

THE EFFECT OF POPULATION NUMBER, ADHK GDP, POVERTY AND HUMAN DEVELOPMENT INDEX ON INCOME INEQUALITY IN TEN PROVINCES ON THE ISLAND OF SUMATRA

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ABSTRACT

This study aims to explain the condition of income inequality in ten provinces on the island of Sumatra by using four independent variables, namely Population Number, ADHK GDP, Poverty and Human Development Index in 2013-2023. The data was then analyzed based on the panel data regression method procedure. The results obtained from the regression analysis of panel data are that the Fixed Effect Model (FEM) is the most appropriate approach to explain the influence of variables bound to free variables in this study. Based on the validity test of influence or t-test, it is known that the variable that has a significant effect on the income inequality of ten provinces on the island of Sumatra in 2013-2023 is the Population variable with a negative coefficient direction.

Keywords: Number of Population, ADHK GDP, Poverty, HDI, Income Inequality, Sumatra Island, Panel Data.

INTRODUCTION

Income inequality is still a problem that many countries face when trying to achieve prosperity. The disproportionateness of the total national income among households or communities is known as income inequality. In general, the efforts that can be made to increase the income of the people are known as economic growth. Income inequality is inseparable from poverty, which usually occurs in poor and developing countries, because rapid economic growth will lead to income inequality.

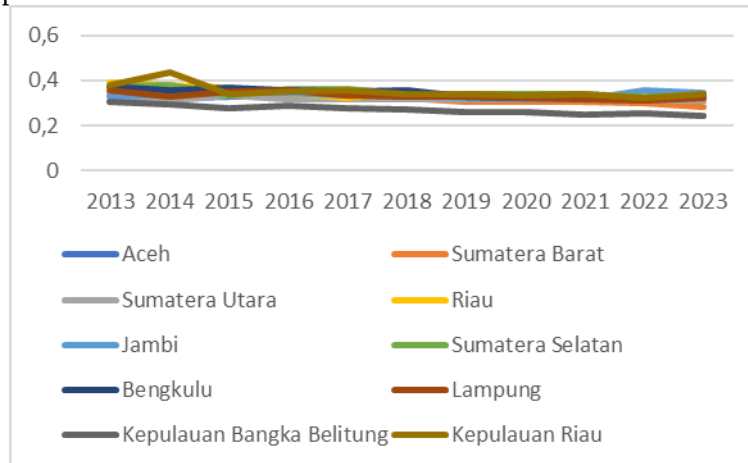
Creating sustainable and equitable economic growth across the region is the main goal of regional economic development. Regional economic development has several goals, namely improving welfare, reducing inequality, diversifying the economy, increasing competitiveness, infrastructure development, improving the quality of life, sustainable development and local empowerment. The goal is to create a situation where each region has an equal opportunity to develop, so that it can contribute to overall economic growth (Lecca, et al (2023)).

Economic development or economic growth always has positive and negative impacts (Susetyo, et al (2022)). Thus, the government is focusing on how to increase economic growth while maintaining low levels of income inequality. To achieve this, accurate identification of the components that affect a country's income inequality is necessary. The Gini ratio is often used as a tool to monitor the level of income inequality in society. High levels of income inequality can give rise to social problems such as dissatisfaction, social instability, and injustice, while low levels of inequality are typically considered a better indicator of social well-being.

The Gini ratio is a numerical indicator that measures how much income inequality is distributed, with values ranging from 0 (most even) to 1 (least even) (Todaro & Smith, 2020). The Gini ratio consists of three categories: low ratios (below 0.3), medium ratios (between 0.3 and 0.5), and high ratios (above 0.5). Based on data from the Central Statistics Agency (2024), Indonesia recorded a Gini ratio of 0.388 in 2023, placing it in

the middle inequality category and having very variable numbers ranging from 0.289 to 0.368. The following presents a graph of the Gini ratio index of ten provinces on the island of Sumatra during 2013-2023.

Figure 1
Graph of the Gini Ratio Index of Ten Provinces on the Island of Sumatra



Source: Central Statistics Agency (2024)

Graph 1 presents the Gini ratio index of ten provinces on the island of Sumatra in 2013-2023. Judging from the graph, the ten provinces on the island of Sumatra are always consistently at 0.2 to 0.4 which indicates that income inequality in the ten provinces on the island of Sumatra is a perfect inequality where the distribution of income or wealth is perfect equally, where everyone has the same income or wealth.

There are still few studies that raise this issue, when the island of Sumatra is the second island after Java Island which makes the highest contribution to the economy in Indonesia. The background that the author has described, the author aims to explore, identify, and analyze the factors that affect the level of income inequality. The main goal is to find factors that significantly differentiate the level of income inequality between provinces, especially on the island of Sumatra.

RESEARCH METHODS

This study analyzes the income inequality of ten provinces on the island of Sumatra from 2013 to 2023 by reading literature or literature studies to get the secondary data needed. A literature study is also needed to find out the findings of previous studies or those that are similar or similar to this study, but with different times so as to enrich the methods used by the researcher to conduct this research.

