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The Impact of Exports, Unemployment, Human Development, and Farmers' Terms of Trade on Income Inequality in Indonesia

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Abstract: This study aims to analyze the impact of exports, unemployment rate, human development index, and farmers' terms of trade on income inequality in Indonesia. Income inequality remains a major issue despite uneven economic growth across regions. This study employs a quantitative approach using panel data covering 33 provinces over the period 2019–2025. The analysis method used is panel data regression, with the fixed effect model selected as the best model based on model selection tests. The results show that the human development index and farmers' terms of trade have a negative and significant effect on income inequality, while exports and unemployment rate have no significant effect. These findings indicate that improving human capital and farmers' welfare plays an important role in reducing income inequality. This study contributes to the empirical literature on inequality determinants and highlights the importance of inclusive development through human capability enhancement and the agricultural sector.

Keyword: Income Inequality, Exports, Unemployment Rate, Human Development Index, Farmers' Terms of Trade.

INTRODUCTION

Income inequality remains one of the most persistent challenges in developing countries, including Indonesia. Despite relatively stable economic growth over recent decades, disparities in income distribution across regions and population groups continue to exist. Data from Badan Pusat Statistik indicate that the Gini Ratio in Indonesia fluctuates over time, reflecting that the benefits of economic growth are not evenly distributed. This condition suggests that economic expansion alone is insufficient to achieve inclusive welfare improvement, particularly in economies characterized by structural imbalances between sectors and regions.

From a theoretical perspective, the relationship between economic development and income inequality is commonly explained by the Kuznets Curve, which proposes that inequality initially increases and later decreases as economies develop (Kuznets, 1973). However, recent studies argue that this relationship is not consistently observed in developing economies due to unequal access to education, employment opportunities, and productive resources (Piketty, 2015). Therefore, understanding income inequality requires a multidimensional approach that incorporates macroeconomic performance, labor market conditions, human development, and sectoral welfare dynamics.

Exports are widely regarded as an important driver of economic growth because they stimulate production, productivity, and foreign exchange earnings (Krugman et al., 2023). Nevertheless, the effect of exports on income inequality remains inconclusive. Some studies argue that export expansion creates employment opportunities and reduces inequality, while others suggest that trade benefits are often concentrated in capital-intensive and skill-intensive sectors (Goldberg et al., 2009; Helpman & Itskhoki, 2010). In Indonesia, export activities are unevenly distributed across provinces and are frequently dominated by sectors with limited distributional effects, potentially weakening their contribution to reducing inequality.

The unemployment rate also represents an important structural factor influencing income inequality. High unemployment reduces household income opportunities and widens disparities among social groups. Although labor market theory generally predicts a positive relationship between unemployment and inequality (Blanchard et al., 2021), the effect may differ in developing countries characterized by large informal sectors. In Indonesia, many individuals outside formal employment continue to engage in informal economic activities, potentially weakening the direct relationship between unemployment and income inequality.

In addition, human development plays a central role in reducing inequality. According to Sen's capability approach, development should be understood as the expansion of human capabilities through improved education, health, and income opportunities (Northover, 2024). The Human Development Index (HDI) therefore represents an important indicator of inclusive development. Higher levels of human development are generally associated with broader economic opportunities and more equitable income distribution (UNDP, 2020). However, regional disparities in HDI remain substantial in Indonesia, indicating unequal access to public services and human capital development.

The agricultural sector is also strategically important in the Indonesian economy, particularly for rural communities. Farmers' Terms of Trade (NTP) reflects farmers' purchasing power by comparing the prices received by farmers with the prices they pay for goods and services. Improvements in NTP indicate stronger rural welfare and are expected to contribute to reducing poverty and inequality. Nevertheless, studies examining the direct relationship between NTP and income inequality remain limited, despite the agricultural sector continuing to employ a significant proportion of Indonesia's workforce.

Although previous studies have examined the determinants of income inequality, most focus on partial relationships, such as economic growth, trade, unemployment, or human development independently. Few studies integrate exports, unemployment, human development, and rural welfare into a single analytical framework. Moreover, the inclusion of Farmers' Terms of Trade as a proxy for agricultural welfare remains relatively underexplored in inequality research, particularly in developing economies such as Indonesia. This indicates an important empirical and theoretical gap in understanding inequality as a structural outcome influenced by both capability development and sectoral welfare dynamics.

This study contributes theoretically by integrating trade performance, labor market conditions, human development, and rural welfare into a unified framework for explaining income inequality in Indonesia. Unlike previous studies that mainly examined these

determinants separately, this study positions inequality as a structural outcome shaped by capability-based development and sectoral welfare distribution. In particular, the inclusion of Farmers' Terms of Trade extends the inequality literature by incorporating agricultural welfare as an important dimension of inclusive economic development in emerging economies.

