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THE CONVERGENCE ANALYSIS OF THE ECONOMIC GROWTH OF ASEAN+3 COUNTRIES AND ITS INFLUENCING FACTORS

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Abstract: *ASEAN is a geo-political and economic organization which is established on August 8, 1967. The objectives of the establishment of ASEAN include accelerating the economic growth and the social progress of cultural and social in Southeast Asia area. it is known that the income of ASEAN + 3 member countries is still very unbalanced with the index rate of an average of 0.98 per year. However, when it is viewed from year to year during the estimation period, the value of the Williamson Index tends to decrease, although it is very low. This shows the tendency of the movement of economic growth is increasingly convergent with the decreasing inequality level. The results of the analysis through calculation of Williamson Index are also in accordance with the results of the analysis conducted by panel data method. The result of panel data analysis shows that there is conditional and unconditional convergence process of economic growth of ASEAN + 3 countries because the dependent variable lag coefficient of -0.1 and -0.2 is between -1 and 0.*

KEYWORDS: Economic Growth, Developing Country, Income, Gross Domestic Product

INTRODUCTION

ASEAN cooperation is a geo-political and economic organization which is established on August 8, 1967. The objectives of the establishment of ASEAN include accelerating the economic growth and the social progress of cultural and social in Southeast Asia area, promoting the Southeast Asian regional peace and stability, promoting the cooperation and assisting the mutual interests in science and technology, promoting the cooperation in agriculture, industry, commerce, transport and communications, promoting the joint research on issues in Southeast Asia, and maintaining the closer cooperation with international and regional organizations.

ASEAN was formed to support each country in improving its economic situation. Through the establishment of ASEAN, it is expected to be able to improve the welfare of each member country and reduce inequality among countries. The economic growth improvement of each country will then be able to improve the welfare of each country so that it will achieve the mutual progress and decrease the income inequality among the member countries.

This cooperation is then expanded with the entry of more advanced countries such as China, Japan and South Korea in ASEAN + 3. The widespread cooperation that has been performed is expected to give a positive effect on the economy of each member country. There is hope for the creation of a healthy economic growth climate can be met immediately, so that it can produce an improvement in the economy by each member country. But it can be the entry of developed countries effectively help the development of developing countries in the ASEAN region? because the cooperation is also increasing the competition among the member countries. There is a possibility on the increasing of the economies of member countries, especially the developing countries with the ease of capital mobility and trade between

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countries, but on the other hand it is also possible to increase the imbalance among countries because only the developed countries can take advantage of it. Some ASEAN + 3 countries have higher incomes per capita when compared to other countries, with considerable and unequal differences, as in table 1.

Table. 1: Gross Domestic Product per Real Capital of ASEAN + 3 Countries in 2009-2011 (USD)

Country	2009	2010	2011
Brunei Darussalam	17 092	17 225	17 301
Cambodia	533	558	590
Indonesia	1 090	1 145	1 207
Laos	519	556	592
Malaysia	4 902	5 169	5 345
Phillipine	1 307	1 383	1 413
Singapore	28 950	32 641	33 530
Thailand	2 531	2 713	2 699
Vietnam	684	723	757
Japan	38 242	39 972	39 578
China	2 209	2 427	2 640
South Korea	15 326	16 219	16 684

Source: World Bank, 2013

Based on the per capita income, Brunei Darussalam, Singapore, Japan, and South Korea are included in the category of high income countries according to the World Bank. Meanwhile Malaysia, Thailand, and China, including upper the middle income countries and other member countries, are still in lower middle income. Table 1 shows the income amount of ASEAN + 3 member per capita. High-income countries tend to have a large and dominant per capita income that reflects a better welfare rate than the developing countries. The amount of per capita income is determined by the population of a country, so that the amount of income per capita can also be reduced if a country has a large population. The developed countries with large per capita income tend to have small and constant economic growth, so the change from year to year becomes smaller is near to come its full employment condition. While the developing countries who have low income per capita but their economic growth is high because they are not in full employment condition as seen in figure 1 below.

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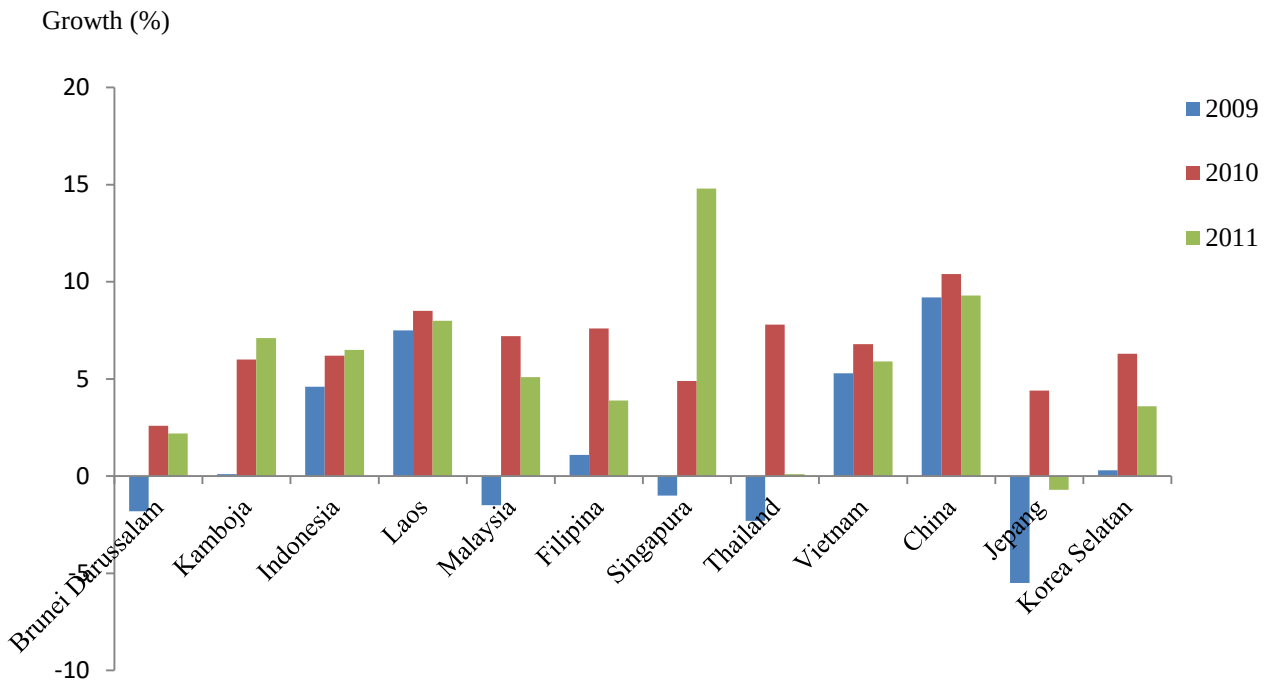
Figure. 1: The Economic Growth of ASEAN Countries + 3 in 2009-2011



