

HUMP-SHAPE RELATION IMPLEMENTATION IN EAST JAVA

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ABSTRACT

This study aims to analyze the hump-shaped relation of regions in East Java Province. The proof of hump-shaped relation is seen from the influence of the degree of fiscal decentralization on economic growth. Fiscal decentralization analysis which is the ratio of regional original income and total regional expenditure, as well as using control variables consisting of government investment, and education which is implemented with reading and writing ability figures. The method used in this research is the econometrics approach. The model used in this study is the Fixed Effect Model with the Generalized Least Square method. The results of this study indicate that together the degree of decentralization, the degree of quadratic fiscal decentralization, government investment, the Gini ratio, the Gini squared ratio and education significantly influence the regional economic growth in East Java Province. Partially the degree of decentralization, the degree of decentralized fiscal squared, government investment, the Gini ratio, the quadratic Gini ratio, and education also significantly affect economic growth, and show a hump-shape relationship, namely the degree of fiscal decentralization has a positive effect and quadratic fiscal decentralization hurts economic growth.

Keywords: Degree of fiscal decentralization, economic growth, hump-shaped relationship, Fixed Effect Model

A. PRELIMINARY

Economic growth is the main benchmark of a country or region to see the economic development from the period to the next period. Neo-classical economic growth theory believes that the main factors affecting economic growth at a certain time are the increase in production factors and technological progress. (Octavianingrum, 2015)

Data from the Central Statistics Agency, East Java's economic growth in 2017-2019 showed a positive trend, namely 5.46 in 2017, 5.50 in 2018, and 5.52 in 2019 although the increase that occurred in 2019 was not so significant, namely 0.02 percent from 2018. The increase in economic growth at the provincial level is inseparable from the economic growth of each region. (Central Bureau of Statistics, East Java Province, 2019)

Slowing economic growth in the area of East Java Province has the same tendency with economic growth at the national level. Overall, the slowdown in regional economic growth is not too high, this shows that regional economic growth is still in a relatively high and stable condition.

Seeing the importance of local government policies in overcoming economic problems, especially related to the main sectors that contribute greatly to national output, it needs to be explored and developed. Effective and efficient management of resources in the regions is one of the major tasks of the regional government. The central government assists to develop the potential of the region through allocation funds, for the remainder is the responsibility of local governments. This is where local government contributions are seen as contributors to national economic growth. (Winarni, 2017)

The policy of regional autonomy and fiscal decentralization provides an opportunity for a region to improve the condition of the regional economy by increasing the potential of the region efficiently from both natural and human resources. The essence of autonomy and fiscal decentralization is applied not only to carry out the duties of the central government, but the regions are required to increase creativity in developing regional potential. Decentralization itself is seen as a step or way to improve public sector efficiency, reduce budget deficits, and increase economic growth. (Handayani, 2016)

The purpose of providing regional transfer funds is to ensure the achievement of public service standards and reduce horizontal disparities between regions and vertical disparities from the center to the regions. (Azizi, 2018). The investment climate in East Java in recent years has shown good development. East Java Provincial Investment Board data from 2019 realization of investment in foreign investment and domestic investment in 2019 in the third quarter grew by 28.4 percent from 2018. The increase in investment realization gave a large contribution to the national investment of 46.78 trillion rupiahs or 12.85 percent of national investment. (East Java Provincial Investment Board, 2019)

Equitable distribution of income indicates that economic development can be felt by all people, especially the regions. Along with economic growth that continues to increase, but in reality, the distribution of income is often considered uneven resulting in problems of inequality between provinces and regions. One of the causes of unequal distribution of income is one of which is due to economic

activities that are only focused on an area that has great potential both in terms of natural resources and human resources so that in other areas with less potential will experience inequality.

The average value of the regional Gini index from 2015 to 2019 is relatively moderate, ranging from 0.36 to 0.42. Such a Gini index value shows that the area in East Java Province from 2015 to 2019 the level of income distribution inequality is still low.