Based on the Kuznets hypothesis, capability approach, and trade theory, this study conceptualizes income inequality as a structural outcome influenced by macroeconomic performance, labor market conditions, human development, and rural welfare. Exports and unemployment represent structural economic dynamics, while HDI and Farmers' Terms of Trade reflect capability enhancement and welfare distribution mechanisms. Therefore, this study develops an integrated analytical framework linking these variables to income inequality in Indonesia.

Accordingly, this study aims to analyze the impact of exports, unemployment rate, human development index, and farmers' terms of trade on income inequality in Indonesia using panel data analysis. The findings are expected to contribute to the literature on inequality determinants and provide policy implications for promoting inclusive and sustainable economic development.

METHOD

The research method contains the type of research, sample and population or research subject, time and place of research, instruments, procedures and research techniques, and other matters related to the research method. This section can be divided into several sub-chapters, but it is not necessary to include the numbering.

This study employs a quantitative research approach with an explanatory design to analyze the determinants of income inequality. The objective of this research is to examine the causal relationship between exports, unemployment rate, human development, and farmers' terms of trade on income inequality in Indonesia.

The population of this study consists of all provinces in Indonesia. The sampling technique applied is saturated sampling, meaning that all provinces are included as research samples. The study uses secondary data obtained from *Badan Pusat Statistik (BPS)* and other official sources. The data are structured as panel data, combining cross-sectional data (33 provinces) and time-series data over the period 2019–2025.

The variables used in this study consist of one dependent variable and four independent variables. The dependent variable is income inequality, measured using the Gini Ratio. The independent variables include exports, unemployment rate (*Open Unemployment Rate*), human development index, and farmers' terms of trade. The operational definitions of variables are presented in Table 1.

The selection of variables in this study is theoretically grounded in the multidimensional perspective of income inequality. Exports and unemployment rate represent macroeconomic and labor market dynamics that influence income distribution through production structure and employment opportunities. Human Development Index reflects the capability approach, emphasizing the role of education, health, and human capital in reducing inequality. Meanwhile, Farmers' Terms of Trade represents rural welfare and agricultural sector dynamics, which are particularly relevant in developing economies where agriculture remains an important source of livelihood. Therefore, the selected variables collectively capture both structural economic and capability-based determinants of income inequality.

Table 1. Operational Definition of Variables

Variable	Definition	Indicator/Measurement	Scale	Reference
Income Inequality (Y)	The level of disparity in income distribution among the population (Todaro et al., 2011).	Gini Ratio (0–1)	Ratio	
Exports (X_1)	The total value of goods and services exported to foreign markets (Krugman et al., 2023)	Export value (IDR/USD)	Ratio	
Unemployment Rate (X_2)	The proportion of the labor force that is unemployed (*Open Unemployment Rate*) (Blanchard et al., 2021)	Percentage (%)	Ratio	
Human Development Index (X_3)	Composite index reflecting health, education, and income dimensions (UNDP, 2020)	HDI (0–100)	Ratio	
Farmers' Terms of Trade (X_4)	Indicator of farmers' welfare based on the ratio of prices received to prices paid (World Bank, 2020)	NTP Index	Ratio	

The data analysis technique employed in this study is panel data regression, which is processed using EViews version 13. Panel data analysis allows for more efficient estimation by capturing both cross-sectional and time-series variations (Baltagi, 2021).

The estimation is conducted using three alternative models, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). To determine the most appropriate model, a series of statistical tests is carried out. The Chow test is used to compare the Common Effect Model and Fixed Effect Model, while the Hausman test is applied to select between the Fixed Effect Model and Random Effect Model. Furthermore, the Lagrange Multiplier (LM) test is utilized to evaluate the suitability between the Common Effect Model and Random Effect Model (Gujarati & Porter, 2020; Wooldridge, 2013).

The regression model used in this study is formulated as follows:

$$Gini_{it} = \beta_0 + \beta_1 Export_{it} + \beta_2 Unemployment_{it} + \beta_3 HDI_{it} + \beta_4 NTP_{it} + \epsilon_{it}$$

Prior to hypothesis testing, the model is evaluated through several classical assumption tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests, to ensure that the regression model meets the BLUE (*Best Linear Unbiased Estimator*) criteria.

Hypothesis testing is conducted using the t-test to examine the partial effect of each independent variable and the F-test to assess the simultaneous effect of all independent variables on income inequality. A significance level of 5% is applied in this study. In addition, the coefficient of determination (R^2) is used to measure the proportion of variation in income inequality explained by the independent variables.

