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COVID-19, Economic Growth, and Income Inequality: Empirical Study in Indonesia

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Abstract

Income inequality remains a significant issue in developing countries like Indonesia, affecting societal well-being unevenly. Economic growth is often considered a key indicator of social welfare, but its benefits are not always distributed equitably. When economic growth coincides with high levels of income inequality, it suggests that only certain groups reap greater benefits while others are left behind. Therefore, it is essential to analyze whether there are disparities in the influence of economic growth on income inequality in Indonesia before and during the COVID-19 pandemic. Using a random effects model and 12 years of data (2010–2021), this analysis reveals that economic growth does not significantly affect income inequality in Indonesia, challenging the Kuznets hypothesis. Domestic investment (DIN) also shows no influence on income inequality. In contrast, the human development index (HDI) consistently has a significant negative impact on income inequality across both periods. Meanwhile, foreign direct investment (FDI) positively impacts income inequality. There is no difference in the influence of HDI and FDI on income inequality before and during COVID-19. These findings emphasize the importance of improving human resource quality as an effective strategy for addressing income inequality, particularly by enhancing access to education, healthcare services, and overall social welfare.

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INTRODUCTION

The even distribution of societal well-being is often linked to rapid economic growth, an assumption that remains relevant in several developing countries. Government efforts to enhance societal well-being can be observed through the quality of economic growth achieved (Kuo & Ranis, 2020). In Indonesia, economic growth is characterized by interdependence among nations, influenced by diplomatic relations and global economic trends. When one country experiences a crisis, its effects extend to other nations (Estuningtyas, 2018).

Efforts to increase production capacity, aimed at achieving additional output, are referred to as economic growth. Indicators used to measure economic growth include gross domestic product (GDP) and gross regional domestic product (GRDP) (Putri & Erita, 2019). Economic growth is not merely a snapshot of an economy at a specific moment but rather a continuous process, allowing for the observation of dynamic changes over time. An economy is considered to be growing when the total real returns to factors of production in a given year exceed those of the previous year. This indicates that real societal income has increased compared to the previous year (Assidikiyah et al., 2021).

In early 2020, both Indonesia's economy and the global economy experienced a downturn due to the COVID-19 outbreak (Indayani & Hartono, 2020). The contraction in Indonesia's economy during the second quarter of 2020 resulted from the implementation of large-scale social restrictions (PSBB) in various cities starting in April 2020 (Widiastuti, 2021; Sulistiyowati & Agusalim, 2023; Agusalim et al., 2023).

As shown in Figure 1, Indonesia's economic growth from 2010 to 2019 exhibited a declining trend. In 2019, economic growth stood at 5.02%. However, with the onset of the COVID-19 pandemic in March 2020, economic growth declined sharply to -2.07% in 2020. By 2021, a slow recovery was observed, with growth reaching 3.69%. The spread of COVID-19 in Indonesia has resulted in 4.90 million recorded cases, contributing to the drastic economic contraction in 2020. These developments indicate the significant impact of the COVID-19 pandemic on Indonesia's economic growth.

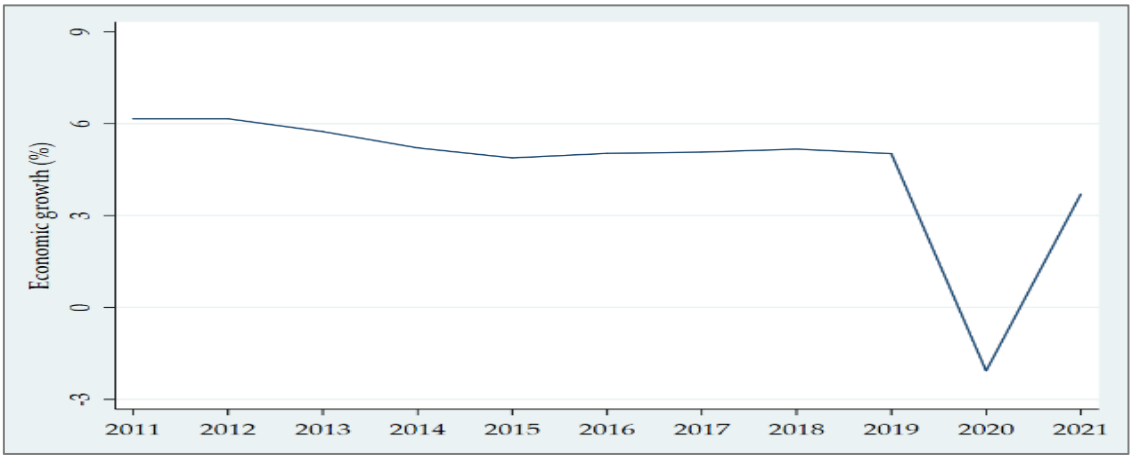

Figure 1. Indonesia's Economic Growth
Source: BPS-Statistic Indonesia, 2023 (Processed)

The welfare of society can be measured by economic growth, as an increase in economic growth enhances a region's economy and raises the population's income, enabling them to meet their living needs. This implies that economic growth has a trickle-down effect on regional economies (Indrawati et al., 2020). However, the trickle-down effect is not always realized. Research by Azwar and Subekan (2016) indicates that most economic growth in developing countries, including Indonesia, does not directly benefit economically disadvantaged segments of society. This suggests that economic growth is not inclusive, ultimately leading to worsening

poverty and inequality. Similarly, Setiawan et al. (2024) found that the benefits of inclusive economic growth are primarily felt in the long term rather than the short term.

