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Income Inequality Viewed from the Aspects of Welfare, Economy, and Demographics: Regression Analysis in the Cities of Malang, Madiun, and Surabaya

Ardhita Eko Ginanjar[1], Albrian Fiky Prakoso[1*], Heny Musfidah[1], Komm Pechinthorn[2]
[1*] Universitas Negeri Surabaya, Surabaya, Indonesia
[2]Thai Global Business Administration Technological College, Samut Prakan, Thailand

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ABSTRACT

***Objective**: This research seeks to identify the factors that potentially influence income inequality from the perspective of welfare (Human Development Index/HDI), economic factors (economic growth), and demographics (population) in the cities of Malang, Madiun, and Surabaya. **Method**: This study was conducted using a quantitative panel data regression method over the period 2020-2024, using Gretl software. **Results**: This study's findings indicate that HDI has a positive and massive impact on income inequality. Economic growth has no significant effect, while population has a negative and big implication on income inequality. These results imply local government policies related to the equitable distribution of HDI, optimisation of economic growth, and the creation of job opportunities. **Novelty:** The novelty of this research lies in its focus on areas classified as cities by the central statistics agency in East Java, which face issues of income inequality, specifically the cities of Malang, Madiun, and Surabaya which have never been studied based on the most recent year.*

INTRODUCTION

Reducing inequality is one of the main achievements in the Sustainable Development Goals (SDGs), particularly in goal 10, which is Reduced Inequalities (Gobby et al., 2021). A critical benchmark in achieving this goal is income redistribution. Income inequality itself can be understood as an uneven distribution of income among the population in a given area. The context of the problem of income inequality has been discussed at the United Nations. Income inequality between countries has improved, but income inequality within countries has actually worsened. In the last 25 years, 71% of the world's population has lived in countries with worsening inequality (UN, 2020).

This condition reflects a disparity between high-income and low-income groups (Gao et al., 2024; Y. Liang & Zhang, 2025), which in turn can have negative impacts on regional economic development. This is particularly important for developing countries like Indonesia. Income inequality in Indonesia has experienced fluctuations over the past five years. Since 2020, the Gini ratio has been recorded at 0.385, while in 2024 it improved to 0.381. This result needs to be addressed in order to catch up with developed countries that have an average Gini ratio below 0.300 (Worldbank, 2025). If a country or region faces extreme income inequality, then low-income communities will find it difficult to escape the poverty trap (Jachimowicz et al., 2020).

Quantitatively, income inequality can be assessed through the Gini Ratio. The Gini Ratio or Gini Index is a statistical assess that indicates the degree of inequality in the distribution of income or wealth within a population, with values ranging from 0 (perfect equality) to 1 (perfect inequality). Values close to 0 indicate a more equal distribution of income, while values close to 1 indicate increasing inequality (Charles et al., 2022; Kopitzke, 2020). In 2024, several provinces in Indonesia reported varying Gini ratios. The

highest Gini Ratio in 2024 came from the Special Region of Yogyakarta at 0.435 (BPS, 2024). Meanwhile, the region with a relatively good Gini ratio is Maluku at 0.291.

Income inequality can be triggered by several factors. The first is well-being, which can be reviewed through the Human Development Index (HDI). The HDI is a composite measure used to assess the quality of life of the population in three main dimensions: (1) longevity and healthy living, (2) education, and (3) decent living standards (Sagar & Najam, 1998; Urzúa & Vilbert, 2024). In terms of health, a healthy population is certainly more productive and increases income. In terms of education, the higher the education level, the greater the chances of obtaining decent-paying jobs. This narrows the income gap between different social groups. Regarding adequate living standards, better access to basic needs (food, housing, technology) enhances purchasing power and well-being. .

The second factor that can influence income inequality is economic growth. Economic growth is a process of increasing the activity and manufacturing capacity of a country over a certain period, measured by the increase in total goods and services produced in real or nominal terms (Ginanjar et al., 2024; Vallés-Giménez & Zárate-Marco, 2019). Economic growth will increase the quantity of production, thus the output also increases. An increase in output will raise community income and add to per capita income, which in turn will reduce income inequality between regions. According to Kuznets' hypothesis, at the initial phase of economic growth, income distribution generally becomes more unequal; however, in the later stages, it tends to improve, although at some point disparities will increase again and eventually decline once more (Bahmani-Oskooee & Gelan, 2008; Saleepon, 2020).

