



The Convergence of Economic Growth: Case Study of East Java

Herman Cahyo Diartho^{1✉}, ²Rafael Purtomo Somaji, ³Gheghe Rizky Kharisma

^{1,2,3}Economics and Business Faculty, University of Jember

Article Information Abstract

History of Article

Received April 2023

Accepted June 2023

Published August 2023

Keywords:

Economic Growth,

Convergence, Sigma

Convergence, Beta Convergence

Economic growth is a parameter in achieving regional economic development, which describes an increase in the actual production capacity and the dynamics of the regional economy. This study aims to determine whether there is a yearly decrease in economic growth inequality (sigma convergence) or an acceleration of low economic growth to high economic growth (beta convergence) in East Java in 2016 – 2021. This study used secondary data. The analytical method used in this study is convergence and panel data regression analysis. The results showed that the dispersion of economic growth experienced a downward trend, indicating the occurrence of sigma convergence in East Java. Underdeveloped regions do not grow faster than developed regions, showing no absolute beta convergence in East Java. The HDI and Population Variables have not been able to accelerate convergence in East Java, indicating no conditional beta convergence in East Java.

INTRODUCTION

Economic growth becomes a parameter in achieving regional economic development, which describes an increase in the actual production capacity and the dynamics of the regional economy. According to the basic theory of Neo-classical economic growth of Solow and Swan (1956), Economic growth is influenced by capital, labor, and technology, which are exogenous. However, the government can control the economic growth through the population, which will affect the availability of labor but has no impact on economic growth.

Economic growth is often not followed by economic equality, so it can only widen the gap between one region and another. The economy is categorized as developing if the per capita income increases in the long term. It can be driven by improving the quality of human resources, progress in capital resources, and proper management of natural resources. Economic development that has an impact on socio-economic conditions is the human development index. Economic growth increases when the amount of goods and services produced increases, making economic issues very important in society.

The involvement of the population in economic development is essential to increase income. Rapid population growth increases the number of workers, where government and society manage their resources and create new jobs to increase economic growth in the region (Arsyad, 1999).

East Java has higher economic performance compared to other provinces due to high economic growth in some regencies and cities in East Java. However, there is variation in each region, so the disparity between regions is high. If we take a closer look at the districts/cities in East Java, it seems that many regions can only feel high economic growth. Viewed from the real GRDP, more than 70% of districts/cities in East Java are below the provincial average of real GRDP. Real GRDP is one of the indicators to measure society welfare between regions. However, it cannot fully describe the people's welfare because there are regions with high real GRDP, but many people are still in poor condition. Regions with rich resources can produce greater GRDP, but all societies may not necessarily feel the results, so poor individuals cannot feel their wealth. This indicates the occurrence of disparity between regions in East Java. This means some regions are rich while others are poor or even very poor.

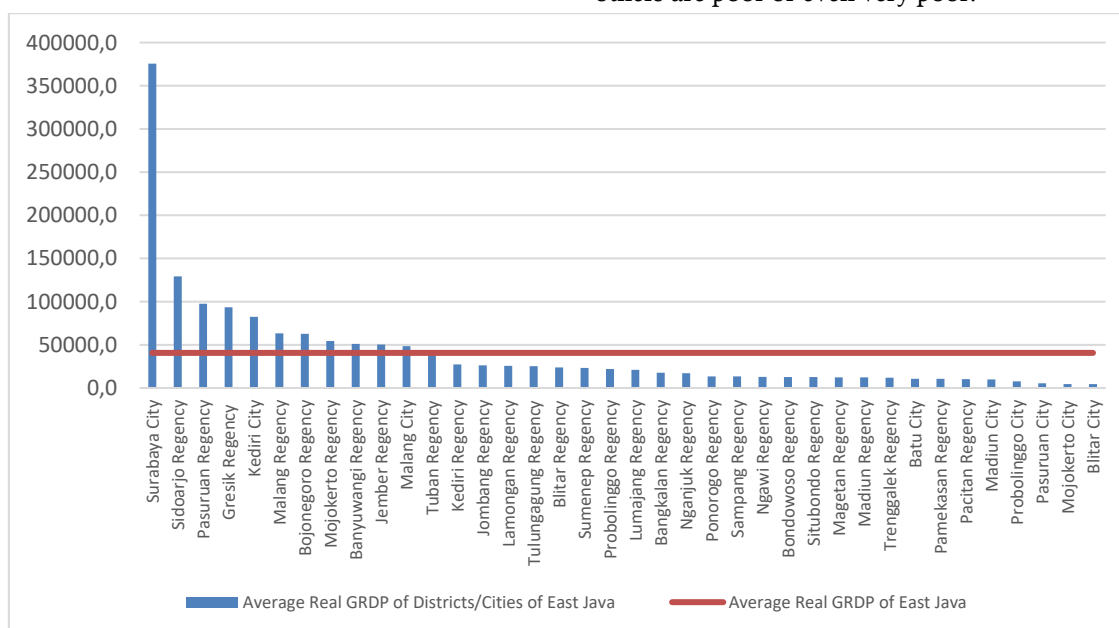


Figure 1. Average Real GRDP of Districts/Cities of East Java in 2016-2021 (billions)
Source: Data Processed, 2023

