Driving Inclusive Development: Determinants of Regional Income Inequality In The Former Kediri Residency, Indonesia

Aulia Dwi Rahayu[1*], Agus Tri Basuki[2], Imamudin Yuliadi[3]

[1,2,3]Master of Economics, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia
Coresponden author:
Email: auliadwirahayu@gmail.com

Abstract.
Income inequality remains a major challenge to achieving inclusive regional development. This study aims to analyze the effects of Gross Regional Domestic Product (GRDP), poverty, Human Development Index (HDI), Incremental Capital Output Ratio (ICOR), and capital expenditure on income inequality in the seven regencies/cities of the former Kediri Residency during 2018–2025. The study employed a quantitative approach using secondary panel data analyzed through panel data regression. Based on the Chow and Hausman tests, the Fixed Effect Model (FEM) was selected as the most appropriate estimation model. The results indicate that GRDP has a negative and significant effect on income inequality, while poverty, HDI, and capital expenditure have positive and significant effects. In contrast, ICOR does not significantly affect income inequality. Simultaneously, all independent variables significantly influence income inequality (Prob. F-statistic = 0.001). The model explains 51.7% of the variation in income inequality (R^2 = 0.517). These findings suggest that reducing regional income inequality requires inclusive development policies that promote equitable economic growth, accelerate poverty reduction, expand equal access to education and healthcare, and improve the allocation of capital expenditure toward balanced regional development.
Keywords: *Income Inequality; Regional Development; Panel Data; Fixed Effect Model and Inclusive Development.*

I. INTRODUCTION

One of the important aspects in efforts to improve people's welfare is economic development. Economic development itself is expected to increase per capita income in a sustainable manner and be accompanied by changes in economic structure and improvement in people's welfare. However, the development process does not always result in an even distribution of income, which can lead to income inequality between individuals, between community groups, and between regions. In the regional context, inequality usually occurs when the increase in economic development activities and results is more concentrated in one region only, thus causing differences in income and welfare levels between regions or regions (Sukirno, 2019).

The former Kediri Residency Area (Tulungagung Regency, Kediri Regency, Kediri City, Nganjuk Regency, Trenggalek Regency, Blitar Regency, Blitar City) is an area that shows heterogeneous economic development characteristics due to variations in urbanization levels, economic activities, and investment concentrations between regions. In the context of regional development, the existence of growth centers such as Kediri City has the potential to produce an agglomeration effect that increases economic productivity, but at the same time can widen income inequality if the benefits of growth are only concentrated in certain areas. Akita and Kataoka (2022) explain that regional inequality is a consequence of differences in economic structure, productivity, and concentration of economic activity between regions, while Hornok and Raeskyesa (2024) show that the development of economic zones in Indonesia is able to encourage local economic growth, but can also increase income distribution inequality. Based on these conditions, the study of income inequality in the former Kediri Residency area is relevant to see the extent to which economic growth has been followed by the equitable distribution of welfare between regions.

The difference in the level of development between regions indicates that economic growth is not always followed by an equitable distribution of income. In the view of regional economies, income inequality usually arises as a result of differences in economic structure, productivity levels, concentration of economic activities, and the capacity of local governments to manage development. Therefore, the analysis of income inequality needs to be directed not only at measuring the magnitude of the disparity, but also at identifying the factors that influence it. This is in line with the findings of Hartmann and Pinheiro (2022)

who show that regions with more complex economic activities tend to experience higher levels of inequality because development benefits are concentrated in specific groups and regions. In addition, Pietrovito (2023) explained that the characteristics of fiscal governance in regional areas also affect income distribution, so the analysis of determinants of inequality is important as a basis for formulating more inclusive development policies.