The third factor is the population size. If population growth is not matched by job availability and productivity improvements, many workers will find it difficult to get jobs and will be unemployed (Goswami, 2022). This leads to an uneven distribution of income between groups with better access to jobs and those without. A large population can be a potential market and workforce if managed well. However, if the quality of the population is low, it can instead be a burden and widen the income gap. Generally, population size has a positive impact on income inequality, especially in urban areas. Existing knowledge states that population growth outpaces production growth (Kenny, 2010). Without appropriate policies, this will certainly increase the number of people with low incomes (deepening inequality).

Overall, within a conceptual framework, income inequality is the result of the interaction between human development, economic performance, and demographic dynamics through labour market mechanisms and the distribution of economic opportunities. From the perspective of Human Capital Theory, an increase in HDI under ideal conditions is negatively related to inequality because it enhances labour quality, productivity, and mobility (Larionova & Varlamova, 2015; Suhendra et al., 2020). Inclusive economic growth is also negatively related to inequality because it expands employment opportunities and income distribution (Domonkos, 2020; Kurniasih, 2017).

In addition, within the framework of the Dual Economy Theory, the increase in the working-age population supported by the quality of human resources and labour absorption has a negative relationship with income inequality (Kararach, 2024; Pula, 2017). Those things happen through the transfer of labour to the modern sector. Thus, under ideal economic conditions, these three factors become predictors and important concepts in reducing income inequality.

The interrelationship of the above concepts is relevant to the empirical conditions in Indonesia, one of which is the province of East Java. This province consists of 29 regencies and 9 cities. In 2024, this province ranks second as the area with the largest population in Indonesia, reaching 41.81 million people. Nevertheless, East Java still faces significant challenges in terms of inequality, ranking eighth in the highest Gini ratio nationally. On the other hand, this province is not included in the top ten regions with the highest economic growth or the best HDI in Indonesia. This situation is very regrettable considering the economic potential of East Java that could be optimized.

Although the income inequality in East Java has shown an improving trend, especially in the last two years, urban areas remain a primary focus of study. This is due to the high population density and concentration of economic activity in modern urban areas which represent the dynamics of development. Consequently, income inequality in urban areas tends to be sharper compared to rural areas. Addressing macroeconomic issues in urban areas is urgently needed to support equitable welfare in all aspects.

Based on data provided by the Central Statistics Agency (BPS), of the nine cities in East Java, six cities showed a Gini Ratio that is relatively lower than the national and provincial averages. However, there are three cities that have actually experienced an increasing trend in income inequality over the last five years, namely Malang, Madiun, and Surabaya. Below is a comparison of the Gini ratios of these three cities against the provincial and national levels:

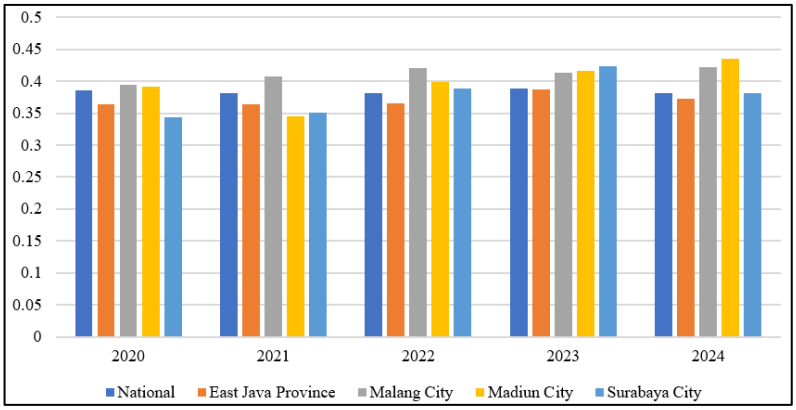

Figure 1. Comparison of gini ratios among regions.

The conditions in Figure 1 make these three cities important to study in depth in order to understand the dynamics of income inequality in urban areas of East Java. The phenomenon of income inequality in Indonesia has generally been studied in several previous studies. There has been much research on income inequality. One study that can be representative is the research by Purusa et al., (2025), which found that workforce participation and population growth have a negative impact on income inequality in Central Java province. In addition, there is research by Md Jamil et al., (2024) with findings that financial inclusion can reduce income inequality in 73 developing countries. This research, along with many others, has not found any analysis of the main factors in income inequality, specifically HDI, economic growth, and population in urban classified areas in East Java Province.

A study by Nilasari & Febrianti, (2025) reveals that income inequality in East Java province during the period 2018-2023 remains a problem, with economic growth being

one of the positively and significantly influential factors on income inequality. Furthermore, research by Ariasta & Setiawati, (2024) states that the HDI and population size have a positive and massive impact on income inequality between regencies/cities in East Java. Meanwhile, other results were found in research stating that economic growth in a partial context does not impact the level of inequality in East Java. Several studies also examined the overall number of regencies/cities in East Java comprehensively.