RESULTS AND DISCUSSION

1. Panel Data Regression Analysis

The Fixed Effect Model (FEM) is a model that assumes that the slope coefficient does not vary with respect to individuals or time (constant) by using the Ordinary Least Square (OLS) method approach as the estimation technique.

Results of Fixed Effect Model (FEM) Regression Estimation:

$$Y = 3.36548596116 - 0.189947556935 \cdot \text{LOG_X1} + 0.000813992734371 \cdot \text{X2} + 0.000669565626263 \cdot \text{X3} - 0.00190232195399 \cdot \text{X4} + [\text{CX}=\text{F}]$$

The processing of the Fixed Effect Model (FEM) regression data shows a constant value of 3.365486 with a probability number of 0.0000. The R-Square value

of 0.795182 explains that the level of probability of income inequality in ten provinces on the island of Sumatra which is influenced by the number of population, ADHK GDP, poverty and human development index is 79.51% and the remaining 20.49% is influenced by other factors that are not included in this study. So, the assumption using the Fixed Effect Model (FEM) is more realistic in determining the influence of Population, ADHK GDP, Poverty and HDI on Income Inequality.

2. Panel Data Regression Model Selection Test

Chow Test

The Chow test or some books call it the F statistics test is a test to choose whether the model used is Pooled Least Square or Fixed Effect. As is well known, the assumption that each cross-section unit has the same behavior is sometimes unrealistic because it is possible for each cross-section unit to have different behavior. After processing the Chow Test and the results carried out, it was found that the significance value of the Chi-square cross section probability was less than α 0.05 ($0.0000 < 0.05$) so that H_0 was rejected and H_1 was accepted. Thus in the Chow Test, the best model chosen is the Fixed Effect Model (FEM).

Hausman Test

Basically, the Hausmann test is used to evaluate the consistency of the estimate with the OLS, so when the panel data is modeled the Hausmann test can be used to determine whether to use a fixed effect or random effect model. Based on the processing of the Hausman Test, it has been known that the significance value of the *random Cross-section probability* is approximately α 0.05 ($0.0064 < 0.05$) so that H_0 is rejected and H_1 is accepted. Thus, in the Hausman Test, the best model chosen is *the Fixed Effect Model* (FEM).

Langrange Multiplier

The Chow and Hausman Tests have chosen the best model for this study, namely the Fixed Effect Model (FEM), so the Langrange Multiplier Test is not needed in this research.

3. Classical Assumption Test

The best estimation model chosen for this study is the Fixed Effect Model (FEM) so that the classical assumption test is carried out in this study to see if the regression model is found to have a correlation between independent variables and residual variance around the regression line is constant for each combination of the values of the independent variables, then the Multicollinearity Test and the Heteroscedasticity Test will be carried out. The Normality Test and Autocorrelation Test were not carried out because this study used panel data.

Multicollinearity Test

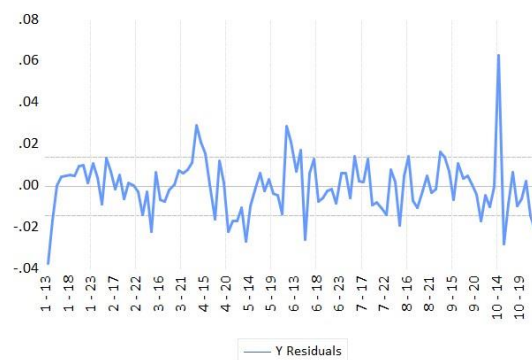
The purpose of the multicollinearity test is to find out whether the regression model shows a correlation between independent variables and a good regression model should not find a correlation between independent variables. Based on the processing of the Multicollinearity Test, the results of the correlation coefficients Log_X1 and X2 were $-0.055087 < 0.85$, the correlation coefficients of Log_X1 and X3 were $0.233677 < 0.85$, the correlation coefficients of Log_X1 and X4 were -

$0.145007 < 0.85$, the correlation coefficients of X2 and X3 were $0.031984 < 0.85$, the correlation coefficients of X2 and X4 were $-0.244503 < 0.85$, the correlation coefficients of X3 and X4 were $-0.455820 < 0.85$. Therefore, it can be concluded that there is no correlation between the independent variables used in this study, so that the classical assumption test of multicollinearity is fulfilled or free from multicollinearity or passes the multicollinearity test, this can be seen because the test results show that the correlation value of each independent variable is less than 0.85.

Heteroscedasticity Test

This assumption states that the residual variance around the regression line is constant for any combination of the values of its independent variables. The test results showed that the correlation value of each independent variable was greater than 0.05, so that for variables X2, and X3 the classical assumption test of heteroscedasticity was fulfilled or free from heteroscedasticity or passed the heteroscedasticity test. However, the value of the variable Log_X1 Prob. As much as $0.0008 < 0.05$ is smaller than 0.05 and variable X4 has a prob value of $0.0277 < 0.05$, then variables Log_X1 and X4 are declared not to pass the heteroscedasticity test and a residual graph will be carried out to test the residual value.