Source: World Bank, 2013

Figure 1 shows that during the years 2009 to 2011 the developing countries such as Indonesia, Cambodia, Laos, Vietnam, have higher economic growth but very fluctuative because it is still far from the steady state. So a slight change or shock will cause shocks to the economy. The developed countries like Japan experience more constant economic growth with little change from year to year, as the economy is near to come to a steady state. If the economy is already in a steady state, then the balance will tend to be difficult to change.

According to the Solow model, when the developed countries have reached the full employment conditions it will be difficult to change or improve the economic conditions, because it has reached the maximum conditions in all things. Meanwhile the developing countries will continue experiencing the changes to the steady state. The addition of new capital through investment according to Solow will increase the country's income, so it will continue to move toward its steady state. According to Solow, if the process occurs in the economies of countries then it will create a convergence process, where the movement of income of each country toward the same direction.

The analysis of the Solow convergence process in this research is conducted by using the ASEAN + 3 cooperative analysis unit consisting of countries with different characteristics and levels of achievement. Based on this research, it will be seen whether the process of convergence submitted by Solow occurs in the economic conditions of ASEAN + 3 countries that tend not to meet the assumptions as submitted by Solow.

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REVIEW OF LITERATURE

Gross Domestic Product

The economic growth of a country is usually measured by using GDP data. Basically the real GDP measures the total income of everyone in an economy. The purpose of GDP calculation is to summarize the economic activity in a certain money value within a certain period of time. GDP can be calculated or measured by using three types of approaches, namely production approach, income approach, expenditure approach.

Economic Growth

The economic growth can be interpreted as t5he improving the standard of living material over time for most families in a country. This increase can come from increased revenue, allowing people to consume more and more variety (Mankiw 2007). This means that with the increase in economic growth, the improvement of people's welfare also will be achieved, which is reflected by the increase in production capacity, increased consumption, and increased incomes of society.

Theories about economic growth are constantly evolving over time. According to Harrod Domar's growth model, every economy must reserve and save some of its national income to invest in the capital of goods. Economic growth can be accelerated by new investments that are a net addition to the capital stocks. With existence of the increasing net of the capital stock in the form of investments, it will result in an increase in national output flow or GDP (Todaro and Smith 2006). Harrod Domar's theory is widely used to determine the economic policy in developing countries. According to this theory, the amount of S savings is the result of the multiplication of the national saving ratio (Margin Propensity to Save) of the total of national income Y (S = sY). Meanwhile the net investment is defined as the changes in the capital stock ΔK (I = ΔK) and the total of K capital stock is the result of multiplication between the value of k capital output ratio with the national income Y (K = kY) or it can be in the form of ΔK capital stock ?change and the changes of ΔY in national income (ΔK = kΔY).

Another assumption in Harrod Domar's model is that the magnitude of national net savings equals net investment (S = I). Based on the equation described above, it can be seen that I = ΔK = kΔY.. By entering the above equation into the S equation = I, then it is obtained the new equation S = sY = kΔY = ΔK = I and then it can be simplified becomes sY = kΔY. Then by dividing the equation with Y, and dividing it again with k, we obtain the equation ΔY/Y = ΔK/K = ΔI/I = s/k..

Note

ΔY / Y = the growth rate of aggregate demand or output

ΔK / K = the rate of increase of capital stock (aggregate bargaining)

ΔI / I = the rate of increase of investment

Based on the above equation it can be seen that the GDP growth rate is determined by the s national saving ratio and the ratio of the k national output capital. Without any government intervention, the national income growth rate is directly proportional to the saving ratio and inversely proportional to the ratio of output capital of an economy. The more GDP invested the higher the GDP growth will be, and vice versa.

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Another model that discusses about the issue of economic growth is a model coined by Robert Solow (1979) from the United States. Perhaps it is the most famous growth model. The Solow model is better at describing the economies of developed countries than in developing countries, but this model can still serve as a baseline of policies related to the growth and the development. The Solow model assumes that there is a fixed relationship between the labor capital input and the output of service goods. But this model can be modified by incorporating the technological advances as exogenous variables that can increase community production capability (Mankiw 2007).

Solow states that economic growth is a series of human-generated activities, capital accumulation, the use of modern technology and output, in order to achieve the sustainable economic growth. Economically, a growth model of Solow is designed to show how the capital stock growth, the labor force growth, and the technological advancements interact in the economy, as well as how they affect the output of goods and services of a country as a whole (Mankiw 2007). In the Solow model, there is a substitution between the capital and the labor.

This model states that conditional economies of countries will meet at a point where the income levels are all the same, but with the assumption that the savings rate, depreciation, labor force growth, and productivity growth of each country are the same. The Solow model is the basic framework for researching the level of inter-countries convergence. According to Todaro and Smith (2006), the aggregate production function, Y = f (K, L) assumes a constant yield scale. The output will increase by the same proportion when the capital and the labor are doubled and new inputs are used as important as existing inputs. Inputs other than capital, labor and knowledge are assumed to be unimportant. The production function attributes the total capital of K and the total labor of L to the total output of Y, can be written to Y = f (K, L). the addition of new variables, that is labor efficiency E, then the equation becomes Y = f (K, LxE). The labor efficiency means the knowledge of the community about the methods of production, when the technology is increasing the efficiency of labor will also increase. LxE measures the number of effective workers, so the output depends on the efficiency of the workplace and the amount of the capital. As the labor force grows at the rate n, efficiency grows with the rate of g, the number of effective LxE labors grows at level n + g.