More broadly, a combination of several factors influencing income inequality such as the HDI, economic growth and population has also been studied. Research by Saputro & Setyowati, (2018) shows that economic growth, population size, and the HDI do not affect income inequality in East Java Province. Meanwhile, research entitled "Analysis of the Impact of Economic Growth, Population Size, HDI, and Minimum Wage on Inequality in Banten Province" shows that economic growth and population size significantly affect income inequality, while HDI does not.

In the context of a smaller region, a study titled "The Impact of Economic Growth and Poverty on Income Inequality in Five Districts/Cities in Bolaang Mongondow, North Sulawesi" indicates that economic growth exerts a negative and massive influence on income inequality (Kunenengan et al., 2023). Meanwhile, research shows that there is a moderate income distribution inequality in Bojonegoro Regency, East Java. On the other hand, research from Makipantung et al., (2023) suggests that economic growth is not significant to income inequality, while the HDI demonstrates a negative and massive implication on income distribution inequality in Minahasa Regency, North Sulawesi.

In general, previous research indicates that the relationship between HDI, economic growth, and population size with income inequality remains inconsistent. Some studies find that economic growth and HDI have a positive effect on inequality, while other research shows a negative or even insignificant effect. Similarly, the population variable in some contexts has been shown to reduce inequality, but in other studies it actually widens the gap. These differing results indicate that the influence of these three variables largely depends on the characteristics of the region, the economic structure, and the socio-demographic conditions of each area. Therefore, there is still no strong empirical conclusion regarding the direction of the relationship between the variables, particularly in the context of urban areas.

From prior research descriptions, a research gap can be identified, as it is very difficult to find studies that specifically discuss the connection between HDI, Economic Growth, and Population with income inequality at the city level with different characteristics within one province. In addition, simultaneous testing of HDI, Economic Growth, and Population against the Gini ratio at the city level has not been widely conducted. Furthermore, the research gap is not only geographical but also substantive, meaning there is no comprehensive empirical explanation regarding the causes of inconsistencies in previous research results, particularly in the context of inequality dynamics in urban areas.

Previous research has not extensively integrated the dimensions of welfare, economics, and demographics into a single, integrative analytical framework, nor has it explained how the interaction of these three variables operates within the urban labour market structure. This context is very important to fill as it can compare more specifically according to the characteristics of smaller areas with characteristics that are certainly

different. This is very urgent as it is important in making more effective income inequality reduction policies according to the characteristics of each different city. The inconsistency of the results of the relationships between the aforementioned variables also needs to be retested.

For this reason, this research exists with the aim of understanding the impact of the HDI, economic growth, and population on income inequality both partially and simultaneously. The novelty of this research lies in its focus on areas classified as cities by the central statistics agency in East Java, which face issues of income inequality, specifically the cities of Malang, Madiun, and Surabaya. Additionally, the new aspect of this research is reflected in the observation period used from 2020 to 2024, which allows for the reflection of the latest and most relevant economic conditions that have not been previously studied. This research contributes to producing a more specific understanding of the dynamics of urban inequality in the context of developing economies, where structural characteristics such as labour market segmentation and uneven human capital distribution have the potential to shape different patterns of inequality between cities.

The contribution of this research is distributed into three aspects: theoretical, empirical, and policy. Theoretically, this study enriches the literature on the relationship between economic growth, human development, and demographic dynamics on income inequality, particularly in the context of urban areas in developing regions. Empirically, this study provides evidence of how variations in city characteristics result in differences in the patterns and determinants of inequality, thus avoiding the generalisation of urban inequality as a uniform phenomenon. In terms of policy, this research offers an empirical basis for formulating policies to reduce income inequality. The findings that highlight differences in the role of determining factors in each city can be used to design more contextual interventions and serve as input for urban development planning at the city level.

RESEARCH METHOD

Study Design

This research employs a quantitative approach with an explanatory approach aimed at examining the influence of welfare aspects represented by the HDI, economic aspects represented by economic growth, and demographic aspects represented by the population on Income Inequality measured through the gini ratio in the cities of Malang, Madiun, and Surabaya during the period 2020-2024. The data used is secondary data obtained from the Central Statistics Agency (BPS).

Considering the limitation of the cross-section units consisting of only three cities and the relatively short observation period (2020–2024), this study uses the pooled Ordinary Least Squares (OLS) approach to examine the effect of independent variables on income inequality. The use of this model is intended to provide a general overview of the relationships between variables, rather than to capture unobserved heterogeneity across regions. Therefore, this study focuses on the direction and significance of the effects, while acknowledging that the use of more complex panel models such as Fixed Effects or Random Effects could potentially provide more robust estimation results.