Based on Figure 1. There are variations of real GRDP between 38 regencies/cities in East Java in 2016-2021. The average GDRP of East Java is about Rp. 41539.7 billion, districts/cities in East Java Province can be grouped into two. First, there are only 10 regions with GRDP per capita above its average, namely Surabaya City, Sidoarjo Regency, Pasuruan Regency, Gresik Regency, Kediri City, Malang Regency, Bojonegoro Regency, Mojokerto Regency, Banyuwangi Regency and Jember Regency. Second, there are 28 regions with real GRDP below the average, namely Malang City, Tuban Regency, Kediri Regency, Jombang Regency, Lamongan Regency, Tulungagung Regency, Blitar Regency, Sumenep Regency, Probolinggo Regency, Lumajang Regency, Regency Bangkalan, Nganjuk Regency, Ponorogo Regency, Sampang Regency, Ngawi Regency, Bondowoso Regency, Situbondo Regency, Magetan Regency, Madiun Regency, Trenggalek Regency, Batu City, Pamekasan Regency, Pacitan Regency, Madiun City, Probolinggo City, Pasuruan City, Mojokerto City and Blitar City.

Specifically, Surabaya City has the highest real GRDP, while the region City has the lowest real GRDP is Blitar City. The high gap between rich and poor regions indicates inequality in East Java. So, it needs to accelerate the growth of underdeveloped regions in order to be equal with the developed regions, called convergent.

Convergence always happens in every country, both developing and developed countries. However, every country has different abilities and times according to conditions in each region or country to achieve convergence conditions. Convergence can be categorized into two types, namely, sigma convergence and beta convergence. Sigma convergence refers to the reduction of income inequality over time, while beta convergence is the convergence that occurs when the economy of a poorer region grows faster than that of a wealthier region. Beta convergence can be used to assess how quickly per capita GDP or variables can achieve convergence. Beta convergence consists of two hypotheses, namely absolute convergence and

conditional convergence. The theory of economic growth, which emphasizes the development of the production factors, is neoclassical growth theory. Neoclassical theory explains that per capita income growth is negatively related to the initial per capita income level. Therefore, if a country or region economically has the same utility and production function, then the developing country or region can have a relatively faster rate of economic growth than the developed country or region. Its condition is called convergence (Barro & Sala-i-Martin, 1992).

Another study related to convergence was conducted by Malik (2014), aiming to identify the level of convergence in Indonesia after the implementation of Regional Autonomy and analyze the effects of Foreign Direct Investment, Inter-Governmental Transfers, and Human Development Index on per capita GDP growth after the implementation of Regional Autonomy from 2001 to 2012. This study found that both σ -convergence and β -convergence occurred.

Foreign Direct Investment, Inter-Governmental Transfers, and the Human Development Index positively impacted Indonesia's per capita GDP from 2001 to 2012. From this research, it can be inferred that income convergence and economic growth yield different results when tested in different regions. This variation arises due to different regions having distinct economic factors and conditions. Therefore, the author needs to research income convergence and economic growth in Indonesia, particularly in the East Java region.

However, contradicting the findings, Yulisningrum and Styastuti (2015) indicated no convergence in economic growth in Indonesia from 1992 to 2012. Furthermore, according to Faqieh (2016), no convergence was observed on Madura Island from 2007 to 2014, as seen from absolute and conditional convergence perspectives. Similarly, Ahmad (2017) showed no convergence in cities and districts within Central Sulawesi.

The different result of some studies above lies in the object explicitly discussing economic growth convergence in East Java. The research

period starts in 2016-2021 by examining the Convergence of Sigma (σ) and Beta (β). Based on the background above, the authors are interested in analyzing the convergence of economic growth in East Java.

RESEARCH METHODS

This study used quantitative, emphasizing testing theory through measuring variables with numbers and conducting data analysis with statistical procedures. Secondary data is data obtained through third parties or other agencies. This study uses time series data for 2015-2021 and cross-section data covering regencies in East Java. This study's data sources were obtained from the Central Bureau of Statistics of East Java and agencies related to studies, various journals, books, theses, and other sources. In calculating the convergence of economic growth, convergence analysis is used, which is divided into two, namely as follows:

Sigma Convergence: This analysis is a time series analysis by observing the convergence of the observed variables by calculating the coefficient of variation. According to Shanker et al. in Achmad (2017), the formula for calculating the coefficient of variation each year is as follows:

$$CV = \frac{\sqrt{\frac{\sum(Y_i - \bar{Y})^2}{n}}}{\bar{Y}} \dots\dots\dots(1)$$

Where CV is the coefficient of variation in a particular year; Y_i represents the real GRDP of each region in year i ; \bar{Y} represents the mean real GRDP for 2016-2021, and n represents the number of districts in the study: the more excellent CV value, the greater the inequality in an area, and vice versa.