In fact, income inequality is still the main problem in the development process, especially in an effort to realize equitable welfare between regions. Various studies show that income inequality is not only influenced by economic growth, but also by socioeconomic conditions, the quality of human resources, poverty, and the effectiveness of government development policies. Studies in ASEAN countries show that macroeconomic factors such as gross capital formation, unemployment, inflation, and population growth are related to income inequality, suggesting that increased economic activity does not always result in a more equitable distribution of income (Ayyash et al., 2025). In the Indonesian context, empirical research shows that poverty and the quality of human development are important factors that affect income inequality, while economic growth does not always have a direct impact on equity if it is not accompanied by improving the quality of human resources and reducing social inequality (Walujadi et al., 2022). In addition, the aspect of regional fiscal policy also has an important role in reducing inequality because government spending directed at social development, basic services, and community capacity building can strengthen the equitable distribution of welfare (Neuhuber & Schneider, 2024). However, the effectiveness of fiscal policy is highly dependent on how local governments allocate public resources, as fiscal decentralization that is not followed by proper governance has the potential to increase disparities between regions (Pietrovito et al., 2023). Therefore, research on income inequality at the regional level needs to consider a combination of economic, social, investment efficiency, and local government spending policies in order to be able to explain the variation in inequality more comprehensively.

Based on these empirical findings, it can be concluded that income inequality is a multidimensional phenomenon and is influenced by economic, social, investment, and fiscal policy factors. However, most studies still test these factors partially and are generally conducted at the national or provincial level, so empirical evidence on regional regions with heterogeneous development characteristics is still relatively limited. In addition, research that integrates indicators of economic growth, poverty, quality of human resources, investment efficiency, and capital expenditure of local governments in one analysis model is also still rare. Therefore, to bridge these gaps, research is needed that is able to comprehensively integrate these various determinants in the context of regional development. This study analyzes the influence of Gross Regional Domestic Product (GDP), percentage of poor population, Human Development Index (HDI), Incremental Capital Output Ratio (ICOR), and local government capital expenditure on income inequality in the former Kediri Residency area.

II. RESEARCH METHOD

The method used in this study is a regression of panel data in the period 2018-2025 covering seven districts/cities in the former Kediri Residency area, namely Kediri Regency, Kediri City, Blitar Regency, Blitar City, Nganjuk Regency, Tulungagung Regency, and Trenggalek Regency. The dependent variable in this study is income inequality which is proxied using the Gini Index. Meanwhile, independent variables include Gross Regional Domestic Product describing the level of activity and economic growth, Percentage of Poverty Population, Human Development Index, *Incremental Capital Output Ratio*, and regional capital expenditure. The function of the equation used in this study:

$$IG = f\left(LOG(GRDP), POV, IPM, ICOR, LOG\left(CAPEX\right)\right) \ldots\ldots\ldots\ldots (1)$$

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of Poverty Population, Human Development Index, *Incremental Capital Output Ratio*, and regional capital expenditure. The function of the equation used in this study:

$$IGit = \beta 0 + \beta 1LOG(GRDP)\,it + \beta 2POV_i t + \beta 3IPMit + \beta 4ICORit + \beta 5LOG(CAPEX)\,it + \varepsilon it \ldots\ldots\ldots (2)$$

in this equation, the IG represents the Gini Index which describes income inequality; Log (GRDP) is a logarithmic form of GDP describing the level of activity and economic growth of a region; POV represents the percentage of the poor population describing the level of welfare of the people in an area; HDI shows the quality of human development as measured through three main dimensions, namely health, education, and decent living standards; ICOR is the ratio of investments, in this case PMTB to GRDP. The lower the ICOR value, the higher the level of investment efficiency (Arsyad, 2015) and Log (CAPEX) represents local government capital expenditure which describes local government expenditure on the development of fixed assets. Here, i refers to the observed district or city, t denotes time, and εit represents the error term that takes into account the cross-sectional effect and time series.

III. RESULT

This study aims to find out the elements that affect income inequality in the former Kediri Residency area covering 7 Regencies/Cities during 2018–2025. Table 1 shows the results of descriptive statistical analysis to provide an initial overview of the conditions and variations of the data used in this study which include minimum values, maximum values, averages, Middle values and standard deviations of all research variables:

Table 1. Descriptive Statistic

	IG	GRDP	POV	HDI	ICOR	CAPEX
Mean	0.341	30.700.000.000.000	9.004	74.761	3.749	281.000.000.000
Median	0.336	25.800.000.000.000	8.825	74.045	5.450	249.000.000.000
Maximum	0.421	96.400.000.000.000	12.140	82.710	11.100	577.000.000.000
Minimum	0.289	4.570.000.000.000	5.960	68.710	-15.950	73.800.000.000
Std. Dev.	0.029	25.900.000.000.000	1.936	3.712	5.563	131.000.000.000