The technological advances will affect the population, because technology can improve the labor efficiency. The Solow model shows the capital-labor-growth ratio, k is influenced by sf (k) savings, δk depreciation, new net labor that coems into the labor force, nk. The Solow equation can be written $\Delta k=sf(k)-(\delta+n)k$. In established conditions it is determined that $\Delta k=0$, so the equation becomes $sf(k^*) = (\delta+n)k^*$.

According to Solow, national output is only used for two purposes: consumption and investment. The output part which is used for the investment purposes comes from savings. As a process of capital accumulation, an investment unit produces an additional unit of new capital, meanwhile the old capital depreciates.

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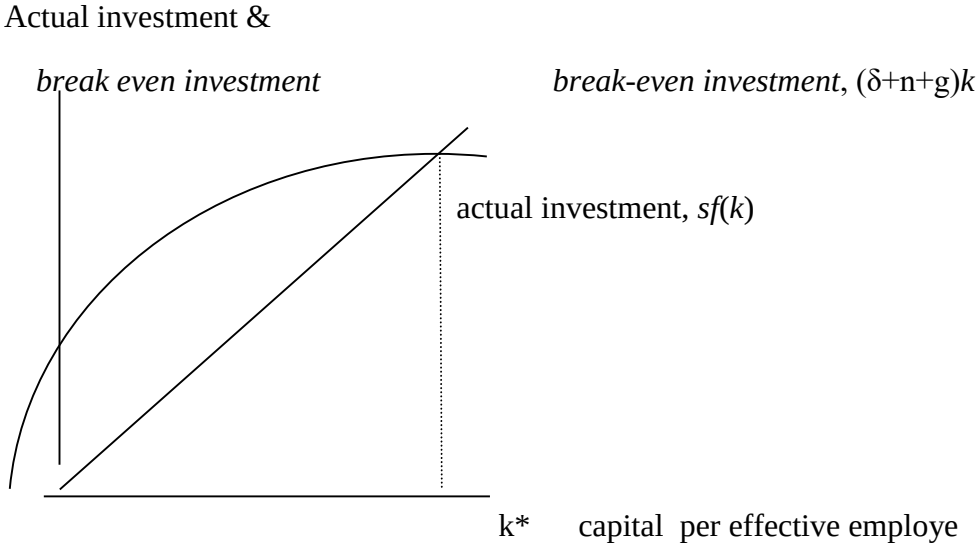
Figure. 2: Actual and Break Even Investment



Source: Mankiw, 2007

The change rate of capital stock per unit of effective labor represents the difference between the actual investment changes and break-even investment changes (the required investment to balance the growth of labor and knowledge as well as to replace the depreciation of old capital so that the amount of capital stock per effective fixed labor keeps maintained. The effective capital stock per labor will be in a balanced growth path position when the actual investment changes are equal to the break-even investment changes.

If the k value is higher or lower than k*, then the economy will return to a steady state in k*, because k* is a stable equilibrium of capital. If the level of capital stock per effective labor is low, then the actual investment per unit of effective labor is greater than the break-even investment. Consequently the productivity level of capital stock per effective labor increases in number to the capital stock position per effective labor of equilibrium. This movement shows a positive growth rate. The opposite situation is when the level of capital stock per effective labor is at a high value.

Based on Solow's thoughts above, it can be said that the economy will always reach a point of equity for each country (convergent). The movements will happen automatically toward the balanced growth that is a situation where each variable grows at a constant level. On the balanced growth, the output growth per labor is determined solely by the rate of technological progress. Therefore, technology becomes something important in achieving the growth.

The endogenous growth model emerges as a remedial attempt of unsatisfactory neoclassical theory in explaining the sources of long-term economic growth. The neoclassical models do not explain how in case of external shocks and technological changes in the economy. The existence of the developed countries capital flows underlies the emergence of endogenous growth theory. This model rejects the assumption of the Solow model that assumes the technology is external (exogenous). The main purpose of this model is to explain the

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differences in growth rates among the countries as well as the factors that give a greater proportion in the growth (Todaro and Smith 2006).

The endogenous growth theory attempts to explain the factors that determine the unexplained rate of GDP growth and are regarded as an exogenous variable in Solow's neoclassical growth theory. The endogenous growth models have structural similarities with neoclassical theory, but the assumptions used and the conclusions drawn have difference. The endogenous growth theory seeks to explain the increasing pattern of yield scale and the different growth among the countries. This becomes something different from the Solow model which assumes the marginal results that are declining over the capital investments that have been made. According to this model there is no power that can create the same level of economic growth among the countries in a closed economy; the growth rate among the countries will always be different and constant depending on the level of savings and technology of the country.

Convergence

In the concept of economic growth, the growth convergence is the tendency of poor country economies to grow faster than the economies of rich countries. The economy of poor countries is expected to be able to catch up so that the economic inequality among the countries will decline. The poor countries in the world have an average income level per capita less than 1/10 of average perfection of rich countries. This income difference is seen in almost all measures of quality of life (Mankiw 2007).

If the poor world economy can pursue the economies of developed countries, then this shows a convergent movement. But if there is no convergence, then the countries which are initially poor will remain poor forever. According to the Solow model, when the economic (convergence) will takes place depends on the difference they start. Two economies with the same steady state when viewed from the savings rate, population growth, labor efficiency, then convergence will possibly be achieved. But if there is a different steady state, then convergence will not be achieved. By assuming that the same public and technological preferences apply in all countries, poor countries tend to grow faster than rich countries.

There are two concepts of convergence in the economy that is ß convergence which consists of absolute and conditional and α convergence. The occurrence of a convergence process in which poor areas tend to grow faster does not necessarily lead to a decrease in regional income disparities per capita. The convergence is used to measure the dispersion rate of the growth. If the income dispersion decreases, the disparity among regions/countries also decreases, so the possibility of income convergence has occurred.

The measurement of dispersion is conducted by looking at the variant coefficient value and standard deviation from logarithm value of dependent variable. Meanwhile ß is useful to see the factors that are likely to affect the convergence. By testing the conditional convergence, it can be seen whether poor countries have faster growth rates than the rich countries if other variables are considered constant.

