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ASSESSING THRESHOLD LEVELS OF INCOME INQUALITY AND HUMAN DEVELOPMENT QUALITY ON ECONOMIC GROWTH IN INDONESIA

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ABSTRACT

This study attempts to assess threshold levels of income inequality and human development quality on economic growth for 34 provinces in Indonesia during 2022-2023. The cross-section threshold regression was employed. The findings reveal that the threshold levels of income inequality in 2022 and 2023 were 0.319 and 0.345, respectively. At the same time, the threshold levels of human development index were 71.65 and 71.25, respectively. The condition posits that the quality of income distribution and human development will be marginally lower in 2023 than in 2022. By considering Global OLS, total labor force and unemployment rate deliver a significant and negative impact on economic growth at 10% level in 2022. Interestingly, FDI provides a positive impact at 10% (income inequality) and 1% (human development) levels. Therefore, the central and local governments are challenged to design economic development under inclusive and sustainable perspectives. Their policies can improve the quality of labor (educated, skilled labors, and productive) and increase the equality of economic activities for all provinces. Besides, those governments should lead all economic agents to obtain and guarantee the quality of human development in the long-run.

Keywords : *Income Inequality, Human Development, Threshold Level, Economic Growth.*

ABSTRAK

Studi ini berupaya menilai ambang batas ketimpangan pendapatan dan kualitas pembangunan manusia terhadap pertumbuhan ekonomi di 34 provinsi di Indonesia selama periode 2022–2023. Metode cross-section threshold regression digunakan dalam analisis ini. Temuan penelitian menunjukkan bahwa ambang batas ketimpangan pendapatan pada tahun 2022 dan 2023 masing-masing sebesar 0,319 dan 0,345. Pada saat yang sama, ambang batas indeks pembangunan manusia (IPM) masing-masing tercatat sebesar 71,65 dan 71,25. Kondisi ini menunjukkan bahwa kualitas distribusi pendapatan dan pembangunan manusia pada tahun 2023 sedikit lebih rendah dibandingkan dengan tahun 2022. Dengan mempertimbangkan Global OLS, total angkatan kerja dan tingkat pengangguran memberikan pengaruh yang signifikan dan negatif terhadap pertumbuhan ekonomi pada taraf 10% di tahun 2022. Menariknya, Penanaman Modal Asing memberikan dampak positif pada taraf 10% (untuk ketimpangan pendapatan) dan 1% (untuk pembangunan manusia). Oleh karena itu, pemerintah pusat dan daerah ditantang untuk merancang pembangunan ekonomi dengan perspektif yang inklusif dan berkelanjutan. Kebijakan mereka dapat meningkatkan kualitas tenaga kerja (terdidik, terampil, dan produktif) serta mendorong pemerataan aktivitas ekonomi di seluruh provinsi. Selain itu, pemerintah juga perlu memimpin seluruh pelaku ekonomi untuk mencapai dan menjamin kualitas pembangunan manusia dalam jangka panjang.

Kata kunci: *Ketimpangan Pendapatan, Pembangunan Manusia, Tingkat Ambang, Pertumbuhan Ekonomi*

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INTRODUCTION

The equitable development, income equality and quality of human development have been subjects of both literature and economic policy, with particular pertinence to developing countries. Consequently, the Indonesian Government has promptly initiated the formulation of the National Long-Term Development Plan (RPJPN) 2025-2045. This development plan is a comprehensive framework for how Indonesia views 100 years of independence and is the forerunner of Golden Indonesia (glory as a developed country). Achieving this goal is predicated on significant improvements in welfare, steady income equality, and superior quality of human development. This study, therefore, aims to determine the implications of income inequality and quality of human development on economic growth at the provincial level in Indonesia in recent years. To this end, the study emphasises threshold levels on both economic variables.

The current issue of globalisation has been demonstrated to be a contributing factor to the exacerbation of income inequality within societies. The disparities in income and technological literacy between the affluent and the economically disadvantaged are pronounced. However, the extant literature acknowledges that the relationship between economic growth and income inequality is ambiguous (positive or negative) depending on the source of the growth. For instance, Alamanda (2021) identified a positive correlation between economic growth and inequality in 50 countries during the period 2000-2018. The increase in economic growth has consequences for the expansion of the level of income inequality in society. The impact of income inequality on economic growth is often intricate in 143 countries during 1980-2017 (Topuz, 2022). Income inequality exerts a detrimental effect on economic growth, yet it fosters saving behaviour in developed countries. Besides, Mdingi & Ho (2023) estimated the relationship between income inequality and economic growth in South Africa during 1989-2014. Their findings suggest that, in the short term, income inequality exerts no influence on economic growth; however, in the long term, it is associated with a negative impact.

Concurrently, the enhancement of human development has been identified as a catalyst for economic growth in numerous nations. As Bloom et al. (2020) elucidated, investment in human development engenders considerable scope for economic growth. An enhancement in the three components of human development (education, health, and reproduction) has

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been demonstrated to engender an increase in GDP per capita growth. Specifically, several Arab countries (Jordan, Egypt, Saudi Arabia, and Bahrain) have demonstrated a positive correlation between economic development and increasing human development (Omar, 2020). A significant relationship between human development and economic growth in Pakistan during the period 1980-2018 has also been pointed out (Taqi et al., 2021). The enhancement of human development quality engenders an augmentation in economic output. A similar phenomenon has been observed in Indonesia. Nainggolan et al. (2022) found that economic growth had significant implications for human development in 34 provinces in Indonesia during 2015-2019.

