ASSESSING THE ROLE OF INEQUALITY AND HUMAN DEVELOPMENT INDICES IN REGIONAL ECONOMIC GROWTH: WEST JAVA

MENILAI PERAN KETIMPANGAN DAN INDEKS PEMBANGUNAN MANUSIA DALAM PERTUMBUHAN EKONOMI REGIONAL: STUDI KASUS PROVINSI JAWA BARAT, INDONESIA

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ABSTRACT

Research shows that inequality could hamper economic growth, while HDI improvement generally correlates positively with economic growth. West Java, one of the provinces with the largest population in Indonesia, faces unique challenges in the interplay of relationships between those factors. This study aims to measure the relationship between measurements of inequality and the various indices that serve as components of HDI on the one hand, as well as economic growth on the other hand, in all of the 27 municipalities (i.e., regencies and cities) of West Java Province. Using panel regression of cross-sectional and time series data, this study found that inequality and the life expectancy index both showed positive and significant relationships with economic growth. These findings might be related to increased investments by wealthier individuals and increased labor productivity due to a healthier workforce. Conversely, the education and income index were found to be non-significant, possibly due to qualitative disparities in education and mismatches with labor market needs, and also due to the limitations of expenditure-based measures in regions with substantial informal economic activities that are not fully captured in official data. These findings can guide targeted interventions to balance growth and equity in West Java.

Keywords: *Inequality, Human Development Index (HDI), Economic Growth, West Java, Data Panel Regression*

ABSTRAK

Penelitian menunjukkan bahwa ketimpangan dapat menghambat pertumbuhan ekonomi, sementara peningkatan Indeks Pembangunan Manusia (IPM) umumnya berkorelasi positif dengan pertumbuhan ekonomi. Jawa Barat, sebagai salah satu provinsi dengan populasi terbesar di Indonesia, menghadapi tantangan unik dalam interaksi antara faktor-faktor tersebut. Penelitian ini bertujuan untuk mengukur hubungan antara pengukuran ketimpangan dan berbagai indeks yang menjadi komponen IPM di satu sisi, serta pertumbuhan ekonomi di sisi lain, di seluruh 27 kabupaten dan kota di Provinsi Jawa Barat. Menggunakan regresi panel dari data cross-sectional dan time series, penelitian ini menemukan bahwa ketimpangan dan indeks harapan hidup keduanya memiliki hubungan positif dan signifikan dengan pertumbuhan ekonomi. Temuan ini mungkin terkait dengan meningkatnya investasi oleh individu berpenghasilan tinggi dan produktivitas tenaga kerja yang lebih baik karena kondisi kesehatan yang meningkat. Sebaliknya, indeks pendidikan dan pendapatan tidak menunjukkan signifikansi, kemungkinan disebabkan oleh perbedaan kualitas pendidikan dan ketidaksesuaian dengan kebutuhan pasar tenaga kerja, serta keterbatasan pengukuran berbasis pengeluaran di wilayah dengan aktivitas ekonomi informal yang tidak sepenuhnya tercatat dalam data resmi. Temuan ini dapat membimbing intervensi yang lebih tepat untuk menyeimbangkan pertumbuhan dan kesetaraan di Jawa Barat.

Kata kunci: Ketimpangan, Indeks Pembangunan Manusia (IPM), Pertumbuhan Ekonomi, Jawa Barat, Regresi Data Panel

INTRODUCTION

Inequality has long been a central topic in economic discussions, with significant implications for economic growth and social variables such as political conflict, education, health, and crime (Thorbecke & Charumilind, 2002). While some researchers argue that inequality hinders economic growth and suggest redistribution as a solution (Aghion et al., 1999; Mo, 2000; Zabala, 2019), others find no robust relationship or suggest that its impact varies depending on economic conditions (Barro, 2000; Forbes, 2000; Panizza, 2002). Barro (2000) and Shin (2012) propose that higher inequality can impede growth in poor countries but encourage it in wealthier ones, consistent with the Kuznets curve. Recent studies further emphasize that reducing wealth inequality is crucial for achieving sustainable and inclusive growth, as seen in France (Policardo & Sanchez Carrera, 2024), Brazil (Fonseca & Matray, 2024), and MENA countries (Chroufa & Chtourou, 2023). These findings align with Hussain et al. (2023), who argue that inequality hinders sustainable growth, particularly in developing economies dominated by informal and sharing economies. In Indonesia, income inequality measured by the Gini ratio varies significantly across regions, with the manufacturing and services sectors contributing to inequality while agriculture reduces it (Gordón & Resosudarmo, 2019). The Human Development Index (HDI) serves as a key indicator of prosperity and well-being, yet its improvement is often constrained by income inequality, as unequal access to health and education undermines productivity and economic opportunities (UNDP, 2020). Thus, addressing inequality requires holistic policies that promote equitable income distribution alongside economic growth to ensure broader access to opportunities and improve HDI outcomes.