All data processing, estimation, and statistical analyses in this study are carried out using EViews version 13, ensuring accuracy and reliability of the econometric results. This methodological framework is expected to provide robust empirical evidence regarding the determinants of income inequality and contribute to policy recommendations aimed at promoting inclusive economic development in Indonesia.

Although the Fixed Effect Model helps control for unobserved heterogeneity across provinces, this study acknowledges the potential presence of endogeneity arising from reverse causality or omitted variables. For example, income inequality may also influence human development and labor market conditions over time. However, due to data limitations and the exploratory nature of the study, advanced econometric techniques such as dynamic panel estimation or instrumental variable approaches were not applied. Future research is encouraged to address these issues using more advanced panel econometric methods.

RESULT AND DISCUSSION

Descriptive Analysis of Export Data

The export value in Indonesia shows a fluctuating but generally increasing trend over the period 2019–2025. In 2019, export value was recorded at 167,683 million US$, which slightly decreased to 163,191.8 million US$ in 2020. This decline can be associated with global economic disruptions, particularly due to the COVID-19 pandemic, which affected international trade activities.

However, a significant recovery occurred in 2021, where exports increased sharply to 231,710.1 million US$, followed by a further rise to 292,186.7 million US$ in 2022, marking the highest value in the observed period. This substantial growth indicates strong global demand and improved economic conditions post-pandemic.

In 2023, export value declined to 259,527.8 million US$, suggesting a correction phase after the peak in 2022. Nevertheless, exports showed a gradual recovery in 2024, reaching 266,529.2 million US$, and continued to increase in 2025 to 282,908.9 million US$.

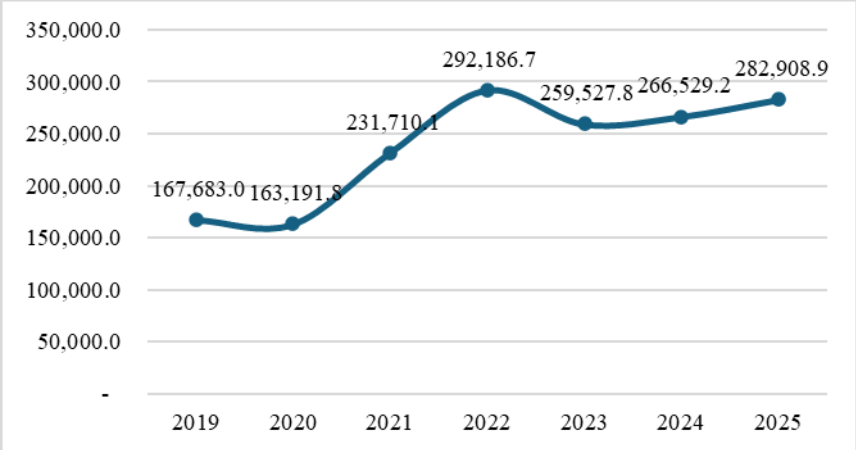


Figure 1. Export Value in Indonesia, 2019–2025 (Million US$)

Overall, the export trend reflects resilience and recovery in Indonesia's external sector, although fluctuations indicate sensitivity to global economic conditions. Despite this increasing trend, the earlier regression results suggest that export growth does not significantly affect income inequality, implying that the benefits of export expansion may not be evenly distributed across regions or sectors.

Descriptive Analysis of Unemployment Rate

The unemployment rate in Indonesia shows a fluctuating trend over the period 2019–2025, with a significant increase during the early phase of the COVID-19 pandemic. In 2019, the unemployment rate was recorded at **5**.23%, which sharply increased to 7.07% in 2020, reflecting the impact of economic contraction and job losses during the pandemic.

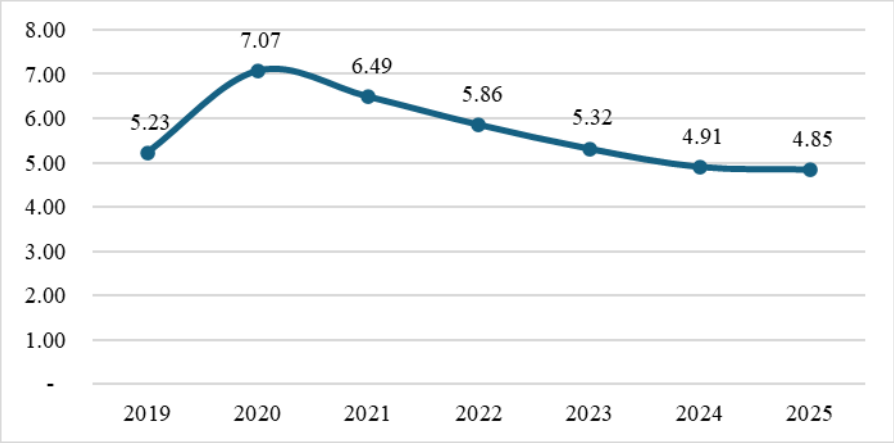


Figure 2. Unemployment Rate in Indonesia, 2019–2025 (Percent)