In particular, the previous studies ignored to examine the threshold levels of income inequality and human development on economic growth by considering Solow Growth Model. Romer (2019) emphasized that economic growth was determined by capital accumulation (investment) and labor. The contribution of income inequality and human development in the model provides a better understanding on the literature of economic growth. The threshold level is comparatively under-researched in the academic discourse on income inequality and human development in developing countries. Moreover, this study estimates threshold levels of income inequality and human development on economic growth for 34 provinces in Indonesia during the years 2022 and 2023. The temporal frame selected for this study is the post-COVID-19 pandemic. The provincial sample is limited to 34 provinces that provide sufficient economic data. The estimation method utilises cross-section threshold regression, as developed by Hansen (1999 & 2000).

The present study provides several contributions to the extant literature. First, the estimation of threshold levels of income inequality and human development on economic growth for provincial levels has been neglected in previous literature. The threshold level stimulates better evidence of the certain levels of income inequality and human development quality for groups of provinces both under and upper regimes. Consquently, the central dan provincial governments can pay more attention on the specific and proper macroeconomic policies to guarantee the quality of income distribution and human development. Second, it is critical to acknowledge that income inequality and the quality of human development remain pivotal concerns for policy makers in Indonesia,

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particularly in the context of the long-term development plan extending to 2045. Third, policy makers face the challenge of reducing income inequality and enhancing human development quality in the long term.

LITERATURE REVIEW

Stylized Facts

The Indonesian government has introduced a series of legislative measures aimed at promoting income equality, inclusive growth, and regional development. Key examples include Law No. 23/2014 on Regional Government and Law No. 6/2014 on Villages, which strengthen local autonomy, as well as Presidential Regulation No. 96/2015 on poverty alleviation. Additional initiatives include the empowerment of cooperatives and MSMEs through Government Regulation No. 7/2021, the establishment of Village-Owned Enterprises (PP No. 11/2021), and the National Strategy for Accelerating Development of Disadvantaged Regions (Presidential Regulation No. 105/2021). More recently, Government Regulation No. 20/2024 on Industrial Zoning was introduced to ensure balanced industrial development. Collectively, these policies demonstrate the government's integrated approach to reducing inequality and improving human development outcomes across provinces.

Furthermore, the enhancement of human development quality has been enshrined in numerous legislative acts and regulatory frameworks. These include Government Regulation No. 37/2021 on the Job Loss Guarantee Program, Presidential Regulation No. 113/2022 on the Pre-Employment Card Program, Presidential Regulation No. 59/2024 on Health Insurance, and Presidential Regulation No. 83/2024 on the National Nutrition Agency. Collectively, these policies reflect the government's integrated approach to reducing inequality and ensuring sustainable improvements in human development across provinces.

Income Distribution (Inequality) and Economic Growth

It is widely accepted amongst economic theorists that economic growth can be determined, at least in part, by capital and labour. Moreover, the possession of knowledge that has the capacity to stimulate productivity can also have implications for the formation of national output or economic growth. Conceptually, the determinants of national growth

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or output have been systematically and comprehensively elaborated by Romer (2019). One such economic growth model is the Solow Growth Model. However, this model can be further refined and expanded by referring to literature discussions on the significant contribution of income distribution (inequality) to economic growth.

The concept of income distribution as a factor in shaping economic growth was elaborated by de Carvalho & Gabriel (2023) on the basis of the work of Kaldor (1956, 1957) and Pasinetti (1962). The concept has also been introduced by Prebisch (1949), Furtado (1959) and Medina (1963). Furthermore, Kuznets (1955) mentioned five things in the analysis of income distribution (inequality), namely: income is recorded in the family expenditure unit category; income distribution is allocated to all units; units are separated based on income recipients; that income is interpreted as current national income; and economic units are grouped based on income levels.

Income distribution inequality constitutes a significant issue for economic policy (Tinbergen, 1956). Income distribution theory emphasises not only the scientific approach but also the policy design to formulate future income distribution. Scitovsky's (1964) seminal work identified four fundamental aspects of income distribution theory. Firstly, the level and change of income received in a particular job is considered. Secondly, the distribution and change of individual income distribution based on size is examined. Thirdly, the income distribution function among owners of production factors is analysed. Finally, the relative size and change of the relative size of various components of individual income is evaluated.

Bouincha & Karim (2018) observed that the relationship between economic growth and income inequality has been a subject of discussion in the literature since the 1970s, with reference to Kuznets Theory. Income inequality has been identified as a factor hindering the attainment of the Millennium Development Goals (MDGs) and the reduction of poverty rates. The researchers found that the correlation between the two economic variables was not significant for developing and middle-income countries during 1990-2015. Conversely, a negative impact was observed between the two variables in developed countries.