To increase regional economic growth not only rely on the potential of existing natural resources and capital, but economic growth must also be encouraged by productive human resources. Without human resources, all economic activities will also not work. One of the ways to improve the quality of human resources is through improving education levels. The better and higher level of education of human resources shows that human resources in the area are more productive, which in itself will increase the output of each region.

Education indicators can be seen through the length of education and reading and writing skills, both of which are components forming the human development index. The reading and writing ability rate in the regions in East Java Province is on average above 80 percent. (East Java Central Statistics Agency, 2019)

The economic growth indicators mentioned above are the effects of the implementation of regional autonomy policies and regional fiscal decentralization. The policy has shown a positive influence on the development of regional potential and regional economic growth. Furthermore, the extent to which the role of fiscal decentralization in this region is unknown. The current degree of fiscal decentralization is already high or in the long run, it still needs to be increased again.

With this background, the researcher is interested in further studying how the influence of the degree of fiscal decentralization on economic growth, whether there is a hump-shaped relationship at the regional level, as well as looking at the influence of other factors including investment, Gini index, and reading and writing ability figures on regional economic growth in East Java Province in 2015 to 2019.

B. CONCEPTS

Economic growth and economic development have a close relationship, where economic growth is the main condition of several conditions needed in the development process. The level of economic growth in one year can use the formula as explained in Sukirno (Marlinda, 2019) as follows:

$$g_t = \frac{Y_t^r - Y_{t-1}^r}{Y_{t-1}^r} \times 100$$

Information :

g_t = Economic Growth Rate in Year t (Percent)

Y_t^r = National income (Gross Regional Domestic Product) real in year t (Rupiah)

Y_{t-1}^r = National income (Gross Regional Domestic Product) real in the previous year (Rupiah)

Classical economic growth states that two main factors influence economic growth, namely total output growth and population growth. Economic growth depends on factors of production. Production factors are considered important factors because before achieving an increase in the rate of economic growth preceded by an increase in production factors. (Azazi, 2011).

The neoclassical growth theory developed in the 1950s. The neo-classical theory is based entirely on the different side of supply from Harrod Domar's theory which unites the aspects of demand and supply in the long run. As stated in Say's law, in the long-run supply creates its demand. (Soemantri & Setiawan, 2017)

The neoclassical economic growth model or commonly referred to as the Solow growth model in the development of economic growth is not only centered on capital accumulation and population growth but in this model also focuses on technological progress. (Basuki & Ingtingmah, 2017)

Law of the Republic of Indonesia number 23 of 2014 concerning regional governance in article 1 paragraph 8 explains that decentralization is the transfer of government affairs by the central government to autonomous regions based on the principle of autonomy. Decentralization is very closely related to regional autonomy. Regional autonomy itself in the Law of the Republic of Indonesia number 23 of 2014 article 1 paragraph 6 explained that regional autonomy is the right, authority and obligation of autonomous regions to regulate and manage their government affairs and the interests of local communities in the system of the Unitary State of the Republic of Indonesia.

Research on the relationship between the degree of fiscal decentralization and economic growth includes research conducted by Zhang and Zou (1998) in China in 1978-1992 (Yang, 2016). Xie et al (1999) in the USA in the period 1948-1994 (Kim & Bae, 2019). Jin and Zou (2005) in China in two different periods, namely 1979-1993 (Yu et al., 2010). All three results showed a negative and significant effect on economic growth.