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METHODOLOGY

Types and Data Sources

The data used in this research is secondary data that consist of ten years period from 2002 to 2010. The data used include 12 countries in Southeast Asia except Myanmar plus the countries of China, Japan and South Korea incorporated in ASEAN +3. These countries include Indonesia, Malaysia, Singapore, Philippines, Thailand, Brunei Darussalam, Laos, Cambodia, and Vietnam plus three other Asian countries that are very influential for the economies of ASEAN countries such as China, Japan and South Korea. The data structure to be analyzed in this research is the panel data which is time series and cross section. The data is obtained from World Bank. The data used to analyze the convergence process are real GDP, real GDP per capita, Foreign Direct Investment (FDI), agricultural value added, export net and labor.

Data Analysis Method

Descriptive Analysis with Mapping Based on Real GDP Growth and Revenue Per Capital

The pattern picture and the structure of economic growth of each country in this research is seen by mapping the country based on real GDP growth and per capita income of each countries of ASEAN + 3 compared with the average. This research compares the economic position of each country at the beginning of the period estimated in 2002 and the estimated final year of 2010. The four awareness based on the two indicators are as follows

1. Quadrant I is a fast-advanced and fast-growing country with a larger GDP growth rate than the average GDP growth and has a larger average GDP per capita.

2. Quadrant II is a developed but depressed country that has a GDP growth value lower than the average GDP growth, but has a larger GDP per capita than the average GDP per capita.

3. Quadrant III is occupied by a relatively underdeveloped country that has a lower GDP growth value than its average growth and at the same time a smaller per capita GDP than the average per capita GDP.

4. Quadrant IV consists of fast developing countries that have a GDP growth value that is higher than average GDP growth, but the regional GDP per capita is smaller than the average (Kuncoro 2004).

Descriptive Analysis with Williamson Index (IW)

The Williamson Index is used to measure the difference in the average output value produced by a region. This measurement usually uses PDRB per capita data to measure the development inequality among the regions, expressed by the formula:

$$IW = \frac{\sqrt{\Sigma[\,(yi-y)\left(\frac{fi}{n}\right)]}}{y}$$

The Williamson Index (inequality level) is between 0 and 1, the nearer zero means the income disparity of ASEAN + 3 countries is lower or in other words the economic growth occurs evenly, but if the Williamson Index approaches 1 (one) then the income disparity among the member countries are getting higher and indicating an uneven economic growth.

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Oshima in Matolla (1985) establishes a criterion used to determine whether gaps exist in low, medium, or high-level gaps. The criteria are:

a. Low level gap, if IW <0.35

b. Medium level gap, if 0.35 = IW = 0.5

c. High level gap, if IW> 0.

Panel Data Analysis

This research uses panel data regression analysis, by using cross section data which consist of 12 countries and time series data from 2002 to 2010. Panel data is a combination of cross section data with time series data. The advantage of using panel data models over time series and cross section data is that it can generate larger amounts of observation, increase the degree of freedom so that it will improve the efficiency and reduce the collinearity among variables, and reduce the problem of identification by accommodating the variable heterogeneity levels.

With panel data analysis, we can capture the behavior of a number of individuals who have different characteristics over a period of time. The heterogeneity between individuals and inter-time is depicted in models with different intercepts and slope coefficients. The different values of intercepts and slope coefficients are derived from the influence of variables that are not included in the explanatory variables in a regular regression equation. The general model of panel data regression can be written like:

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}$$

With:

α = individual heterogeneity

y = dependent variable

x = independent variable

i = individual

ε = component error

t = time period

According to Firdaus (2011), based on the presence or absence of the correlation between the component error with the dependent variable, there are 2 models that can be applied in panel data regression. The model is Fixed Effects Model (FEM) and Random Effects Model (REM). If there is a correlation between the individual effects and the explanatory variables or having non-random patterns, then the Fixed Effects Model (FEM) is used. The estimators in FEM can be calculated by the following techniques:

1) Pooled Least Square Approach (PLS)

This approach uses a combination of all data (pooled). The model used is:

$$y_{it} = \alpha_i + X_{it}\,\beta + u_{it}$$

Where αi is constant for all observations, or αi i = α

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This approach has the weakness that the alleged parameter of ß will be biased. This biased parameter is due to the PLS cannot distinguish the different observations over the same period, or cannot distinguish the same observations at different periods.

2) Within Group Approach (WGA)

This approach is used to overcome the biased problem in PLS. The technique used is to use the deviation data from the average individual.

3) Least Square Dummy Variable (LSDV) Approach

This method aims to be able to represent the difference of intercept with dummy variable, by putting a number of $d_{git} = 1$ (g = i), the initial equation becomes:

$$y_{it} = \alpha_1 d_{1it} + \alpha_2 d_{2it} + \alpha_N d_{Nit} + x_{it}' \beta + u_{it}$$

This equation can be estimated with OLS approach to obtain ß LSDV parameter.

4). Two Way Error Components Fixed Effect Model Approach

This model is based on the fact that sometimes fixed effects not only come from the variation between the inter individuals (time invariants) but also from the variants between time (time effect). The Random Effect Model (REM) approach arises when there is no correlation between the individual effects and the independent variables. This assumption makes the error component of the individual effects and time inserted into the error. The most important assumption in REM is the assumption that the expected value dari *xit* untuk setiap τi adalah 0 atau E(τi *xit*) = 0.

To test whether the model used is correct, it can be used Chow test and Hausman test. Chow test will compare the Pooled Least Square model with the fixed effects model. If the estimation results show significant results, then the model chosen is the fixed fixed model. Then to choose whether the fixed or random effects is better, tested the assumption of the presence or absence of correlation between the independent variables and the individual effects. To test this assumption, it can be used Hausman Test. If the probability is less than the alpha or H value of the test result is greater than $\chi 2$ table, then H_0 is rejected and the appropriate model is the Fixed Effects Model. If the two twat show the significant result, then it is deceded that the best model is the fixed effects model.