West Java, as one of the provinces with the largest population in Indonesia, faces unique challenges in terms of economic development and welfare. According to BPS Jabar (2023), the HDI in West Java exhibits significant variations between regencies and cities, reflecting disparities in access to healthcare, education, and economic opportunities. Significant disparities in per capita GRDP exist across regions in West Java, ranging from IDR 19 million in Cianjur to IDR 116 million in Bandung (Bappeda, 2023). This highlights the economic divide between urban centers and rural areas, reflecting unequal access to resources and economic opportunities. **Figure 1.** illustrates the disparities in economic contributions and growth across regencies and cities in West Java. It highlights how urban areas, such as Bandung, contribute significantly more to regional GDP compared to rural regions, exacerbating economic inequality.

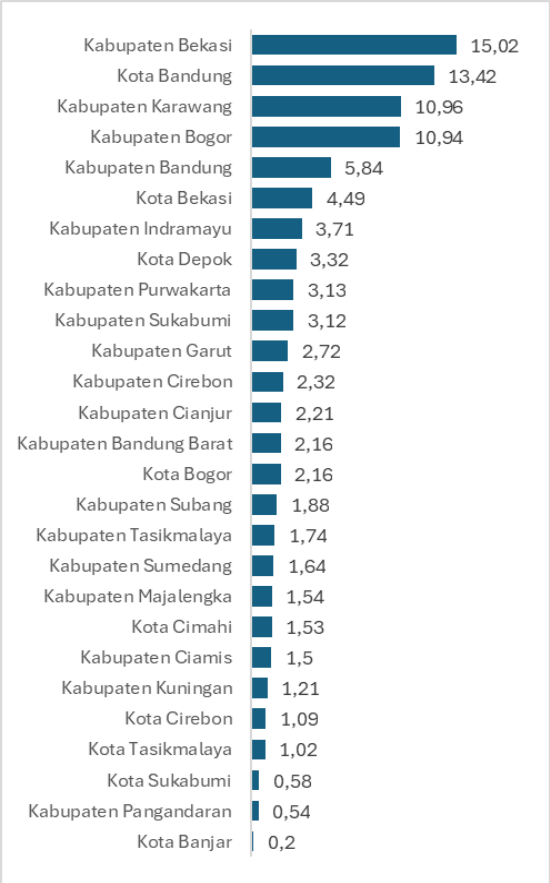

Figure 1. Contribution and Economic Growth in 2022

Source: Bappeda, 2023

These economic disparities are further reflected in the Gini coefficient, underscoring the need for targeted interventions to bridge the gap between urban and rural areas.The Gini coefficient also indicates inequalities that need to be addressed to achieve inclusive and sustainable economic growth. Research by Ramadhan (2024) shows that the Gini coefficient significantly influences HDI in West Java in 2022, with an impact of 56.6%, indicating a positive relationship between inequality and human development. Furthermore, studies by Risyadi (2018) reveal that Islamic finance, government expenditure, and the Gini coefficient significantly impact HDI and economic growth in Indonesia, with the greatest effects observed in West Java Province.

Despite efforts to improve HDI and reduce inequality, West Java still faces significant

challenges. High inequality can hinder economic growth, raising important questions: To what extent do HDI and the Gini coefficient affect regional economic growth? Understanding this interplay of relationships between the various factors discussed above is crucial for formulating more effective policies to promote inclusive and sustainable economic growth in West Java. Previous studies have explored the relationship between income inequality, HDI, and economic growth across countries and regions (Aghion et al., 2010; Barro, 2000; Forbes, 2000; Gordón & Resosudarmo, 2019; Policardo & Sanchez Carrera, 2024; Ramadhan, 2024; Risyadi, 2018). However, most studies focus on the direct relationship between one of these factors and economic growth, without considering the simultaneous interaction between inequality and HDI components in a single model. This simultaneous analysis is crucial as it provides a more holistic understanding of how inequality and human development jointly influence economic outcomes.