Indonesia's economic growth during the COVID-19 pandemic, which began in early 2020, experienced a drastic decline. Bali Province was the most affected, with economic growth falling to -9.33%, while North Maluku Province maintained positive growth at 5.35% (BPS, 2022).

One of the major challenges faced by developing countries, including Indonesia, is income inequality. Economic growth should be accompanied by an equitable distribution of income. When economic growth occurs alongside high-income inequality, it loses its significance, as the benefits are not shared by all segments of society. A commonly used measure of income inequality is the Gini coefficient or Gini ratio (Pulakian et al., 2021; Tjakrawerdaja et al., 2021; Agusalim, 2022).

The COVID-19 pandemic, which has impacted countries worldwide, has also significantly affected Indonesia. This pandemic has not only disrupted economic conditions, including Indonesia's economic growth but has also worsened income inequality. The communities most directly affected by the Large-Scale Social Restrictions (PSBB) policy are those with lower to middle incomes, as their reduced earnings limit their ability to engage in consumption activities (Santoso & Mukhlis, 2021).

Data on income inequality, measured using the Gini ratio, is shown in Figure 2. Before the COVID-19 pandemic, the Gini ratio increased in 2011 but then showed a downward trend until 2019. However, the rise in COVID-19 cases led to an increase in the Gini ratio, reaching 0.384 in 2021. This indicates that the pandemic has contributed to worsening income inequality in Indonesia

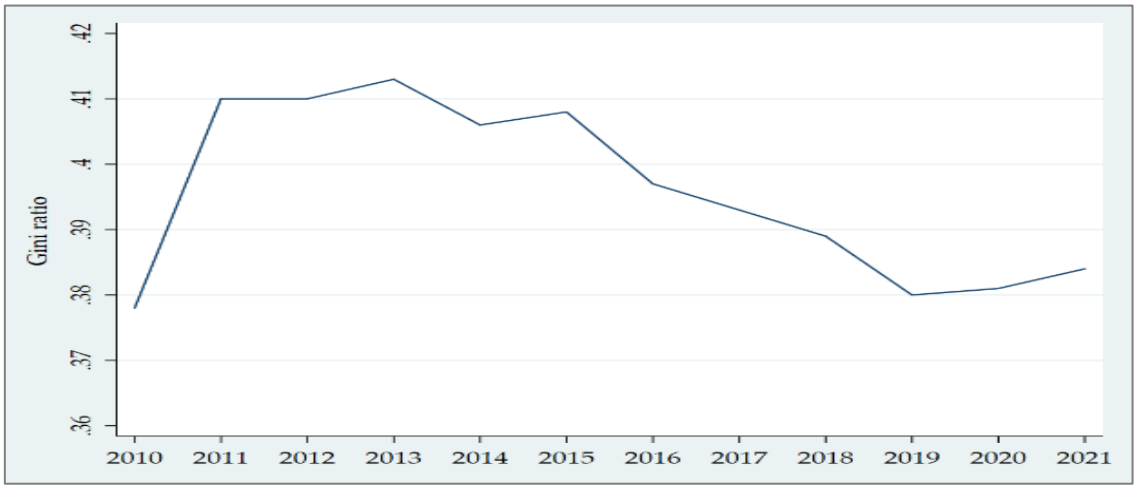

Figure 2. Indonesia's Gini Ratio
Source: BPS-Statistic Indonesia, 2023 (processed)

Economic growth can have both positive and negative effects on income inequality. This means that economic growth does not always reduce income inequality; in some cases, it can exacerbate it. Kuznets (1955) first introduced his hypothesis on the relationship between economic growth and income inequality, arguing that in the early stages of development, a country experiences increasing wage inequality. This occurs because productivity in the agricultural sector is much lower than in the rapidly expanding industrial sector. However, as economic growth continues, inequality is expected to decrease due to labor shifts from agriculture to industry, along with improvements in agricultural modernization and productivity. This relationship forms an inverted U-shaped curve, commonly known as the Kuznets curve (Oczki et al., 2017).

Suhendra et al. (2020) found that economic growth negatively impacts income inequality. According to economic theory, higher economic growth leads to reduced inequality by increasing value-added activities in economic sectors, thereby facilitating a more equitable income distribution. Additionally, greater economic growth stimulates economic activity, which in turn creates employment opportunities and helps distribute income more evenly.

Bouincha and Karim (2018) demonstrated that economic growth reduces inequality only when a country has reached an advanced stage of development. Their research also suggests that economic growth can decrease inequality through redistributive mechanisms designed to benefit all economic groups. However, in developing countries, economic growth often correlates with increased inequality.

The relationship between economic growth and income inequality depends on the extent to which economic development includes income redistribution. If economic policies prioritize equitable income distribution, the process takes longer to materialize. Conversely, in a shorter time frame, economic development may focus solely on growth without addressing inequality, increasing the likelihood of uneven income distribution (Oksamulya & Anis, 2020).

However, Setyadi et al. (2022) found that economic growth and domestic investment have a non-significant negative impact on income inequality, while foreign investment has a non-significant positive impact. In contrast, Fazaalloh (2019) and Gam et al. (2023) found that both foreign and domestic investments significantly affect income inequality, particularly in developing countries. Foreign direct investment (FDI) can stimulate economic growth but often exacerbates inequality when its benefits are concentrated in specific sectors, worsening income disparities. On the other hand, domestic investment tends to reduce inequality by increasing productivity and creating more evenly distributed employment opportunities, particularly in infrastructure and social services (Hằng, 2022).