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Human Development Quality and Economic Growth

Romer's seminal work (2019) constitutes a systematic and comprehensive elaboration on the determinants of national growth or output. The Solow Growth Model is one theoretical framework that aims to explain the process of economic growth. However, this model can be further expanded by referring to literature discussing the significant contribution of human development quality on economic growth.

Suri et al. (2011) posited that human development is a component of economic growth in accordance with endogenous theory. The extant literature has described the relationship between human development and economic growth as being intrinsically related, interrelated changes, and two mutually reinforcing factors (Chiappero-Martinetti et al., 2015). In the 1970s, heterodox literature placed greater emphasis on the reduction of poverty, inequality, and unemployment as pivotal factors in economic development (Nayyar, 2023). Setyowati et al. (2024) suggests that economic growth does not have a significant impact on human development in Indonesia during the period 2015-2022. The study identified several economic variables that exert a detrimental effect on human development, namely unemployment and poverty. Furthermore, Soeparno & Pratomo (2023) observed that the positive correlation between economic growth and human development in Indonesia during 1990-2021 was sustained over an extended period.

RESEARCH METHODOLOGY

This study determines the variables that shape economic growth following the Solow Economic Growth Model and the Classical Economic Growth Theory. The Solow Economic Growth Model posits that economic growth is influenced by the accumulation of capital, labour, and technological progress. Conversely, the Classical Economic Growth Theory propounded by Adam Smith and David Ricardo places greater emphasis on population growth as a catalyst for economic development. The study thus identifies the primary variables that influence economic growth as the labor force level (LF), domestic investment (DI), foreign direct investment (FDI), and population. The extension of the fundamental theory of economic growth encompasses the level of income inequality and the quality of human development. Besides, the study determines the variables of wages and unemployment rates.

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The dependent variable in this study is the economic growth rate (EG) of each province, which is measured as the annual percentage change in regional gross domestic product (GDP). The independent variables include several key economic and demographic indicators. These consist of the labor force participation rate (LF), expressed as a percentage; domestic investment (DI), measured in billion Indonesian Rupiah (IDR); foreign direct investment (FDI), measured in million United States Dollars (USD); total population (POP) at the provincial level, measured in thousands of persons; average hourly wage (W), expressed in Indonesian Rupiah per hour; and the unemployment rate (UE), representing the percentage of the labor force that is unemployed. In addition, this study incorporates two threshold variables to examine potential non-linear effects: the Gini Index (GINI), which captures income inequality on a scale from 0 (perfect equality) to 1 (perfect inequality); and the Human Development Index (HDI), a composite indicator reflecting the quality of human development in terms of health, education, and income. All variables are observed across 34 provinces in Indonesia for the years 2022 and 2023.

This study estimates cross-section threshold levels of income distribution (inequality) on economic growth for 34 provinces in Indonesia in 2022 and 2023 following the Hansen (1999 & 2000) modelling standard. The empirical modelling considers the Solow Economic Growth Model, Classical Economic Growth Theory and previous empirical studies on the impact of income distribution (inequality) on economic growth, as follows:

$$EG_i = \alpha_0 + \beta_1 GINI_i + \beta_2 Z_i + \varepsilon_i \quad (1)$$

EG is economic growth, GINI equals Gini Ratio, while Z denotes the economic variables by considering Solow Growth Model and Classical Economic Growth Theory (labor, investment, population, wage, and unemployment rate). The i presents number of provinces. The β explains parameter of independent variables, while ε illustrates error term. Furthermore, Equation (1) can be rewritten to construct cross-section threshold regression model as follows:

$$EG_i = (\beta_1 GINI_i + \lambda_1 Z_i) I(GINI_i \leq \gamma) + (\beta_2 GINI_i + \lambda_2 Z_i) I(GINI_i > \gamma) + \varepsilon_i \quad (2)$$

The γ is the unknown threshold parameter, while *I(.)* is an indicator function of low or high regime. Finally, ε denotes the error term. The threshold regression model is predicated on a series of assumptions. Firstly, it is important to note that threshold

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regression can be employed in the analysis of cross-sectional data, such as that pertaining to household behaviour (Hansen, 2000). Secondly, the threshold regression system considers two regime categories: low regime and high regime. Thirdly, threshold regression can be applied to both nonlinear and linear models. Equation (2) will be drawn in threshold form, resulting:

$$EG_i = \begin{cases} \beta_0^1 + \beta_1^1 GINI_i + \beta_2^1 Z_i + \varepsilon_i, & GINI_i \le \gamma \\ \beta_0^2 + \beta_1^2 GINI_i + \beta_2^2 Z_i + \varepsilon_i, & GINI_i > \gamma \end{cases} \quad (3)$$

$\beta^1{}_1$ denotes the parameter for provinces with low regime, while $\beta^2{}_1$ describes the parameter for provinces with high regime.