In addition, most previous studies use expenditure-based income indicators without highlighting their limitations in the context of regions with high informal activities. In the context of Indonesia, especially West Java, related studies are also still rare, even though this province has unique characteristics in the form of high inequality accompanied by significant economic growth in urban areas. Therefore, this study provides novelty by analyzing the simultaneous relationship between inequality, HDI, and economic growth using panel data for the period 2013–2023 in 27 municipalities (i.e., regencies and cities) in West Java. The finding of a positive relationship between inequality and economic growth is also an important contribution, offering a nuanced perspective that differs from the conventional consensus in developing countries. These insights could serve as a foundation for targeted policies to address inequality while sustaining economic growth.

LITERATURE REVIEW

A. Income Inequality

Income inequality is the uneven income distribution among individuals or groups. This inequality can be measured using various indicators and has significant social and economic welfare implications. One of the most famous theories of inequality is the Kuznets Curve, which posits that inequality initially increases with economic growth and then decreases after reaching a certain income level (Kuznet, 1955). However, this theory has been criticized and modified in recent literature.

Khatatbeh & Moosa (2023) introduced the Financial Kuznets Curve (FKC) concept, depicting a non-linear relationship between financialization and income inequality. They found that in some countries, this relationship takes an inverted U shape, while in others, it follows a regular U shape, depending on economic development and financial structure.

Income inequality is typically measured using several key indicators (Trapeznikova, 2019):

- Gini Coefficient: This is one of the most commonly used indicators to measure income inequality. The Gini coefficient ranges from 0 (perfect equality) to 1 (maximum inequality).
- Palma Ratio: Measures the income ratio between the top 10% of the population and the bottom 40%.
- Theil Index: Measures inequality by assessing entropy within income distribution.

Each indicator has its strengths and weaknesses, providing different perspectives on inequality. For instance, the Gini coefficient is sensitive to changes in the middle of the income distribution but less sensitive to changes at the tails. Baiardi & Morana (2016) found that the level of financial development also plays a crucial role in influencing inequality in Euro-area countries, highlighting the importance of financial development in creating more equitable income distribution.

Income inequality has various negative impacts on the economy and society:

- Reduced Economic Growth: High inequality can hinder economic growth by reducing aggregate demand and investment in human capital.
- Social Instability: High inequality is often associated with social and political instability, which can disrupt economic development.
- Health and Education: Income inequality can lead to unequal access to healthcare and education services, perpetuating the cycle of poverty.

Khatatbeh & Moosa (2023) emphasize that policies to balance financial and real sectors and improve access to credit for low-income households can help reduce inequality. Guo & Li (2024) found that regional inequality in educational development has decreased in

China, but significant differences still exist between urban and rural areas. This study illustrates how inequality can vary in different regional and national contexts, as well as the factors influencing it.

B. Human Development

Since 1990, human development has gained wide attention amongst economists, due to annual Human Development Reports (HDRs) published by the United Nations Development Programme (UNDP). As such, the Human Development Index (HDI) has become an important alternative to the traditional unidimensional measure of development, such as GDP (Sagar & Najam, 1998). This index is developed as a way to differentiate between the means and the ends of development. As Anand & Sen (1994) stated, it is the lives of human beings that are of intrinsic importance, not the commodities nor income that they happen to possess.

Sagar & Najam (1998) criticized the HDI for not accounting for ecological dimensions and failing to capture the essence of the world it seeks to portray. They proposed three modifications to improve this index:

- Multiplicative Index of Dimension: Using a multiplication method rather than arithmetic means to reflect the importance of each dimension as an essential and irreplaceable component.
- Logarithmic Approach in GNI Calculation: Using a logarithmic approach to depict income more realistically and reflect disparities among countries more accurately.
- Consideration of Inequality: Integrating inequality into the evaluation of each component dimension to provide a more comprehensive picture of human development performance.

Human development and economic growth are closely intertwined. Economic growth can provide the resources needed to enhance quality of life, while human development can create a more productive and innovative workforce that drives economic growth. However, Sagar & Najam (1998) emphasize that development focus should not only be on increasing income but also on fair and sustainable distribution of these resources.

C. Economic Growth

Economic growth refers to the increase in an economy's capacity to produce goods and services over time, typically measured through Gross Domestic Product (GDP) or Gross National Product (GNP). This growth reflects improvements in productivity, innovation, and the expansion of economic activities that ultimately enhance the standard of living for society.

The Solow growth model, introduced by Robert Solow in 1956, emphasizes the role of accumulation of physical capital, labor growth, and technological progress in driving economic growth. Mankiw et al. (1992) extended the Solow model by incorporating human capital accumulation alongside physical capital. They found that the modified Solow model provides a good description of international variations in living standards and indicates that poorer countries tend to grow faster than richer ones if population growth rates and capital accumulation are held constant.