In addition to economic growth and investment, several studies have highlighted a complex relationship between the Human Development Index (HDI) and income inequality. Setyadi et al. (2022) found that HDI significantly reduces income inequality, emphasizing the importance of human resource development through education in minimizing income disparities. Similarly, Sinaga and Zalukhu (2022) argued that improvements in health and education enhance individuals' earning potential. However, Wahyuningrum and Aisyah (2023) noted that a higher HDI does not always lead to lower inequality, particularly when economic growth is not accompanied by a fair distribution of benefits. At the regional level, Arkum and Amar (2022) found that in certain areas of Indonesia, HDI may even exacerbate income inequality.

Empirical evidence and prior studies indicate that the COVID-19 pandemic has significantly affected economic growth and income inequality in Indonesia. However, research gaps remain that require further exploration. While many studies have documented the economic downturn caused by the pandemic, few have thoroughly analyzed its long-term effects on income inequality, particularly in Indonesia (Anoraga et al., 2022; Angelov & Waldenström, 2021). Additionally, economic growth and income inequality in Indonesia have shown fluctuating trends. Some provinces have experienced economic growth alongside rising inequality, while others have seen growth accompanied by a decline in inequality. This suggests that Indonesia continues to face uneven levels of welfare. Therefore, further empirical research on the relationship between COVID-19, economic growth, and income inequality in Indonesia is essential for understanding the underlying mechanisms and developing more effective policies to mitigate similar crises.

RESEARCH METHODS

This study utilizes secondary data obtained from BPS-Statistics Indonesia (BPS) and other relevant literature sources. A quantitative research method is employed, using panel data regression analysis. The research covers the period 2010 to 2021 and includes 34 provinces in Indonesia. The variables used in this study are adapted and modified from Setyadi et al. (2022), with the addition of a COVID-19 dummy variable. The years 2020 and 2021 represent the COVID-19 pandemic era, while the period from 2010 to 2019 reflects the pre-pandemic period. A detailed description of the variables used in this study is presented in Table 1.

Table 1. Research Variables

No.	Variable	Information
1	lgini	Gini index (x100), which is transformed into a natural logarithm form
2	growth	Economic growth is proxied by the naturalized logarithm of gross regional domestic product per capita.
3	lhdi	The human development index is transformed into a natural logarithmic form
4	lfdi	Foreign investment is transformed into a natural logarithmic form
5	ldin	Domestic investment is transformed into a natural logarithm form
6	dc	Dummy COVID-19

Source: Data Processed, 2024

Generally, the panel data model can be written as follows:

$$y_{it} = \alpha + \beta x_{it} + \varepsilon_{it} \quad \text{.....(1)}$$

Parameter estimation in panel data models can be conducted using Pooled Least Squares (PLS), the Fixed Effects Model (FEM), and the Random Effects Model (REM) (Gujarati, 2021; Agusalim et al., 2024).

This study analyzes the effects of COVID-19 and economic growth on income inequality in Indonesia using a twelve-year time series dataset (2010–2021) and cross-sectional data from 34 provinces in Indonesia. The variables are adapted and modified from Setyadi et al. (2022), with the addition of a COVID-19 dummy variable. The research model utilized in this study is as follows:

$$\begin{aligned} lgini_{it} = {} & \alpha_0 + \alpha_1 dc_{it} + \alpha_2 growth_{it} + \\ & \alpha_3 growth_{it} dc_{it} + \alpha_4 growth^2{}_{it} + \\ & \alpha_5 growth^2{}_{it} dc_{it} + \alpha_6 lhdi_{it} + \\ & \alpha_7 lhdi_{it} dc_{it} + \alpha_8 lfdi_{it} + \alpha_9 lfdi_{it} dc_{it} + \\ & \alpha_{10} ldin_{it} + \alpha_{11} ldin_{it} dc_{it} + \varepsilon_{it} \quad \text{.....(2)} \end{aligned}$$

The model is used to determine whether economic factors influence income inequality in Indonesia differently before and during the COVID-19 pandemic. Equation (2) serves as the fundamental model for identifying the impact of various factors on income inequality. This model includes several independent variables, such as economic growth ($growth_{it}$), the Human Development Index ($lhdi_{it}$), foreign direct investment ($lfdi_{it}$), and domestic investment ($ldin_{it}$), all of which interact with the dummy variable dc_{it} to capture the effects of the COVID-19 pandemic. This equation provides the basis for analyzing the overall impact of economic variables on income inequality before differentiating between the pre-pandemic and pandemic periods:

Before COVID-19 ($dc_{it} = 0$), Equations (3) and (4), and (4) are used to analyze conditions before the COVID-19 pandemic, assuming ($dc_{it} = 0$), meaning there is no effect from the pandemic. In these equations, all interaction terms involving dc_{it} are exclude. This analysis focuses on the relationship between economic factors and income inequality during the pre-pandemic period, providing a fundamental understanding of how income inequality was shaped under normal economic conditions.

$$\begin{aligned} lgini_{it} = {} & \alpha_0 + \alpha_1 dc_{it}(0) + \alpha_2 growth_{it} + \\ & \alpha_3 growth_{it} dc_{it}(0) + \alpha_4 growth^2{}_{it} + \\ & \alpha_5 growth^2{}_{it} dc_{it}(0) + \alpha_6 lhdi_{it} + \\ & \alpha_7 lhdi_{it} dc_{it}(0) + \alpha_8 lfdi_{it} + \\ & \alpha_9 lfdi_{it} dc_{it}(0) + \alpha_{10} ldin_{it} + \\ & \alpha_{11} ldin_{it} dc_{it}(0) + \varepsilon_{it} \quad \text{.....} \quad (3) \end{aligned}$$