Beta Convergence According to Barro and Martin (1992), there are 2 models in beta convergence, namely absolute beta convergence and conditional beta convergence. The following is a panel data regression model with absolute beta convergence:

$$\ln PDRB_{it} = \beta_{0it} + \beta_1 \ln PDRB_{it-1} + u_{it} \dots\dots\dots(2)$$

Where β_0 represents constant/intercept; β_1 represents convergence coefficient; $PDRB_{it}$ represents real GRDP kabupaten Provinsi Jawa Timur tahun 2016-2021; $PDRB_{it-1}$ represent real GDRP of district/city in East Java in year $t-1$; u_{it} Represents error term; i represents cross-section (district/city in East Java); t represents time series (2016-2021). Meanwhile, the conditional beta convergence regression model is:

$$\ln PDRB_{it} = \beta_{0it} + \beta_1 \ln PDRB_{it-1} + \beta_2 \ln IPM_{it} + \beta_3 \ln JP_{it} + u_{it} \dots\dots\dots(3)$$

Where β_0 represents Constant/intercept; β_1 represents the Convergence Coefficient; $GRDP_{it}$ represents the real GRDP of the districts in East Java in 2016-2021; $GRDP_{it-1}$ represents the real GRDP of districts in East Java year $t-1$; IPM_{it} represented the Human Development Index of districts in East Java in 2016-2021; JP_{2it} represents the Total Population of districts in East Java in 2016-2021; u_{it} represents error term; i represents the cross section (district in East Java); t represents the time series 2016-2021.

Based on Barro and Sala-I Martin (2004), it is crucial to determine the pace of convergence as it signifies the economy's proximity to the steady state when it occurs quickly. On the contrary, the economy will drift away from a steady state if the convergence is sluggish. To compute the speed of convergence, one derives the formula below:

$$\text{Velocity of Convergence} = \text{Coefficient } \beta \times 100\% \dots\dots\dots(4)$$

Panel Data Regression Analysis: This study used panel data regression analysis. Panel or pooled data results from time series and cross-section data combination (Ekananda, 2015). The panel data estimation process has several models that can be used in research, including the following:

CEM (Common Effects Model) or what is known as Pooled Least Square (PLS). CEM (Common Effects Model) is a simple model in panel data, a model that does not observe individual or time dimensions so that it is

assumed that the behavior of each individual will be the same within a certain period.

$$Y_{it} = \alpha + X'_{it}\beta + \varepsilon_{it} \dots\dots\dots(5)$$

FEM (Fixed Effects Model) is a panel data regression model which assumes that each individual has different effects on the intercept's differences.

$$Y_{it} = \alpha_{it} + X'_{it}\beta + \varepsilon_{it} \dots\dots\dots(6)$$

The index i on the intercept α_i shows that the intercept of each individual is different, but the individual intercepts are the same (time-invariant). If there is a correlation between the independent variables, the FEM model used is usually X'_{it} and α_i characteristic.

REM (Random Effects Model) is commonly called an error component model. REM and FEM are different; the different characteristics of each error in the model can be seen through the REM model. The regression equation with the REM model is as follows:

$$Y_{it} = \alpha + X'_{it}\beta + w_{it} \dots\dots\dots(7)$$

Where w_{it} is the combined error term, which consists of the error cross-section component u_i and the error component at ε_{it} .

From the three models above, the model selection is then carried out by the Chow and Hausman tests so that the model used will be appropriate.

Chow test is used to test the significance of FEM so that it can be seen whether FEM is better to use than CEM. In this case, F-test probability is used to identify the model. The hypothesis of this test is H_0 means CEM is better than FEM; H_1 means FEM is better than CEM. Suppose the F-statistic value is more significant than the F-table, and its probability value is less than the significant level α . In that case, it is sufficient evidence to reject the null hypothesis, or it can be said that FEM is better than CEM.

Hausman test uses statistics that follow the chi-square distribution to determine whether the REM is better than FEM. The hypothesis in this test is H_0 means REM is better than FEM; H_1 means FEM is better than REM. Suppose the statistical value of the Hausman test is greater

than the chi-square table, and its probability value is less than the significance level (α). In that case, it will reject the null hypothesis, and FEM is better than REM.

