Mapping Economic Disparity: A Panel Data Analysis of 34 Indonesian Provinces

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Info Artikel	Abstract
	Income inequality remains a complex challenge in developing countries, including Indonesia. While it cannot be eliminated, it can be reduced to socially acceptable levels to maintain harmony in the system. This study analyzes the effect of the Human Development Index (HDI), poverty, economic growth, Regional Original Revenue (PAD), and Farmer Exchange Rate (NTP) on income inequality in Indonesia during 2000-2021. Using the panel data regression analysis technique with the Fixed Effects Model, the results show that economic growth and NTP significantly negatively affect inequality, helping to reduce it. In contrast, HDI and poverty increase inequality, while PAD has no significant effect. The intercept indicates that East Java, Central Java, and West Java have lower inequality, mainly due to the presence of growth centers and industries. This study suggests the development of new economic centers in poor regions as an effective strategy to reduce inequality in Indonesia.

	Abstrak
	Ketimpangan pendapatan tetap menjadi tantangan kompleks di negara berkembang, termasuk Indonesia. Walaupun tak sepenuhnya dapat dihapuskan, ketimpangan ini dapat ditekan hingga tingkat yang dapat diterima secara sosial, guna menjaga harmoni dalam sistem. Penelitian ini menganalisis pengaruh Indeks Pembangunan Manusia (IPM), kemiskinan, pertumbuhan ekonomi, Pendapatan Asli Daerah (PAD), dan Nilai Tukar Petani (NTP) terhadap ketimpangan pendapatan di Indonesia selama 2000-2021. Menggunakan teknik analisis regresi data panel dengan Fixed Effects Model, hasil menunjukkan pertumbuhan ekonomi dan NTP berpengaruh negatif signifikan terhadap ketimpangan, membantu meng0uranginya. Sebaliknya, IPM dan kemiskinan meningkatkan ketimpangan, sementara PAD tidak berpengaruh signifikan. Nilai konstanta mengindikasikan bahwa Jawa Timur, Jawa Tengah, dan Jawa Barat memiliki ketimpangan lebih rendah, terutama karena keberadaan pusat pertumbuhan dan industri. Penelitian ini menyarankan pengembangan pusat-pusat ekonomi baru di wilayah miskin sebagai strategi efektif untuk mengurangi ketimpangan di Indonesia.

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INTRODUCTION

Inequality in income in Indonesia has been a serious concern in the country's social and economic dynamics. Despite economic growth over the past few years, the large gap between groups in income distribution remains a crucial issue that must be addressed. Although Indonesia has achieved significant economic progress in recent decades, the positive impact of such growth has yet to be spread evenly across all segments of society. Several economic, social, and geographical factors have magnified this inequality (Sulistyaningrum & Tjahjadi, 2022; Hall, 2021).

The poverty still dominating Indonesia's agricultural sector is a severe problem contributing to income distribution inequality. This poverty context illustrates that most people in rural areas depend on the agricultural sector as their primary source of income (Statistics Indonesia, 2022; Aginta, 2019).
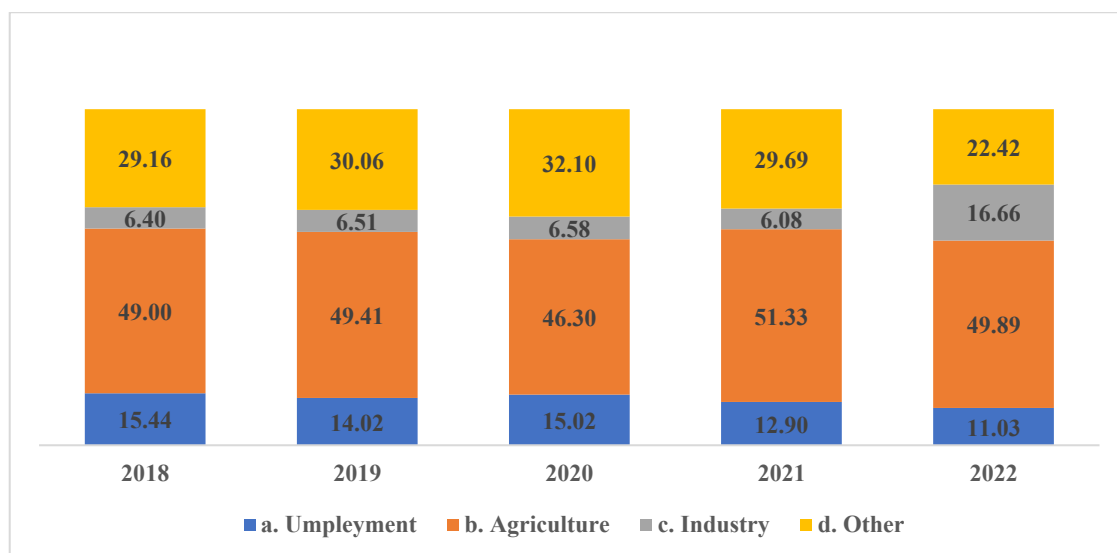