In contrast, endogenous growth theory emphasizes internal factors within the economy that influence growth, such as government policies, innovation, and investments in education and research. One classical work forming the foundation of endogenous growth theory is the work by Mankiw et al. (1992). In this research, they demonstrated that the Solow model modified to include human capital accumulation alongside physical capital provides a better description of variations in living standards across countries. This theory argues that policies encouraging innovation and investment in human capital can generate sustainable economic growth.

Han & Wu (2024) examined the impact of policy reforms in China that removed market barriers between regions by merging counties into larger prefecture-level divisions. They found that these reforms had direct and sustained positive effects on the economic growth of the merged counties. This research highlights the importance of reducing interregional market barriers in promoting economic growth in developing countries.

D. Synergy between Inequality, Human Development, and Economic Growth

HDI serves as a pivotal metric reflecting a country's overall development through indicators of health, education, and standard of living. Investments in these areas are not only essential for societal well-being but also play a critical role in fostering economic growth. As

Mankiw et al. (1992) argue, "higher levels of human capital, as captured by HDI indicators like education and life expectancy, contribute significantly to increased labor productivity and innovation, thereby enhancing long-term economic growth prospects." Countries with higher HDI scores tend to exhibit more inclusive growth patterns where improvements in health and education positively influence economic output (Piribauer et al., 2023).

On the other hand, income inequality has major implications for the dynamics of economic growth. Although some argue that moderate levels of inequality can encourage productivity and entrepreneurship, a large body of empirical evidence suggests that high levels of inequality can hinder economic growth. According to Amos (1988), “extreme inequality can hinder the formation of human capital and social cohesion, thereby leading to underinvestment in education and health, which are essential for long-term economic development.” Moreover, as Shaban (2023) notes, “persistent income disparities can exacerbate social tensions and political instability, which in turn discourage investment and hinder overall economic growth prospects.” Countries experiencing high inequality often face challenges in achieving sustainable economic growth due to unequal distribution of resources and limited opportunities for social mobility (Williamson, 1965).

The literature review highlights the interconnected nature of income inequality, human development, and economic growth. Specifically, the hypothesis of this research is as follows.

- Regional economic growth correlates with and can be explained by inequality and the general state of public welfare indicated by the levels of public health, education, as well as wealth and consumption.
- Inequality, represented by the Gini index, correlates negatively in respect to economic growth.
- The Level of public health, represented by the life expectancy index, correlates positively in respect to economic growth.
- The Level of education, represented by the education index, correlates positively in respect to economic growth.
- The Level of wealth and consumption, represented by the income index, correlates positively in respect to economic growth.

DATA AND RESEARCH METHODS

As stated beforehand, this study aims to measure the relationship between measurements of inequality and the various indices that serve as components of HDI on one hand, as well as economic growth on the other hand, in all of the 27 municipalities (i.e., regencies and cities) of West Java Province. The welfare indicators used are the HDI and the Gini Ratio. This study uses a panel of cross-sectional and time series data, with the following indicators to represent each variable outlined in this study’s hypothesis: Gini ratio to represent inequality variable, life expectancy index to represent public health level variable, education index to represent public education level variable, and expenditure index to represent general per capita wealth and consumption variable, all of which serve as independent variables. Meanwhile, Economic Growth Rate (GR) is used to represent regional economic growth variable, which itself is the dependent variable.

The data used in this study are obtained from three main sources: (1) Data from the Central Bureau of Statistics (BPS) for the years 2010-2018; (2) Data from the 2024-2026 Regional Development Plan (RPD) of West Java Province, which includes government performance target’s achievements for the years 2018-2023; and (3) Data from the 2023 Regional Government Administration Report (LPPD) for each municipality in West Java Province. Based on the availability of data from sources above, the complete data panel covers the years 2013 through 2023. Exceptions of particular note on that matter include the absence of HDI indices for the Regency of Pangandaran, which has not existed prior to 2013, as well as the utilization of target numbers, instead of real numbers, for the 2023 Gini ratio data of six municipalities. The following table outlines the summary statistics of aforementioned variables, with ***lpe*** being GR, ***gini*** being Gini ratio, ***ind_kes*** being life expectancy index, ***ind_dik*** being education index, and ***ind_out*** being expenditure index.

