LABOR MOBILITY, FISCAL DECENTRALIZATION, AND ECONOMIC CONVERGENCE BETTWEN REGIONS IN INDONESIA

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Abstract- The purpose of this study is to analyze the economic convergence between regions in Indonesia. By using a panel data of 33 provincial regions in 1987-2014, analysis of economic convergence between regions in Indonesia is divided into two parts, sigma convergence and beta convergence. It was found that a decline in economic disparity between regions in Indonesia or sigma convergence. Economic convergence that occurs due to poor regions grows faster than other one or beta convergence, with the convergence speeds of 0.05 per cent and takes as long as 1,514 years for achieving equality. Convergence can be accelerated to 0.20 by controlling variable labor mobility and fiscal decentralization policy, while the time required for achieving equality among regions is 352 years.

Keywords- Economy Disparity, Sigma Konvergence, Beta Konvergence Unconditional, Beta Konvergensi Conditional.

I. INTRODUCTION

Economic disparities between regions become a common phenomenon in many countries. This disparity was originally due to differences in the content of the natural resources and differences in demographic conditions of each region (Sjafrizal, 2012). The dynamics of decrease or increase is called the convergence or divergence.

Economic convergence between regions or between countries become a major issue in the literature of regional growth theory which is based on the neoclassical growth model. According to the neoclassical growth model Solow (1956) and Swan (1956) states that to encourage the growth of output required amount of investments or investments. Assuming that the diminishing return to capital, poor region that have low capital will grow faster than richer regions that have high capital. Thus, in the long term per capita income between regions will be the same or convergent (Barro & Sala-i-Martin, 1991).

Research on economic convergence between regions or between countries has been widely applied in many countries. For instance, in Romania Munteanu (2015), American Latin Dobson & Ramlogan (2002), Canada Coulombe & Tremblay (2001), United State (Yu & Lee, 2012), Thailand Fakthong (2012), Greece Liargovas & Fotopoulos (2009), China Wei & Ye (2009), India Agarwalla & Pangotra (2011), and other countries. While the study of economic convergence between regions in Indonesia is still very little, for example Aritenang (2008), Firdaus & Yusop (2009), Kharisma & Saleh (2013), and Rahayu, Ismail, Santoso, & Pratomo (2015).

Differences in per capita income show that the economic disparity between regions in Indonesia. The question is whether the economic disparity between regions is experiencing convergence or divergence? Whether labor mobility and fiscal decentralization accelerate the process of convergence is happening? To answer these questions, we using a model Barro & Sala-i-Martin (1992) approach to analysis of economic convergence among the provinces in Indonesia.

After the introductory part of the content, the theoretical framework underlying the analysis of economic convergence between regions in Indonesia will be presented. Wherein, the theory underlying the model is neoclassical growth theory. The analytical method used becomes an integral part in the writing of this paper. The findings of the research will be described in the following research methods, and this paper then end with some conclusions.

II. LITERATURE REVIEW

1.1 The Concept of Convergence

According to Barro & Sala-i-Martin (1991) there are two concepts of convergence into the analysis of economic growth between countries or between regions. The first concept is the decline in value of income percapita disparities between regions over time. This means that the convergence occurs if the dispersion, as measured by the standard deviation, the income per capita between countries or regions decreased over time. This concept is called sigma convergence. The second concept is the convergence applies if the poor economy growth faster than the rich one, so that in the long term all region will converge on the steady-state. This concept is called beta-convergence.

1.2 Neoclassic Growth Model

The neoclassical growth model was built first by Solow (1956) and Swan (1956). The structure of the neoclassical growth model is to explain the mechanism of long-term economic growth. Where the accumulation of capital and labor growth explains the growth of output per worker or labor productivity (Alexiadis, 2013).