Source: Authors' work (2026)

The descriptive statistical results of the variables in this study include the average value of the Gini Index of 0.341, indicating a relatively moderate level of income inequality in the study area. The average GRDP was recorded at IDR 30.7 trillion, while the average poverty rate was 9.004%, HDI was 74,761, ICOR was 3,749, and CAPEX was IDR 281 billion. The minimum and maximum values of each variable showed variations in characteristics between regions and between observation periods. In addition, the standard deviation value of each variable indicates the level of data dissemination to its average value, which reflects the difference in economic and development conditions in the research area during the observation period. Then, before estimating the regression of the panel data, the best model approach test was carried out in this study with the results presented in table 2 below:

Table 2. Estimation Results of the Model

Variable	CEM	FEM	REM
LOG(GRDP)	-0.009	-0.012	-0.011
	0.024**	0.004***	0.015**
POV	0.442	0.648	0.515
	0.132	0.024**	0.101
HDI	0.496	0.753	0.468
	0.007***	0.000***	0.012**
ICOR	-0.001	0.000	-0.001
	0.078*	0.866	0.337
LOG(BM)	0.005	0.007	0.005
	0.001***	0.000***	0.001***
Constant (C)	-0.088	-0.318	-0.053
	0.617	0.070*	0.768

R-squared	0.273	0.517	0.217
F-statistic	3.755	3.836	2.779
Prob(F-statistic)	0.006	0.001	0.027

Panel Data Model Selection Tests			
Chow Test	**Statistic**	**d.f.**	**Prob.**
Period F	2.993	(7,43)	0.012**
Hausman Test	**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**
Period random	11.053	5	0.050**

Note: *** significant at α = 1% ** significant at α = 5% * significant at α = 10%

Source: Authors' work (2026)

The selection of the best model is based on the results of the Chow test and the Hausman test as shown in table 2. The Chow test is a test to determine the best model between (Fixed Effects Model/FEM) and (Common Effect Model/CEM). Meanwhile, the Hausman Test is used to choose between (Fixed Effects Model/FEM) or (Random Effect Model/REM) (Greene, 2002).

Based on the results of the Chow test, a probability value of 0.012 was obtained, which is smaller than the significance level of 0.05. These results show that FEM is more suitable for use than CEM. Furthermore, the results of the Hausman test showed a probability value of 0.050, which is equal to the significance level of 0.05, so that FEM is more appropriate to be used than REM.

In addition to being supported by the results of the Hausman test, the selection of FEM as the best model was also strengthened by a higher value of determination coefficient (R-squared) compared to other models. According to Gujarati and Porter (2009), the coefficient of determination (R^2) is a measure of goodness of fit that shows the proportion of variation of dependent variables that are able to be explained by independent variables in a regression model. The greater the R^2 value, the better the model's ability to explain the variation of dependent variables. The R^2 value in FEM was 0.517, greater than CEM of 0.273 and REM of 0.217. This shows that 51.7% of income inequality variations can be explained by independent variables in the FEM model, while the remaining 48.3% are influenced by other factors outside the model. Therefore, FEM was chosen as the most suitable model to analyze the influence of independent variables on income inequality in this study.

Table 3. Classical Assumption Tests

Uji Heteroskedastisitas	
F-statistic	1.449
Prob(F-statistic)	0.182
Uji Autokorelasi	
F-statistic	1.596
Prob(F-statistic)	0.148
Uji Normalitas	
Prob Jarque-Bera	0.302

Source: Authors' work (2026)

Table 4. Multicolenarity Matrix

	IG	**GRDP**	**POV**	**HDI**	**ICOR**	**CAPEX**
IG	1.000	-0.007	-0.083	0.079	-0.059	-0.238
GRDP	-0.007	1.000	-0.373	0.433	0.190	-0.223
POV	-0.083	-0.373	1.000	-0.688	-0.128	0.526
HDI	0.079	0.433	-0.688	1.000	0.171	-0.629
ICOR	-0.059	0.190	-0.128	0.171	1.000	0.177
CAPEX	-0.238	-0.223	0.526	-0.629	0.177	1.000

Source: Authors' work (2026)

Based on the results of the classical assumption test in Table 3, the FEM model has met the necessary assumptions so that it is suitable for use as an estimation model. The tests were carried out

sequentially, including normality tests, heteroscedasticity tests, autocorrelation tests, and multicollinearity tests.