Figure 1. Percentage of Poor Households According to Main Source of Household Income 2018-2022 (%)
Source: Statistics Indonesia, 2023

The percentage of poor households by primary source of household income from 2018 to 2022 shows that the agricultural sector has a relatively high poverty rate compared to other sectors. The poverty percentage in the agricultural sector ranges from 46.30% to the highest peak in 2021 at 51.33%, before declining again to 49.89% in 2022. These significant fluctuations reflect the vulnerability of agriculture-dependent households to external factors, such as changes in agricultural commodity prices, climate change, and limited access to necessary resources and technologies. Volatile economic conditions and inconsistent government policies can also exacerbate fluctuations in poverty levels (Malhi et al., 2021; Onsay, 2022). Farmers are often caught in vulnerable conditions as changes in agricultural commodity prices and the impact of climate change on crop yields directly affect their income. Limited access to education, training, and modern agricultural technologies are also essential factors that create a cycle of poverty that is difficult to break (Akpan & Zikos, 2023). In addition, unequal access to resources, such as land and technology, between smallholders and large farmers further exacerbates this situation, where smallholders often need equal access, thus reinforcing the income gap in the agricultural sector. This points to the need for profound structural improvements in the agricultural sector to reduce poverty and address income inequality in Indonesia (Giller et al., 2021).

Factors such as the Human Development Index (HDI), persistent poverty, and uneven economic growth are key drivers of this inequality. The low HDI in some regions often reflects wide disparities in income distribution, given that the HDI encompasses socio-economic well-being that can affect the income of individuals and community groups. High levels of poverty are also an essential factor in shaping inequality, where those below the poverty line tend to have limited access to the same economic opportunities as wealthier groups (Sugiharti et al., 2023; Rachmawatie & Prakoso, 2023). Uneven economic growth also contributes significantly to income inequality, as the benefits of economic growth are often not spread evenly across society. In addition,

regional own-source revenue (PAD) also plays an essential role in determining income distribution inequality, where the management of economic resources at the local level can affect inter-regional inequality.

In addition, there is a significant correlation between economic growth, poverty rate, farmer exchange rate, and income distribution inequality. While an increase in the farmer exchange rate has the potential to improve farmers' welfare and reduce income inequality, it should be noted that other factors, such as uneven economic growth, can worsen income inequality between regions.

The policy implications of these findings point to the need for greater focus on equitable development and resource distribution to regions with high levels of income inequality. Improving the quality of life, access to education, health, and economic infrastructure in rural areas is crucial. In addition, policies that promote stable and equitable economic growth in various regions and poverty alleviation are needed to reduce income inequality. Policies that support farmers in obtaining a better exchange rate for their agricultural produce are also needed as part of the strategy to balance income distribution inequality.

In this context, the government needs to formulate integrated and comprehensive policies, with a particular focus on improving welfare in regions experiencing high levels of income inequality, such as South Sulawesi (0.360), West Sulawesi (0.354), and Central Sulawesi (0.309) (Statistics Indonesia, 2024). Infrastructure development, improving access to essential services, strengthening the rural economy, and empowering farmers are some of the steps that can be taken to reduce income distribution inequality. With a targeted and sustainable approach, it is anticipated that these efforts will help reduce income disparities between regions and enhance overall community welfare. Similarly, the farmer exchange rate is a crucial factor in Indonesia's agrarian economy, where fluctuations in this rate can significantly impact rural welfare and inequality.

Kharisma & Saleh (2013) said that income distribution from 1984-2008 generally fluctuated. This was caused by economic shocks such as the economic crisis, the Bali bombing, and major earthquakes. Concerning urban and rural areas, income among workers also differed. Even in 2000, regional disparities in rural areas explained about 6% of income inequality (Wicaksono et al., 2017). Inequality in income distribution between high and low-income groups is a significant problem in developing countries (Igamo et al., 2023). Previous empirical research has confirmed that inequality is one factor that triggers crime rates in various countries, including Indonesia (Sugiharti et al., 2022; Widyastaman & Hartono, 2022). Europe's eastern and northern regions show a correlation between inequality and higher crime rates.