In 2021, the unemployment rate slightly decreased to 6.49%, indicating the beginning of economic recovery. The downward trend continued in 2022, where the unemployment rate fell to 5.86%, followed by 5.32% in 2023. This decline suggests improvements in labor market conditions and increased employment opportunities.

The recovery trend became more evident in 2024 and 2025, with unemployment rates decreasing further to 4.91% and 4.85%, respectively. These values indicate a return to pre-pandemic levels and reflect the resilience of the labor market.

Overall, the unemployment rate demonstrates a temporary shock during the pandemic period followed by gradual recovery. However, despite this improvement, the regression results show that unemployment does not have a significant effect on income inequality, suggesting that other structural factors, such as human development and rural welfare, play a more dominant role.

Descriptive Analysis of Human Development Index

The Human Development Index (HDI) in Indonesia shows a consistent upward trend over the period 2019–2025, reflecting continuous improvements in the quality of human development. In 2019, the HDI was recorded at 71.90, increasing to 72.81 in 2020 and 73.16 in 2021, indicating steady progress despite the challenges posed by the COVID-19 pandemic.

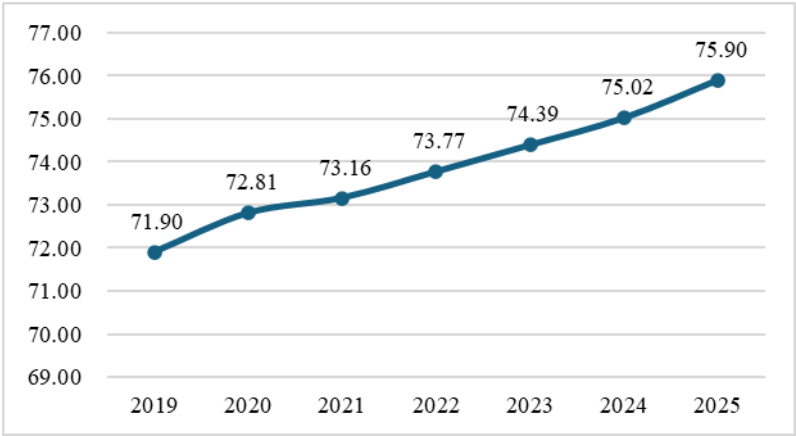


Figure 3. Human Development Index in Indonesia, 2019–2025

The upward trend continued in 2022, with the HDI reaching 73.77, followed by 74.39 in 2023. This growth suggests ongoing improvements in key dimensions of human development, including education, health, and income.

In 2024 and 2025, the HDI further increased to 75.02 and 75.90, respectively, indicating a strengthening of human capital development. The consistent rise in HDI reflects the effectiveness of government policies aimed at improving access to education and healthcare services.

Overall, the increasing trend of HDI demonstrates significant progress in human development in Indonesia. This improvement aligns with the regression results, which show that HDI has a significant negative effect on income inequality, indicating that better human development contributes to a more equitable distribution of income.

Descriptive Analysis of Farmers' Terms of Trade

The Farmers' Terms of Trade (NTP) in Indonesia shows a consistent upward trend over the period 2019–2025, indicating continuous improvement in farmers' welfare. In 2019, the NTP was recorded at 100.90, slightly increasing to 101.66 in 2020, suggesting stable purchasing power of farmers during the early phase of the COVID-19 pandemic.

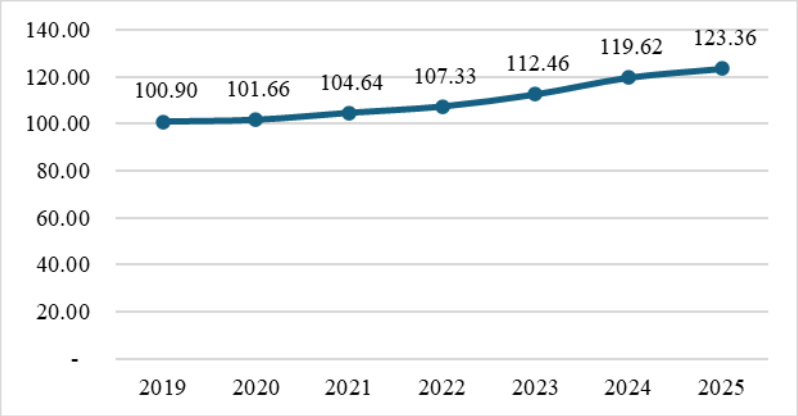


Figure 4. Farmers' Terms of Trade in Indonesia, 2019–2025

A more significant increase occurred in 2021, with the NTP rising to 104.64, followed by 107.33 in 2022. This trend continued in 2023, where the NTP reached 112.46, reflecting improved agricultural performance and better price conditions for farmers.