The first test is a normality test, with the aim of finding out if the residual model is distributed normally. According to Gujarati and Porter (2009), normality tests are performed to ensure that the residuals follow the normal distribution so that statistical testing can produce more valid inferences. The test results showed that the Jarque-Bera probability value was 0.301, greater than the significance level of 0.05. These results show that the residuals in the FEM model have met the normality assumption.

The second test is the heteroscedasticity test, which aims to find out whether residual variance is constant across all observations. Based on the test results, a Prob(F-statistic) value of 0.182 was obtained, which is greater than 0.05. These results show that there are no symptoms of heteroscedasticity so that residual variance can be considered homogeneous.

Next, an autocorrelation test is carried out to determine the correlation between the residual in one observation and the residual of other observations. According to Wooldridge (2020), the absence of autocorrelation is one of the important assumptions in regression models because the existence of autocorrelation can cause estimators to be inefficient and standard errors to be biased. The test results showed a Prob(F-statistic) value of 0.148, which is greater than the significance level of 0.05. Thus, it can be concluded that the model does not undergo autocorrelation.

The last test in classical assumptions is a multicollinearity test performed using a correlation matrix between independent variables. According to Gujarati and Porter (2009), multicollinearity shows that there is a high linear relationship between independent variables that can cause the regression coefficient to become unstable. Based on the rule of thumb Ajija et al. (2011), the model is indicated to experience multicollinearity if the correlation coefficient exceeds 0.85. The results in Table 4 show that the entire value of the correlation coefficient is below 0.85, so it can be concluded that the FEM model does not experience multicollinearity.

Overall, the results of the normality, heteroscedasticity, autocorrelation, and multicollinearity tests showed that the FEM model had fulfilled all classical assumptions. Thus, the model is feasible to use for further analysis because it fulfills the basic assumptions so that the Ordinary Least Squares (OLS) estimator has the property of the Best Linear Unbiased Estimator (BLUE) according to the Gauss-Markov Theorem (Wooldridge, 2020).

Table 5. Fixed Effect Model Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GRDP)	-0.012	0.004	-3.041	0.004***
POV	0.648	0.277	2.340	0.024**
HDI	0.753	0.173	4.349	0.000*
ICOR	0.000	0.001	0.170	0.866
LOG(BM)	0.007	0.001	5.330	0.000*
Constant (C)	-0.318	0.171	-1.860	0.070*
R-squared	0.517			
Adjusted R-squared	0.382			
F-statistic	3.836			
Prob(F-statistic)	0.001			
Durbin-Watson stat	1.451			

Note: *** significant at α = 1% ** significant at α = 5% * significant at α = 10%

Source: Authors' work (2026)

Based on the results of the selection of the best model, the Fixed Effect Model (FEM) was selected which was considered the most appropriate model for the estimation of panel data in this study. The results of the FEM estimate in Table 5 show that the Gross Regional Domestic Product (GDP) variable proxied in logarithm form has a coefficient of -0.012 with a t-statistical value of -3.041 and a probability of 0.004 (<0.05). This value shows that GDP has a negative and significant effect on the Gini Index. This means that every one unit increase in the LOG variable (GDP) is followed by a decrease in the Gini Index by 0.012

points, assuming the other variables are constant. A probability value that is below the significance level of 5% indicates that the influence is statistically significant.

The Percentage of Poor (POV) variable obtained a coefficient of 0.648, with a t-statistic of 2.340 and a probability of 0.024 (<0.05). The positive coefficient value shows that the increase in the percentage of the poor is correlated with the increase in the Gini Index. This means that a one-unit increase in the POV variable is expected to increase the Gini Index by 0.648 points, assuming the other variables remain the same. A probability value of 0.024 indicates that the effect is significant at a significance level of 5%.