Equation (3) can be simplified into the following Equation (4):

$$lgini_{it} = \alpha_0 + \alpha_2 growth_{it} + \alpha_4 growth^2{}_{it} + \alpha_6 lhdi_{it} + \alpha_8 lfdi_{it} + \alpha_{10} ldin_{it} + \varepsilon_{it} \quad ..(4)$$

During COVID-19 (dc_{it}=1), represented by Equations (5) and (6), is used to analyze conditions during the COVID-19 pandemic. These equations assume ($dc_{it} = 1$), indicating that the effects of the pandemic have begun to emerge. Interaction terms, such as $growth_{it} dc_{it}$, are included to capture changes in the impact of existing economic variables due to the pandemic. By incorporating the dummy variable (dc_{it}) and these interaction terms, the analysis can examine how the effects of economic growth, the Human Development Index, and both foreign and domestic direct investment on income inequality evolved during the COVID-19 period.

$$\begin{aligned} lgini_{it} = {} & \alpha_0 + \alpha_1 dc_{it}(1) + \alpha_2 growth_{it} + \\ & \alpha_3 growth_{it} dc_{it}(1) + \alpha_4 growth^2{}_{it} + \\ & \alpha_5 growth^2{}_{it} dc_{it}(1) + \alpha_6 lhdi_{it} + \\ & \alpha_7 lhdi_{it} dc_{it}(1) + \alpha_8 lfdi_{it} + \\ & \alpha_9 lfdi_{it} dc_{it}(1) + \alpha_{10} ldin_{it} + \\ & \alpha_{11} ldin_{it} dc_{it}(1) + \varepsilon_{it} \quad .....(5) \end{aligned}$$

Equation (5) can be simplified into the following Equation (6):

$$\begin{aligned} lgini_{it} = {} & (\alpha_0 + \alpha_1) + (\alpha_2 + \alpha_3) growth_{it} + \\ & (\alpha_4 + \alpha_5) growth^2{}_{it} + (\alpha_6 + \\ & \alpha_7) lhdi_{it} + (\alpha_8 + \alpha_9) lfdi_{it} + (\alpha_{10} + \\ & \alpha_{11}) ldin_{it} + \varepsilon_{it} \quad .....(6) \end{aligned}$$

With this approach, the analysis focuses on the significance of the coefficients $\alpha_1, \alpha_2, \alpha_5, \alpha_7, \alpha_9$, and α_{11} which are essential for determining whether there is a difference in the influence of independent variables on income inequality in Indonesia between the pre-pandemic and pandemic periods.

RESULTS AND DISCUSSION

Societal welfare can be measured by economic growth, as increasing economic growth enhances regional development and raises people's income to meet their living needs. Economic growth reflects efforts to increase production capacity to generate additional output, typically measured using Gross Domestic Product (GDP) or Gross Regional Domestic Product (GRDP). Per capita GRDP is one of the key indicators for assessing social welfare.

Among Indonesia's provinces, DKI Jakarta has the highest per capita GRDP at Rp174.81 million, while East Nusa Tenggara (NTT) has the lowest at Rp12.76 million, resulting in a disparity of Rp162.05 million. The national average per capita GRDP across all provinces is Rp43.64 million. During the pandemic, several regions experienced a decline in per capita GRDP, including DKI Jakarta, where per capita GRDP fell to Rp170.10 million. Meanwhile, the province with the lowest per capita GRDP remains Papua at Rp12.96 million, indicating that NTT was more significantly affected by the pandemic. The overall ratio between the highest and lowest per capita GRDP across provinces is 13.12 times (see Table A1).

Following the implementation of the COVID-19 Handling and National Economic Recovery (PC-PEN) program, per capita GRDP in each province showed an increase. DKI Jakarta remains the province with the highest per capita GRDP at Rp174.96 million, while East Nusa Tenggara (NTT) continues to have the lowest per capita GRDP at Rp13.09 million. The ratio between the highest and lowest per capita GRDP across all provinces is 13.36 times. Although NTT has the lowest per capita GRDP, it has experienced an increase compared to the previous year.

Economic growth remains a primary policy objective, as it plays a crucial role in addressing social issues and reducing poverty. Rapid economic growth is one of the key prerequisites for achieving societal welfare. According to Table A1, Central Sulawesi recorded the highest economic growth at 8.83 percent, while Papua experienced the lowest growth at -15.74 percent. The average economic growth across all provinces stands at 4.68 percent.

During the pandemic, North Maluku had the highest economic growth rate at 5.35 percent, whereas Bali recorded the lowest at -9.33 percent. After the implementation of the PC-PEN

program, economic growth improved in several regions. North Maluku continued to experience the highest economic growth at 16.40 percent, while Bali remained the province with the lowest growth, though it improved to -2.47 percent. The success of the PC-PEN policy is evident in its positive impact on economic growth in various provinces. Papua demonstrated the most significant improvement, with an increase of 12.72 percentage points, followed by several other regions.