Classic assumption test, panel data analysis can minimize bias in the results of panel data analysis. It provides information such as variation and degree of freedom (Gujarati, 2012). According to Sugiono (2011), regression can be done after the model from this study has fulfilled the requirements, namely passing the classical assumptions. These conditions are that the data does not multicollinearity, autocorrelation, and heteroscedasticity. The classic assumption test includes the following:

A test for multicollinearity was carried out to ascertain if there exists a correlation among the independent variables in the regression model. This can be established by examining the tolerance and variance inflation factor (VIF) values. To find out VIF value, we used the formulation as follows:

$$VIF = \frac{1}{(1-R^2)} \dots\dots\dots (8)$$

$VIF < 10$ means there is no multicollinearity in the model; $VIF > 10$ means there is multicollinearity in the model.

The heteroscedasticity test occurs "if the confounding variable has a variant that is not constant. This examination determines whether the regression model exhibits dissimilar variability among its residuals. If the variability of the residuals remains uniform, it is known as homoscedasticity. Conversely, if it varies, it is referred to as heteroscedasticity. The Park test can determine the existence of heteroscedasticity in the data. One of the methods used to detect heteroscedasticity is Glejser Test (Gujarati, 2006). If the t-statistic value $>$ t-table or probability value $\leq \alpha = 5\%$, then there is heteroscedasticity, and vice versa if the t-statistic t-table or value prob $\geq \alpha = 5\%$, then there is no heteroscedasticity.

A normality test was conducted to determine whether the observed data was normally distributed. Normally distributed variables can be observed using the Jarque-Berra

(JB) (Wardhono, 2004; 61). To determine whether the data is normally distributed by comparing the Jarque-Berra value with the chi-square value (X^2). If the value of $JB \leq X^2$ is not normally distributed. In addition, it can be seen by comparing the probability value of JB to determine whether the data is normally distributed. If the probability value of JB is greater than $\alpha > 5\%$, then it is normally distributed, and vice versa. If the probability value JB is $< 5\%$, it is not normally distributed.

Statistic test was carried out to determine the significance level of each independent variable regression coefficient on the dependent variable, so statistic tests can be used as follows:

Partial Significance Test (Uji t): The t-test, or partial significance test, is employed to ascertain the regression coefficient's significance level. This helps to examine the relationship between the independent and dependent variables individually. The formula of the t-test is as follows:

$$t = \frac{\beta_1}{(\beta_1)} \dots \dots \dots (9)$$

Where β_1 is Estimated parameters Se; (β_1) : Standard deviation of the 1st independent variable. Hypothesis $H_0 \beta \leq 0$ means the independent variable partially has a negative effect on the dependent variable; $H_1 \beta > 0$ means the independent variable partially has a positive effect on the dependent variable.

Decision-making criteria: If probability t count $\leq \alpha$ (0.05) where α is the amount of error tolerable in decision-making, then H_0 will be rejected and H_1 accepted. If arithmetic probability $\geq \alpha$ (0.05) where α is the amount of error tolerable in decision making, H_0 is accepted, and H_a is rejected.

Simultaneous Parameter Significance Test (F) was carried out to determine whether the independent variable simultaneously affects the dependent variable or not. F test formula is as follows:

$$F \text{ statistic} = \frac{R^2:(k-1)}{(1-R^2):(n-k)} \dots \dots \dots (10)$$

Where Hypothesis H_0 is $\beta_1, \beta_2, \beta_3 = 0$ means, independent variables simultaneously do not

affect the dependent variable; H_1 is $\beta_1, \beta_2, \beta_3 \neq 0$ means the independent variable simultaneously affects the dependent variable.

Criteria for testing Riyanto et al. (2020) involve a confidence level (α) of 5% or 0.05. If the F count exceeds the F table, H_0 is rejected, and H_1 is accepted, indicating that the independent variable significantly affects the dependent variable. However, suppose the F count is less than or equal to the F table. In that case, H_0 is accepted, and H_1 is rejected, suggesting that the independent variable has no significant effect on the dependent variable.

Determination Test (R^2) evaluates how much the independent variable can clarify the dependent variable. Ranging from 0 to 1, the coefficient of determination indicates the degree of correlation between X and Y. An R^2 value of 0 signifies the absence of any connection between the two variables. In contrast, a value close to 1 implies that the independent variables can almost entirely account for predicting the dependent variables (Setiawan, 2010). Hence, a higher coefficient of determination indicates a more fitting regression model for the study's testing tool.

RESULTS AND DISCUSSION

The first step analysis of the research is Sigma Convergence. Sigma convergence aims to measure a region's economic inequality level at a particular time. Convergence is seen through the dispersion in the coefficient of variation. Convergence results can be seen in the graph in Figure 2.