To maintain alignment with the research objective focused on analysing the influence among variables, estimation was carried out using the OLS with an emphasis on the direction of relationships and the significance of regression coefficients. In this context,

testing classical assumptions is not the main focus of the analysis but serves as a complement to ensure the quality of the model. Therefore, this study does not explicitly report all classical assumption tests such as multicollinearity, heteroscedasticity, and residual normality.

Measurement

In this study, the variables used are measured based on official indicators published by the Central Statistics Agency (BPS). The Gini Ratio variable is used to measure income inequality, with the Gini Ratio value ranging from 0 to 1. The HDI variable is derived from human development achievements across three main dimensions: (1) longevity and health, (2) knowledge, and (3) decent standard of living. The measurement unit is in the form of an index (0–100). The economic growth variable is measured through the growth rate of Gross Regional Domestic Product (GRDP) based on constant prices, with a unit in percentage (%). The population variable represents the total population of each city in terms of the number of individuals.

Data Analysis

Data analysis used to test hypotheses in this study is panel data regression. Panel data consists of cross-sectional data (Malang City, Madiun City, and Surabaya City), while the time series data covers the period from 2020 to 2024. A total of 15 observations were made. Several relevant variables were identified by referring to theory and previous research to support the empirical analysis of this study. The tool used for statistical calculations is Gretl. In general, the formula for the Ordinary Least Squares (OLS) regression model is formulated below:

$GR_{it} = \alpha + \beta 1\ HDI_{it} + \beta 2\ \text{Economic Growth}_{it} + \beta 3\ \text{Population}_{it} + u_{it}$

Where:

GR_{it}	: Income Inequality in region i at time t
α	: Constant
$\beta 1, \beta 2, \beta 3$	: Regression Coefficients
HDI_{it}	: HDI of city i at time t
$\text{Economic Growth}_{it}$	: Economic Growth Rate of city i at time t
Population_{it}	: Population of city i at time t
U	: Error term

Hypothesis testing was conducted at a significance level of 5% ($\alpha = 0.05$). The decision of the test is based on the p-value from the t-test and F-test in the panel regression model. If the p-value falls below 0.05, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is approved, indicating that the independent variables have a massive implication on income inequality.

In addition, it should be noted that the number of observations in this study is relatively limited, with 15 observations consisting of 3 cities over a period of 5 years. Nevertheless, the use of data in this study is still justifiable because it is census-type data, covering all the cities that are the focus of the research (Malang, Madiun, and Surabaya), thus not involving a sampling process. The analysis conducted represents the actual conditions of the units of analysis studied. To enhance the reliability of the results, this study also considers the consistency of the direction and significance of coefficients as the basis for interpretation.

RESULTS AND DISCUSSION

Results

Income Inequality Trends in the Cities of Malang, Madiun, and Surabaya

Based on data observations, here is an overview of the development of the Gini Ratio trend in the three related cities during the period 2020-2024:

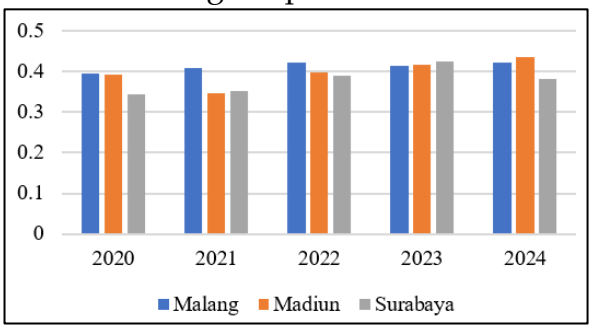

Figure 2. Income inequality trends.

Based on Figure 2, it is known that Malang City shows an increasing trend in the Gini ratio, with its highest peak occurring in 2024 at 0.422. A similar trend is observed in Madiun City, which has the highest Gini ratio among the three related cities in 2024 at 0.435. Meanwhile, Surabaya City experienced an improvement in the same year with a Gini ratio of 0.381. Nevertheless, these figures are still above the average Gini ratio for East Java Province, which stands at 0.373.

HDI Trends in the Cities of Malang, Madiun, and Surabaya

Based on the data observations, here is an overview of the HDI trend developments of the three related cities during the period 2020-2024:

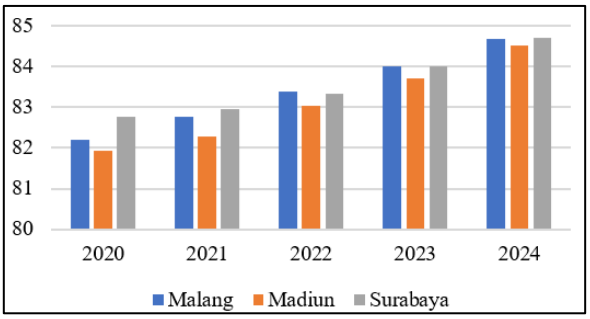

Figure 3. HDI trends.