The Gini ratio is a numerical measure of income inequality, ranging from 0 to 1. A lower Gini ratio, approaching zero, indicates low-income inequality, while a higher ratio, closer to 1, signifies greater inequality (Putra & Lisna, 2020; Agusalim, 2016; Kuncoro et al., 2022, 2023). Deaton (2021) noted a widespread belief that the COVID-19 pandemic had exacerbated global income inequality, particularly in developing countries. However, he argued that while this assumption seemed logical, it was inaccurate. This perspective is reflected in Indonesia's case, where, in 2020, most provinces saw a decline in their Gini indices.

As shown in Table A2, before the COVID-19 pandemic, the province with the highest Gini ratio was the Special Region of Yogyakarta at 0.42, while Bangka Belitung Islands Province had the lowest at 0.26. The national average Gini ratio stood at 0.35, with a disparity ratio of 1.56 between the lowest and highest values. During the pandemic, Yogyakarta remained the province with the highest Gini ratio, increasing slightly to 0.43, while Bangka Belitung Islands Province retained the lowest at 0.26. Consequently, the disparity ratio widened to 1.66, though the national average remained at 0.35.

Following the implementation of the PC-PEN policy, income inequality declined in several Indonesian provinces. In 2021, Yogyakarta continued to have the highest Gini ratio, rising to 0.44, while Bangka Belitung maintained the lowest at 0.26. The national average Gini ratio remained stable at 0.35. Central Java experienced the largest increase in income inequality, with its Gini ratio rising by 2.76 percent. In contrast, Central Sulawesi saw the most significant decline, with its Gini ratio decreasing by 3.07 percent, resulting in a disparity ratio of 1.72.

Table 2 presents a summary of the variables, beginning with the Gini coefficient. A data shortage issue arises due to missing data samples from BPS, particularly for the period between 2010 and 2014, when North Kalimantan Province had not yet been established. Consequently, only 403 observations are available for the Gini variable. The average Gini coefficient is 0.363, with the lowest value recorded in Bangka Belitung Province in 2021 at 0.256 and the highest in Gorontalo Province in 2011 at 0.459.

Similarly, the per capita GRDP variable has only 405 observations due to data limitations from survey agencies. The average per capita GRDP is Rp3.80 million, with the lowest value recorded in East Nusa Tenggara Province in 2010 at Rp9.30 million and the highest in DKI Jakarta Province in 2021 at Rp174 million.

The Human Development Index (HDI) variable also faces data shortages, with only 405 observations, largely due to the absence of data for North Kalimantan Province from 2010 to 2012. The average HDI value is 68.80, with the lowest recorded in Papua Province in 2010 at 54.45 and the highest in DKI Jakarta Province in 2021 at 81.11.

Likewise, the foreign direct investment (FDI) variable has only 405 observations due to data limitations from survey agencies. The average FDI value is $8.03 million, with the lowest recorded in West Sulawesi Province in 2012 at $0.2 million and the highest in West Java Province in 2013 at $7.124 million.

The domestic investment (DIN) variable also encounters data shortages due to missing samples from BPS, particularly in Bengkulu Province in 2011, North Kalimantan Province from 2010 to 2012, Maluku Province from 2010 to 2015, and North Maluku Province in 2010. As a result, only 399 observations are available for the DIN variable. The average DIN value is Rp6.88 trillion, with the lowest recorded in East Nusa Tenggara Province in 2010 at Rp0.10 trillion and the highest in DKI Jakarta Province in 2019 at Rp62.09 trillion.

Table 2. Summary Statistics

Variable	Unit	Obs.	Mean	Std. Dev.	Min	Max
Gini	0-1	403	0.36	0.04	0.256	0.459
grdp_c	million rupiah	405	3.80	3.0	9.31	174
Hdi	0-100	405	68.80	4.50	54.45	81.11
Fdi	million dollars	405	8.03	12.22	0.2	7.124
Din	trillion rupiah	399	6.88	11.06	0.1	62.09

Source: BPS-Statistic Indonesia, 2023 (Processed)

In panel data regression analysis, three key tests are conducted to determine the most appropriate model approach for the study. These include the Chow test, which assesses whether the Common Effects Model (CEM) or Fixed Effects Model (FEM) is more suitable; the Hausman test, which distinguishes between the FEM and Random Effects Model (REM); and the Lagrange Multiplier test, which evaluates the best choice between the REM and CEM approaches (Agusalim et al., 2022). Based on the results of the Hausman and Lagrange Multiplier tests, the REM approach is identified as the preferred estimation model for panel data analysis in this study. The regression analysis using the REM technique is presented in Table 3.

The model's R-squared value, or coefficient of determination, is 0.20, indicating that the independent variables collectively explain 20 percent of the variance in the dependent variable. Since the R-squared value is below 0.5, it suggests that approximately 80 percent of the variance is influenced by other factors not included in the regression model. Furthermore, the Wald Chi² test produces a value of 88.04, implying that the independent variables in the model do not have a statistically significant impact on the dependent variable.

Table 3. Results of Panel Data Model Estimation

Independent Variable	Dependent Variable: lgini
Growth	-0.166 (0.151)
growth*dc	-0.156 (0.120)
$growth^2$	0.020 (0.020)
$growth^2$*dc	0.019 (0.016)
Lhdi	-0.425*** (0.165)
lhdi*dc	0.108 (0.162)
Lfdi	0.008** (0.004)
lfdi*dc	-0.004 (0.005)
Ldin	-0.001 (0.002)
ldin*dc	0.005 (0.008)
Dc	-0.190 (0.702)
Constant	5.681*** (0.640)
R-squared (R^2)	0.202
Wald Chi²	88.04
Num. of Observations	397
Province	34
Model Selection Criteria	
• Chow Test	FEM
• Hausman Test	REM
• LM Test	REM
Decision	REM

Note: *** p < 0,01; ** p < 0,05; * p < 0,1; parentheses are the standard error
Source: Data Processed, 2024

The results of the analysis shown in Table 5 show that there is no significant difference in income inequality either before or after COVID-19. Furthermore, Table 3 can be rearranged as Table 4 to examine whether there are any differences in the impact of independent variables on the dependent variable both before and during COVID-19.