The analysis of the neoclassical growth model can be simplified in the one sector growth model. The assumption of this model is that each region produces the same type of product, using a combination of production factors of capital and labor, which is assumed to be homogeneous. The model also assumes that the production function between regions was same and diminishing returns to capital as well as the constant return to scale. By removing the influence of technology, output is determined by the input of capital and labor. In general, the production function per worker can be written as follows:

$$y_{i,t} = f(k_{i,t}) \quad (1)$$

where $k_{i,t} = \frac{K_{i,t}}{L_{i,t}}$.

Simple neoclassical growth model shows that the regional economy growth depends on the growth of labor and capital inputs. Changes in the number of labor force from over time due to population growth, changes in labor force participation rates, and the shift time work by specialized workers. Thus, the growth of population reflects the birth rate, death rate and immigration rate (Barro, Mankiw, & Sala-i-Martin, 1995). Although these factors are endogenous, in the long run, labor supply is often assumed to be exogenous.

The second source of growth in a simple neoclassical growth model is the accumulation of physical capital. Based on the assumption that the investment is equal to the savings, the production function can be rewritten as follows (Barro dan Sala-i-Martin, 1995):

$$\dot{K}_{i,t} = sL_{i,t}f(k_{i,t}) - \delta K_{i,t}. \quad (2)$$

The steady-state equilibrium can be achieved by lowering the equation changes in capital per worker over time. Thus, changes in capital per worker can be written as follows:

$$\dot{k}_{i,t} = sf(k_{i,t}) - (n + \delta)k_{i,t}. \quad (3)$$

To achieve steady-state ($\dot{k}_{i,t} = 0$) then the balance of capital per worker (k^*) must satisfy the condition:

$$sf(k^*) = (n + \delta)k^*. \quad (4)$$

Thus, for all economies converge to steady-state conditions of the production function and saving preferences between regions must be equal. Even if the initial levels of capital per worker differ between regions each region will end at the same point of balance.

The concepts of dynamic transitions are used to describe the process of convergence of output per worker between regions in steady-state conditions. In this case, the main driving force is the shift of capital per worker.

This dynamic transition process can be used to describe the process of economic convergence between regions. Suppose the economy is divided into two regions, the region i and region j. Both regions have different initial capital per worker, capital per worker initial of region i $(k_{i,0})$ is higher than the initial capital per worker region j $(k_{j,0})$. It is assumed that the growths of labor and depreciation rates were similar between the two regions, as well as saving preferences and consumption is also assumed to be equal. However, the growth rate of both regions depends on the underlying parameter, namely the displacement towards balance is not the same at any point and time.

Assuming additional capital diminishing results, then the additional investment in physical capital is not sufficiently profitable in regions rich in (i) for each additional capital in region i generate additional output slightly compared with the region j. So the poor region will grow faster than rich region, or more specifically that regions with low capital per worker will grow faster because both region moving toward the same of the steady-state, k^*.

The neoclassical model provides a clear understanding of how the poor region will experience catching-up. This model predicts that if the regions are assumed to have the production function and the same preferences, but the stock of initial capital differently, then the poor regions are defined as regions with the value of capital per worker initial low, will grow faster and chase rich regions, to process convergence at steady-state conditions. Differences in growth rates are an imbalance phenomenon and will disappear in the long term between regions where the economy will be the same. Predictions that a group of economies will converge in the manner described above at steady-state the same, referred to as the unconditional convergence. The process of catching-up, manifested in different growth rate, which is referred to as beta convergence.

1.3 Empirical Evidence

Testing of economic convergence between regions has been done by previous researchers in various countries. In Romania Munteanu (2015) found evidence that the economy between regions in Romania experienced a divergence based on test results sigma convergence, while beta convergence results did not find the same conclusion. The same was found by Dobson & Ramlogan (2002) in Latin American that the process of economic convergence between regions occur quite slowly, but there is no convincing evidence of sigma convergence. While Liargovas & Fotopoulos (2009) found a decrease in the economic disparities between the regions and the relationship between disparity and economic growth in Greece. Likewise, the Agarwalla & Pangotra (2011) found evidence of economic convergence between regions in India.