This study also investigates the cross-section threshold levels of human development index on economic growth for 34 provinces in Indonesia in 2022 and 2023 following the Hansen (1999 & 2000) modelling standard. The empirical modelling is as follows:

$$EG_i = \alpha_0 + \beta_1 HDI_i + \beta_2 Z_i + \varepsilon_i \quad (4)$$

EG is economic growth, HDI equals Human Development Index, while Z denotes the economic variables by considering Solow Growth Model and Classical Economic Growth Theory (labor, investment, population, wage, and unemployment rate). The i presents number of provinces. The β explains parameter of independent variables, while ε illustrates error term. The Equation (4) can be rewritten to construct cross-section threshold regression model as follows:

$$EG_i = (\beta_1 HDI_i + \lambda_1 Z_i) I(HDI_i \le \gamma) + (\beta_2 HDI_i + \lambda_2 Z_i) I(HDI_i > \gamma) + \varepsilon_i \quad (5)$$

The γ is the unknown threshold parameter, while *I(.)* is an indicator function of low or high regime. Finally, ε denotes the error term.

Equation (5) will be drawn in threshold form, resulting:

$$EG_i = \begin{cases} \beta_0^1 + \beta_1^1 HDI_i + \beta_2^1 Z_i + \varepsilon_i, & HDI_i \le \gamma \\ \beta_0^2 + \beta_1^2 HDI_i + \beta_2^2 Z_i + \varepsilon_i, & HDI_i > \gamma \end{cases} \quad (6)$$

$\beta^1{}_1$ denotes the parameter for provinces with low regime, while $\beta^2{}_1$ describes the parameter for provinces with high regime

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RESULTS AND DISCUSSION

Descriptive Analysis

Table 1 delineates the research variables that exert an influence on economic growth for 34 provinces in Indonesia in 2022 and 2023, with a particular emphasis on threshold levels of income inequality and human development quality. In 2022, the average economic growth of provinces in Indonesia was 5.76%, which exhibited a downward trend in 2023 to 5.40%. The range of economic growth levels is notably wide, with the highest and lowest levels reaching 18% and 20%, respectively. The average labor force (LF) exhibited a modest increase in 2023 (69.34%) compared to 2022 (68.64%). This increase was accompanied by an increase in both domestic investment (DI) and foreign direct investment (FDI). The average population (pop) also increased from 7.9 million to 8.1 million. The Gini coefficient, a measure of economic inequality, remained relatively stable at an average of 0.34. A marginal rise was also observed in the human development index (HDI), with an increase from 73.13 (2022) to 73.77 (2023). A similar rise was observed in the average hourly wage of workers (w), which increased from IDR 17,901 (2022) to IDR 19,662. Conversely, the average unemployment rate experienced a slight decrease from 4.97% (2022) to 4.61% (2023).

Table 1. Descriptive Statistics

Variables	Mean		St Dev		Min		Max	
	2022	2023	2022	2023	2022	2023	2022	2023
EG (%)	5.76	5.40	3.71	3.03	2.01	1.80	22.94	20.49
LF (%)	68.64	69.34	3.64	3.60	63.08	63.60	77.75	77.2
DI (Billion IDR)	16,258	19,779	22,572	24,755	611	1,174	89,224	95,202.1
FDI (Million USD)	1,341	1,445	1,879	2,182	28	8	7,486	8,283.7
POP (Thousand Person)	7,971	8,197	11,510	11,604	720	730	49,307	49,860.3
Gini (Index/rasio)	0.34	0.34	0.05	0.05	0.24	0.24	0.44	0.435
HDI (index)	73.13	73.77	3.80	3.76	62.16	63.01	82.77	83.55
W (IDR Per hour)	17,901	19,662	4,181	5,664	11,734	12,933	32,685	42,354
UE (%)	4.97	4.61	1.60	1.42	2.34	2.27	8.31	7.52

Note: eg = *economic growth rate, lf = total labor force, di = domestic investment, fdi = foreign direct investment, pop = total population, gini = Gini Ratio, hdi = human development index, w = wage, and ue = unemployment rate*

Figure 1 provides a visual representation of the economic growth, Gini ratio, and human development index for 34 provinces in Indonesia in 2022. During the period, the highest and lowest levels of economic growth were observed in North Maluku Province at 22.94%

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and West Papua Province at 2.01%, respectively. The disparity in economic growth rates was 20.93%. The Gini ratio, a measure of economic inequality, exhibited similar trends, with the highest and lowest ratios recorded in D.I. Yogyakarta Province at 0.439 and Bangka Belitung Islands Province at 0.239, respectively. Concurrently, the highest and lowest human development indices (HDI) were recorded in D.I. Jakarta Province at 82.77 and Papua Province at 62.16, respectively.