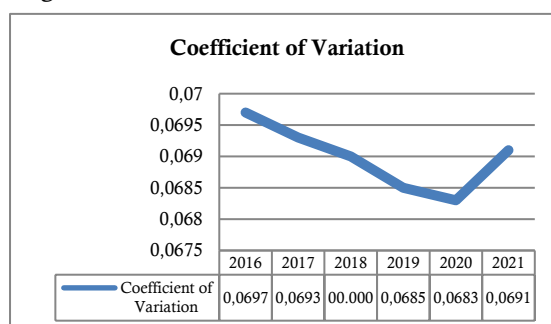


Figure 2. Graph of Sigma Convergence of East Java in 2016-2021.

Source: Data Processed, 2023

According to Lall and Yilmaz (2001), beta convergence is divided into beta convergence (unconditional convergence) and absolute convergence (conditional convergence). Beta convergence aims to measure whether economic growth in a region is accelerating or vice versa. In this study, beta convergence was calculated using panel data regression analysis.

Absolute Beta Convergence

Absolute beta convergence assumes that the economy between regions has similarities such as economic structure, demographic conditions, savings rates, and other economic variables. Absolute convergence can be analyzed by estimating the model when only initial income is the explanatory variable for economic growth. Among the 3 models in the panel data regression, we used the fixed effect model. The results of its estimation can be seen in Table 1.

Table 1. Absolute Beta Convergence Estimation

Variables	Coef.	Std. Error	t-Statistics	Prob.
C	2.491605	0.280506	8.882527	0.0000
(Log PDRB (-1))	0.746550	0.028907	2.582562	0.0000
R-squared	0.996660	F-Statistics		1476.949
Adj. R-squared	0.995985	Prob. F-Stats		0.000000
S.E. Regression	0.021488	Durbin Watson Stats		2.959231

Source: Data Processed, 2023

The absolute beta convergence model equation based on the estimation results of the Fixed Effect model in Table 1 above is as follows:

$$\ln PDRB_{it} = 2.491.605 + 0.746550_{it-1} + it \quad (11)$$

The above equation can be explained as follows: A constant value of 2.491.605 means that GRDP increased by IDR 2.491.605 billion, assuming other variables are constant—the coefficient value of the variable. $\ln PDRB_{it-1}$ is 0.746550, which means that the variable $\ln PDRB_{it-1}$. Alternatively, if real GRDP_{t-1} increases by 100 billion, the real GRDP will increase by 74.6550 billion, assuming other variables are constant. Based on the coefficient value of real GRDP_{t-1}, the rate of acceleration for

a region to catch up with other regions to get closer to the steady state is 74%.

Conditional beta convergence postulates that the variations in structural attributes among regions affect the convergence, implying that the convergence relies on the region's structural features. It is necessary to add several explanatory variables to the conditional beta convergence, which are thought to affect economic growth. The human Development Index (IPM) and Total Population variables are added to this equation. Among the 3 models in the panel data regression analysis, the best model is the fixed effect model. The results of its estimation can be seen in Table 2.

Table 2. Estimation Results of the Conditional Beta Convergence Fixed Effect Model

Variables	Coef.	Std. Error	t-Statistics	Prob.
C	2.350591	0.348411	6.746610	0.0000
(Log PDRB (-1))	0.732314	0.057964	1.263390	0.0000
IPM	0.00862	0.004019	2.140348	0.0348
JP	-3.19007	7.660008	-4.163325	0.0001
R-squared	0.997226	F-Statistics		1584.816
Adj. R-squared	0.996596	Prob. F-Stats		0.000000
S.E. Regression	0.019784	Durbin Watson Stats		2.727418

Source: Data Processed, 2023

The conditional beta convergence model equation based on the estimation results of the fixed effect model in Table 2 above is as follows:

$$\ln PDRB_{it} = 2.350.591 + 0.732314_{it-1}$$

$$+ 0.008602_{it} - 3.19E - 07_{it} + it \dots\dots (12)$$

The above equation can be explained as follows: A constant value of 2,350,591 means that GRDP increased by 2,350,591 billion,

assuming other variables are constant. The coefficient value of $\ln PDRB_{it-1}$ variable is 0.732314, which means that the $\ln PDRB_{it-1}$ variable increased by 10 billion, it will increase the real GRDP by about 7.32314 billion, assuming other variables are constant. The coefficient value of $\ln IPM_{it}$ variable is 0.008602, which means that $\ln IPM_{it}$ variable or IPM increased by 1000 billion, and the real GRDP will increase by 8602 billion, assuming other variables are constant. The coefficient value of $\ln P_{it}$ variable is $-3.19E-07$, which means that $\ln P_{it}$ variable or population decreased by $-3.19E-07$. Based on the coefficient value of real GDP_{t-1}, the rate of acceleration for a region to catch up with other regions is 73%.