Table 4. Comparison of estimation results before and during the COVID-19 pandemic

Independent Variable	Coefficient	
	Before COVID-19 (dc=0)	During Coovid-19 (dc=1)
Growth	-	-
$growth^2$	-	-
Lnhdi	-0.425	-0.425
Lfdi	0.008	0.008
Ldin	-	-

Note: Dependent Variable: lgini
Source: BPS-Statistic Indonesia, 2023 (processed)

The regression test results indicate no significant relationship between economic growth and income inequality, both before and during the pandemic. Higher economic growth generally reflects increased value addition in the economy, which should, in theory, reduce income inequality. Moreover, economic growth fosters increased economic activity and job creation, leading to a more equitable income distribution. However, in the case of Indonesian provinces, economic growth has had a limited impact on society (Suhendra et al., 2020). One of the primary causes of economic disparity is the restricted access to infrastructure and essential facilities for the population. This challenge hinders efforts to improve and equalize access to healthcare, education, social services, and information dissemination across all regions (Andiny & Mandasari, 2017). These findings align with Pangkiro (2016), who also found that economic growth does not significantly affect inequality. This suggests that the observed economic growth has not effectively addressed existing disparities. Growth driven by labor-intensive sectors contributes minimally, while key sectors with large workforces remain inadequate in driving equitable economic progress.

In the early stages of development, income distribution often worsens before improving, eventually leading to a resurgence of disparity, as depicted by the inverted U-shaped Kuznets curve. A rising per capita Gini coefficient indicates a short-term positive correlation between income growth and income disparity. However, in the long run, this relationship turns negative, suggesting that as economic growth continues, income inequality diminishes. Thus, economic growth does not necessarily widen inequality (Mansyur et al., 2021). However, this study contradicts the Kuznets curve theory, which has not been empirically validated in developing countries like Indonesia. These findings differ from those of Younsi & Bechtini (2020) in BRICS nations and Agbatogun et al. (2021) in African countries. This discrepancy is likely due to the insufficient time needed to observe the Kuznets hypothesis in developing countries. Economic growth trends are typically analyzed over the long term, spanning 10 to 50 years or more (Boediono, 2012).

According to the Lewis model, the early stages of economic growth are concentrated in modern industrial sectors, which offer limited job opportunities but relatively high wages and productivity. The Kuznets curve emerges from a sustained growth process that transitions an economy from a traditional to a modern structure, driven by the expansion of modern industries. Additionally, returns on investment in the education sector initially increased due to rising demand for skilled labor in emerging modern sectors. However, these returns may decline as the supply of educated workers grows while the availability of unskilled labor decreases (Putri et al., 2015).

The regression analysis results indicate a significant relationship between the Human Development Index (HDI) and income inequality, with consistent effects observed both

before and during the pandemic. Specifically, an increase in HDI leads to a reduction in income inequality, with a one percent rise in HDI associated with a 0.425 percent decrease in income inequality.

Previous research by Hindun et al. (2017) emphasizes the crucial role of education in reducing income inequality. Income disparities arise due to differences in abilities, educational attainment, and variations in educational quality. Limited access to education restricts opportunities for higher earnings, highlighting the importance of government investment in education to mitigate income inequality.

Education serves as a key investment in human resource development, enhancing skills and work productivity, which in turn contributes to national income growth. Economic underdevelopment can be addressed by improving human capital through education (Arniwita et al., 2020). The human capital approach underscores the indirect benefits of education in enhancing individual utility through higher income potential. Investments in human capital yield substantial returns when considering the total cost of education relative to future earnings. While individuals with higher education may enter the workforce later, their income growth tends to outpace that of individuals who begin working at an earlier age (Sari et al., 2021).

According to Seran (2017), education serves as a fundamental means of enhancing human resource quality, as reflected in indicators such as average years of schooling, which measure the level of education attained by a community. A longer average duration of schooling generally corresponds to higher education levels, leading to improved cognitive abilities and behavioral patterns.

The human capital theory suggests that education plays a crucial role in promoting economic growth and reducing income inequality. Factors such as education and health can help mitigate existing disparities by enhancing human resource quality, thereby increasing per capita income—particularly among lower-income groups—and narrowing income gaps. Improvements in human capital signal positive progress in regional economic development. A well-educated workforce can access better employment opportunities and healthcare, ultimately improving livelihoods and overall well-being. Thus, enhancing the Human Development Index (HDI) is essential for reducing income inequality (Hartini, 2017).

The onset of the COVID-19 pandemic in late 2019 disrupted Indonesia's economic landscape. The rising costs of education disproportionately affected impoverished communities, limiting their access to higher education compared to wealthier groups. This disparity contributed to variations in education quality, reinforcing the critical role of education in determining wages and income levels. Uneven HDI distribution across regions has led to imbalances, where some areas have developed more rapidly due to better human resources, while others have lagged behind. If left unaddressed, these disparities will continue to widen regional income inequality (Nadya & Syafri, 2019).