While many studies have addressed income inequality and its influencing factors, there still needs to be a research gap in understanding the direct linkages between income inequality, agricultural vulnerability, and local economic impacts in Indonesia. While most previous studies have focused on individual factors such as poverty levels, uneven economic growth, and differences in access to resources among small and large farmers, few have explored how the interaction between income inequality and local economic factors, such as farmer exchange rates and PAD, specifically affect social and economic stability in different regions. Further research is needed to fill this gap, focusing on the deeper relationship between inequality, farmers' economic vulnerability, and the socio-economic implications in the Indonesian context.

METHOD

This study examines the effect of the Human Development Index (HDI), poverty, economic growth, local revenue, and farmer exchange rate on Income Distribution Inequality in Indonesia from 2000-2021. This study uses time series data for 22 years, from 2000 to 2021, while the cross-section data are from 34 provinces.

Table 1. Operational Definition of Variables

No.	Variable	Definition	Unit	Data Source
1	Gini Ratio	Measurement of the level of inequality in the distribution of relative income between residents of a region. The Gini ratio value ranges between 0 (zero) and 1 (one).	Ratio	Statistics Indonesia
2	Human Development Index	Comparative measure of life expectancy, education, and living standard for all provinces	Index	Statistics Indonesia

No.	Variable	Definition	Unit	Data Source
3	Poverty	Inability to basic needs approach. Residents are categorized as poor if their average monthly per capita expenditure is below the poverty line.	Percentage	Statistics Indonesia
4	Economic growth	The development of economic activities that occurs from time to time and causes real national income to grow	Percentage	Statistics Indonesia
5	Locally-generated revenue	Regional government rights are recognized as adding to the value of net assets obtained by the region.	Rupiah	Ministry of Finance
6	Farmers Exchange Value	Comparison of the price index received by farmers to the price index paid by farmers	Index	Statistics Indonesia

The quantitative analysis technique used is panel data regression. The panel data regression equation used in this study is as follows:

$$GR_{it} = \beta_1 + \beta_2\,HDI_{it} + \beta_3 KM_{it} + \beta_4 PE_{it} + \beta_5 PAD_{it} + \beta_5 NTP_{it} + \vartheta_{it} \ldots..(1)$$

Description GR is the gini ratio, HDI is the human development index, KM is poverty, PE is economic growth, PAD is local revenue, NTP is the farmer exchange rate, ϑ is the error term.

RESULT AND DISCUSSION

In panel data regression, it is necessary to test the selection of the most appropriate model. Some tests include the Chow and Hausman Test (Wooldridge, 2002).

Table 2. Model Selection Test

Chow Test			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	18.015048	(3,33)	0.0000
Cross-section Chi-square	97.800738	33	0.0000
Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	19.705816	5	0.0014

Source: Data Processed, 2023

The Chow Test aims to determine whether the Common Effect model or the Fixed Effect Model will be chosen for data estimation. Based on the Chow test, the cross-section probability value F is more minor than α (0.000 < 0.05), which means the best model is the Fixed Effect Model. After carrying out the Chow test on the panel data estimates, the Hausman Test is continued. Hausman Test is a statistical test that chooses whether the fixed effect or random effect model is more appropriate for panel data regression. Based on the Hausman test, the cross-section probability value f is greater than the significance level (0.0014 < 0.05), which means the best model is the Fixed Effect Model.

Table 3. Panel Data Regression Estimation with Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.201371	0.024284	8.292336	0.0000***
HDI	0.055912	0.010606	5.271542	0.0000***
POVERTY	0.001328	0.000428	3.105361	0.0020***
LE	-0.013803	0.002903	-4.755686	0.0000***
PAD	0.161539	0.219674	0.735357	0.4624
NTP	-0.002138	0.000797	-2.683614	0.0075***
R-squared	0.203937			
Adjusted R-squared	0.133940			
S.E. of regression	5.677551			
F-statistic	2.913528			
Prob(F-statistic)	0.000000			

*Description: ***) 1% significance, **) 5% significance, and *) 10% significance*
Source: Processed Data, 2023

The estimation results for the Human Development Index variable positively and significantly affect income distribution inequality. These results align with research conducted by Safrita et al. (2021) regarding the analysis of factors that influence economic growth and income inequality in Indonesia. The Human Development Index has a positive and significant effect on income inequality. One of the HDI instruments is the life expectancy level, a critical factor in creating a productive workforce. A relatively high level of life expectancy can form and create a productive workforce and ultimately increase society's per capita income.