The upward trajectory became more pronounced in 2024 and 2025, with NTP values increasing to 119.62 and 123.36, respectively. This substantial growth indicates a significant improvement in farmers' purchasing power and overall rural welfare.

Overall, the increasing trend of NTP demonstrates strengthening agricultural sector performance in Indonesia. This finding aligns with the regression results, which show that NTP has a significant negative effect on income inequality, indicating that improvements in farmers' welfare contribute to reducing income disparities, particularly between rural and urban areas.

Descriptive Analysis of Gini Ratio

The Gini Ratio in Indonesia shows a relatively stable but fluctuating pattern over the period 2019–2025, indicating persistent income inequality. In 2019, the Gini Ratio was recorded at 0.380, slightly increasing to 0.385 in 2020, which may reflect the unequal impact of the COVID-19 pandemic on different income groups.

In 2021 and 2022, the Gini Ratio remained stable at 0.380, suggesting that income distribution did not significantly improve during this period. However, in 2023, the Gini Ratio increased to 0.388, indicating a widening income gap, possibly due to uneven economic recovery across regions and sectors.

In 2024, the Gini Ratio declined again to 0.380, and further decreased to 0.360 in 2025, representing a notable improvement in income distribution. This decline suggests that economic recovery and policy interventions may have contributed to reducing inequality.

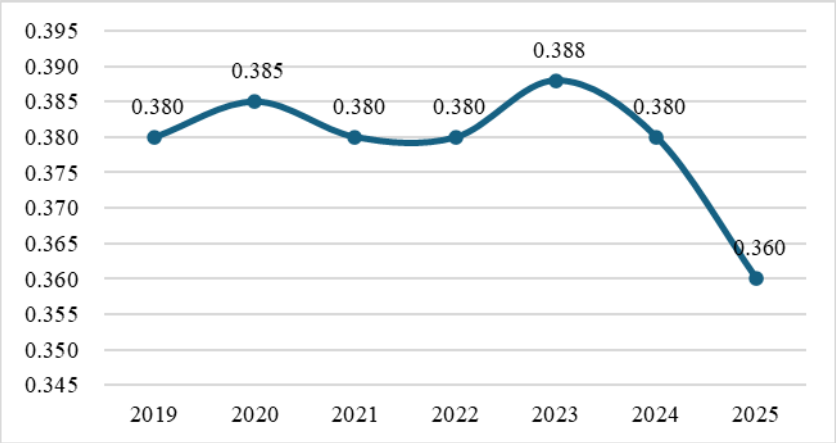


Figure 5. Gini Ratio in Indonesia, 2019–2025

Overall, the trend indicates that income inequality in Indonesia remains relatively stable with slight fluctuations but shows signs of improvement in recent years. This pattern supports the regression findings, where structural factors such as human development and farmers' welfare play a significant role in reducing income inequality.

Analysis of Panel Data Model Selection

Table 2 presents the results of the panel data model selection tests, including the Chow test, Hausman test, and Lagrange Multiplier (LM) test. These tests are conducted to determine the most appropriate estimation model for the analysis.

The Chow test results show a probability value of 0.0000, which is lower than the 5% significance level. This indicates that the null hypothesis is rejected, meaning that the Fixed Effect Model (FEM) is more appropriate than the Common Effect Model (CEM). This finding implies that there are significant differences across cross-sectional units, suggesting the presence of unobserved heterogeneity among provinces.

Furthermore, the Hausman test yields a probability value of 0.0496, which is also below the 5% significance level. This result indicates that the null hypothesis is rejected, confirming that the Fixed Effect Model is more suitable than the Random Effect Model (REM). This suggests that the individual effects are correlated with the independent variables, making FEM a more consistent estimator.