Research Model of Economy Growth Convergence of ASEAN+3

This research will measure the absolute and conditional convergencies of ASEAN+3 countries. Barro and Martin (1992) in a research conducted by Mutaqin and Ichihashi (2012) styate that absolute convergency can be measured by using the equation as follows:

$$\ln y_{i,t} - \ln y_{i,t-1} = \alpha + \beta \ln y_{i,t-1} + v_{i,t}$$

With $y_{i,t}$ is the amount of per capita income, and $\ln y_{i,t-1}$ is the per capita income of the previous year. Meanwhile the conditional convergency in this research is calculated by using the following equation:

$$\ln y_{i,t} - \ln y_{i,t-1} = \alpha + \beta \ln y_{i,t-1} + \gamma_1 \ln FDI_{i,t} + \gamma_2 \ln NetEks_{i,t} + \gamma_3 \ln Agval_{i,t} + \gamma_4 \ln Inval_{i,t} + \gamma_5 \ln Serval_{i,t} + \gamma_6 \ln Govex_{i,t} + \gamma_7 \ln labour_{i,t} + v_{i,}$$

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With:

$y_{i,t}$ = PDB per capita at final year (USD)

$y_{i,t-1}$ = PDB per capita at the previous year (USD)

FDI = Foreign Direct Investment (USD)

NetEks = Real export (USD)

Agval = Agricultural value added (USD)

Inval = Industry value added (USD)

Serval = Service value added (USD)

Govex = Government expenditure (USD)

Labour = number of labor (person)

The above convergency model can be written becomes:

$$\ln y_{i,t} - \ln y_{i,t-1} = \beta \ln y_{i,t-1}$$

$$\ln y_{i,t} = \ln y_{i,t-1} + \beta \ln y_{i,t-1}$$

$$\ln y_{i,t} = (1+\beta) \ln y_{i,t-1}$$

If β value is between 0 and -1 then it can be said that there is an economy growth convergence among the countries of ASEAN+3. If it is getting near to -1 then the economy growth of ASEAN+3 countries become convergent. Meanwhile if $\beta > 0$ and $\beta < -1$ then the economy growth goes to the divergent and spread movement. In addition through the-t statistical test it will obtain a significant variable on the economy growth of ASEAN+3 countries.

Statistical Test and Assuming Violation

1) Test Assumptions

After estimating the parameters of the regression coefficients, frist we must test the assumptions of the regression model before performing the overall model test (F-test) and testing each regression coefficient (t-test). If there is a violation of assumptions, then we cannot perform the F-test nor the t-test (Juanda 2009).

2) Multicolinearity

Multicolinearity occurs if there is a definite linear relationship between the explanatory x variables, which are included in multiple regressions. The consequences of multicollinearity are large variance and standard error of OLS estimator, larger confidence interval, t-test ratio which is not significant, R2 value is high but t ratio is slightly significant ratio, OLS estimator tends to be unstable. According to the Klein Test, if there is a higher correlation value of |0.80|, the multicolinearity may be negligible as long as the correlation value does not exceed its Adjusted R-squared. Klein states that if R2Y Xi, Xj, ... Xn > r2 Xi, Xj then there is no multicollinearity problem or for all correlations between independent variables which have r2 smaller than R2 (r2 <R2). This gives the conclusion that all independent variables in the specification model are used regardless of the multicollinearity problem.

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3) Heteroscedasticity

Heteroscedasticity occurs when disorders appear in regression functions that have unequal variants for each observation, so the OLS estimator is inefficient either in small samples or large samples. The heteroscedasticity problem can be detected by the white cross section method. If sum square resis weighted < sum square resist unweighted then there is a heteroscedasticity problem. This heteroscedasticity problem can be ignored if it has used the Weighted Least Squares method (Gujarati 2007).

4) Autocorrelation

The autocorrelation problem occurs when there is a correlation between the ui disturbances in the regression. The resulting consequence is the same as that of the heteroscedasticity violation, which is the usual smallest squares estimator, although it is linear and unbiased, but it will not be efficient, so it does not meet the BLUE (Best Linear Unbiased Estimator) assumption (Gujarati 2007). Because the model uses the dependent variable lag as its independent variable, the DW test statistic value is often near to 2 despite autocorrelation. It is suggested to use Durbin h statistic, with T = number of observations.

$$h = (1 - DW)\ \rho \sqrt{\frac{T}{1-T\ [\ var\ (\beta)]}}$$

If through t-test statistic, it is obtained the rejected Ho results, then it is decided there is a violation of autocorrelation (Juanda 2009).

5) F-Test (Overall Model Test)

After doing the assumption test, then the whole model test is conducted to explain the diversity of the dependent variable. If from the estimation results it is obtained F-statistics is greater than the value of F-tabeldbr, dbg or F-test probability value is smaller than alpha (α < probability) then it means H_0 is rejected and the independent variables can explain the diversity of the dependent variable in the model.

6) Test-t (Partial Test)

After obtaining that the statistical F-test is significant then it is continued with partial test between the dependent variables to each independent variable. The t test is performed to see if each independent variable significantly affects the dependent variable. If the value of t-statistic generated from the estimate is greater than ttable α, db or probability value for each independent variable is smaller than the real level (prob < α), then it can be concluded that the independent variables significantly affect the dependent variable.

DISCUSSION

The calculation results show that there is a change of state position at the beginning and the end of the period under the research. In 2002 it is found that the average real GDP growth ($\bar{r}$) is 5.3% and the average per capita income is 8 539.2 thousand rupiah. Some countries that are still above the average growth as a whole are Cambodia, Laos, Malaysia, Vietnam, China, and South Korea. While the countries with above average per capita incomes are Brunei, Singapore, Japan and South Korea. South Korea in 2002 is in excellent economic condition with high per

