product cost in Dollars currency will make much more Rupiah. The mechanism gives positive effect for exporters because rupiahs that they earn can support production ability. This effect is short because market will be in the new equilibrium.

Figure IV.2, shows time lag of exchange rate change with export volume. In 1983, when Rupiah was appreciated in one semester, export cost increases but not too high then experienced rapid declining from 1984 until 1986, when the government evaluated Rupiah, export volume didn't automatically increase but it needed three months to react. Less than the next six months, export volume was on the average position. At that time, domestic input market had reacted for a change. Beside that, import input stock had lost its positive affection on the export volume because producer bought input from import with the new rupiah price.

Source: BPS, Statistic Indonesia.

**Figure IV.2 Connection between
Export Variable and Exchange Rate**
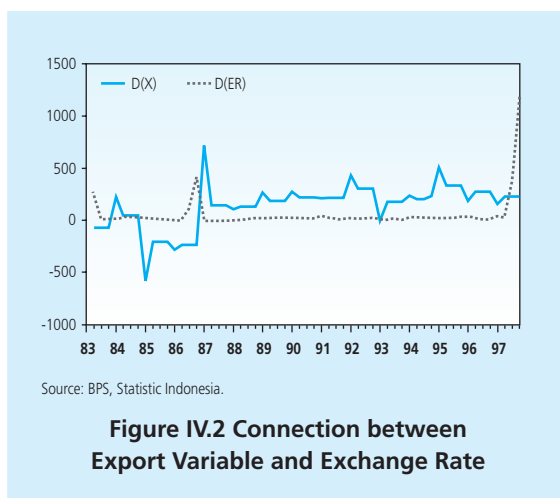
The low significance of economic structural movement in affecting export volume can be interpreted that long-term export volume is not useful. Preferred estimation based on those long-term facts is many output industries moved to domestic market. The higher people income as the effect of the economic structural movement, people will consume output industries much more. Economic structural movement that we mean in this research is sectoral movement happening on Gross Domestic Product from production side. Movement happening in Indonesia's economy is movement from farming sector domination towards GDP become industry sector domination.

The economic structural movement affects the kind of exported and imported commodity. Many countries prefer industry sector to accelerate economic growth. It is based on the reason that made by industry sector has a relatively higher extra value than farming sector. The high extra value of industry sector will make the more industry sector output the higher GDP will be formed.

Because of the reason, industry sector output is directed to export side. There is a positive connection among economic structural movements that can be specifically said as industrialization, with export volume. The higher GDP coming from industry sector the higher industry sector output thrown to the export market. It means that export is dominated by industry sector.

Investment policy that is able to support non-oil & gas export, known as 6 May Package, is effectively announced in 1986. The 6 May Package basically has important points that is to encourage enterprises at least 85% of the output that is exported in import input supply with low cost through subsidy, give a bank loan if it is at least 75% belong to Indonesian, if it is at

least 51% equity offered in Jakarta Stock Exchange, and if it is at least 51% equity belong to Indonesian plus at least 51% equity offered, 20% of them offered in Jakarta Stock Exchange (Poot, Kuyvenhoven, Jansen, 1991:236-238)

After having some revision of the investment policy, we can see that since 1986 investment realization increase. As it is seen at Figure 3, the increase of foreign investment realization development (PMA) or PMDN had happened since 1985/1987 period. Period before investment policy was made just developed up to 19,43% for PMDN and 4,26% for PMA so in period after the 6 May package, the assumption did happen after running in one year, PMDN grew 18,91% a year after policy and PMA grew up to 27,12 %. The increase is continuing until it reached the peak in 1989/1991, PMDN grew up to 92,63 and PMA grew up to 42,17%.

Source: Bank Indonesia, SEKI.

**Figure IV.3 : Realization Development of PMA and PMDN (% from Total of Investment)**
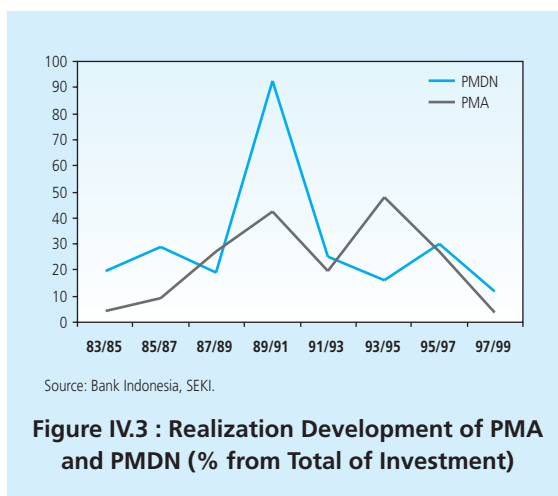
The effect of 6 May package policy is the increase of export value. The result of estimation indicates that the policy was positively responded by investor, especially industry sector investor, because they want government to give a priority to the sector as the leading sector.