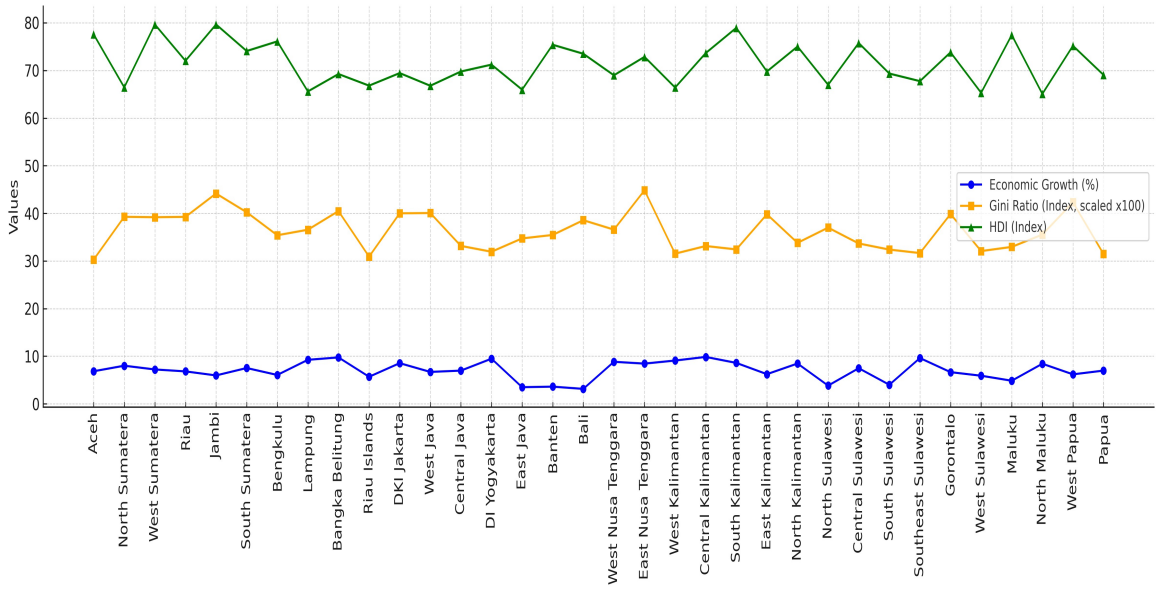

Figure 1. Economic Growth, Gini Ratio, and Human Development Index for 34 Provinces in Indonesia, 2022
(Source: Central Bureau of Statistics)

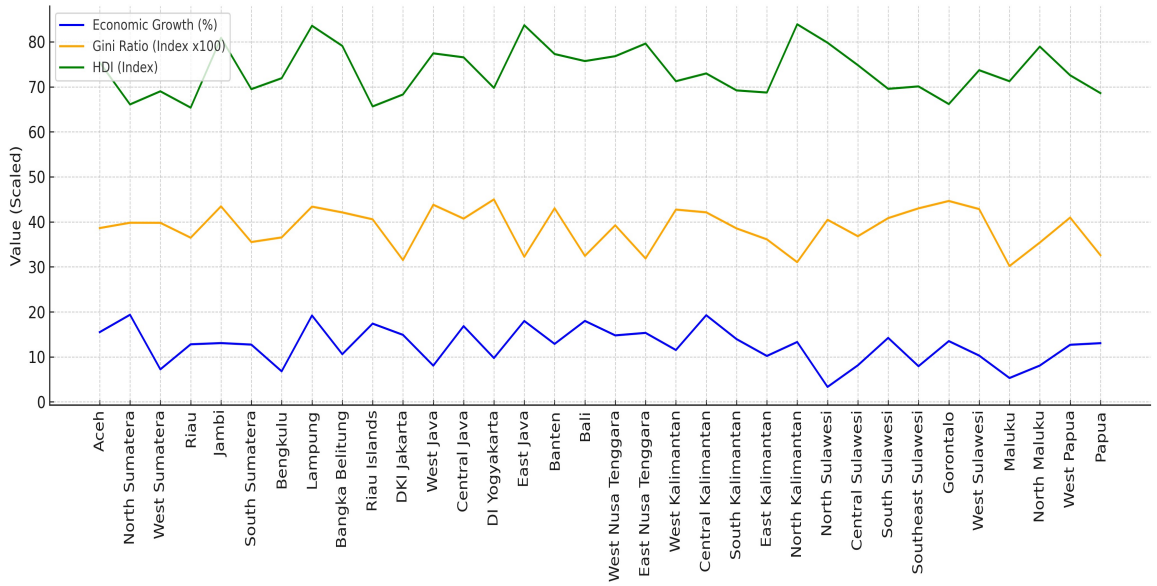

Figure 2. Economic Growth, Gini Ratio, and Human Development Index for 34 Provinces in Indonesia, 2023
(Source: Central Bureau of Statistics)

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In 2023, North Maluku Province attained an economic growth rate of 20.49% (see Figure 2). Conversely, West Nusa Tenggara Province attained an economic growth rate of 1.80%. The disparity in economic growth rates between the two provinces is striking, with a margin of 18.69%. Within the same period, the Special Region of Yogyakarta Province recorded the highest level of income inequality (Gini ratio) at 0.435. Conversely, the Bangka Belitung Islands Province exhibited the lowest Gini ratio of 0.244. Furthermore, the Special Region of Jakarta Province demonstrated the highest human development index (HDI) of 83.55, while Papua Province exhibited the lowest HDI of 63.01.

Threshold Levels of Income Distribution-Economic Growth Nexus

Equation (1) is estimated using cross-section threshold regression. The findings reveal that there are three classifications of cross-section threshold levels: Global OLS (estimation without constraint threshold level), Regime 1 (estimation under or equal threshold level), and Regime 2 (estimation above threshold level). The threshold level of income inequality on economic growth in 2022 is approximately 0.319. The average Gini ratio of 34 provinces is 0.34, which is higher than this threshold level. This situation gives the national and local governments more lucrative room to develop innovations for lowering the Gini ratio through labour absorption and boosting investment in a sustainable and inclusive way. A comprehensive account of the estimation results can be found in Table 2.