By controlling the variables of human capital, Coulombe & Tremblay (2001) suggested that economic convergence between regions in Canada would be faster if there is an increase investment in the education sector. The same thing Fakthong (2012) found in Thailand that with the addition of a subsidy for the education sector in the form of research and development investments capable of accelerating economic convergence between regions in Thailand.

Unlike the case with Yu & Lee (2012), which examines the convergence in the United States with spillovers technological factors enter into the neoclassical framework, found the level of economic convergence among states in the United States is higher. Kırdar & Saracoglu (2007) found a negative relationship between economic convergence between regions and the mobility of the population in Turkey, while research Rappaport (2005) concluded that the increased mobility of labor slow economic convergence is relatively low.

Testing of economic convergence between regions in Indonesia has been carried out by Aritenang (2008). By using a panel data of 26 provinces from 1993 to 2005, Aritenang (2008) concluded that there is evidence of economic convergence between regions in Indonesia, but fiscal decentralization has no significant effect on the reduction in economic disparities between regions. With the same amount of region, Firdaus & Yusop (2009) also did testing economic convergence between regions in Indonesia from 1983 to 2003. The study concluded that economic convergence between regions in Indonesia with the speed of convergence 0.29 percent. Kharisma & Saleh (2013) also did testing of economic convergence in the 26 provincial regions in Indonesia from 1984 to 2008. The study concluded that there is evidence of economic convergence between regions in Indonesia with the speed of convergence is quite high. While research Rahayu et al. (2015) find the influence of natural resources and human capital in accelerating economic convergence between districts/cities in Kalimantan.

III. RESEARCH METHOD

Data used in this study is panel data comprising 33 provincial regions from 1987-2014. The data used in this research is data GDRP per capita, and the number of in-migration. Economic data was measured at constant prices in 2010.

Testing of economic convergence between regions in this study was divided into two parts, namely the sigma convergence and beta convergence. Sigma convergence testing was performed using a linear regression model between Williamson index (IW) and a time line (T) (Goschin, 2014):

$$IW_t = \alpha_1 - \alpha_2 T + \varepsilon_t, \qquad (5)$$

where α_1 and α_2 is constant and the regression coefficients respectively, while ε is the residual. To estimate the regression coefficients, the sigma convergence models be estimated by using the OLS method. If the sign of regression coefficient is negative this indicates the occurrence of convergence, divergence indicates otherwise.

Beta convergence model in this study was divided into two parts, namely the unconditional convergence model and conditional convergence models. The unconditional convergence model can be written as follows:

$$\frac{1}{T}\log\left(\frac{Y_{i,t}}{Y_{i,t-1}}\right) = \gamma_1 - \gamma_2 \log Y_{i,t-1} + u_{i,t} \qquad (6)$$

where Y is GDRP per capita, γ_1 and γ_2 is constant and the regression coefficients respectively, and $u_{i,t}$ is the residual. Interregional economy is said to converge if the coefficient of initial percapita income is negative, otherwise diverges if the regression coefficient is positive.

The conditional convergence models constructed by inserting some control variables in the unconditional convergence model. The control variables in question are labor mobility and fiscal decentralization policy. Thus, the conditional convergence model can be written as follows:

$$\frac{1}{T}\log\left(\frac{Y_{i,t}}{Y_{i,t-1}}\right) = \gamma_1 - \gamma_2 \log Y_{i,t-1} + \gamma_3 \log M_{i,t} + \gamma_4 D + u_{it} \qquad (7)$$

Where M is labor mobility as measured by in-migration and D is a dummy variable that describes the fiscal decentralization policy.

The speed of economic convergence (β) between regions to achieve economic equality under steady-state conditions during a certain period of time can be calculated as follows (Arbia, 2006):

$$\beta = -\frac{\ln(\gamma_2 + 1)}{T} \qquad (8)$$

While the amount of time required between regional economy into converging at steady-state can be calculated using the time half-life (Arbia, 2006).