Table 2. Summary of Panel Data Model Selection Tests

Test	Purpose	Statistic	Prob.	Decision	Conclusion
Chow Test	CEM vs FEM	F = 42.77298 Chi-square = 472.4482	0.0000	Reject H0	FEM is preferred over CEM
Hausman Test	FEM vs REM	Chi-square = 9.5073	0.0496	Reject H0	FEM is preferred over REM
LM Test (Breusch-Pagan)	CEM vs REM	Chi-square = 422.3479	0.0000	Reject H0	REM is preferred over CEM

Source: Processed data using EViews 13

In addition, the Lagrange Multiplier (LM) test results show a probability value of 0.0000, indicating that the Random Effect Model is preferable to the Common Effect Model.

This confirms that the Common Effect Model is not appropriate, as it fails to account for individual-specific effects.

Overall, the results of the three tests consistently demonstrate that the Common Effect Model is not suitable for this study. Although the Random Effect Model performs better than the Common Effect Model, the Hausman test confirms that the Fixed Effect Model (FEM) is the most appropriate model. Therefore, the Fixed Effect Model is selected as the final estimation model to analyze the relationship between exports, unemployment rate, human development index, farmers' terms of trade, and income inequality in Indonesia.

Fixed Effect Model Estimation Results

The estimation results using the Fixed Effect Model (FEM) are presented in Table 3. The model shows strong explanatory power, with an Adjusted R-squared value of 0.8669, indicating that approximately 86.69% of the variation in income inequality can be explained by exports, unemployment rate, human development index, and farmers' terms of trade. The remaining 13.31% is influenced by other variables outside the model.

Table 3. Fixed Effect Model (FEM) Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Decision
Log_Export	-0.00149	0.00188	-0.79320	0.4286	Not Significant
Unemployment	0.00043	0.00137	0.31429	0.7536	Not Significant
HDI	-0.00245	0.00068	-3.59808	0.0004	Significant
NTP	-0.00022	0.00008	-2.74988	0.0065	Significant
C	0.54866	0.05128	10.69957	0.0000	Significant

Model Summary

Indicator	Value
R-squared	0.8873
Adjusted R-squared	0.8669
F-statistic	43.42185
Prob (F-statistic)	0.0000
Durbin-Watson	1.3617

Source: Processed data using EViews 13

The overall model is statistically significant, as indicated by the F-statistic value of 43.42185 with a probability value of 0.0000, which is lower than the 5% significance level. This result implies that all independent variables simultaneously have a significant effect on income inequality in Indonesia.

Although the adjusted R^2 value is relatively high, the result should be interpreted cautiously. The strong explanatory power may indicate that the selected variables capture important structural dimensions of income inequality in Indonesia, particularly human development and rural welfare. However, the possibility of omitted structural and institutional factors cannot be fully excluded. In addition, the panel structure combining provincial and time-series observations may strengthen the explanatory relationship among variables. Therefore, the findings should be interpreted as indicative of strong structural associations rather than definitive causal relationships.

The Durbin–Watson statistic of 1.36 indicates the possibility of mild positive autocorrelation in the residuals. This condition may arise because the panel data combine provincial observations over multiple years, where temporal dependence is difficult to eliminate entirely. Nevertheless, the Fixed Effect Model remains appropriate because it effectively controls for unobserved heterogeneity across provinces. The results should therefore be interpreted with caution, and future studies are encouraged to apply more

advanced panel estimation techniques, such as dynamic panel models or robust standard error correction, to address potential autocorrelation issues more comprehensively.

Individually, the estimation results reveal that exports (Log_Export) have a negative coefficient of -0.00149, but the effect is not statistically significant (p-value = 0.4286). This suggests that exports do not have a significant impact on income inequality. This finding indicates that export growth in Indonesia may not be inclusive, as its benefits are likely concentrated in specific sectors or regions, limiting its ability to reduce inequality.

The unemployment rate shows a positive coefficient of 0.00043, but it is also not statistically significant (p-value = 0.7536). This indicates that unemployment does not significantly affect income inequality. One possible explanation is that Indonesia's labor market is characterized by a large informal sector, which reduces the direct impact of unemployment on income distribution.

In contrast, the Human Development Index (HDI) has a negative and statistically significant coefficient of -0.00245 (p-value = 0.0004). This result indicates that improvements in human development significantly reduce income inequality. Higher levels of education, health, and income contribute to more equal opportunities, thereby narrowing income disparities.

Similarly, Farmers' Terms of Trade (NTP) show a negative and statistically significant effect on income inequality, with a coefficient of -0.000217 (p-value = 0.0065). This finding suggests that an increase in farmers' welfare contributes to reducing inequality, particularly by improving income distribution in rural areas.

Overall, the results indicate that human development and agricultural welfare are key determinants in reducing income inequality, while exports and unemployment do not show significant effects in this study. These findings highlight the importance of policies focusing on improving human capital and strengthening the agricultural sector to achieve more inclusive economic development in Indonesia.