The effect of each independent variable individually on the dependent variable based on the probability t-statistic estimation results in Table 2 shows the following results: The probability value of $\ln PDRB_{it-1}$ variable is 0.0000, meaning that $\ln PDRB_{it-1}$ variable or real GRDP_{t-1} significantly affects real GRDP because the probability value is smaller than the α value 0.05 value.

The probability value of $\ln IPM_{it}$ variable is 0.0348, meaning that $\ln IPM_{it}$ variable or IPM significantly affects real GRDP because the probability value is smaller than the α value of 0.05.

The probability value of $\ln P_{it}$ variable is 0.0001, meaning that $\ln P_{it}$ variable or population significantly affects real GRDP because the probability value is smaller than the α value of 0.05.

Meanwhile, based on an F-statistic of 0.000000 or less than the α value of 0.05, HDI and total population variables significantly affect the real GRDP.

Based on graph 2, the coefficient of variation of real GRDP of East Java in 2016-2021 experienced a decreasing trend. So, this study's results indicate a tendency to decrease inequality between regions in East Java. Thus, this study shows that sigma convergence has occurred in East Java.

The variation coefficient value in 2016-2021 has decreased, showing that inequality in East Java tends to decrease. This happens because economic growth in East Java in 2016-2021 tends to increase. Based on graph 2, the coefficient of variation value in 2016 is 0.0697 and consistently decreases until 2020, which is 0.0683. Furthermore, in 2021, it increased by 0.0691. In 2020, the COVID-19 pandemic caused an imbalance between developed and underdeveloped regions because economic growth in both developed and underdeveloped regions experienced a slowdown. This happened because the COVID-19 pandemic caused various sectors to experience a decline.

The result of this study follows Barro and Sala-I-Martin's convergence theory of economic growth, which explains that advanced economic growth is marked by decreasing inequality between regions. Based on the convergence theory of economic growth, Barro and Sala-I-Martin explained that a downward trend between regions in East Java could occur when the dispersion rate of growth has decreased over time. In this case, it is shown by the decreasing coefficient of variation. This is following this study where the coefficient of variation tends to decrease. Thus indicating the occurrence of sigma convergence in East Java. The result of this study is similar to the study Fashollatan (2014), which shows a downward trend in the results of the sigma convergence analysis of economic growth in Indonesia. This study is inversely proportional to the study Achmad (2017), which stated that there was no sigma convergence in the regencies and cities of Central Sulawesi in 2010-2014.

Beta convergence aims to measure whether a region's economic growth can accelerate. There are 2 types of beta convergence: absolute beta convergence and conditional beta convergence. When estimating absolute beta convergence, the researchers use real GRDP as a dependent variable and real GRDP_{t-1} as an independent variable. The estimation results in Table 1 show that the coefficient value of real GRDP_{t-1} is 0.746550. The estimation results of the absolute beta convergence model show a

positive relationship between real $GRDP_{t-1}$ and $GRDP$ in 2016-2021. The positive relationship in this equation means that regions with low real $GRDP$ have not been able to catch up with regions with high real $GRDP$. The positive coefficient of real $GRDP_{t-1}$ indicates that there is divergence in the economic growth of East Java due to the growing gap in growth so that the economy is moving away from the steady state condition.

Based on the assumption of the law of diminishing returns, convergence occurs when there is a negative relationship between real $GRDP$ and real $GRDP_{t-1}$. With this assumption, regions with high economic growth will reach a steady state condition so that regions with low economic growth can catch up. Every year, the real $GRDP$ has increased, which means that the district economy with the highest economy is not yet in a steady state condition. The economic growth of the districts with the highest economic growth has not stagnated, so the districts with the lowest economic growth have been unable to catch up (divergence).

However, the absolute beta value indicates that there is no convergence at a high rate of convergence velocity, which is 74%, indicating that the economic growth of underdeveloped regions cannot catch up with the economic growth of developed regions. So, a lower beta value (closer to zero) indicates a faster convergence velocity. Meanwhile, a higher beta value (farther from zero) indicates a slower convergence value. Therefore, a high % absolute beta value of 74% indicates a relatively slow convergence velocity.

As the absolute beta convergence analysis results, the conditional beta convergence estimation results also show a positive value of 0.732314 with an economic growth velocity of 73% towards a steady state economy. This positive result indicates no conditional beta convergence in the districts of East Java. In the conditional beta convergence, other independent variables are added besides real $GRDP_{t-1}$, namely the Human Development Index and Population. The results of the estimation of the HDI variable have a positive effect on the real $GRDP$ of the

districts in East Java. This positive effect indicates that when the Human Development Index (HDI) rises, economic growth or real $GRDP$ also increases. A high Human Development Index (HDI) indicates a high quality of human resources. The higher quality of human resources can produce high-quality goods and services and have high competitiveness, increasing the real $GRDP$. Residents can absorb and manage essential resources for economic growth with this impact.