Table 2. Threshold Level of Income Inequality on Economic Growth in 2022

Variable	Global OLS	Regime 1 (q ≤ 0.319)	Regime 2 (q > 0.319)
Intercept	18.523*	76.318	0.399
	(1.659)	(1.334)	(0.071)
LF	-0.181*	-0.977	0.054
	(-1.199)	(-1.317)	(0.654)
DI	-0.001	0.001	-0.001
	(-0.333)	(0.510)	(-0.385)
FDI	0.002*	0.002**	0.018***
	(1.667)	(2.103)	(2.571)
POP	-0.001	-0.002	0.003
	(-0.410)	(-0.667)	(1.510)
W	0.002	-0.001	0.002*
	(0.111)	(-0.333)	(1.176)
UE	-0.528*	-0.697	-0.222
	(-1.731)	(-0.731)	(-0.798)
Threshold Estimate	0.319		
Confidence Interval	[0.319, 0.319]		
R-squared	0.7725	0.8174	0.1944

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Variable	Global OLS	Regime 1 (q ≤ 0.319)	Regime 2 (q > 0.319)
LM-test for no threshold	8.937		
Bootstrap P-Value	0.705		
Observations	34	14	20

Note: the t-statistics is presented in the parenthesis (). *, **, *** are 10%, 5%, and 1% level of significant, respectively

The labour force level (LF) has been shown to exert a substantial and negative influence on economic growth, as evidenced by Global OLS analysis at the 10% significance level. Stated differently, a barrier to bolstering the domestic economy is the calibre of the labour force. As a result, the personnel must be guided to become knowledgeable and effective. Conversely, foreign direct investment (FDI) has been observed to exert a significant and positive influence on economic growth, as evidenced by the findings of Global OLS (10% significance level), Regime 1 (5% significance level), and Regime 2 (1% significance level). This circumstance implies that the national economy's reliance on foreign direct investment (FDI) can be leveraged to support MSMEs' downstream operations to advance and expand internationally. The hourly wage level (w) has a significant and positive impact on economic growth according to Regime 2 at the 10% significance level. Raising pay for employees helps the country's economy grow. However, worker productivity and business competitiveness must also be taken into account while raising salaries. However, the unemployment rate (UE) has been found to exert a significant negative influence on economic growth, as evidenced by Global OLS at the 10% significance level. To lower the unemployment rate, the national and local governments must work together to use budgetary resources and coordinate programs.

A further finding of the study is the R-squared level for each type of cross-section threshold estimation. The global OLS model demonstrates an R-squared level of 0.7725, which corresponds to 77.25% of the total variation in the data. This value is applicable to all samples of 34 provinces in Indonesia. In contrast, Regime 1 exhibited an R-squared value of 0.8174, representing a substantial 81.74% of the total variation. Regime 2, on the other hand, demonstrated an R-squared value of 0.1944, equivalent to 19.44% of the total variation. The total sample size of 34 provinces (Global OLS) is distributed as follows: 14 provinces are classified under Regime 1, while 20 provinces are classified under Regime 2. The threshold level of income inequality on economic growth was also conducted for

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the period of 2023 (see Table 3). The threshold level of income inequality was determined to be 0.345, which is marginally higher than the threshold level observed in the previous period. This cutoff point is essentially the same as the average Gini ratio for Indonesia's 34 provinces. It is noteworthy that several economic variables have been identified as having significant consequences for economic growth based on Regime 1.

The findings indicate that the labour force level (LF) exerts a substantial and negative influence on economic growth, as evidenced by Regime 1 at a significance level of 1%. In addition, foreign direct investment (FDI) has been shown to have a significant and positive effect on economic growth based on Regime 1 and 2 at a significance level of 5%. Wages (w) have been found to have a significant and positive impact on economic growth, as evidenced by Global OLS and Regime 1, with a significance level of 10% and 5%, respectively. Therefore, by taking worker productivity and business competitiveness into account, the Central and Regional Governments can use FDI to support the development of MSMEs' downstream processes and create room for raising workers' pay.

The R-squared values of the three categories of cross-section threshold regression estimation are 0.8204 or 82.04% (Global OLS), 0.8399 or 83.99% (Regime 1), and 0.2999 or 29.99% (Regime 2). The number of samples for each estimation category is 34 provinces (Global OLS), distributed into 18 provinces (Regime 1), and 16 provinces (Regime 2).

Table 3. Threshold Level of Income Inequality on Economic Growth in 2023

Variable	Global OLS	Regime 1 (q ≤ 0.345)	Regime 2 (q > 0.345)
Intercept	3.952***	3.294***	4.999***
	(6.532)	(3.179)	(9.595)
LF	-0.002	-0.159***	-0.018
	(-0.105)	(-2.650)	(-0.110)
DI	-0.001	-0.001	-0.001
	(-0.513)	(-0.510)	(-0.333)
FDI	0.002	0.012**	0.015**
	(0.547)	(2.315)	(2.015)
POP	-0.001	0.002	0.001
	(-0.714)	(1.176)	(0.059)
W	0.003*	0.013**	0.002
	(1.875)	(2.307)	(0.013)
USE	-0.119	-0.154	-0.003

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Variable	Global OLS	Regime 1 (q ≤ 0.345)	Regime 2 (q > 0.345)
	(-0.286)	(-0.412)	(-0.017)
Threshold Estimate	0.345		
Confidence Interval	[0.316, 0.346]		
R-squared	0.8204	0.8399	0.2999
LM-test for no threshold	6.807		
Bootstrap P-Value	0.957		
Observations	34	18	16

Note: the t-statistics is presented in the parenthesis (). *, **, *** are 10%, 5%, and 1% level of significant, respectively.