Figure 1
Grafik and Residual



Source: Data processed (Eviews 12, 2024)

4. Uji Hipotesis

Test t

The t-test is used to determine the influence of independent (independent) variables on dependent (bound) variables individually To find out the value of whether the t-value is statistical in the table, the significance level used is 5% with the decision-making criteria. The t-calculation value was obtained by Microsoft Excel 2019 from probability 0.05; deg_freedom (number of samples – 2) is 0.05; 108 and managed using the formula $t_{inv}(0.05; 108) = 1.982173$.

Test F

The F test is used to test independent variables simultaneously or simultaneously against dependent variables and proves that this studied model is feasible for further testing. This test is used by assuming the value of Fcal with Ftable. If the p-value $< \alpha$ 5%, this proves to be significant and vice versa. The Ftable value is obtained by using Microsoft Excel 2019 with the formula $=FINV(\alpha; K-1; n-k)$ where α is an alpha of 0.05, n is the total observation, and k is the total

dependent variable and independent variable, then the result is $=\text{FINV}(0.05; 5-1; 110-4)$ and the value of F_{table} is 1.65936.

Coefficient of Determination

Calculating the magnitude of the contribution between the independent variable and the bound variable can be done using the determination coefficient. After processing the eviews 12 software, it shows that the Adjusted R-squared value is 0.767446 or 76%. The value of the determination coefficient shows that the independent variables of Population Number, ADHK GDP, Poverty Percentage and Human Development Index are able to explain 76% of income inequality on the island of Sumatra while the other 24% are explained or influenced by variables outside the study.

Based on the output of *the fixed effect regression model* of the panel data above, the regression equation model can be obtained as follows:

$$Y_{it} = 3.365486 - 0.189948\text{Log_X1}_{it} + 0.000814\text{X2}_{it} + 0.000670 - 0.001902\text{X3}_{it}\text{X4}_{it} + \varepsilon_{it}$$

The interpretation of the results of the panel data regression equation in this study is as follows:

1. The regression results of the panel data in this study show that the constant value is 3.365486. This means that if it is assumed that the Number of Population, ADHK GDP, Poverty and Human Development Index are equal to zero, then the Income Inequality on the island of Sumatra is 3.365486 or has a positive value and has increased.
2. The Population Variable has a coefficient of -0.189948 and explains the negative influence of Population on Income Inequality on the Island of Sumatra. If the number of population increases by one person, it will reduce the Income Inequality on the island of Sumatra by 1.89948 assuming other variables are fixed/constant.
3. The ADHK GDP variable has a coefficient of 0.000814 and explains the positive influence of ADHK GDP on Income Inequality on the island of Sumatra. If ADHK's GDP increases by one percent, it will increase the Income Inequality on the island of Sumatra by 0.000814 assuming other variables are fixed/constant.
4. The Poverty variable has a coefficient of 0.000670 and explains the positive influence on Income Inequality on the island of Sumatra. If poverty increases by one percent, it will increase Income Inequality on the island of Sumatra by 0.000670, assuming other variables are fixed/constant.
5. The Human Development Index variable has a coefficient of -0.001902 and explains the negative influence on Income Inequality on the island of Sumatra. If poverty experiences a human development index of one percent, it will reduce Income Inequality on the island of Sumatra by 0.000670, assuming other variables are fixed/constant.

CONCLUSION

Based on the results of data analysis and discussion that has been presented earlier, it can be concluded as follows:

- The best model selected in this study is the Fixed Effect Model (FEM), the results of which show negative population variables and have a significant effect on income inequality on the island of Sumatra, the factors that affect it are Uneven Economic Expansion, Economic Diversification, Infrastructure Development, Growth of the Informal Sector Micro, Small, and Medium Enterprises (MSMEs), Creative and

Digital Economy, Improvement of Social Welfare, Welfare Program.

- The ADHK GDP variable with the results of the Fixed Effect Model (FEM) estimate has a positive influence and does not have a significant effect on income inequality on the island of Sumatra. The factors that affect it are Economic Growth Without Equitable Distribution, Concentration of Growth in Certain Sectors, Growth Geography, Quality of Economic Growth, Growth Without Job Creation, Wages That Do Not Increase Evenly, Uneven Income Distribution, Education and Skills Gaps, Access to Economic Opportunities.
- The poverty variable has been processed and the results of the Fixed Effect Model (FEM) estimate have a positive influence and do not have a significant effect on income inequality on the island of Sumatra. The factors that affect it are Persistent Inequality in Low-Income Groups, Equal Income among the Poor, Income Improvement Below the Poverty Line, Limited Economic Growth in Certain Segments, Economic Growth only in the Elite group, Limited Access to Economic Opportunities, Limited Access to Markets and Capital, Economic and Social Segregation, Regional Differences, Regional Inequality.
- The human development index variable has been processed and the results of the Fixed Effect Model (FEM) estimate have a negative influence and do not have a significant effect on income inequality on the island of Sumatra. This is due to Uneven Distribution of Development Benefits, Gaps in Education, Varying Quality of Education, Uneven Burden of Disease, Uneven Living Standards, Quality of Housing and Sanitation, Unequal Income.

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