The relationship of fiscal decentralization and economic growth will be hump-shaped if the results of positive α coefficient and negative β coefficient. A hump-shaped relationship is proven where when the degree of decentralization is still low there is a positive and significant relationship to economic growth while at a higher degree of decentralization will reduce economic growth. So the analysis model in this study can be written as follows:

$$PE_{it} = \beta_0 + \beta_1 DF_{it} + \beta_2 DF^2_{it} + \beta_3 INV_{it} + \beta_4 GINI_{it} + \beta_5 GINI^2_{it} + \beta_6 EDUC_{it} + \mu$$

Where:

PE_{it} = Economic Growth (percent)

DF_{it} = Degree of Fiscal Decentralization (percent)

DF^2_{it} = Degree of Fiscal Decentralization Squared (percent)

INV_{it} = Government Investment (Billion)

$GINI_{it}$ = Gini Ratio / Gini Index

$GINI^2_{it}$ = Gini Ratio / Gini Squared Index

$EDUC_{it}$ = Education (Percent)

C. METHODS

The research approach used in this research is inferential quantitative with hypothesis testing with regression analysis tools. An analysis of the effect of the degree of fiscal decentralization on economic growth was also carried out by including several control variables such as Investment, Gini Ratio, and Education with the indicator used was literacy rate. The control variable is a variable that is controlled/kept constant so that the independent variable on the dependent variable cannot be influenced by external factors not examined. Control variables are commonly used in comparative/comparative research. Regression models using panel data are regression models that combine time series data and cross-sections. Three methods can be used to process panel data.

Gujarati mentioned the panel data model using the pooled least square (PLS) approach is as follows (Gujarati, 2012: 239):

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \dots + \beta_n X_{nit} + \mu_{it}$$

The panel data model with the fixed effect approach is as follows:

$$Y_{it} = \alpha_1 + \alpha_2 D_2 + \dots + \alpha_n D_n + \beta_2 X_{2it} + \beta_3 X_{3it} + \dots + \beta_n X_{nit} + \mu_{it}$$

Random effect model (REM) cannot use OLS method techniques because it will not produce an efficient estimator, so in this approach, it is more appropriate to use the Generalized Least Square (GLS) Method. Panel data model with a random effect model (REM) approach is as follows (Gujarati, 2012: 250):

$$Y_{it} = \beta_1 i + \beta_2 X_{2it} + \dots + \beta_n X_{nit} + \mu_{it}$$

D. EXPLANATION

The main purpose of this study is to determine the effect of the degree of fiscal decentralization, the degree of quadratic fiscal decentralization, and control variables (Investment, Gini ratio, and Education) together or partially on the economic growth of cities in East Java Province in 2015 up to the year 2019. Also, this research will prove the hump-shaped relationship at the regional level.

Panel data regression models in this study can be estimated using three methods, namely pooled least square (PLS), fixed effect models (FEM), and random effect models (REM). The best model selection from the three methods above can be done with several tests including the Chow test to choose the PLS or FEM model and the Hausman test to choose the model between FEM and REM.

Based on the results of the Chow test and the Hausman test conducted, a fixed-effect model (FEM) was obtained to be the right model to be used in this study. After the fixed effect model (FEM) is indicated violating the classic assumption test which includes multicollinearity, heteroscedasticity, and autocorrelation tests, the model is cured using generalized least square (GLS).

Table 1. Regression Results

		Dependent Variable: Economic Growth (PE)		
		PLS	FEM	BRAKE
A constant (_Cons)	Coefficient	1,203	-12.99	-1.901
	t-stat	2.73	-5.88	-1.54
	Probability	0.007	0,000	0.123
Degree of Fiscal Decentralization (DF)	Coefficient	0.068	0.104	0.065
	t-stat	2.60	2.71	2.04
	Probability	0.010	0.007	0.042
Degree of Fiscal Decentralization2 (DF2)	Coefficient	-0.001	-0.009	-0,0008
	t-stat	-2.03	-1.43	-1.35
	Probability	0.043	0.154	0.178
Government Investment (INV_P)	Coefficient	1,108	-0.587	0.651
	t-stat	2.03	-1.05	1.27
	Probability	0.043	0.295	0.204
Gini Ratio (GINI)	Coefficient	-6,160	6,454	8,636
	t-stat	2.95	2.87	3.90
	Probability	0.003	0.004	0,000
Gini2 ratio (GINI2)	Coefficient	7,540	-5,297	-7,335
	t-stat	-2.20	-2.20	-3.05
	Probability	0.029	0.028	0.002
Education (EDUC)	Coefficient	0.028	0.190	0.061
	t-stat	3.33	7.34	4.28
	Probability	0.001	0,000	0,000