Threshold Levels of Human Development Quality-Economic Growth Nexus

Equation (4) was estimated using cross-section threshold regression for the years 2022 and 2023. The findings in 2022 reveal that the threshold level of human development on economic growth is 71.65 (see Table 4). The average Human Development Index (HDI) for 34 provinces is 73.13, which is higher than this cutoff level. According to this scenario, the findings of threshold level estimation are typically undervalued. Stated differently, the government's HDI accomplishment is superior and at its highest level.

The labour force level (LF) has been shown to exert a significant negative influence on economic growth, as evidenced by Global OLS (10% significance level) and Regime 1 (10% significance level). In addition, foreign direct investment (FDI) has been found to have a significant and positive impact on economic growth based on Global OLS at a 1% significance level. Conversely, population (pop) has been found to have a significant and positive impact on economic growth based on Regime 1 at a 1% significance level. The impact of wages (w) on economic growth is found to be significant and positive based on Regime 2 at a 10% significance level. Finally, the unemployment rate (ue) has a significant and negative impact on economic growth based on Regime 1 (at a 1% significance level) and Regime 2 (at a 10% significance level).

The R-squared value for each category of cross-section threshold regression is 0.6638, representing 66.38% of the total variation (Global OLS); 0.8459, representing 84.59% (Regime 1); and 0.3393, representing 33.93% (Regime 2). In addition, the number of samples for each threshold level category is 34 provinces (Global OLS), distributed into 9 provinces (Regime 1), and 25 provinces (Regime 2).

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Table 4. Threshold Level of Human Development Index on Economic Growth in 2022

Variable	Global OLS	Regime1 (q<=71.65)	Regime2 (q>71.65)
Intercept	18.523*	172.974**	4.414**
	(1.659)	(2.133)	(2.379)
LF	-0.181*	-2.462**	-0.013
	(1.198)	(-2.173)	(-0.493)
DI	-0.001	-0.002	-0.001
	(-0.076)	(-0.143)	(-0.063)
FDI	0.003***	0.003	0.002
	(3.015)	(0.218)	(0.105)
POP	-0.001	0.005***	0.002
	(-0.083)	(2.508)	(0.154)
W	0.002	0.001	0.014*
	(0.105)	(0.053)	(1.750)
UE	-0.527*	-5.011***	-0.209*
	(-1.728)	(-2.582)	(-1.980)
Threshold Estimate	71.65		
Confidence Interval	[71.650, 71.790]		
R-squared	0.6638	0.8459	0.3393
LM-test for no threshold	12.281		
Bootstrap P-Value	0.213		
Observations	34	9	25

Note: the t-statistics is presented in the parenthesis (). *, **, *** are 10%, 5%, and 1% level of significant, respectively.

Table 5. Threshold Level of Human Development Index on Economic Growth in 2023

Variable	Global OLS	Regime1 (q<=71.25)	Regime2 (q>71.25)
Intercept	3.952	3.355	6.092
	(6.532)***	(5.667)***	(1.450)
LF	-0.002	0.019	-0.012
	(-0.103)	(1.727)*	(-0.018)
DI	-0.001	-0.001	-0.002
	(-0.077)	(-0.083)	(-0.012)
FDI	0.003	0.003	0.003
	(0.130)	(0.167)	(0.188)
POP	-0.002	-0.019	0.021
	(-0.125)	(-0.950)	(1.235)
W	0.015	0.002	0.014
	(1.250)	(0.117)	(1.556)
UE	-0.119	0.042	-0.133
	(-0.486)	(0.287)	(-0.586)
Threshold Estimate	71.25		
Confidence Interval	[70.980, 71.250]		
R-squared	0.9090	0.9756	0.6446

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Variable	Global OLS	Regime1 (q<=71.25)	Regime2 (q>71.25)
LM-test for no threshold	11.946		
Bootstrap P-Value	0.135		
Observations	34	9	25

Note: the t-statistics is presented in the parenthesis (). *, **, *** are 10%, 5%, and 1% level of significant, respectively.

Cross-section threshold regression of human development on economic growth in Indonesia is also applied in 2023. The threshold level is set at 71.25, as indicated in Table 5. At 73.77, the average HDI for 34 provinces is higher than this cutoff level. Stated otherwise, the estimation result at the threshold level is undervalued. Besides, the findings indicate that there is not much significant evidence of the impact of economic variables on economic growth in each threshold level estimation category. However, the labor force level (lf) has been found to have significant and positive consequences for economic growth based on Regime 1 at a significance level of 10%.