Based on the outcome shown in Figure 3, it is evident that the three related cities have experienced a positive trend in terms of HDI for the period 2020-2024. In 2024, Malang recorded a figure of 84.68, Madiun 84.51, and Surabaya 84.69.

Economic Growth Trends in the Cities of Malang, Madiun, and Surabaya

Based on the data observations, here is an overview of the economic growth trend of the three cities involved in the period 2020-2024:

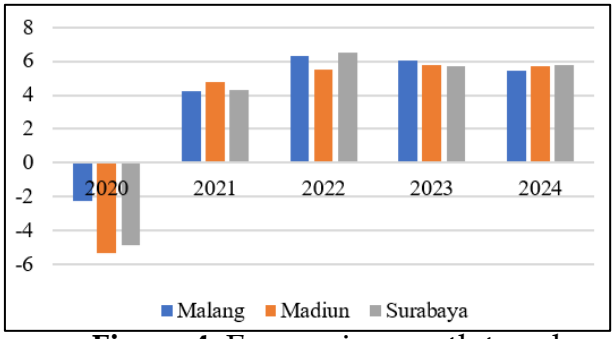

Figure 4. Economic growth trends.

Based on the outcome of Figure 4. It is known that after the Covid-19 era, there was a fluctuating increase related to economic growth. In the period 2023-2024, Malang City experienced a decrease in economic growth from 6.07% to 5.41%. A similar situation also occurred in Madiun City. Meanwhile, Surabaya City showed improvement in 2024 with an economic growth rate of 5.76%.

Population Trends in the Cities of Malang, Madiun, and Surabaya

Based on the data observations, here is an overview of the economic growth trend of the three cities involved in the period 2020-2024:

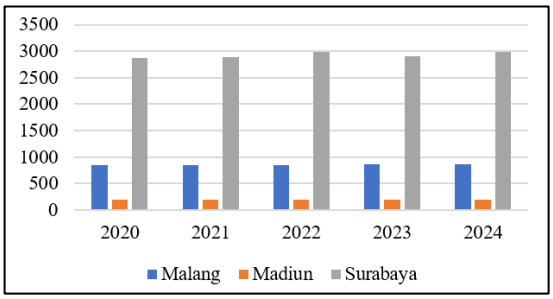

Figure 5. Populations trends.

Grounded on Figure 5, it is known that the city of Surabaya has a very large population, reaching 2.9 million in 2024. Interestingly, the city of Malang saw an increase in population from 2023 to 2024 to 872 thousand. Meanwhile, the city of Madiun has the smallest population, with only 201 thousand people in 2024.

Regression Results Analysis

Based on the data processing results in the Gretl software, the following regression analysis results were obtained using the OLS method:

Table 1. Data processing results.

Pooled OLS, using 15 Observations
Included 3 Cross-sectional Units
Time-series Length = 5
Dependent Variable: Gini Ratio

	Coefficient	Std.error	t-ratio	P-value
Const	-1.34764	0.739582	-1.822	0.0957 *
HDI	0.0211145	0.00894808	2.360	0.0378 **
Economic Growth	-4.93943e-05	0.00192632	-0.02564	0.9800

Pooled OLS, using 15 Observations Included 3 Cross-sectional Units Time-series Length = 5 Dependent Variable: Gini Ratio				
	Coefficient	**Std.error**	**t-ratio**	**P-value**
Population	-1.24633e-05	5.10469e-06	-2.442	0.0327 **
Mean Dependent Var	0.395400	S.D Dependent Var	0.029272	
Sum Squared Resid	0.005449	S.E. of Regression	0.022256	
R-squared	0.545775	Adjusted R-squared	0.421896	
F (3.11)	4.405699	P-value (F)	0.028823	
Log-likelihood	38.11914	Akaike Criterion	-68.23828	
Schwarz Criterion	-65.40608	Hannan-quinn	-68.26845	
Rho	0.237696	Durbin-Watson	1.116354	

Regression Equation Model

GR = -1.34764 + 0.0211145 HDI + (– 0.0000493943) Economic Growth + (– 0.0000124633) Population

1. Constant = -1.34764. This means that if all independent variables are valued at zero, the Gini Ratio is estimated to be -1.34 (in this context, the constant is meaningless).
2. HDI = 0.0211145. This implies that every one-point increase in HDI will increase the Gini Ratio by 0.0211.
3. Economic Growth = (-0.000049394). This implies that for every one percent increase in economic growth, the Gini ratio will decrease by 0.000049394.
4. Population = (−0.0000124633). For each additional person in the population, the Gini Ratio is estimated to decrease by 0.0000124633. In other words, in a population of 1000, the Gini Ratio decreases by about 0.0124633.