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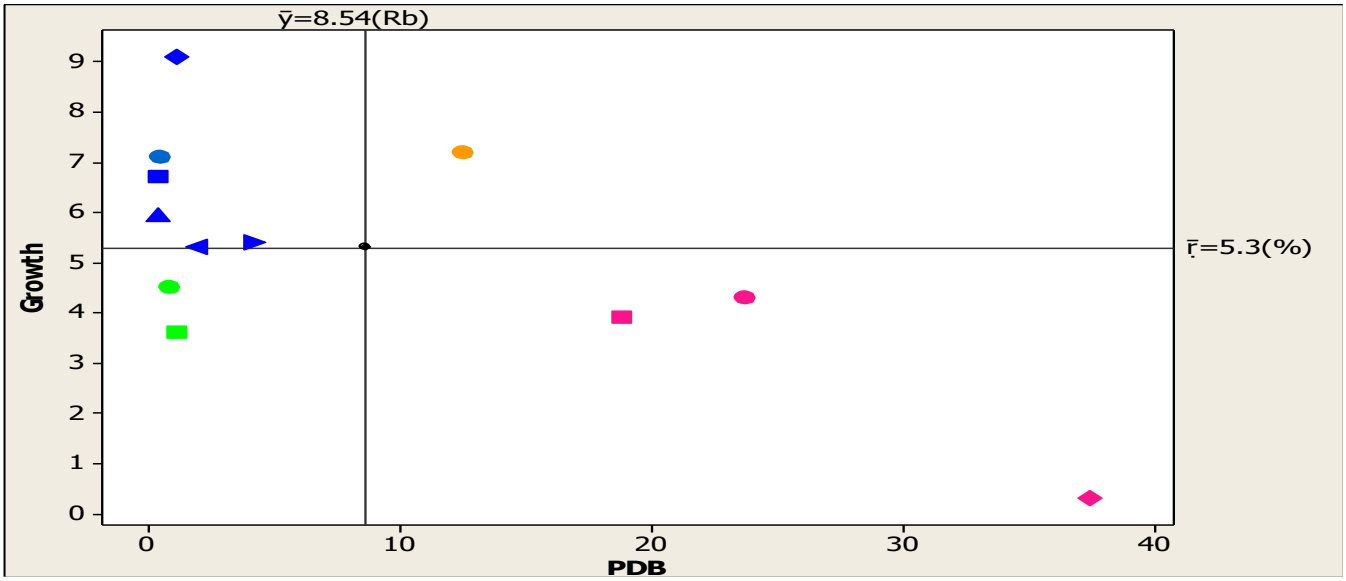
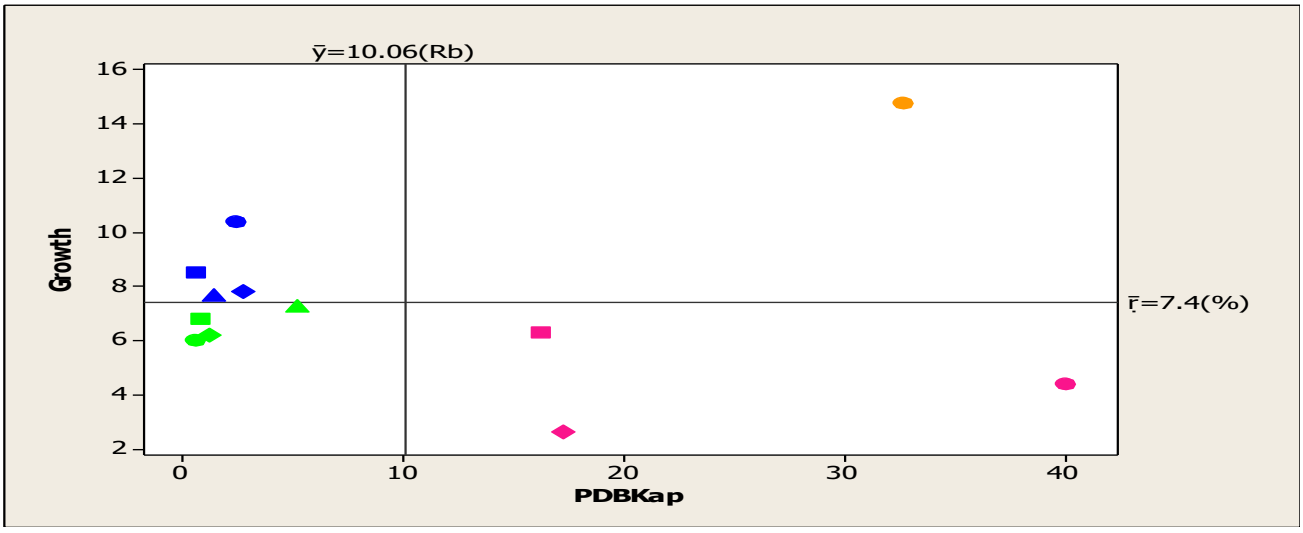
capita income and high GDP growth so it is in quadrant I. While countries with high per capita income tend to have lower economic growth than average is in quadrant II. The countries that are in the second quadrant are the countries that are classified as high income such as Japan, Brunei, and Singapore. On the contrary, Cambodia, Laos, Malaysia, Vietnam, Thailand and China with high economic growth tend to still have low income of capita so it is in quadrant IV. Quadrant III consists of countries with low economic growth and per capita income such as Indonesia and Philippines. Country mapping based on real GDP growth and per capita income for 2002 and 2010 is shown in Figure 3 and Figure 4 below.

Figure. 3: Country Mapping Based on Real PDB Growth and the Size of Income Per Capita in 2002



Source: World Bank, 2013 (processed)

Figure. 4: Country Mapping Based on Real GDP Growth and Size of GDP per Capita in 2010



Source: World Bank, 2013 (proccesed)

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Note:

Quadran I	Quadran II	Quadran III	Quadran IV
● Singapore	● Japan	● Cambodia	● China
	■ South Korea	■ Vietnam	■ Laos
	◆ Brunei	◆ Indonesia	◆ Thailand
		▲ Malaysia	▲ Phillipine

In 2010 there is a position change of each country seen from real GDP growth and GDP per capita. Singapore shows the condition of gold in its economy with high per capita income as well as economic growth which is much higher than other countries, so it is in quadrant I. While South Korea which in 2002 was in quadrant I, to be in quadrant II in 2010 together With Japan, and Brunei Darussalam in 2010. Quadrant II consists of countries with high per capita income but lower economic growth compared to the average. Quadrant III consists of Cambodia, Indonesia, Laos, Malaysia, and Vietnam which have real GDP growth and per capita income that is lower than average. Countries of the Philippines, Thailand, and China are in the Quadrant IV with high real GDP growth but low per capita income.

