



Determinant of Income Inequality in Eastern Indonesia

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Abstract. This research aims to identify and analyze the factors that influence income inequality in Eastern Indonesia, which often lags behind Western Indonesia. Income inequality is a serious problem that hinders equitable and sustainable economic development. In this context, this study explores the role of population, education, and labor productivity variables as the main determinants of income inequality. The method used is a quantitative approach with panel data analysis covering 13 provinces in Eastern Indonesia over the period 2009 to 2023. The regression analysis shows that education and labor productivity have a significant effect on reducing income inequality, while population does not show a significant effect. This finding indicates that improving the quality of education and labor productivity is crucial in reducing income inequality, and government policies should focus on improving access to and quality of education and training to increase productivity. This study concludes that although income inequality is difficult to eliminate completely, efforts to reduce it can be made through more equitable improvements in education and productivity.

Keywords: Income Inequality, Population, Education, Labor Productivity

1 Introduction

At the beginning of economic development in Indonesia, there were many obstacles in realizing equitable economic development in each region, some regions experienced rapid economic growth, while other regions experienced slow economic growth. The natural wealth of each region should be able to make added value in improving economic development. These advantages are expected to have a spread effect[1]. However, natural resources in each region have different contents in 34 provinces in Indonesia and evenly. This causes inequality or disparity between regions.

Economic development will be considered successful if economic growth can be balanced and there is no economic imbalance. Social inequality and inter-regional disparity is one of Indonesia's unresolved economic problems to date. Based on this, the economic growth of a region can have an impact on regional inequality in a negative direction. This means that higher economic growth automatically increases production capacity so that output also increases. The increase in output will increase people's income and increase per capita income and subsequently income inequality between regions will narrow[2].

Indonesia is one of the countries with a high level of income inequality. Most of the income inequality problems in Indonesia are caused by the lack of income received in meeting the needs of life. Various efforts have been made to reduce the level of inequality. However, inequality cannot be eliminated but can only be reduced so that harmony in the growth process can occur.

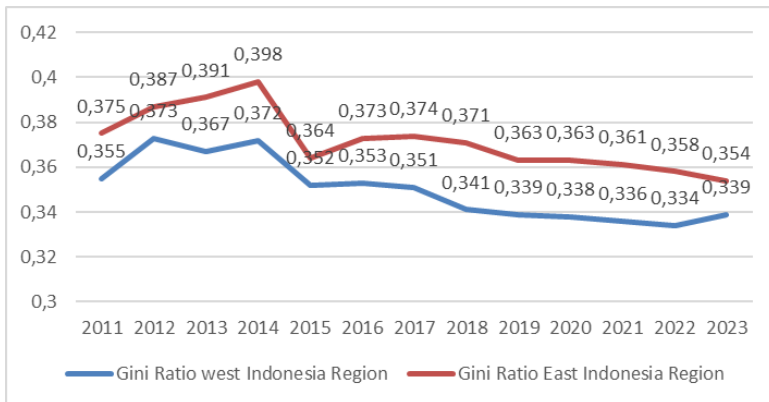


Fig. 1. Comparison of Gini Index of Western and Eastern Indonesia Region 2011-2023

In National Development Planning, Eastern Indonesia has always received attention and priority from the government. However, until now economic growth, equitable distribution of development results and the ability of regions in Eastern Indonesia in the overall efforts and results of national development are still lagging behind compared to Western Indonesia in general[3]. This is because most of the centers of the real economy and markets are located in Western Indonesia and most of the population lives in Western Indonesia.

The high income gap in Eastern Indonesia suggests that the achievement of economic growth has not been evenly distributed, so that economic growth cannot be used as a measure of community welfare. From the point of view of spatial economics, inequality due to non-uniform development patterns is natural in creating regions that are left behind or grow more slowly, but this pattern results in fundamental differences in income to inequality between regions in Indonesia[2].

There are several factors that can affect income inequality in Eastern Indonesia, including population. Increasing population growth is one of the factors that complicate the problem of income inequality, especially in developing countries[4]. When population growth is not accompanied by an increase in the quality of human resources, it can exacerbate inequities in income distribution. Unequal access to education, employment and economic resources will further exacerbate inequality[5]. In low-income developing countries, income inequality is associated with negative impacts on long-term economic growth. Predictions also suggest that global income inequality will bottom out around 2027, then rise again due to economic and demographic influences [6].