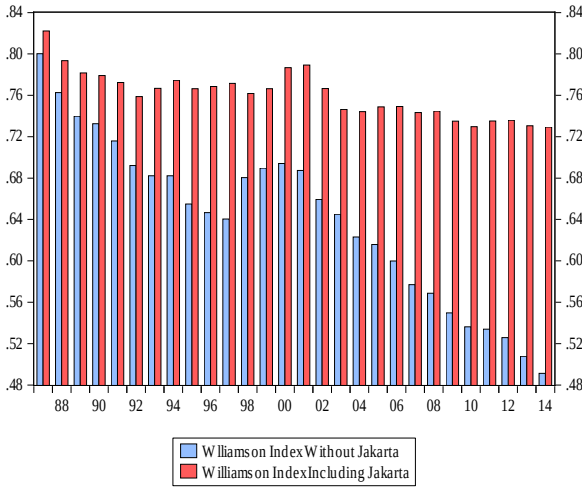
The sigma convergence model in equation (5) above is a time series regression model. Thus, the model needs to be done the unit root test using Augmented Dickey-Fuller test (ADF) (Gujarati, 2004).

The unconditional convergence and conditional convergence on the equation (6) and (7) is the panel data regression model. To view the effect of cross-sectoral and cross-time in the model, then the model can be estimated using three approaches, namely Common Effect Model (CEM), Fixed Effects Model (FEM), and Random Effects Model (REM). Estimation of which one to use depends on the model test results performed. The test tool models to choose the best model estimation is the Chow test, Hausman test, and Langerange Multiplier (LM) test (Baltagi, 2005). The research model in equation (5), (6) and (7) must meet the assumptions underlying the linear regression model that models are Best Linear Unbiased Estimator (BLUE). Testing assumptions are made through multicolinearity test (especially in the conditional convergence model), heteroscedasticity test and autocorrelation test.

IV. RESULTS AND DISCUSSION

Economic disparities between regions in Indonesia were measured using Williamson index, and the results are shown by Graph 1.

Graph 1: Williamson Index between Provinces in Indonesia, 1987-2014



In Graph 1 above shows that the economic disparity between regions in Indonesia is quite high at 82.22 per cent in 1987. Despite a previous decline, but the economic disparities between regions in Indonesia to increase again in 2000 and 2001 as the impact of the economic crisis that occurred in 1997/1998. Since 2002 the economic disparity between regions in Indonesia decreased slowly, and in 2014 the economic disparity between regions in Indonesia became 72.93 percent.

Furthermore, it was found that the economic disparity between regions in Indonesia is relatively lower output DKI Jakarta province were not included in the index calculation Williamson. The average value of the index Williamson calculated without DKI Jakarta is 64.05 percent, while if including Jakarta average index value Williamson was 76.06 percent. These findings are evidence that high economic disparity between regions in Indonesia occurred because of national economic activity is concentrated in the region of Java island, especially in the province of Jakarta. These findings can be seen from the proportion of the GDRP of provinces in Java to the GDRP of all provinces in Indonesia in 2014, which reached 58.67 percent, while the Jakarta provincial accounted for 16.18 percent.

Judging from the trend, the economic disparity between regions in Indonesia has fluctuated over time. However, in general, the economic disparity between regions in Indonesia has decreased. These findings can be tested through analysis of sigma convergence and beta convergence which will be discussed in the next section.

1.4 Sigma Convergence Analysis

ADF test results in equation (5) concluded that the sigma convergence model has not unit root or stationary. While based on the classical assumption that the model beckon transformed using methods Conchrane-Orcutt meet the assumption BLUE. The results estimation of sigma convergence model which has been transformed listed in Table 1.