When the quality of human resources is high, other factors of production will be used optimally. High-quality residents can innovate to develop existing production factors to produce maximum products. Therefore, when the quality of human resources is high, it will increase productivity and income, accelerating economic growth.

Meanwhile, based on the estimation results of the population variable, it has a negative relationship to real $GRDP$ in East Java. This negative relationship means that when there is an increase in population, it will reduce economic growth in East Java. The inverse relationship between population and real $GRDP$ reflects that the real $GRDP$ in East Java decreases when the population increases. A decrease in real $GRDP$ occurs when the population increases, but the productivity does not. When the population increases but does not produce productivity, the population does not contribute to regional $GRDP$, so economic growth decreases. The increase in population is also another cause for the inability of the population variable to accelerate economic growth so that convergence can occur in East Java.

The absolute beta convergence velocity results are 74%, and the conditional beta convergence velocity is 73%. The variable population influences the decrease in beta convergence velocity. The result of the analysis of the population variable shows a negative number. This indicates that the population's productivity in East Java has not been able to increase the velocity of economic growth.

The absolute beta convergence and conditional beta convergence showed no accelerated economic growth in regions with low economic growth compared to regions with high economic growth or beta convergence. Because the results of this study indicate that there is no absolute beta convergence or conditional beta convergence in East Java, this study does not follow the existing hypothesis.

This study's result is similar to that of Yulisningrum and Setyastuti (2015), in which no absolute beta and conditional beta convergence were found in Indonesia from 1992-2012. Zainuri et al. (2022) showed no beta convergence in East Java from 2008-2018. Furthermore, this implies that the inequality of supporting facilities for regional economic growth efforts in East Java is still very unequal, so although, in general, there exists a few convergence, the majority of regencies in East Java are unable to catch up with the economic growth of the prosperous region.

This study also provides evidence that a region's economy conditionally does not experience convergence according to the Solow neoclassical theory. Neoclassical growth theory is a theory of economic growth that emphasizes the development of production factors. The concentration of production factors in developed regions results in higher regional economic growth. On the other hand, developing regions will find it more challenging to catch up with the economic growth of developed regions, which will become higher over time.

CONCLUSION

The dispersion of economic growth experienced a downward trend. Thus, it indicates the occurrence of sigma convergence in East Java. This means that there is a trend of decreasing inequality in East Java. However, in several periods of economic turmoil, for example, the COVID-19 pandemic, the capabilities of underdeveloped regions were weaker than developed regions, so the provincial or central government had to pay more attention so that the economic inequality would not widen.

Underdeveloped regions do not grow faster than developed regions in East Java. So, it

shows that there is no absolute beta convergence in East Java because real GRDP positively affects the convergence of economic growth in East Java. The real GRDP has not been able to accelerate the convergence of economic growth in East Java.

HDI and Total Population have not been able to accelerate the convergence in East Java. So, it shows that there is no conditional beta convergence in East Java because the population is not matched by productivity, so it contributes less to GRDP in East Java. As an implication, development and investment must focus more on improving the quality of human resources, especially in underdeveloped regions, to increase productivity and GRDP. Finally, it will accelerate the convergence in East Java.

REFERENCES

- Achmad, L. (2017). *[Analisis Konvergensi dan Keterkaitan Spasial Pertumbuhan Ekonomi Kabupaten / Kota di Sulawesi Tengah]*. *Jurnal Katalogis*, 5(1), 153-164. <http://jurnal.un tad.ac.id/jurnal/index.php/Katalogis/article/view/7964>.
- Arsyad, L. (1999). *[Pengantar Perencanaan dan Pembangunan Ekonomi Daerah]*. Yogyakarta. BPFE.
- Arsyad, L. (2009). *[Pengantar Perencanaan dan Pembangunan Ekonomi Daerah]*. BPFE-Yogyakarta.
- Arsyad, L. (2010). *[Ekonomi Pembangunan]*; Edisi Kelima. Yogyakarta: STIM YKPN.
- Arsyanti, R.A. dan Nugrahadi, T. (2021). *[Analisis Konvergensi Pada Level Kawasan dan Nasional Serta Faktor-Faktor yang Memengaruhinya]*. *Seminar Nasional Official Statistics*. <https://doi.org/10.34123/semnasoffstat.v2020i1.481>.
- Aulia, M.G. dan Santoso, D.B. (2019). *[Analisis Konvergensi Pertumbuhan Ekonomi Provinsi Jawa Barat Tahun 2007-2016]*. *Jurnal Ilmiah FEB Universitas Brawijaya*.
- Budiman, A. et al. (2019). *[Analisis Konvergensi Antar Provinsi (Studi Kasus Pulau Sumatera)]*. *Jurnal Ecogen*, 1(3), 511-520. <https://doi.org/10.24036/jmpe.v1i3.4992>.
- Barro, R. J. and Sala-i-Martin, X. (1992). *Convergence Author. In Source: Journal of Political Economy*.
- Barro, R. J. and Sala-i-Martin, X. (1991). "Convergence Across States and Regions". *Brookings Papers on Economic Activity*.
- Cabral, R. J. and Castellanos-Sosa, F.A. (2019). *Europe's income convergence and the latest global financial crisis. Research in Economics*. <https://doi.org/10.1016/j.rie.2019.01.003>.