Then the Human Development Index (HDI) variable has a coefficient of 0.753, t-statistic of 4.349, and a probability of 0.000 (<0.01). Compared to other independent variables, HDI has a relatively high t-statistic value so that it shows strong statistical evidence of its effect. The positive coefficient indicates that each increase in one unit of HDI is followed by an increase in the Gini Index by 0.753 points, assuming the other variables remain unchanged. A very small probability value indicates that the HDI effect is significant at a significance level of 1%.

The Incremental Capital Output Ratio (ICOR) variable produces a coefficient of 0.000, with a t-statistic of 0.170 and a probability of 0.866 (>0.05). A coefficient value close to zero indicates that the change in ICOR hardly makes any difference to the Gini Index. In addition, a probability value much greater than 0.05 indicates that the influence of ICOR on income inequality is not statistically significant so the hypothesis regarding the influence of ICOR is not supported by the results of the model's estimation.

Furthermore, the Capital Expenditure Variable (BM) expressed in logarithm form has a coefficient of 0.007, with a t-statistic of 5.330 and a probability of 0.000 (<0.01). The t-statistic value is the largest among all independent variables, thus indicating a very strong level of statistical significance. The positive coefficient indicates that every one unit increase in the LOG(BM) is estimated to increase the Gini Index by 0.007 points, assuming the rest of the variables are fixed. A probability value close to zero confirms that the influence of Capital Expenditure is significant at a significance level of 1%.

Overall, the model has an R-squared value of 0.517, which indicates that 51.7% of the variation in income inequality proxied by the Gini Index can be explained by variations in LOG(PDRB), POV, HDI, ICOR, and LOG(BM) along with the fixed effects of each region, while the remaining 48.3% is influenced by other factors outside the model. The Adjusted R-squared value of 0.382 indicates that after adjusting for the number of free variables and degrees of freedom, the model is still able to explain 38.2% variation in the Gini Index. Furthermore, the F-statistic value of 3.836 with a Prob(F-statistic) of 0.001 (<0.05) indicates that all independent variables simultaneously have a significant effect on income inequality so that the estimated model is feasible to use. The Durbin-Watson statistical value of 1.451 shows that the residual value is relatively close to 2, so it does not indicate a strong autocorrelation in the model.

IV. DISCUSSION

The results of the Fixed Effect Model (FEM) model estimate in table 5 show that the Gross Regional Domestic Product (GDP) has a negative and significant effect on income inequality. This finding indicates that the increase in economic activity in the former Kediri Residency area is able to encourage income equity through job creation, increased productivity, and increased opportunities for the community to earn income. This illustrates that the economic growth that occurs tends to be inclusive so that the benefits of development can be felt by various groups of people. The results of this study are in line with the concept of inclusive economic development put forward by Todaro and Smith, (2021), which states that quality economic growth not only increases output, but is also able to improve people's welfare more evenly. This finding is also supported by research from the World Bank (2022) which explains that economic growth followed by expanding economic opportunities and job creation is one of the important factors in reducing income inequality.

The percentage of the poor population has been proven to have a positive influence on income inequality. These findings show that the higher the poverty rate, the larger the income gap. This condition

reflects that the poor still face limited access to education, business capital, productive assets, and employment opportunities so that the increase in income they obtain is slower than that of the community group with better resources. The results of this study are in accordance with the vicious circle of poverty theory put forward by Nurkse (1953), which explains that poverty will continue to recur due to low productivity, limited capital accumulation, and lack of economic opportunities. These results also strengthen the research of Ardiani and Prabowo (2024) and Istiqomah and Floresti (2024) who concluded that poverty is one of the main determinants of increasing income inequality. Thus, the results of this study show consistency that reducing poverty levels is an important prerequisite in creating a more equitable distribution of income.

The Human Development Index (HDI) also shows a positive influence on income inequality. These results indicate that the improvement in the quality of education, health, and living standards has not been fully enjoyed equally by all community groups in the former Kediri Residency area. In other words, people who have better access to education, health, and economic services increase their income faster than people whose access is still limited, so the income gap is increasing. These findings are in line with the hypothesis of Kuznets (1955) who explained that in the early stages of economic development, an improvement in the quality of development is often followed by an increase in inequality before finally declining when the benefits of development have been more evenly distributed. In addition, Grimm, Harttgen, and Klasen (2010) explained that the high achievement of HDI does not always reflect the equitable distribution of human development because the distribution of education, health, and income can still take place unevenly. The results of this study show that improving the quality of human development needs to be followed by equal access so that the benefits of development can be felt by all levels of society.