However, in reality, this only clusters in areas that are economic activity centers, causing uneven economic growth. The explanation above can be explained by Perroux's theory, which states that income equality cannot occur in all regions simultaneously because each region has different characteristics. In every province in Indonesia, access to education and health is quite widely available in cities, but not all people have adequate education and health. Urban communities with access to education and health can improve their quality of life and per capita income. This improvement in quality of life is only enjoyed by a small part of society, so income increases only occur in some parts of society, and inequality is increasing.

The estimation results show that economic growth and poverty have a negative effect on distributional inequality. This indicates that if economic growth and poverty increase, income inequality between regions will also increase, and vice versa; if economic growth decreases, then income inequality between regions will also increase. The existence of a relationship between economic growth and the level of inequality in income distribution, which has a powerful correlation, is explained by the views of Neo-Classical economists. The existence of the Kuznets Hypothesis regarding the relationship between economic growth and inequality has a relationship like an inverted u, namely, when in the early stages of economic growth, income distribution tends to worsen and will experience a decline. However, in the later stages, income distribution will improve and increase. Kuznets shows that there is a negative relationship between economic growth and inequality in income distribution. If growth is higher, inequality will decrease. This research aligns with Moges (2013) and Fuso (2010), who stated that there is strong growth elasticity and income distribution inequality due to poverty. Economic growth can reduce poverty and inequality in income distribution.

The estimation results show that the farmer's exchange rate negatively influences income distribution inequality. If there is an increase in the exchange rate for farmers, farmers will be more prosperous because farmers' income is more significant than their expenses so that farmers will have savings. Of course, this will reduce income distribution inequality among prosperous farmers. Most of the poor people in Indonesia are in the agriculture, forestry, and fisheries sectors. People who work in the agricultural sector have low incomes and are classified as poor. Therefore, if there is an increase in the exchange rate for farmers, it will increase people's income.

Theoretically, an increase in prices for goods and services consumed by the public will have a negative effect on the government's efforts to eradicate poverty. This is caused by a decrease in the actual income received by society. This impact is increasingly felt, especially for middle and lower-income groups. Improving farmer welfare can be influenced by two things. First, farmers' welfare can increase when the price of agricultural product commodities is higher than the increase in commodities consumed by farmers. Second, the selling prices of agricultural commodities have remained the same while the prices of commodities consumed by farmers have decreased. However, the most likely scenario is the first scenario, where the prices of both types of commodities are sold and consumed. However, the highest increase occurs in commodities sold by farmers.