Significance Test

Table 2. Significance test result.

Variable	P-value	Description
HDI	0.0378 **	Significant
Economic Growth	0.9800	Not Significant
Population	0.0327 **	Significant

Simultaneous Influence Test

It is known that the F-statistic (3, 11) = 4.405699 with a p-value of 0.028823. Using a significance level of 5% (α = 0.05), the p-value is smaller than α (0.028823 < 0.05). This means that all independent variables simultaneously have a significant effect on the Gini Ratio.

R-squared (R^2)

In terms of R-squared approaching 1, the better it is, R squared = 0.545775/54.6% of the variation in the Gini Ratio is explained by the independent variables in the model, namely the HDI, Economic Growth, and Population. The remaining 45.4% is influenced by other factors not included in the model.

Discussion

The Impact of HDI on Income Inequality

Based on the outcome of the regression analysis, it was found that there is a positive and significant effect of HDI on income inequality (Coeff = 0.0211145, P-value = 0.0378). The higher the HDI, the greater the income inequality that occurs, and vice versa. This finding is consistent with research by Arif & Wicaksani, (2017), which explains that the life expectancy in East Java province is relatively high, thus forming and creating a productive workforce that will increase community income; however, unfortunately, this is clustered only in areas of economic activity, especially in industrial centres or high-income areas, leading to income inequality. A significant increase in income may play a relatively lesser role in human development. The disparities occurring in a region will affect the welfare level of the society in that area. Meanwhile, research from Dias & Indrawati, (2021) shows that the unevenness of the HDI in a region results in some areas being more advanced due to better human quality while others lag behind due to lower human quality.

In other words, this finding may occur because the improvements in aspects of the HDI such as education, health, and living standards are often enjoyed more quickly only by those groups that are already economically capable or stable in urban areas (Majumdar & Sen, 2024; Nesterova et al., 2025). Groups with stable economies have access to educational and health services to capitalise on productivity, including acquiring new job opportunities (Liu et al., 2025). Their income can grow relative to poorer groups. Furthermore, this phenomenon may potentially occur due to the economic characteristics of the cities being studied. Cities like Surabaya, Malang, and Madiun tend to experience growth in the service and industrial sectors, thus able to absorb skilled labour massively. They earn higher incomes. On the other hand, jobs in the informal or low-tech sector continue to receive low wages despite their large proportion, resulting in inequality running parallel.

In addition, the phenomenon of urban agglomeration effects also strengthens the positive relationship between HDI and income inequality. Economic activities concentrated in urban areas such as Surabaya and Malang create an accumulation of economic opportunities that are unevenly distributed. Areas with high HDI tend to attract skilled labour and investment (Sofilda et al., 2024), thereby increasing the income of certain groups more rapidly than others. This condition causes income distribution to become increasingly unbalanced even though the HDI improves overall.

On the other hand, this finding can also be explained through the concept of the Matthew Effect (cumulative advantage), which refers to a situation where groups that have an initial advantage, such as access to education and resources (Perc, 2014), will continue to reap greater benefits from HDI improvements compared to less fortunate groups. An increase in HDI does not automatically reduce inequality, but can reinforce the concentration of income within certain groups. The positive relationship between HDI and income inequality in this study reflects a gap in the distribution of the benefits of human development itself.

However, this does not align with the research by Farhan & Sugianto, (2022) which found a negative relationship between HDI and income inequality. This negative relationship can be explained because an increase in HDI reflects improvements in the dimensions of education, health, and living standards, which tend to enhance human

resource quality more evenly. This difference in findings indicates that an increase in HDI does not necessarily directly reduce inequality, especially in the context of urban areas with complex economic characteristics as in the subject of this research.

Educated individuals with high skills usually move to large cities such as Surabaya or Malang because job opportunities there are better and salaries are higher (Prameswari & Asmara, 2024; Wang, 2021). Their presence raises the HDI of the city, as the average education and income of the urban population also increases (Juned, 2021; Urzúa & Vilbert, 2024). On the other hand, these individuals enter the high-income group (increasing the proportion of high-income earners), resulting in income becoming more concentrated among the upper class. Meanwhile, migrants with low education typically occupy the informal sector (for example, labourers, small traders, or manual workers) (Dessy Hersahanty, 2022; C. Liang & Wang, 2020). Their earnings are low and unstable. As a result, the gap between the rich and the poor in the city is widening, leading to increased income inequality.