Table 1: Estimation Sigma Convergence Model between Provinces in Indonesia, 1987-2014

Independent Variable (1)	Dependent Variable (IW_t) 1987-2014 (2)	1987-2000 (3)	2001-2014 (4)
C	5.1464*** (0.7503)	-1.9102 (4.2940)	4.3254*** (1.2285)
Time (T)	-0.0022*** (0.0003)	0.0013 (0.0021)	-0.0018*** (0.0006)
R-square	0.8522	0.4860	0.8409
F-statistic	42.2707***	4.7283**	26.4312***
D-W	1.6295	1.7906	2.0339

Note: * are significant respectively at 10%, ** are significant respectively at 5%, *** are significant respectively at 1%.

From the results of estimation sigma convergence model with OLS method, we take the regression coefficient about -0.0022 (column 2) and significant at one percent error term. The negative sign in the regression coefficients show that the economic disparity between regions decreased or convergence from 1987-2014. This finding is in line results of research conducted by Firdaus & Yusop (2009) and Kharisma & Saleh (2013). However, if patterned according to the time interval used (in columns 3 and 4), reduction in economic disparities between regions in Indonesia occurred after the fiscal decentralization policy in 2001. While the prior fiscal decentralization is happening is economic divergence. This finding is evidence that fiscal decentralization in Indonesia since 2001 able to reduce economic disparities between regions. This finding contrasts with the conclusion Aritenang (2008) that there is no evidence of the effect of fiscal decentralization on the decline of economic disparities between regions in Indonesia.

1.5 Beta Convergence Analysis

Analysis of beta convergence in this study was divided into two parts, namely unconditional convergence and conditional convergence. The unconditional convergence will be discussed at the first and conditional convergence will be discussed in the next section.

Unconditional Convergence

Based on the results of the Chow test, Hausman test and Lagrange Multiplier (LM) test, the unconditional convergence model in equation (5) above are estimated using the Common Effect approach. Results heteroscedasticity test and autocorrelation test concluded that it meets the assumptions of BLUE. The unconditional convergence model estimation results are shown in Table 2.

Table 2: Estimation of Unconditional Convergence Model between Provinces in Indonesia, 1987-2014

Independent Variable (1)	Dependent Variable ($\log Y_{i,t} - \log Y_{i,t-1}$) 1987-2014 (4)	1987-2000 (2)	2001-2014 (3)
C	0.0704*** (0.0101)	0.6177*** (0.0804)	0.0657*** (0.0149)
$\log Y_{i,0}$	-0.0127*** (0.0024)	-0.1437*** (0.0191)	0.0109*** (0.0034)
R-square	0.1816	0.3382	0.4248
F-statistic	86.5162***	5.8674***	94.049
D-W	2.0814	2.0577	2.0322

Note: * are significant respectively at 10%, ** are significant respectively at 5%, *** are significant respectively at 1%.

The results estimation of unconditional convergence model obtained the value of regression coefficient is -0.0127 as well as significant at one percent error term. Thus, we can conclude that the economy between regions in Indonesia converges. In other words, poor regions in Indonesia grew faster than richer one. These findings concur with those of Firdaus & Yusop (2009), Kharisma & Saleh (2013), and Aritenang (2008).

In contrast to the findings of Firdaus & Yusop (2009) and Kharisma & Saleh (2013), the speed of convergence on the study found is very slow, which is about 0.05 percent. So that economic equality between regions in Indonesia requires a long time, which is about 1,514 years. This happens because in this study using the 33 provincial regions in Indonesia in estimating beta convergence, while research of Firdaus & Yusop (2009) and Kharisma & Saleh (2013) only uses 26 of the provinces of the 33 provinces.

If we divided by the time interval analysis, it was found that the economic convergence between regions in Indonesia have occurred since the year 1987-2000 until 2001-2014. This is evidenced by the negative sign on the regression coefficient (column 3 and 4). This finding contrasts with the findings on an analysis of sigma convergence before, namely that economic convergence between regions in Indonesia occurred only after the adoption of the fiscal decentralization in 2001. These findings support the hypothesis of Quah (1993) that the beta convergence is necessary condition but not sufficient condition.