Different results are shown in the random effect models (REM), where at the same error rate the variable degree of decentralized fiscal squared and government investment shows insignificant results on economic growth. This is indicated by a probability value greater than the error rate (α) of 5%. While other variables include the degree of decentralization, the Gini ratio, the squared Gini ratio and education have a significant positive effect on economic growth. Generalized Least Square (GLS) is a healing method used if in research violates the classic assumptions of heteroscedasticity and autocorrelation. The following are the regression results using Generalized Least Square (GLS).

Table 2: Generalized Least Square (GLS)

	Dependent Variable		
	Economic Growth (PE)		
	Coefficient	Z-statistics	Prob> z
Constants (_Cons)	1,203	1.60	0.109
(DF)	0.068	2.62	0.041
(DF2)	-0.001	-2.05	0.028
(INV_P)	1,108	2.05	0.040
(GINI)	7,540	2.98	0.003
(GINI2)	-6,160	-2.22	0.027
(EDUC)	0.028	3.36	0.001

Estimation results using the generalized least square (GLS) method obtained for the relationship between each variable with a significance level (α) of 5% indicate that the variable degrees of decentralization (DF), government investment (INV_P), Gini Ratio (GINI), and Education (EDUC) has a significant positive effect, while the degree of decentralized fiscal squared (DF2) and the Gini squared ratio (GINI2) have a significant negative effect on economic growth.

The equation of the test result model can be written as follows:

$$PE_{it} = 1,20 + 0,06DF_{it} - 0,001DF^2_{it} + 1,10INV_{P_{it}} + 7,54GINI_{it} - 6,16GINI^2_{it} + 0,02EDUC_{it} + \mu_{it}$$

From the test results with the fixed-effect model, it is known that the probability value (prob> F) is 0.0000, which indicates that the independent variable has a significant influence on the dependent variable. This is indicated by the R-square value of 0.2782 which means that 27.82% of the independent variables affect the dependent variable, while 72.18% is explained by other variables outside the model. Partially with the generalized least square (GLS) method of each independent variable which includes the degree of fiscal decentralization, the degree of quadratic fiscal decentralization, government investment, Gini ratios, squared Gini ratios and education with probability values of less than 5% significance level, indicating that each the independent variable has a significant effect on the dependent variable, namely economic growth.

Proof to show the hump-shaped relationship as previous research by entering the variable fiscal decentralization (DF2) coefficient value from the test

results showed -0,001. The coefficient results from DF show that in regions with higher degrees of decentralization, each increase in the degree of decentralization of one percent will reduce economic growth by 0.001%. These results prove that hump-shaped relations occur in the area of East Java province. To determine the form of the graph of the assumption that the graph in the quadratic equation opens down if the coefficient value of DF is negative, and the Grafik is open up if the coefficient value of DF shows a positive result.

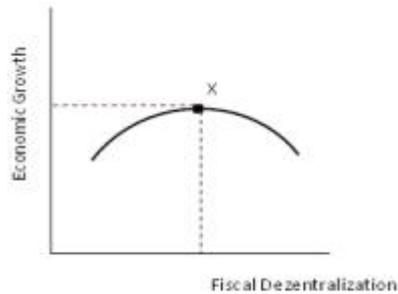


Figure 1
The Relationship between Fiscal Decentralization and Economic Growth (Hump-Shaped)