At the policy level, there are several things that the government can do. First, the government needs to ensure that agricultural product commodity prices do not experience extreme price declines. In several cases, the fall in agricultural commodity prices occurred due to the high supply of agricultural commodities without being accompanied by increased societal demand. Therefore, regional governments must maintain reasonable supply following market needs and encourage farmers to carry out regional exports of commodities experiencing production surpluses. The regression results show no significant influence of Original Regional Income (PAD) on income distribution inequality. In the context of this research, no explanation supports the influence of PAD on income distribution inequality.
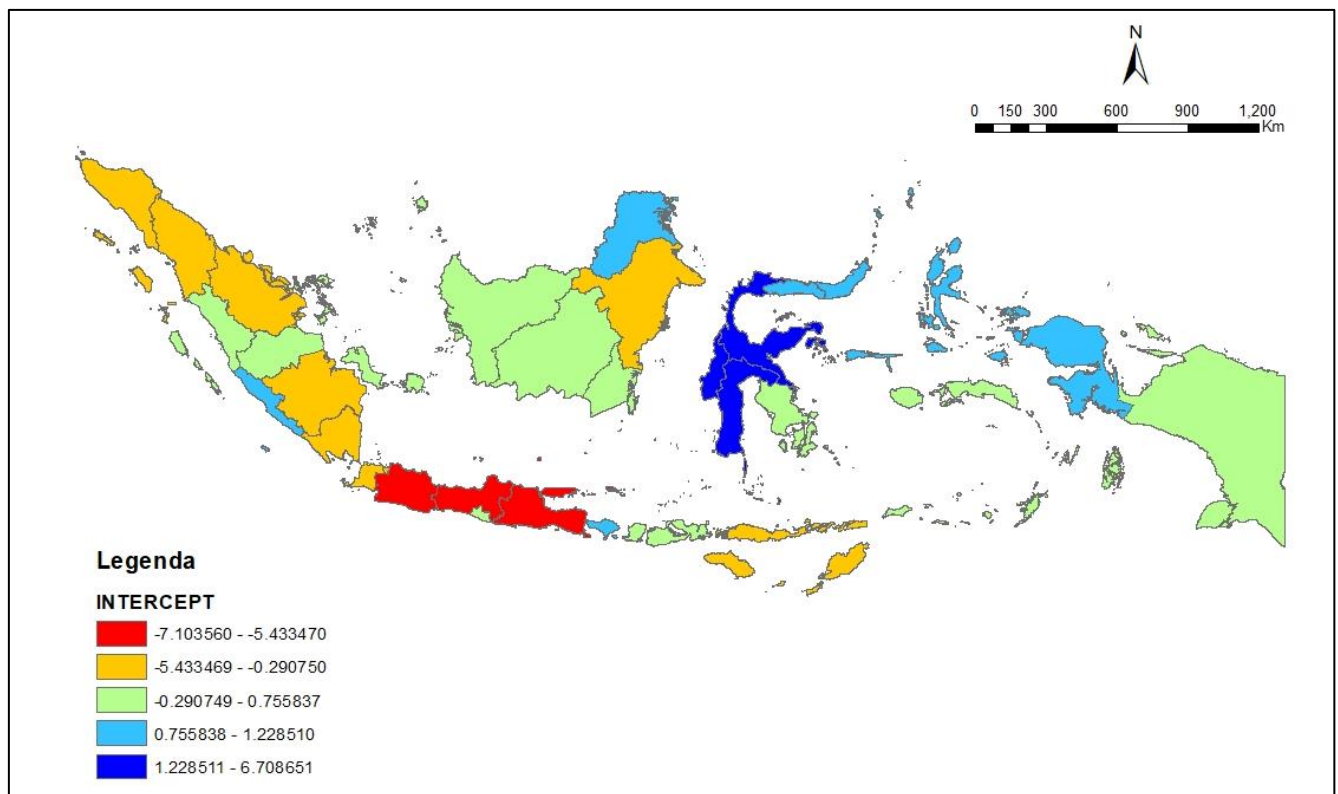
Figure 2. Intercept Value of Inequality of Provincial Income Distribution in Indonesia
Source: Processed Data, 2023

The intercept value shows that if the independent variable is constant or zero, we see inequality in provincial income distribution. Provinces that have high-income distribution inequality are Central Sulawesi, South Sulawesi, and West Sulawesi if the human development index variables, poverty, economic growth, local income, and farmer exchange rates remain constant. The provinces of Central Sulawesi, South Sulawesi, and West Sulawesi, which have high levels of inequality in income distribution, are experiencing challenges in the structural aspects of the economy. Meanwhile, distribution inequality is low in the provinces of East Java, Central Java, and West Java if the human development index variables, poverty, economic growth, local income, and farmer exchange rates remain constant.

CONCLUSIONS

The estimation results of this study reveal significant relationships between several factors—namely, the Human Development Index (HDI), economic growth, the farmer exchange rate (NTP), and poverty—and income distribution inequality in Indonesia. The findings indicate that HDI has a positive effect on income inequality, particularly in regions that serve as centers of economic activity. However, unequal economic growth and limited access to education and healthcare, especially in rural areas, have contributed to the widening of income disparities. Furthermore, economic growth, poverty levels, and the farmer exchange rate are significantly correlated with income inequality. While an increase in the farmer exchange rate has the potential to enhance farmers' welfare and reduce inequality, it is important to note that disparities in economic growth across regions can exacerbate income distribution inequality.

The policy implications of these findings emphasize the importance of equitable development and fair resource distribution, particularly in regions with persistently high levels of income inequality. Based on the significant negative effect of economic growth and the Farmer Exchange Rate (NTP) on inequality, policies that promote regionally inclusive economic growth and improve the terms of trade for farmers must be prioritized. However, the positive impact of HDI and poverty on inequality suggests that improvements in human development must be accompanied by equal access and opportunities, especially in disadvantaged areas. The government is advised to focus on developing new economic centers in poorer regions to stimulate local economic

activities and reduce regional disparities, in line with the findings from East Java, Central Java, and West Java where growth centers and industries have helped maintain lower inequality.

Efforts should also include sustainable infrastructure development and maintenance, improving access to essential services such as education and health, strengthening the rural economy, and empowering farmers through better pricing mechanisms and support systems. These integrated and comprehensive policies are particularly crucial for provinces such as Central Sulawesi, South Sulawesi, and West Sulawesi. With targeted, evidence-based, and sustained implementation, these strategies are expected to reduce income disparities and enhance overall community welfare across Indonesia.

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