Conditional Convergence

The conditional convergence model in equation (7) above is estimated using the approach by OLS Fixed Effect. The model also meets the BLUE assumptions based on test results multicollinearity, heteroscedasticity and autocorrelation. The results of model estimation are as shown in Table 3.

Table 3: Estimation of Conditional Convergence Model between Provinces in Indonesia, 1987-2014

Independent Variable (1)	Dependent Variable ($\log Y_{i,t} - \log Y_{i,t-1}$)		
	1987-2014 (2)	1987-2000 (3)	2001-2014 (4)
C	0.0911** (0.0453)	0.1931** (0.0862)	-0.1140** (0.0552)
$\log Y_{i,0}$	-0.0537*** (0.0095)	-0.1635*** (0.0191)	-0.0075 (0.0120)
$\log M_{i,t}$	0.0269*** (0.0089)	-0.0909*** (0.0197)	0.0289** (0.0116)
Dummy	0.0055*** (0.0021)	-	-
R-square	0.1148	0.2328	0.2332
F-statistic	2.8909***	3.7770***	3.3282***
D-W	1.9797	2.0055	2.0445

Note: * are significant respectively at 10%, ** are significant respectively at 5%, *** are significant respectively at 1%.

From the estimation models found the coefficient of initial GDRP per capita is -0.0537 (column 2) and significant at one percent error term. These findings indicate that by controlling some of the variables that affect the growth, the poor region in Indonesia grew faster than richer one or conditional convergence. These findings support the results of the analysis of sigma convergence and unconditional convergence previous. Meanwhile, if divided by the time interval, after 2001 there is no evidence of convergence condisional.

Both controlled variable in the model, the labor mobility and fiscal decentralization policy, have a significant effect on economic growth in the region with the value of each regression coefficient 0.0269 and 0.0055. This means that the increase in labor mobility between regions and the implementation of fiscal decentralization policy since 2001 will facilitate economic growth regions in Indonesia.

The positive and significant coefficient on the labor mobility have shown that increased labor mobility accelerate economic convergence between regions in Indonesia. This finding contradicts the findings of Rappaport (2005) which concluded that the increased labor mobility of slowing economic convergence in income levels is relatively low, and research Kırdar & Saracoglu (2007) who found a negative relationship between mobility and economic convergence between regions in Turkey.

Similarly of the labor mobility, fiscal decentralization policy implemented since 2001 are able to accelerate economic convergence between regions in Indonesia. This finding contrasts with the results of research Aritenang (2008) who found evidence of the effect of fiscal decentralization on economic convergence between regions in Indonesia. The difference this finding occurred because the time interval in research Aritenang (2008) is relatively shorter than the one used in this study.

By controlling several variables that affect the growth, economic convergence between regions in Indonesia are found more quickly than konvergesi unconditional. Conditional convergence speed is 0.20 percent by the time needed to achieve equalization is 352 years.

CONCLUSIONS

This study examined the economic convergence between regions in Indonesia using panel data of 33 provincial regions in 1987-2014. Testing convergence of GDRP per capita between the regions is done using the model of Barro & Sala-i-Martin (1992), while the economic disparity between regions measured using Williamson index.

From these results it can be concluded that the economic disparity between regions in Indonesia is quite high, due to because they focused the economic activity in the region of Java Island. Secondly, through the analysis of sigma convergence of

evidence that a decline in economic disparity between regions in Indonesia, where the reduction in these disparities occur after the implementation of the fiscal decentralization in Indonesia in 2001. Third, found evidence those poor regions in Indonesia grow to faster than rich regions, either through the analysis of unconditional convergence and conditional convergence. Labor mobility and fiscal decentralization policies accelerate economic convergence between regions in Indonesia. Wherein, the speed of economic convergence between regions in Indonesia is quite slow, which is 0.05 to 0.20 per cent, as well as inter-regional economic equality is achieved in a span of 352 to 1,514 years.

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