The Impact of Economic Growth on Income Inequality

According to the findings of the regression analysis, it is known that economic growth does not possess a massive impact on income inequality (P-value = 0.9800). This means that regardless of whether the level of economic growth is high or low, income inequality is not significantly impacted. This finding aligns with the research by Syahri & Gustiara, (2020). The Kuznets hypothesis can explain this finding with the assertion that during the initial stages of economic growth, inequality tends to increase, but after passing a turning point, inequality decreases (Bahmani-Oskooee & Gelan, 2008; Ota & Tachiyama, 2024). The city studied in this research may not have yet reached the Kuznets turning point, so economic growth has not been inclusive enough to affect income inequality. The distribution of growth is not yet clearly dominant towards the rich or towards the poor.

Meanwhile, research from Novia, (2020) actually found that economic growth has a negative effect on income inequality. This negative relationship can be explained because rising economic growth tends to expand employment opportunities, increase community income, and encourage more inclusive economic activity. However, these research findings indicate a different direction, suggesting that the occurring economic growth has not been fully inclusive and is still concentrated in certain groups or sectors, meaning its impact on reducing inequality has not yet been optimal.

The finding that economic growth does not have a significant impact on inequality can also be indicated through the phenomenon of jobless growth, which is a condition where economic growth is not accompanied by an adequate increase in employment opportunities (Kannan & Raveendran, 2009; Saratchand, 2019). In this context, the rise in economic output is driven more by efficiency, technology, or capital-intensive sectors, thus not directly increasing the income of the wider population. As a result, even though the economy grows, income distribution does not change much because most workers, particularly in the informal sector, are not optimally absorbed in the growth process.

In addition, in terms of urban characteristics, economic growth can arise from the expansion of certain economic sectors, such as industry, property, or modern services that indeed enhance the productivity of the city (Asada, 2020), but the benefits are not directly felt by all layers of the population. This reflection arises from new jobs created which are only enjoyed by the upper class or capital owners, therefore urban economic growth does not automatically reduce or increase inequality because the distribution of

its results remains concentrated. Another illustration is that in urban areas, many informal jobs (street vendors, freelancers, daily workers) do not greatly enjoy direct benefits from economic growth (Mercan & Azer, 2013; Szeles, 2013; Wahyudi et al., 2025).

The Impact of Population Income Inequality

Based on the outcome of the regression analysis, the population exerts a significant negative impact on income inequality (Coeff = (−0.0000124633), P-value = 0.0327). This implies that as the population size increases, income inequality decreases, and vice versa. These findings are counterintuitive, as they contradict the classical expectations based on the Malthusian perspective which suggests that population growth tends to exacerbate inequality due to pressure on resources and job opportunities. Nevertheless, the results of this study are consistent with the findings of Aqilah et al., (2024) and Duarsa & Wijaya, (2023), which indicate that population growth can actually increase productivity and broaden income distribution. This emphasises that the impact of this variable is highly contextual, depending on the economic structure and the labour absorption capacity in each region.

The finding that population size negatively affects inequality can also be explained through the concept of the demographic dividend, where an increase in the proportion of the working-age population boosts labour force participation and economic activity (James et al., 2024). In this context, a large population not only increases the number of workers, but also broadens the base of income recipients. When productive labour is absorbed in various economic sectors, income distribution becomes more equitable because more individuals earn income. This indicates that a large population, under a productive age structure, can be a factor that reduces income inequality.

Furthermore, within the framework of Dual Economy Theory, the increase in population, particularly through urbanisation, accelerates the movement of labour from the traditional sector to the modern sector (Vines & Zeitlin, 2018). In an ideal situation where economic growth can broadly absorb labour, this process allows most workers to obtain employment with higher productivity and income. Although some labour remains in the informal sector, in aggregate this shift broadens income distribution and reduces concentration within certain groups. Population dynamics play a role in driving structural transformation that contributes to a reduction in income inequality.

The increase in the population, one aspect of which is urbanisation, not only adds to the groups of both the poor and the rich, but also creates many new economic activities, such as small and medium-sized enterprises (Prieto-Curiel & Cabrera, 2025; Speare et al., 2019). A large proportion of people working in the informal sector is indeed categorised as having low incomes, but collectively they create a broad middle class. This results in income inequality not spreading further, or being able to decrease proportionally. Urban areas involve a large number of people engaged in productivity cumulatively, leading to a tendency for income inequality to decrease, especially from this perspective.