In contrast to other variables, the Incremental Capital Output Ratio (ICOR) does not show an effect on income inequality. This indicates that investment efficiency has not been able to explain the change in income distribution in the study area. According to Harrod-Domar's theory of growth (1939; 1946), investment is the main factor that drives economic growth through increasing production capacity. However, efficient investment does not necessarily result in income equity if it is still concentrated in certain sectors, is capital-intensive, or develops more in developed areas. Thus, the results of this study show that investments that encourage economic growth do not necessarily have a direct impact on income equity if investment distribution has not taken place evenly.

The variable of local government capital expenditure shows a positive influence on income inequality. These findings indicate that the government's capital expenditure allocation has not fully carried out the development distribution function optimally. The development of infrastructure and public facilities is suspected to be more concentrated in areas with high economic activity so that the benefits of development are more enjoyed by relatively developed regions. As a result, the gap in development and income between regions still persists. The results of this study are in line with the public finance theory put forward by Musgrave (1989) which explains that government expenditure has allocation, distribution, and stabilization functions, so that its effectiveness in reducing inequality is largely determined by the budget allocation pattern. This is also in line with research by Yasni and Yulianto (2020) which shows that local government capital expenditure has a positive effect on income inequality between regions. In addition, Putri (2024) explained that the effectiveness of capital expenditure in reducing inequality is highly dependent on the equitable distribution of construction sites and the quality of budget allocation. Thus, the results of this study indicate that an increase in capital expenditure will not necessarily be able to reduce inequality if the distribution of development is still concentrated in relatively developed areas.

Overall, the results of the study show that income inequality in the former Kediri Residency area is influenced by a combination of economic growth factors, poverty, human development, investment efficiency, and regional fiscal policies. The findings of this study show that economic growth has the potential to be an instrument to reduce inequality if it takes place in an inclusive manner. On the other hand, poverty, uneven human development, and capital expenditure allocation patterns that have not been in favor of disadvantaged areas are still factors that widen the income gap. These results also reinforce previous

studies that the relationship between economic development and income inequality is not only determined by the magnitude of economic growth, but also by the quality of the distribution of development benefits to all community groups and regions. Therefore, regional development policies need to be directed not only at accelerating economic growth, but also at poverty alleviation, equitable access to education and health, equitable distribution of productive investment, and allocating capital expenditure that is more in favor of underdeveloped regions so that the resulting development becomes more inclusive and able to reduce income inequality in a sustainable manner.

V. CONCLUSION

This study provides important knowledge about the factors that affect income inequality in the former Kediri Residency area, especially through the role of economic growth, poverty, human development, investment efficiency, and capital expenditure. The results of this study show that GDP has a negative effect on income inequality, which indicates that economic growth is able to encourage income equity if the benefits can be felt by all levels of society. On the other hand, poverty, the Human Development Index (HDI), and capital expenditure have a positive effect on income inequality. This finding shows that the improvement of the quality of life and development that has been implemented has not been fully enjoyed equally by all community groups in the former Kediri residency area. Meanwhile, ICOR has no significant effect on income inequality, which shows that investment efficiency has not been able to have a direct impact on income distribution.

This research yielded several important policy implications. Local governments need to encourage more inclusive economic growth through the expansion of strengthening sectors involving low-income communities. Poverty alleviation efforts also need to be improved by maximizing existing programs to be on target and sustainable. In addition, improving the quality of education and health must be accompanied by equal access so that the benefits of human development can be felt by all people. The government also needs to direct capital expenditure on infrastructure and public service development in underdeveloped areas so that development benefits can be spread more evenly and be able to reduce income gaps.

Further research is suggested to add other variables that have the potential to affect income inequality, such as unemployment rates, fiscal decentralization, investment, digitalization, and institutional quality. In addition, future research can expand the scope of areas and observation periods to obtain a more comprehensive picture of the factors that influence income inequality and support the formulation of more effective and sustainable development policies.

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