Although individuals with higher education levels generally earn higher incomes, a significant number of university graduates in Indonesia remain unemployed. This is largely due to a mismatch between job opportunities and job seekers' qualifications, leading to prolonged job searches. Unemployment deprives individuals of income and exacerbates income inequality. Therefore, fostering quality human capital—primarily through improved education—is essential to preventing the widening of income disparities (Anshari et al., 2018).

The Foreign Direct Investment (FDI) variable demonstrates a significant relationship with income inequality both before and during the COVID-19 pandemic. However, no discernible difference in its influence between these two periods is observed. A one percent increase in FDI corresponds to a 0.008 percent increase in income inequality. Teeramungcalanon and Chiu (2020) found similar results in Vietnam, where FDI exacerbated income inequality by increasing the

demand for skilled labor. This demand raises wages and employment rates for skilled workers, consequently widening the income gap between skilled and unskilled workers.

These findings align with the Harrod-Domar theory, which posits that investment influences long-term economic growth. While FDI is generally expected to drive economic expansion and reduce income inequality, this study suggests the opposite. The exacerbation of income disparity may stem from the fact that most FDI inflows are capital-intensive, generating limited employment opportunities. As a result, FDI fails to uplift local communities through job creation, instead contributing to greater income inequality (Farrah & Yuliadi, 2020).

This study's results also support Hartati's (2019) findings that FDI significantly and positively affects income inequality. This may be attributed to the uneven distribution of foreign capital investments, which further widens economic disparities across regions. Underdeveloped areas often lack adequate infrastructure, making them less attractive to foreign investors. This highlights the necessity of improving infrastructure to attract foreign investment and promote balanced economic growth.

Conversely, the Domestic Investment (DIN) variable does not exhibit a significant relationship with income inequality, either before or during the pandemic. This suggests that domestic investment does not contribute to reducing income inequality. These findings align with those of Laut et al. (2020) and Rinjani (2018), who also found no evidence that domestic investment impacts income inequality. The uneven distribution of investment across regions may explain this phenomenon, as investors tend to prioritize profit, often favoring already developed regions with better facilities and access. Since investment decisions are driven by expected returns, regions must develop their economic potential to attract investors. By fostering a favorable investment climate and ensuring adequate returns, regions can harness domestic investment to promote local economic growth and benefit their populations (Rizqullah, 2021).

CONCLUSION

The research findings indicate that economic growth does not significantly affect income inequality in Indonesia, both before and after COVID-19. This implies that the Kuznets hypothesis is not supported in Indonesia. Additionally, the study shows that the variables HDI and FDI significantly influence income inequality, with no difference observed in their effects before and during COVID-19. The HDI variable has a negative impact on income inequality, meaning that an increase in HDI leads to a decrease in income inequality. This is attributed to the improvement in human resource quality, facilitating better job opportunities, improved healthcare, and overall welfare enhancement, subsequently boosting regional per capita income, and reducing income inequality. Conversely, the FDI variable has a positive effect on income inequality, as an increase in FDI exacerbates income inequality due to the capital-intensive nature of FDI, leading to limited job creation and widening income gaps. Both variables exhibit consistent effects on income inequality regardless of the pandemic. Moreover, the DIN variable does not affect income inequality in Indonesia before or during COVID-19.

Addressing income inequality requires enhancing human resources. Human capital refers to the knowledge and skills acquired by workers through education. Human development plays a key role in a nation's ability to absorb modern technology and develop its capacity for sustainable growth and development. Indicators such as life expectancy measure health, adult literacy rates and average years of schooling measure education and purchasing power measures living standards. Thus, raising awareness among the population about the importance of education is crucial, as education serves as an investment in human capital, leading to improved human resource quality.

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APPENDIX

Appendix 1. Development of the GRDP and Economic Growth Before and During the COVID-19 Pandemic in Indonesia.