After knowing the relationship of the degree of fiscal decentralization with economic growth shows a graph that is open down, then it is important to know the maximum point (X) to show an inverse (negative) relationship where any increase in the degree of fiscal decentralization can reduce economic growth. The method used to find the maximum point is to use the first derivative of the equation, as follows:

$$\frac{DPE}{DDF} = -0,002DF + 0,06$$

$$DF = 30\%$$

After the value of the degree of decentralization (DF) is known, then next look for the value of the point of economic growth (PE) by substituting the results of the value of DF in the equation with government investment variables, the Gini ratio, and education are considered constant are as follows:

$$PE_{it} = 1,20 + 0,06DF_{it} - 0,001DF_{it}^2 + 1,10INV_{P_{it}} + 7,54GINI_{it} - 6,16GINI_{it}^2 + 0,02EDUC_{it} + \mu_{it}$$

$$PE = 1,20 + 0,06(30) - 0,001(30^2)$$

$$PE = 2,1$$

So the PE value is 2.1 and the value of the degree of fiscal decentralization is 30 then it can be concluded that an inverse relationship where each increase in

the degree of fiscal decentralization will reduce economic growth if the value of a degree of fiscal decentralization of more than 30 percent is not accompanied by an increase in economic growth with an economic growth limit of 2, 1 percent. The Gini ratio has a probability value of 0.003 with a significance level of 5%, then the Gini ratio variable (GINI) has a significant effect on economic growth variables. This is indicated by the coefficient value of the variable Gini ratio of 7.54 which means that each increase in the Gini ratio of one unit of the Gini ratio can increase economic growth by 7.54%. So it can be concluded that the Gini ratio has a significant positive effect on economic growth in districts/cities assuming *ceteris paribus*.

Gini squared ratio has a probability value of 0.027 with a significance level of 5%, then the variable Gini squared ratio (GINI2) has a significant effect on economic growth variables. This is indicated by the coefficient value of the variable Gini ratio of -6.1 which means that any increase in the Gini ratio that exceeds the maximum limit of one unit of the Gini ratio can reduce economic growth by 6.1%. So it can be concluded that the Gini squared ratio has a significant negative effect on economic growth in districts/cities with the assumption that *ceteris paribus*. These results can prove that the research conducted by Kuznet using the U-inverse curve is proven.

In his research, Kuznets found that the effect of economic growth and income distribution using the U-inverse Curve curve showed that at the beginning of development economic growth and inequality had a direct relationship so that the curve moved upward. After experiencing an excessive increase until the turning point of economic growth and inequality is inversely proportional so that the moving curve decreases. (Agarwal, 2012)

From the results of the study, it was found that the U-inverse curve which shows the relationship between economic growth and inequality of income distribution can be proven. By using the equilibrium equation by squaring the Gini ratio variable it is obtained that the positive coefficient of the Gini ratio and the coefficient of the Gini squared ratio show a negative result. The negative Gini squared ratio value shows that the open curve downward corresponds to the Kuznets Curve. (Agarwal, 2012)

Another thing to note is the maximum value of the Kuznets Curve. The maximum point is calculated using the first derivative of the equation assuming that other variables are constant as follows:

$$\frac{DPE}{dGINI} = -12,2GINI + 7,54$$

$$GINI = 0,61$$

growth point value (PE) by substituting the results of the Gini coefficient value in the equation with the variable degrees of fiscal decentralization, government investment, and education are considered constant as follows:

$$\begin{aligned}
 PE_{it} &= 1,20 + 0,06DF_{it} - 0,001DF_{it}^2 + 1,10INV_{P_{it}} + 7,54GINI_{it} - 6,16GINI_{it}^2 \\
 &\quad + 0,02EDUC_{it} + \mu_{it} \\
 PE &= 1,20 + 7,54(0,61) - 6,16(0,61^2) \\
 PE &= 1,20 + 4,59 - 2,29 \\
 PE &= 3,5
 \end{aligned}$$

From the calculation results obtained an economic growth point of 3.5 percent and a Gini ratio value of 0.6, it can be concluded that the inverse relationship in the U-inverse Kuznets curve shows that any increase in economic growth beyond 3.5 percent of the Gini coefficient will decrease below 0.6. The implementation is at the beginning of growth before achieving economic growth 3.5 percent Gini co-efficient continues to increase, as explained by Kuznet, Barro (1999), and Knowles (2001) that inequality and economic growth are directly proportional and after reaching the peak point of development, the inequality and economic growth is inversely proportional.