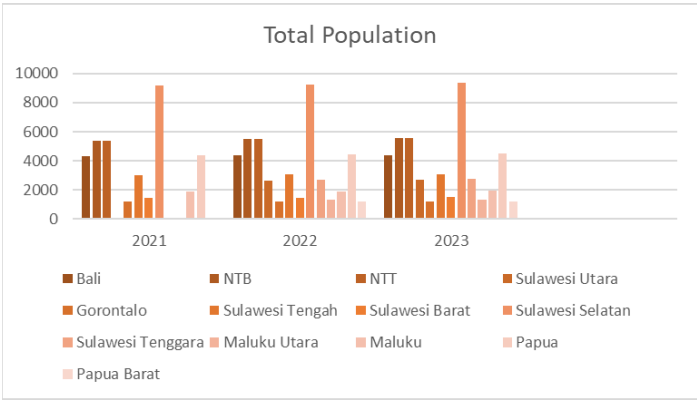


Fig. 2. Total population of the Eastern Indonesia Region 2011-2023

Improving the quality of human resources through equitable education and training is crucial in addressing income inequality[7]. Several studies show that a more equitable distribution of education significantly reduces income inequality. Both the quality and quantity of education play a role in reducing these inequalities, with stronger marginal effects on increasing education levels [8]. In addition, education also affects the two poles of income distribution, reducing the income share of the rich and increasing the income share of the low-income group [9].

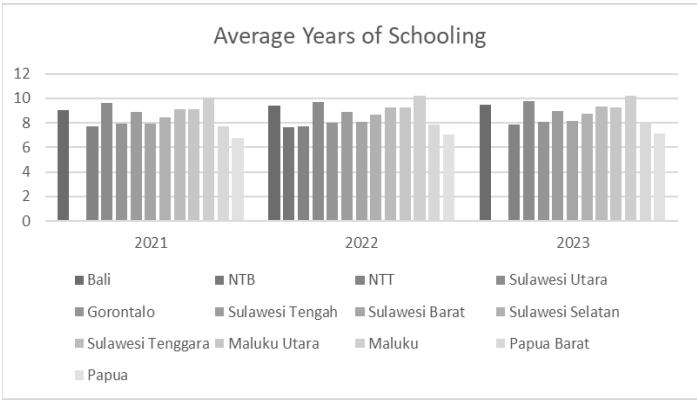


Fig. 3. Average Years of Schooling in the Eastern Indonesia Region 2011-2023

Labor productivity can also affect income inequality. Labor productivity is the source of sustainable economic growth and improved living standards. Thus, labor productivity can be described by the output produced by each worker in a certain year, so the higher the productivity indicates that the labor is more productive.

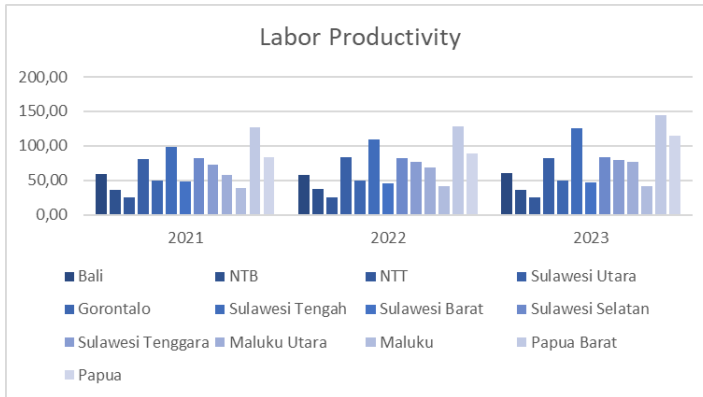


Fig. 4. Labor Productivity of the Eastern Indonesia Region in 2011-2023

In this context, it is important to understand that while factors such as population growth, education, and labor productivity play a key role, the complex interactions between these variables also affect the level of income inequality [10]. Therefore, this study aims to further explore the relationship between these three factors and their impact on income inequality in Eastern Indonesia, and identify policies that can be implemented to effectively address this issue.

Theoretical foundation that connects between Kuznets said that at the beginning of the development process, income distribution tends to be unequal. Then when a certain level of development is achieved, income distribution becomes more equal. It is implied that in the short run, there is a positive relationship between economic growth and income inequality, meaning that economic growth causes an increase in income inequality. However, in the long run, the relationship turns negative, indicating that an increase in income can reduce income inequality [11].