HDI, Economic Growth and Population Simultaneously Affect Income Inequality

Based on the partial relationships between variables, it is known that the increase in the HDI over the past five years in Malang, Madiun, and Surabaya tends to widen income inequality. In other words, the benefits of HDI are still concentrated among certain group characteristics, whether they be high-income groups or educated and skilled groups. These groups find it easier to enter the modern labour market and earn high incomes.

This is in contrast to groups that struggle to compete. This situation occurs alongside the increase in population each year. The population growth, especially through migration, tends to stimulate the emergence of new economic activities in the informal sector such as small and medium enterprises (Inquilla-Mamani et al., 2023; Kebede, 2023). Although their income is relatively small, these activities generate a new middle layer and expand income distribution.

In line with the previous discussion, the improvement in HDI, which positively affects inequality, can be explained through the phenomena of skill-biased technological change and urban agglomeration, where highly educated groups are more advantaged in accessing high-paying jobs in economic centres (Baum-Snow et al., 2018). This condition indicates that the improvement in human resource quality has not been evenly distributed, so its benefits are concentrated in certain groups. On the other hand, economic growth that is not significant for inequality reflects the phenomenon of jobless growth and growth concentration, where output increases are not accompanied by equal employment opportunities, thus not being strong enough to alter the income distribution structure.

Theoretically, economic growth serves as the main engine for building prosperity (Aghion & Roulet, 2014), but in this study, its impact on inequality appears weak. This can be viewed from the perspective that economic growth will only have a real and rapid impact when the equitable distribution of human resource quality occurs. The capacity and skills of the population to absorb economic opportunities are also crucial (Hall, 2018; Hanushek & Woessmann, 2019). If the urban areas in question lack these two factors, then economic growth will only increase output for a portion of the population, with no guarantee of reducing income inequality.

In the context of population dynamics, previous research results showing a negative impact of population size on inequality can be understood through the phenomena of the demographic dividend and informal sector expansion, which broaden economic participation. Within the framework of Dual Economy Theory, this condition reflects the process of labour transformation from the traditional sector to the modern sector, which is not yet fully optimal. When HDI improvement is uneven and economic growth is concentrated, labour shifts only benefit certain groups (Pourmohammadi et al., 2014; Schlossarek et al., 2016). However, an increase in population actually broadens the income distribution base through the informal sector.

CONCLUSION

Fundamental Finding: Based on the description of the results and discussions of the research examining the influence of HDI, Economic Growth, and Population Size on the Gini ratio in the cities of Malang, Madiun, and Surabaya for the period 2020-2024, It is evident that: (1) HDI has a positive and significant impact on income inequality. (2) Economic growth fails to have a massive effect on income inequality. (3) Population size has a negative and significant effect on income inequality. Simultaneously, variations in the Gini Ratio can be accounted by the independent included variables in the model, namely HDI, Economic Growth, and Population to a degree of 54.6%. **Implication**: From this result, policymakers in Malang, Madiun, and Surabaya are advised to level up the HDI, particularly for low-income groups, to avoid concentration in one population point or region. Economic growth must be accelerated because in the last five years, its impact has not been significant on the Gini Ratio. Cooperation in developing the informal sector

and buffer villages with private parties could be an option. In addition, the creation of new job opportunities based on the region's key sectors is essential. Training for the workforce and social assistance programmes are greatly needed to address the income disparity issues in Malang, Madiun, and Surabaya. **Limitation**: This research has limitations, namely that the context is limited to cities in East Java experiencing income inequality issues over the past five years. **Future Research**: Future researchers could expand the scope to include districts in East Java with similar issues. The focus of the research could also be broadened not only to East Java but to other regions with income inequality constraints, in order to yield broader findings.

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Ardhita Eko Ginanjar
Department of Economics Education, Faculty of Economics and Business,
Universitas Negeri Surabaya,
Address: Jl. Ketintang, Ketintang, Kec. Gayungan, Kota Surabaya, Jawa Timur, Indonesia
Email: ardhitaeko.22029@mhs.unesa.ac.id

*__Albrian Fiky Prakoso (Corresponding Author)__
Department of Economics Education, Faculty of Economics and Business,
Universitas Negeri Surabaya,
Address: Jl. Ketintang, Ketintang, Kec. Gayungan, Kota Surabaya, Jawa Timur, Indonesia
Email: albrianprakoso@unesa.ac.id

Heny Musfidah
Department of Economics Education, Faculty of Economics and Business,
Universitas Negeri Surabaya,
Address: Jl. Ketintang, Ketintang, Kec. Gayungan, Kota Surabaya, Jawa Timur, Indonesia
Email: henymusfidah@unesa.ac.id

Komm Pechinthorn
Thai Global Business Administration Technological College,
Address: Samut Prakan, Thailand
Email: komm.p@tgbc.ac.th