The policy of regional autonomy and fiscal decentralization provides opportunities for regional governments to develop resource potential more efficiently. On the other hand, with the transfer of authority from the central government to regulate all regional affairs to the regional government with the intention of the capital provided by the central government is more targeted, so that the regions can develop and can increase local original income without interference from the central government. The greater transfer funds provided by the central government indicate that the region's fiscal independence is still very low. Vice versa, the greater the region's original regional income shows that the regional fiscal independence is high.

Regional revenue in the province of East Java during the implementation of fiscal decentralization still shows a high rate of dependence on sources of revenue originating from the central government, particularly in the form of the General Allocation Fund and the Special Allocation Fund. This level of regional dependence is a consequence of the low ability of the region, especially at the regional level in exploring the sources of Regional Original Revenue. Even if we look closely at the contribution of regional original income to the Total Regional Revenue of East Java Province, it is still very low, below 20 percent.

The estimation results obtained show that in areas with a still-low degree of decentralization in East Java, any increase in the degree of decentralization can have a significant positive effect on economic growth. Whereas in regions where the degree of decentralization is already too high beyond its peak point of 30 percent, any increase in the degree of decentralization will reduce regional economic growth. These results indicate that the relationship is hump-shaped also occurs in areas in East Java.

This assumption of a hump-shaped relationship occurs if the result of the coefficient of the relationship of the degree of fiscal decentralization to positive economic growth is significant and the coefficient of the degree of decentralization of quadratic to economic growth is significantly negative. A hump-shaped relationship is proven where when the degree of decentralization is still low there is a positive and significant relationship to economic growth while at a higher degree of decentralization will reduce economic growth.

The Gini Ratio also shows results that are consistent with the research hypothesis. The effect of the Gini ratio on regional economic growth in East Java showed a significant positive. While the Gini squared ratio from the results of the study showed a significant negative effect. These results show the truth of the inverse Kuznet U-curve which states that at the beginning of development economic growth and inequality have a direct relationship, and after experiencing an excessive increase to the peak point, economic growth and inequality are inversely proportional.

The relationship of the Gini ratio to regional economic growth in the Province of East Java is strengthened by empirical data from the Central Statistics Agency of East Java Province which shows that the Gini ratio in East Java fluctuates. In 2015 the Gini ratio experienced a very large increase of 0.05 in 2016 decreased by 0.02, and continued to decline every year until 2019 the Gini index stood at 0.36 from 0.42 in 2015. If viewed the Gini ratio trend from 2015 to 2019 has decreased which indicates that the level of income distribution is getting better and more evenly distributed.

E. CONCLUSION

Based on the research results of the influence of the degree of fiscal decentralization, the degree of fiscal decentralization, investment, Gini ratio, and education on regional economic growth in East Java Province, the following conclusions are obtained:

1. Together the effects of the degree of fiscal decentralization, the degree of fiscal decentralization, investment, Gini ratio, Gini squared ratio and education have a significant effect on regional economic growth in East Java Province.
2. Partially, the effect of the degree of fiscal decentralization has a significant positive effect on economic growth, and the influence of the degree of quadratic fiscal decentralization on economic growth has a significant negative effect. This proves that regions in East Java show a hump-shaped relationship, that is, in regions where the degree of fiscal decentralization is still low can significantly increase economic growth, but in regions that have too high a degree of decentralization, increasing the degree of fiscal decentralization will reduce growth the economy. While the three control variables (investment, Gini ratio, Gini squared ratio and Education) partially showed a significant effect.

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