The R-squared value is 0.9090, representing 90.90% of the total variation (Global OLS); 0.9756, representing 97.56% of the total variation (Regime 1); and 0.6446, representing 64.46% of the total variation (Regime 2). Furthermore, the number of samples consists of 34 provinces (Global OLS), which are distributed into 9 provinces (Regime 1) and 25 provinces (Regime 2).

Discussion

This study was conducted in 2022 and 2023 to estimate the relationship between income inequality and economic growth in 34 provinces of Indonesia. It also examined the impact of human development quality on these economic outcomes. In principle, the establishment of this threshold level modelling has the potential to facilitate the development of the fundamental Solow Growth model. As Romer (2019) asserts, economic output is determined by capital and labour. In the context of labour discussions, the emphasis is not solely on the quantity of workers, but also on their productivity and the quality of their work, with the objective of facilitating an efficient and competitive production process.

The findings demonstrate that the impact of economic growth determinants in 2022 and 2023 across 34 provinces in Indonesia is subject to variation in terms of both magnitude and significance, owing to differing threshold levels of income inequality. Analogous

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findings were observed in the economic growth model that incorporated human development quality. It is interesting to note that the determinants of economic growth in 2022 tended to be more significant than those in 2023. This assertion is substantiated by substantial shifts in economic recovery in 2022, subsequent to the repercussions of the pandemic (2020-2021).

Kuznets (1955) concentrated on the role of income distribution in economic growth. Income distribution is typically found to be inequitable in developing countries in comparison to that observed in developed countries. This disparity in income distribution within developing countries is underpinned by the relatively modest value and growth of per capita income. Moreover, the economic growth rate in developing countries is relatively low or has not been adequate to improve people's welfare. Moreover, the extant literature refers to Kuznets' theory to elaborate on the relationship between income inequality and economic growth (Boincha & Karim, 2018). They found that there was no significant impact of income inequality on economic growth at the global level or in 189 developing countries during 1990-2015. Conversely, economic growth exhibited a negative and significant impact on income inequality.

The impact of income inequality on economic growth is an intricate and indirect phenomenon. A general consensus emerges from the findings on the relationship between these two economic variables in 143 countries during 1980-2017, indicating a negative impact of income inequality on economic growth (Topuz, 2022). Mdingi & Ho (2023) employed the ARDL bound test to estimate the impact of income inequality on economic growth in South Africa from 1989 to 2018. They reported that income inequality exerts a detrimental influence on long-term economic growth. Concurrently, the two variables exhibited no substantial impact in the short term. Besides, de Carvalho & Gabriel (2023) observed that enhanced income distribution is a catalyst for technological progress and economic growth. An increase in income in northern countries has been demonstrated to result in a decline in growth in southern countries.

As Bloom et al. (2020) emphasised, the contribution of human development to economic growth can be traced from the theory of economic growth models, taking into account the poverty trap. They noted that a one-child decrease in the fertility rate resulted in a two

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percentage point increase in annual per capita GDP growth within a five-year period, and a 0.5 percentage point increase over 35 years. Furthermore, it has been demonstrated that both life expectancy and educational attainment have a stimulatory effect on economic growth. In the Arab world, a significant relationship (reciprocal impact) has been demonstrated between human development and economic growth in Jordan, Egypt, the Kingdom of Saudi Arabia, and Bahrain (Omar, 2020). Specifically, Nainggolan et al. (2022) focused on the issue of inequality in economic development and the quality of human development in eastern and western Indonesia. They argued tha a close correlation between the quality of human development and economic growth in 34 provinces in Indonesia during the period 2015-2019

CONCLUSION

The pursuit of economic growth is not merely a quantitative objective that must be realised by the government. It is also imperative to prioritise the quality of this growth. The quality of economic growth can be traced from the achievement of income equality and the quality of human development. This study estimates the threshold levels of income inequality and human development on economic growth for 34 provinces in Indonesia in 2022 and 2023. The cross-section threshold regression was employed. The findings reveals that the threshold levels of income inequality in 2022 and 2023 were 0.319 and 0.345, respectively. Meanwhile, at the same year, the threshold levels of human development were 71.65 and 71.25, respectively. Furthermore, economic growth was determined by labor force, foreign direct investment and unemployment rate under Global OLS in 2022. Conversely, those variables were not significant impacts on economic growth in 2023. This condition means that the Solow Growth Model occurs in 2022 by considering a certain level of income inequality and human development index. The policy implications can be constructed in several ways. First, the governments (central and local) should pay more attention on the higher quality of income distribution by considering higher level of wage and number of labor force in formal sectors. Second, the quality of human development can be improved using the higher quality of education (skills/competencies) and productivity. Third, the foreign direct investment should be maximized to guarantee the significant contribution of domestic downstream industries, especially small and medium enterprises (SMEs).

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LIMITATION AND RECOMMENDATION

This study faces several limitations. First, this study sets two years to examine threshold levels of income inequality and human development quality on economic growth for 34 provinces in Indonesia after COVID-19 pandemic. Second, this study did not consider the endogeneity problem of cross-section threshold regression. Therefore, the further studies can pay more attention on the endogeneity problem of threshold regression. The further studies can also consider dynamic threshold regression. Besides, they can investigate the short-/long-run and dynamic impacts of income inequality and human development on economic growth for all provinces in Indonesia both under certainty and uncertainty times.

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