The Effect of Exports on Income Inequality

The estimation results indicate that exports have a negative but statistically insignificant effect on income inequality in Indonesia. This finding suggests that export growth does not necessarily lead to a more equitable distribution of income. From a theoretical perspective, international trade theory argues that exports can stimulate economic growth, productivity, and employment opportunities (Krugman et al., 2023). However, the distributional impact of trade largely depends on the structure of the economy and the extent to which export benefits are distributed across sectors and regions.

The insignificant effect found in this study is consistent with (Goldberg et al., 2009), who argue that trade liberalization may widen inequality when export gains are concentrated in capital-intensive and skill-intensive industries. In the Indonesian context, export activities are predominantly driven by resource-based sectors and large-scale industries with limited labor absorption and weak linkages to local economies. Consequently, the benefits of export expansion may be enjoyed primarily by specific firms and regions rather than contributing to broad-based welfare improvement (Suryahadi et al., 2012).

These findings imply that export growth alone is insufficient to reduce income inequality without inclusive economic policies and stronger regional development strategies. In other words, external trade expansion does not automatically translate into equitable income distribution unless accompanied by policies that strengthen employment creation, local industrial participation, and income redistribution mechanisms.

The Effect of Unemployment on Income Inequality

The results show that the unemployment rate has a positive but statistically insignificant effect on income inequality in Indonesia. This finding indicates that changes in unemployment levels do not substantially influence income distribution. From a theoretical perspective, labor market theory suggests that higher unemployment reduces household income and widens inequality (Blanchard et al., 2021). However, this expectation is not fully supported by the empirical findings of this study.

One possible explanation relates to the structure of Indonesia's labor market, which is characterized by a large informal sector. Many individuals outside formal employment continue to generate income through informal economic activities, thereby weakening the direct relationship between unemployment and income inequality. As a result, unemployment alone may not adequately reflect actual income conditions within developing economies.

This finding differs from (Castells-Quintana & Royuela, 2012), who identified a significant positive relationship between unemployment and inequality in cross-country analysis. However, the present result is consistent with several studies in developing countries showing that informal employment may function as a buffer against severe income disparities. In the Indonesian context, inequality appears to be influenced more strongly by structural factors such as human capital, productivity differences, educational access, and regional economic disparities rather than unemployment levels alone.

These findings suggest that labor market indicators in developing economies should be interpreted within broader structural and institutional contexts. Therefore, reducing unemployment alone may not be sufficient to address income inequality without parallel improvements in human development, productivity, and inclusive economic opportunities.

The Effect of Human Development on Income Inequality

The Human Development Index (HDI) is found to have a negative and statistically significant effect on income inequality. This result indicates that improvements in human development contribute to reducing income disparities. This finding strongly supports Sen's capability theory (Teece, 2018; Teece et al., 1997), which emphasizes that enhancing education, health, and income capabilities enables individuals to access better economic opportunities.

Empirically, this result is consistent with UNDP (2020), which highlights that higher human development is associated with lower inequality. In the Indonesian context, studies by (Maorencia & Marwan, 2023; Yuliana & Rosyadi, 2025) and other regional analyses have shown that provinces with higher HDI tend to have more equitable income distribution. This suggests that investment in human capital is a key strategy for achieving inclusive economic development.

Economically, the HDI coefficient (-0.00245) implies that a one-point increase in the Human Development Index is associated with a reduction in the Gini Ratio by approximately 0.00245 points, holding other variables constant. Although the numerical magnitude appears relatively small, the cumulative effect at the provincial level may contribute substantially to long-term inequality reduction.

The results indicate that the Human Development Index (HDI) has a negative and statistically significant effect on income inequality in Indonesia. This finding suggests that improvements in human development contribute to reducing income disparities across regions. From a theoretical perspective, this result strongly supports Sen's capability approach, which emphasizes that expanding access to education, health, and income opportunities enhances individual capabilities and promotes more equitable economic participation (Sen, 1999).

Empirically, the findings are consistent with (UNDP, 2020), which highlights that higher levels of human development are generally associated with lower inequality. In the Indonesian context, studies by (Maorencia & Marwan, 2023) as well as (Yuliana & Rosyadi, 2025) also demonstrate that provinces with higher HDI tend to experience more equitable income distribution. These findings indicate that investment in human capital plays a crucial role in promoting inclusive economic development.