Countries in Quadrants I and III may still experience an increase in the economy by increasing their revenues. While countries in Quadrant III have low per capita incomes, high economic growth still allows those countries to become more advanced by increasing the full use of resources. Full employment resource utilization allows these countries to catch up with other developed member countries. Whereas countries in Quadrant IV that have low growth and per capita income will be more difficult to improve their economic condition and catch up with developed countries. Therefore, countries with economic conditions should get protection and assistance from developed countries to face liberalization and increase their economic activity through the cooperation of ASEAN + 3. So it is hoped that the cooperation that has been done will provide a positive spill-over effect on developing countries and not turning off developing countries but having progress together.

The calculations performed by mapping the countries based on their growth and per capita income are strongly influenced by outliers which are the countries that achieve much higher or lower achievement than other countries, because they use the average value. As the calculations made in 2010 in which Singapore achieved a very high growth rate of real GDP, so that the average diguanakan also become very high.

Descriptive Analysis with Williamson Index

The first descriptive analysis is conducted by using the Williamson Index. Descriptive analysis is conducted by using Williamson Index (IW). The level of inequality that occurs in this method is reflected in an index number between 0 to 1 ($0 < IW < 1$). The calculations of the Williamson Index are shown in Figure 5 below.

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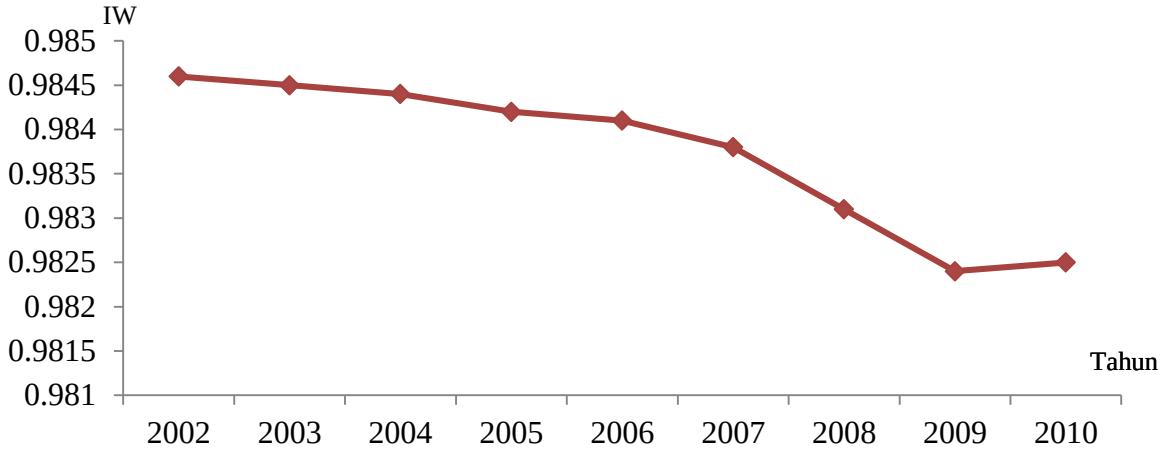
Figure.5: Williamson Index



Based on figure 6 it is seen that the Williamson Index result from the calculation of 0.98 is very close to the number 1. According to Williamson, IW value which is very close to 1 means a very high income per capita gap among the member countries of ASEAN + 3 for each year measured. The Williamson Index measures the level of inequality in each year so that it can be said that this calculation is static and cannot show the process within the calculated year. This static nature is then overcome by counting the Williamson Index for several years from 2002 to 2010, so that although it cannot be seen in one year's movements, it will still be visible from year to year over the calculated period. The movement from year to year can indicate whether there is a income per capita convergence of the member countries of ASEAN + 3.

Through the calculation of Williamson Index conducted in the period 2002 to 2010 produced that there is still a high imbalance among the member countries of ASEAN + 3. This means that the cooperation of ASEAN + 3 is still not able to provide a positive spill-over effect, especially for the developing member countries. The advantages and benefits of cooperation cannot be equally accepted for all the member countries. Some countries experience an increase in income per capita while others have not increased; so that in the end the result is the condition of the economy with unequal income.

Based on the calculation, it is also known that in the period 2002 to 2010, IW value decreased from year to year, although with a low rate of decline. This decreasing IW value can be interpreted that with the occurrence of convergence process among the member countries of ASEAN + 3, the IW scores that tend to be smaller indicate that the inequality decreases so that the income per capita moves toward a converging process to a uniform point. The convergence process is still very slow because the decrease in inequality calculated based on Williamson Index is also very small, but probably one day there will be a truly uneven economy with a low level of inequality.

Economic Growth Convergence Model of the Member Countries of ASEAN + 3

The F-statistic value in Chow test in Table 5 is 1.76 smaller than F-table (1,107) of 6.85 so the best model to describe unconditional convergence condition in this research is Pooled Least Square (PLS). This means that without being followed by certain conditions of each country, the pattern of economic growth of each country tends to have no difference with the constant

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αi for all observations. The Chow test estimation results and the Pooled Least Square model estimation results on unconditional convergence are shown in the following table 2 and 3.

Table. 2: Estimation Result of Chow Test

Approach: LSDV			
Effects Test	Statistik	d.f.	Probability
Cross-section F	1.76184	(11.95)	0.0717

Table. 3: Estimation Result of *Pooled Least Square* (PLS) Model

Variable	***Pooled Least Square***
Ln $y_{i,t-1}$	0.98792
(probability)	(0.0000)
Konstanta	0.13593
(probability)	(0.0000)
R-squared	0.99899
Adjusted R-squared	0.99898
F-statistic	105114
Prob(*F-statistic*)	0.00000
Durbin-Watson stat	1.98143

Source: World Bank, 2013 (processwed)

Based on Klein test, the correlation coefficient value of each independent variable which is smaller than Adjusted R-squared value of 0.99 indicates there is no multicollinearity problem in the model. Meanwhile the autocorrelation test is conducted by h test statistic because the model uses the dependent variable lag as one of its independent variables. The statistical value of the h model of -0.104 is smaller than the value of Z0.025 table of |1.96|, so that H_0 is accepted and it can be decided there is no autocorrelation problem. The F-statistic value of 105114 is greater than F (1,107) which means that the independent variable is able to describe the diversity of the dependent variable in the model for 99.9%.