- Djennas, M. and Ferouani, B. (2014). *Growth and Income Convergence in Africa. Journal of Economics and Development Studies*, 2(4), 63-76. <https://doi.org/10.15640/jeds.v2n4a5>.
- Gömlöksiz, M. et al. (2017). *Regional economic convergence in Turkey: Does the government matter? Economies*, 5(3), 1-16. <https://doi.org/10.3390/economies5030027>.
- Junaedi, D. and Salistia, F. (2020). [Dampak Pandemi COVID-19 Terhadap Pertumbuhan Ekonomi Negara-Negara Terdampak]. *Simposium Nasional Keuangan Negara*, 995-1013. <https://jurnal.bppk.kemenkeu.go.id/snkn/article/view/600>.
- Lall, S. V. and Yilmaz, S. (2001). Regional economic convergence: Do policy instruments make a difference? *Annals of Regional Science*, 35, 153-166. <https://doi.org/10.1007/s001680000035>.
- Malik, A.S. (2014). [Analisis Konvergensi Antar Provinsi Di Indonesia Setelah Pelaksanaan Otonomi Daerah Tahun 2001-2012]. *JEJAK: Jurnal Ekonomi dan Kebijakan*, 7(1), 92-101.
- Nurmalasari, V. (2011). [Analisis Konvergensi Pertumbuhan Ekonomi Dan Konvergensi Inflasi Pada 63 Kota / Kabupaten di Indonesia] *Jurnal FEB Universitas Brawijaya*. <https://jimfeb.ub.ac.id/index.php/jimfeb/article/view/4936>.
- Olarinde, Muftau Olaiya dan Zakari Abdullahi Yahaya. (2018). African Growth Convergence: role of institutions and macroeconomic policies. *International Journal of Development Issues*, 17(3), 346-371. <https://www.emerald.com/insight/content/doi/10.1108/IJDI-12-2017-0212/full/html>.
- Septian, M.R. (2018). [Kecenderungan Konvergensi Ekonomi Antardaerah di Provinsi Sumatera Utara]. *Journal of Regional and Rural Development Planning*, 2(1), 90-103. <https://doi.org/10.19144/jp1wd.1018.1.1.90-103>.
- Setiawan, A.H. (2010). [Analisis Penyerapan Tenaga Kerja Pada Sektor Usaha Kecil Dan Menengah (UKM) Di Kota Semarang. *JEJAK: Jurnal Ekonomi dan Kebijakan*, 3(1), 39-47. <https://journal.unnes.ac.id/nju/index.php/jejak/article/view/4663>.
- Todaro, M. P. & Smith, S. C. (2012). *Pembangunan Ekonomi* (10th ed). Erlangga.
- Wardhono, A. (2004). [Mengenal Ekonometrika Edisi Pertama]. Fakultas Ekonomi Universitas Jember. Jember.
- Wau, T. (2015). [Konvergensi Pembangunan Ekonomi Antar Daerah Kabupaten Dan Kota Di Sumatera Utara]. *Proceedings SNEMA Padang*.
- Yulisningrum, C.A.A. dan Setyastuti, A.R. (2015). [Analisis Konvergensi Pertumbuhan Ekonomi di Indonesia Tahun 1992-2012]. *Angewandte Chemie International Edition*. <http://e-journal.uajy.ac.id/7021/>.
- Zainuri, Lutfi, A et al. (2022). [Analisis Konvergensi Pertumbuhan Ekonomi Di Provinsi Jawa Timur Pasca Krisis Global Tahun 2008]. *Jurnal Ekonomi, Keuangan, Perbankan, dan Akuntansi*. 14(2): 103-115.
- Zakaria, R.D. (2022). [Analisis Produktivitas Tenaga Kerja Sektor Industri Besar Dan Sedang Daerah Kabupaten Dan Kota Provinsi Jawa Timur 2015-2019]. *Jurnal Ilmu Ekonomi JIE*, 6(1), 156-167. <https://doi.org/10.22219/jie.v6i1.20343>.