Economically, the HDI coefficient (-0.00245) implies that a one-point increase in the Human Development Index is associated with a reduction in the Gini Ratio by approximately 0.00245 points, holding other variables constant. Although the numerical magnitude appears relatively modest, the cumulative impact at the provincial level may contribute significantly to long-term inequality reduction. This finding further suggests that policies aimed at improving education quality, healthcare access, and income opportunities may be more effective in reducing inequality than growth-oriented strategies alone.

The Effect of Farmers' Terms of Trade on Income Inequality

The results indicate that Farmers' Terms of Trade (NTP) have a negative and statistically significant effect on income inequality in Indonesia. This finding suggests that improvements in farmers' welfare contribute to reducing income disparities, particularly in rural areas. From a theoretical perspective, rural development and agricultural income are important components of inclusive economic growth because they strengthen household purchasing power and improve welfare distribution across regions (Todaro et al., 2011).

Empirically, this result is consistent with (World Bank, 2020), which emphasizes that increases in agricultural productivity and farmer income can contribute significantly to poverty and inequality reduction. In the Indonesian context, studies by (Nugrahaning Widi, 2021; Oktaviani et al., 2021) also demonstrate that improvements in NTP are associated with better rural welfare and more equitable income distribution. Considering that a substantial proportion of Indonesia's population depends on the agricultural sector, strengthening rural economic welfare remains an important strategy for narrowing income disparities.

Economically, the NTP coefficient (-0.00022) indicates that improvements in farmers' purchasing power contribute gradually to reducing inequality. Although the numerical effect appears relatively small, the cumulative impact may become substantial due to the large rural population and the important role of agriculture in regional economies. This finding suggests that strengthening agricultural welfare may generate broader distributional effects over time.

Overall, the findings demonstrate that human development and agricultural welfare are more influential in reducing income inequality than conventional macroeconomic indicators such as exports and unemployment. This indicates that inequality in Indonesia is shaped more strongly by structural capability factors and welfare distribution mechanisms than by economic growth performance alone.

These results also highlight the importance of adopting an inclusive development approach in which policies focus not only on economic expansion, but also on improving education, healthcare access, and rural economic opportunities. In this context, strengthening human capital and agricultural welfare may provide a more sustainable pathway toward equitable development.

The main theoretical contribution of this study lies in demonstrating that income inequality in Indonesia is influenced more strongly by capability-based development and sectoral welfare dynamics than by aggregate macroeconomic indicators. While exports and unemployment reflect overall economic performance and labor market conditions, the findings reveal that human development and rural welfare play a more substantial role in shaping income distribution. This suggests that inequality in developing economies should

not be understood solely as the outcome of economic growth disparities, but also as the result of unequal capability formation and sectoral welfare distribution.

Furthermore, these findings extend the capability approach and inclusive development perspective by emphasizing that improvements in education, health, and agricultural welfare are more effective in reducing inequality than growth-oriented policies alone. The inclusion of Farmers' Terms of Trade also contributes to the inequality literature by highlighting agricultural welfare as an important structural mechanism for promoting equitable development in emerging economies.

CONCLUSIONS AND RECOMMENDATIONS

This study examines the effects of exports, unemployment rate, human development, and farmers' terms of trade on income inequality in Indonesia using panel data from 33 provinces during 2019–2025. The findings show that Human Development Index (HDI) and Farmers' Terms of Trade (NTP) have significant negative effects on income inequality, while exports and unemployment rate do not show significant effects. These results indicate that inequality reduction in Indonesia is influenced more strongly by human capability development and rural welfare improvement than by macroeconomic growth indicators alone.

The main theoretical contribution of this study lies in positioning income inequality as a structural outcome shaped by capability-based development and sectoral welfare dynamics. The findings extend the capability approach and inclusive development perspective by demonstrating that improvements in education, health, and agricultural welfare play a more substantial role in reducing inequality than aggregate economic performance indicators. Furthermore, the inclusion of Farmers' Terms of Trade contributes to the inequality literature by emphasizing the importance of rural welfare in promoting inclusive economic development in emerging economies.

Practically, the findings imply that government policies aimed at reducing inequality should prioritize investment in human development and strengthen the agricultural sector. Expanding access to education, healthcare, and rural economic opportunities may contribute more effectively to equitable income distribution than growth-oriented policies alone.

This study has several limitations. First, the analysis is limited to provincial panel data and may not fully capture micro-level household inequality dynamics. Second, the study period is relatively short and may not reflect long-term structural changes. Third, potential endogeneity and autocorrelation issues may still exist despite the use of the Fixed Effect Model. Future research is therefore encouraged to apply longer observation periods, dynamic panel approaches, spatial econometric models, or household-level data to obtain a deeper understanding of inequality determinants in developing economies.

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