The panel model in Table 5 above shows the value (1+ß) is 0.98. The level of convergence can be seen from the value of ß resulting from the estimation. If the value (1 + ß) is 0.98, then the value of ß is -0.01 (1-0.99). The ß values between 0 and -1 indicate a process of economic growth convergence calculated from the income per capita among ASEAN, Japan, China and South Korea. The panel data analysis shows that the economic growth trend of ASEAN + 3 countries is moving towards an increasingly convergent point, but the process is very slow. The PLS model shows that the economic growth pattern of each country tends not to differ from the constant αi for all observations. This is due to the calculation of economic growth does not include many other factors that can actually affect the economic growth of each country. However, the selected PLS model does not capture any differences in each of the estimated countries, resulting in the same effect in each country. For example, this model does not take into account the presence of investment and the trade among the ASEAN + 3 countries which can increase and accelerate the convergence process.

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The conditional convergence adds Foreign Direct Investment (FDI), government expenditure, industry value added, service value added, agricultural value added, net export (export-import), and labor. Based on Chow test and Hausman test, the best model is fixed effects with weighted statistic. This model means that each country has a different pattern of economic growth as shown in Table 4 below.

Table. 4: Cross-section Effects of ASEAN+3 Countries

No	Country	Effect	No	Country	Effect
1	Brunei	-0.001990	8	Thailand	-0.001022
2	Cambodia	0.003759	9	Vietnam	-0.005374
3	Indonesia	-0.004067	10	Japan	0.003723
4	Laos	0.002489	11	China	0.000530
5	Malaysia	0.002230	12	Korea Selatan	0.001963
6	Filipina	-0.003270			
7	Singapore	0.001029			

Table 5 and 6 show the estimation result of selecting the best model based on the following Chow and Hausman tests:

Table. 5: Estimation Result of Chow Test

Result	Statistic	d.f.	Probability
Cross-section F	5.7485	(11.88)	0.0000

The probability value of Cross-section F of 0.0000 is smaller than the alpha of 5% so H_0 is rejected and it is decided that the best model is FEM. Then the model selection with FEM and REM approach through Hausman test is conducted.

Table. 6: Estimation Results of Hausman Test

Test Result	Chi-Sq. Statistic	Chi-Sq. d.f.	Probability
Cross-section random	17.282185	8	0.0273

The probability value of cross-section random of 0.027 is smaller than the alpha of 5% so H_0 is rejected and the best model is FEM. The estimation result of FEM model with weighted statistic is as follows

Table. 7: Estimation Results of Fixed Effects Model with Weighted Statistic

Variable	Coefficient	t-statistic	Probability
$y_{i,t-1}$	0.781028	19.96562	0.0000
FDI	0.003731	1.972446	0.0517
NetEks	0.001763	0.982243	0.3287
Agval	-0.053264	-1.150889	0.2529
Inval	0.069898	5.126465	0.0000
Serval	0.168138	5.233755	0.0000
Govex	-0.054436	-6.027697	0.0000

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Labor	-0.000231	-0.510917	0.6107
R-squared			0.9999
Adjusted R-squared			0.9998
F-statistic			35286
Prob(*F-statistic*)			0.0000
Durbin-Watson stat			1.7743

(*) significant on real level 10%

The problem of multicolinearity can be seen based on the partial correlation between each independent variable. According to Klein test, the multicolinearity problem in the model used can be ignored because the partial correlation of each independent variable is smaller than the adjusted R-squared model of 99.98%. The treatment of cross section weights and white covariance coefficient: the cross section method on the model causes the heteroscedasticity problem to be neglected. While the problem of heteroscedasticity can be seen from the h test statistic because the model uses lag dependent variable as independent variable. Based on the calculations obtained that the h value of statistics is equal to 1.14 is smaller than z0.025 table value of |1.96| so it is decided to accept H_0 and there is no autocorrelation violation in the model.

The further tests are performed by statistical tests such as the F-test, the determination test, and the t-test. The FEM model shows a F-statistic value of 35286 which is larger than F-table (8,100) 2.66 then it is decided reject H0. This means that the independent variables used are able to explain the diversity of dependent variables. A fit model can be used to measure convergence between ASEAN + 3 countries and determine the factors that affect significant economic growth through the t-test.

CONCLUSION

Mapping results based on real GDP growth and income per capita show that there was a change of state position in 2002 and 2010. South Korea in 2002 was in Quadrant I with real GDP growth and high income per capita, then in 2010 shifted to Quadrant II along with Japan and Brunei Darussalam. While Singapore originally is in Quadrant II shifted to Quadrant I in 2010. Cambodia, Laos, Vietnam, Malaysia, Thailand, and China are in Quadrant IV year 2002. Meanwhile Indonesia and Philippines are in Quadrant III with the growth and the low income per capita. In 2010 Malaysia and Vietnam shifted to the Quadrant III with Cambodia and Indonesia.

Based on the analysis of inequality by calculating the Williamson Index it is known that the income of ASEAN + 3 member countries is still very unbalanced with the index rate of an average of 0.98 per year. However, when it is viewed from year to year during the estimation period, the value of the Williamson Index tends to decrease, although it is very low. This shows the tendency of the movement of economic growth is increasingly convergent with the decreasing inequality level. The results of the analysis through calculation of Williamson Index are also in accordance with the results of the analysis conducted by panel data method. The result of panel data analysis shows that there is conditional and unconditional convergence process of economic growth of ASEAN + 3 countries because the dependent variable lag coefficient of -0.1 and -0.2 is between -1 and 0. The convergence process that occurs tends to be very slow and takes a long time because the convergence rate occurs only by 10% on

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unconditional convergence and 20% on conditional convergence. In addition, the decrease in the Williamson Index also looks very small from year to year.

Through this research it can be seen that the factors affect the economic growth of ASEAN + 3 countries are significantly positive, among others are yi, t-1, Foreign Direct Investment, industry value added, and service value added. Meanwhile the variable of agricultural value added and the government expenditure have significant negative effect. The labor and the net export variables do not significantly affect the economic growth in this study. Based on the analysis results, it is also known that the service value added variable gives the biggest influence to the economic growth of ASEAN + 3 countries.

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