Export development in 1983-1985 period experienced saturation because international economic development faced by Indonesia didn't support Indonesia's top export development, those are gas and oil. Gas and Oil didn't experience declining in 1984/1985 causing gas and oil export declined drastically from 1986 to 1989. Oil and gas export declined up to'± 10% annually in five years (1984-1989). It encouraged government to develop non-oil export which is only able to gain if there is an increase in non-oil sector investment, especially industry sector.

Figure IV.4 shows that there is a development of non-oil sector performing the export increase. The effect of investment policy towards export increase can not be directly happen.

Different time factor between policy and result that is just 1-2 years can be an indicator that industry sector that react fast to investment development is non-intensive capital or non-intensive technology industry sector. It can be proved by the sharp increase of industry sector of SITC-6 product, industry sector material base, which include plywood and textile commodities.

Source: BPS, Statistic Indonesia

Figure IV.4 . Development of Non-Gas
& Oil Volume Export
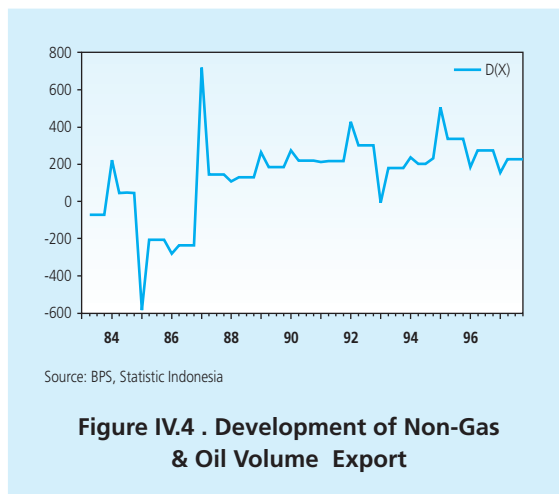
Strategic position of textile and plywood is in economic development of a country. The industry, especially textile industry, has a long-term backward and forward linkage, is an attraction to be developed in a developing country.

V. CONCLUSION AND SUGGESTION

From the all explanations stated from the above chapters, we may conclude that:

1. Based on developed analysis method which is Error Correction Model operated by using Weighted Least Square, we can earn variable result of export cost (PX) in short-term shows positive and significant effect to explain aggregate export volume. Whereas in long-term, those variables did negatively affect the aggregate export volume. The result shows Indonesian exporter position as a price taker. Long-term observation result shows a suitability of the result by Marrian E. Bond (1987).

2. Inflation level variable in short-term can not explain the change experienced by aggregate export volume, whereas long-term inflation has a strong negative impact to affect the change of export volume as found by Goldstein and Khan (1978). The finding can be interpreted that inflation increase can decline export through production cost increase mechanism causing the decline of export product competition effort.

3. Short-term exchange variable of exchange rate has a positive and significant effect whereas it has a negative effect for short-term period. The decline of domestic exchange rate (depreciation) will encourage short-term export, whereas in a long-term period, the decline of exchange rate will decrease export change based on Bond's short-term observation (1978); Riedel (1988).

4. Different from other economic structural movement studies, this research revealed a new relative problem that is the role of economic structural movement in encouraging export change. Economic structural movement variable will bring a positive impact on the export volume in a short-term period. Whereas in long term period, the impact is no longer significant even it still positive. The finding shows that industrialization process occurring in Indonesia has an important role export development, and also supports Iqnacy hypothesis regarding to economic structural development.

5. Foreign investment variable (PMA) has a positive impact but it has only a long-term significance for export volume change. The result of this observation is in accordance with Ali's observation. (1987)

6. From some cases estimated using the same model, we can see there is a different result of each export commodity. This fact shows that each export commodity has a unique characteristic which is different from others.

From the result of estimation and problems faced in this research, researcher wants to ask some questions that can be used by other researches for the same analysis study, and for decision makers regarding to international trade in Indonesia as follow:

1. The need to modify estimation model having long-term and short-term perspectives become estimation model that is able to overcome data unsuitability problem with the demand of classical linear assumption. That is why, we need to consider the existence of Error Correction Model analysis model operated using Maximum Likelihood method that doesn't demand strict assumption for analysis of data.

2. Beside that, we need to concern to intensively pay attention to export commodity process as a case. It is important because the result from estimation applied for each commodity tends to be unique.

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