Province	GRDP per capita (million rupiah)					Economic Growth (percent)				
	2019	2020	2021	%Δ 2020	%Δ 2021	2019	2020	2021	Δ 2020	Δ 2021
AC	24,84	25,02	25,36	0,71	1,36	4,14	-0,37	2,79	-4,51	3,16
SU	36,85	36,18	36,67	-1,84	1,36	5,22	-1,07	2,61	-6,29	3,68
SB	31,43	30,69	31,36	-2,33	2,17	5,01	-1,62	3,29	-6,63	4,91
RI	72.51	76.88	77.99	6.03	1.44	2.81	-1.13	3.36	-3.94	4.49
JA	41.81	41.95	42.92	0.34	2.31	4.35	-0.44	3.66	-4.79	4.10
SS	37.13	37.32	38.17	0.53	2.28	5.69	-0.11	3.58	-5.80	3.69
BE	23.50	23.11	23.53	-1.70	1.85	4.94	-0.02	3.24	-4.96	3.26
LA	28.89	26.74	27.20	-7.44	1.70	5.26	-1.67	2.79	-6.93	4.46
BB	37.17	36.30	37.58	-2.34	3.52	3.32	-2.30	5.05	-5.62	7.35
KR	81.14	85.01	85.43	4.77	0.49	4.83	-3.80	3.43	-8.63	7.23
JK	174.81	170.10	174.96	-2.70	2.86	5.82	-2.39	3.56	-8.21	5.95
JB	30.41	30.18	30.91	-0.77	2.41	5.02	-2.52	3.74	-7.54	6.26
JT	28.70	26.48	27.14	-7.71	2.49	5.36	-2.65	3.32	-8.01	5.97
YO	27.01	27.75	28.90	2.75	4.15	6.59	-2.68	5.53	-9.27	8.21
JI	41.51	39.69	40.83	-4.39	2.88	5.53	-2.33	3.57	-7.86	5.90
BT	35.91	37.16	38.20	3.48	2.78	5.26	-3.39	4.44	-8.65	7.83
BA	37.30	34.22	32.98	-8.25	-3.64	5.60	-9.33	-2.47	-14.93	6.86
NB	18.22	17.58	17.71	-3.49	0.70	3.90	-0.62	2.30	-4.52	2.92
NT	12.76	12.96	13.09	1.56	1.01	5.25	-0.84	2.51	-6.09	3.35
KB	27.20	24.95	25.81	-8.26	3.42	5.09	-1.82	4.78	-6.91	6.60
KT	37.87	37.15	37.86	-1.91	1.91	6.12	-1.41	3.40	-7.53	4.81
KS	31.61	32.21	32.85	1.90	1.97	4.09	-1.82	3.48	-5.91	5.30
KI	134.41	125.81	127.17	-6.40	1.08	4.70	-2.87	2.48	-7.57	5.35
KU	88.30	86.82	88.51	-1.67	1.94	6.89	-1.09	3.98	-7.98	5.07
SA	35.69	33.67	34.79	-5.65	3.32	5.65	-0.99	4.16	-6.64	5.15
ST	42.05	45.05	49.59	7.13	10.07	8.83	4.86	11.70	-3.97	6.84
SN	37.47	36.25	37.57	-3.28	3.66	6.91	-0.71	4.65	-7.62	5.36
SG	35.31	35.71	36.58	1.13	2.44	6.50	-0.65	4.10	-7.15	4.75
GO	24.17	24.31	24.65	0.60	1.38	6.40	-0.02	2.41	-6.42	2.43
SR	24.16	22.65	22.88	-6.25	1.00	5.56	-2.40	2.56	-7.96	4.96
MA	17.56	16.69	17.02	-4.95	1.99	5.41	-0.92	3.04	-6.33	3.96
MU	21.52	21.91	25.10	1.77	14.60	6.25	5.35	16.40	-0.90	11.05
PB	64.42	54.49	52.98	-15.42	-2.77	2.66	-0.76	-0.51	-3.42	0.25
PA	40.20	32.11	36.42	-20.13	13.42	-15.74	2.39	15.11	18.13	12.72
Max	174.81	170.10	174.96	7.13	14.60	8.83	5.35	16.40	18.13	12.72
Mini	12.76	12.96	13.09	-20.13	-3.64	-15.74	-9.33	-2.47	-14.93	0.25
Ratio	13.70	13.12	13.36							
Mean	43.64	42.50	43.55							

Source: BPS-Statistic Indonesia, 2023 (processed)

Appendix 2. Development of the Gini Ratio Before and During the COVID-19 Pandemic in Indonesia

Province	Gini Ratio				
	2019	2020	2021	%Δ 2020	%Δ 2021
AC	0.320	0.323	0.324	0.938	0.310
SU	0.320	0.316	0.314	-1.250	-0.633
SB	0.310	0.305	0.306	-1.613	0.328
RI	0.330	0.329	0.326	-0.303	-0.912
JA	0.320	0.320	0.321	0.000	0.313
SS	0.330	0.339	0.341	2.727	0.590
BE	0.340	0.334	0.326	-1.765	-2.395
LA	0.330	0.327	0.323	-0.909	-1.223
BB	0.270	0.262	0.256	-2.963	-2.290
KR	0.340	0.339	0.343	-0.294	1.180
JK	0.390	0.399	0.409	2.308	2.506
JB	0.400	0.403	0.412	0.750	2.233
JT	0.360	0.362	0.372	0.556	2.762

Province	Gini Ratio				
	2019	2020	2021	%Δ 2020	%Δ 2021
YO	0.420	0.434	0.441	3.333	1.613
JI	0.370	0.366	0.374	-1.081	2.186
BT	0.370	0.363	0.365	-1.892	0.551
BA	0.370	0.369	0.378	-0.270	2.439
NB	0.380	0.376	0.381	-1.053	1.330
NT	0.360	0.354	0.346	-1.667	-2.260
KB	0.330	0.317	0.313	-3.939	-1.262
KT	0.340	0.329	0.323	-3.235	-1.824
KS	0.330	0.332	0.330	0.606	-0.602
KI	0.330	0.328	0.334	-0.606	1.829
KU	0.300	0.292	0.292	-2.667	0.000
SA	0.370	0.370	0.365	0.000	-1.351
ST	0.330	0.326	0.316	-1.212	-3.067
SN	0.390	0.389	0.382	-0.256	-1.799
SG	0.400	0.389	0.390	-2.750	0.257
GO	0.410	0.408	0.408	-0.488	0.000
SR	0.370	0.364	0.356	-1.622	-2.198
MA	0.320	0.318	0.314	-0.625	-1.258
MU	0.310	0.308	0.300	-0.645	-2.597
PB	0.390	0.382	0.380	-2.051	-0.524
PA	0.390	0.392	0.397	0.513	1.276
Max	0.420	0.434	0.441	3.333	2.762
Min	0.270	0.262	0.256	-3.939	-3.067
Ratio	1.556	1.656	1.723		
Mean	0.351	0.349	0.349		

Source: BPS-Statistic Indonesia, 2023 (processed)

1