Income inequality and population growth are two interrelated issues that continue to be of concern in economic and development studies, especially in developing countries. Rapid population growth is often accompanied by major challenges in providing access to adequate education, health and employment opportunities, which in turn exacerbates inequality in income distribution [12]. These inequalities not only affect certain individuals or groups, but can also hamper overall economic growth, creating a cycle that is difficult to break.

Furthermore, the addition of human capital (average level of schooling of the labor force) can make income distribution equal in the long run. Based on this, if education increases, it will reduce inequality in income distribution [13]. Thus, it can be explained that a person with higher education will generally earn a higher income than those with lower education. The income gap between people can be reduced with a high income.

However, in practice, many lagging regions are unable to catch up due to barriers such as limited access to technology, education and infrastructure. This suggests that productivity improvements alone are not enough to reduce regional inequality without being supported by policies that ensure a more equitable distribution of benefits [14].

Based on the background above, this research model is illustrated as follows:

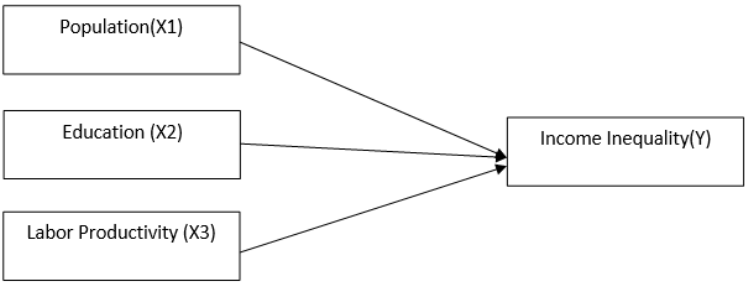


Fig. 5. Research Analysis Model

The hypotheses developed in this study are as follows:

- **Hypothesis 1.** Population has a positive and significant effect on income inequality
- **Hypothesis 2.** Education has a positive and significant effect on income inequality
- **Hypothesis 3.** Labor productivity has a positive and significant effect on income inequality

2 Methods

This research uses a quantitative approach. The quantitative approach is a research approach used to examine a particular population or sample[15]. The quantitative research method used in this study, which measures and analyzes the determinants of income inequality in Eastern Indonesia.

This study uses variables X_1 Population, X_2 education, X_3 Labor Productivity and variable Y income inequality.

Table 1. Variable description

Variable	Deskripsi	Source	
Income Inequality	Gini Ratio	Indonesian Statistics Agency (BPS)	Central
Population	Population of 13 Provinces in the Eastern Indonesia Region	Indonesian Statistics Agency (BPS)	Central
Education	Average Years of Schooling in 13 Provinces in Eastern Indonesia	Indonesian Statistics Agency (BPS)	Central
Labor Productivity	Labor Productivity	Ministry of employment	

The analysis method used in this research is panel data analysis. Regression analysis is a statistical process for estimating the relationship between variables, namely in the form of techniques for modelling and analysing several variables based on the form of the relationship between one independent variable and one or more independent variables.

The linear regression analysis model states that the relationship between one or more independent variables can be expressed in a linear regression model. The linear regression model is as follows:

$$\gamma = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (1)$$

Where:

Y = Income Inequality

X1= Population

X2= Education

X3= Produktivitas Tenaga Kerja

β = Coefficients

ε = Error

3 Result

The initial stage in panel data regression analysis is to select the best model among the Common Effect (CEM), Fixed Effect (FEM), and Random Effect (REM) models. The first step involves a statistical test using the Chow test, which aims to determine the best model between CEM and FEM. After that, it is followed by the Hausman test to determine the more appropriate model between FEM and REM.

The chow test is used to determine the choice of model that is better used in the panel data regression model between CEM and FEM, so the chow test is carried out. The results of the CEM and FEM model selection test are as follows.

Chow Test . F statistic

data: Y ~ X1 + X2 + X3
F = 33.364, df1 = 12, df2 = 179, p-value < 2.2e-16
alternative hypothesis: unstability

Source: Rstudio Data Processing Results (2024)

The Chow test results show an F-statistic of 33.364 with a p-value of less than 2.2e-16 so the decision is H_0 reject. It can be concluded that the fixed effect model is better than the common effect model.

The Hausman test is used to determine the choice of model used, namely between FEM and REM. The results of the Hausman test are as follows:

Hausman Test

data: $Y \sim X1 + X2 + X3$
chisq = 4.581, df = 3, p-value = 0.2052
alternative hypothesis: one model is inconsistent

Source: Rstudio Data Processing Results (2024)

The Hausman test produces a chisq value of 4.581 with a p-value of 0.2052 this value is greater than the value of the significance level $\alpha = 0.05$, so the decision fails to reject H_0 . This means that the random effect model is better than the fixed effect model.

The partial test (T-test) is used to identify the independent variables that significantly affect the change in income inequality partially in an individual model. The following presents the results of the partial test.

T Test.

Coefficients:
Estimate Std. Error t-value Pr(>|t|)
X1 -0.00204782 0. T Test
00487185 -0.4203 0.6747
X2 -0.01402751 0.00310686 -4.5150 1.145e-05 ***
X3 -0.00067961 0.00013654 -4.9772 1.508e-06 ***

Signif. codes: 0 '*' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1**

Source: Rstudio Data Processing Results (2024)

The T-test results show that education (X2) and labour productivity (X3) have a significant effect on income inequality with p-values below 0.001. In contrast, the population variable (X1) is insignificant on income inequality (p-value of 0.6747). This suggests that increasing education and labour productivity can reduce income inequality in the region, while population has no significant effect.

The F-test is used to evaluate whether all independent variables in the model simultaneously or jointly affect the dependent variable. This test can be done by looking at the probability value of the regression results, which is often referred to as the Quick Look method. The F test will show whether the independent variables such as population, education level, and labour productivity in the fixed effects model have a joint influence on income inequality.

F Test.

Residual Sum of Squares: 0.072918
R-Squared: 0.30517
Adj. R-Squared: 0.29426
Chisq: 83.8891 on 3 DF, p-value: < 2.22e-16

Source: Rstudio Data Processing Results (2024)

The F-test yields a Chisq value of 83.8891 with a p-value of less than 2.22e-16. These results indicate that overall, the model is significant in explaining the

relationship between the independent variables (population, education, and labour productivity) and the dependent variable (income inequality). The R-squared value of 0.30517 and Adjusted R-squared of 0.29426 indicate that about 30% of the variation in income inequality can be explained by this model.

The coefficient of determination (R^2) is used to measure the extent to which the model can explain variations in the dependent variable. An R^2 value close to 1 indicates that almost all the information related to the dependent variable is successfully explained by the independent variables in the study. The R^2 value obtained from the Fixed Effect Model regression serves to assess the extent to which the dependent variable can be explained by the independent variables in the research model.

Coefficient of determination test.

Total Sum of Squares: 0.10494

Residual Sum of Squares: 0.072918

R-Squared: 0.30517

Adj. R-Squared: 0.29426

Chisq: 83.8891 on 3 DF, p-value: < 2.22e-16

Source: Rstudio Data Processing Results (2024)

Based on the regression results above, we can see the relationship between the independent variables (population, education, and labour productivity) and the fixed variable (income inequality) from 2009 to 2023. The R-squared value of 0.30517 and Adjusted R-squared of 0.29426 indicate that about 30% of the variation in income inequality can be explained by this model, while the remaining 70% is explained by other variables outside the model.

Based on the test results above, it can be seen that population (X_1) has no significant effect on income inequality with a p-value of 0.6747. This indicates that population growth does not have a significant relationship with income inequality in Eastern Indonesia. The education variable (X_2) has a significant effect on income inequality with a p-value of 1.145e-05, which is well below the 0.05 significance level. This means that education has a significant and negative impact on income inequality. And labour productivity (X_3) also has a significant effect on income inequality, with a p-value of 1.508e-06, which indicates a highly significant effect. An increase in labour productivity contributes to a decrease in income inequality. Higher productivity reflects the ability of labour to produce greater output, which in turn leads to an increase in income.

4 Conclusion

Based on the analysis and discussion above, the following conclusions can be drawn:

1. Total population (X_1) shows no significant effect on income inequality, with a p-value of 0.6747. This means that population growth alone is not sufficient to explain the variation in income inequality in Eastern Indonesia.

2. Education (X_2) has a significant negative effect on income inequality, with a p-value of 1.145e-05. This suggests that increasing the average years of schooling in Eastern Indonesia contributes substantially to reducing income inequality.
3. Labor productivity (X_3) has a negative and significant effect on income inequality, with a p-value of 1.508e-06. This suggests that an increase in labor productivity, which is reflected in the output produced per worker, can significantly reduce income inequality.

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