Table 1. Descriptive Statistics of The Variables Used in The Regression Model

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lpe	377	.049	.021	-.038	.098
gini	375	.358	.046	.23	.49
ind kes	375	.797	.025	.731	.858
ind dik	375	.616	.074	.455	.781
ind out	375	.699	.066	.553	.885

The descriptive statistics of the variables used in this study are summarized in **Table 1**. This

study uses panel data from 27 municipalities in West Java for the period 2010–2023. While most of the data are complete across the time period, some variables, such as HDI indices for Pangandaran Regency, are missing for the years before 2013. Consequently, this study utilizes an unbalanced panel approach to accommodate the available data while maximizing the coverage of observations. The unbalanced panel is managed using statistical techniques that adjust for missing values without introducing bias in the results (Baltagi, 2005).

Regarding the choice of the static panel data model, this study opts for a two-way fixed effects model rather than a dynamic panel data approach (e.g., Generalized Method of Moments or GMM). While dynamic panel data is suitable for exploring the influence of past economic growth on current growth, the primary objective of this study is to examine the contemporaneous relationships between inequality, HDI components, and economic growth. Furthermore, the relatively short time span and limited observations for certain variables pose challenges for robust dynamic modeling. The fixed effects model is deemed appropriate to control for both time-invariant regional characteristics and time-specific factors, providing reliable insights into the simultaneous interaction between the variables. For the research method itself, this study uses panel data regression to analyze the relationship between dependent and independent variables. The choice of using panel data regression is based on the efficacy of said method compared to a simple regression. Using both cross-sectional and time-series data provides the analysis with more information and variability, which leads to an increase in estimates' reliability (Hsiao, 2007). Furthermore, panel data regression allows for the control of unobserved heterogeneity, both that are time-invariant (i.e., characteristics unique to an entity that do not change over time) and time-specific (i.e., change experienced similarly across all entities over a given period of time). This helps to avoid bias in the estimation of coefficients that could result from omitted variable bias (Arellano, 2003; Baltagi, 2005).

Thus, owing to prior discussion, the initial regression model that is used in this study is the two-way fixed effects model, since it takes into account both time-invariant and time-specific characteristics. Furthermore, this study uses a 95% degree of confidence. The mathematical equation model that is used for the regression is assumed to be as follows.

$$lpe_{it} = \alpha + \beta_1 gini_{it} + \beta_2 ind\_kes_{it} + \beta_3 ind\_dik_{it} + \beta_4 ind\_out_{it} + \epsilon_{it}$$

Notes:

α : Intercept

i : Area–i

t : Year–t

lpe : Economic growth rate

$gini$: Gini index

ind_kes : Life expectancy index

ind_dik : Education index

ind_out : Income index

ϵ : Error term representing unincorporated factors in the equation

The regression model presented above is designed to examine the relationship between economic growth (***lpe***) and its determinants, namely inequality (***gini***), life expectancy (***ind_kes***), education (***ind_dik***), and income (***ind_out***). This model employs a two-way fixed effects panel regression approach to account for both cross-sectional and temporal variations.

The choice of this method is driven by its ability to control for unobserved heterogeneity. Specifically, the fixed effects model allows for controlling time-invariant characteristics unique to each regency/city (e.g., geographical advantages, cultural factors) and time-specific factors that may affect all municipalities simultaneously (e.g., national policies or macroeconomic shocks). This minimizes the risk of omitted variable bias, ensuring that the estimates accurately capture the relationships of interest (Baltagi, 2005; Hsiao, 2007).

While dynamic panel data methods such as GMM could have been used to explore the impact of past economic growth on current growth, the relatively short time span of the dataset and missing data for certain variables posed challenges for robust dynamic modeling. Furthermore, the primary aim of this study is to investigate contemporaneous relationships rather than causality over time.

This model differs from previous research in its focus on simultaneous interactions between inequality and HDI components in a single framework. Most prior studies have either analyzed these factors independently or used static indicators without considering variations across time and space. By incorporating panel data regression, this study provides a more

comprehensive view of regional economic dynamics in West Java, particularly in the context of municipalities with high levels of economic heterogeneity.

Despite its strengths, the fixed effects approach is not without limitations. For instance, it does not account for potential endogeneity between the explanatory variables and the dependent variable. However, the inclusion of time-specific and regional fixed effects helps to mitigate potential bias arising from omitted variables. Future research could address this limitation by integrating instrumental variables or dynamic panel data methods to explore causal relationships more deeply. Nonetheless, the fixed effects model remains well-suited for the objectives and constraints of this study.

RESULTS AND DISCUSSION

While a specific model and equation have been assumed and subsequently used in this study's panel data regression, several steps are necessary in order to validate the use of said model and equation. The first step is to identify potential multicollinearity issues, which could be conducted using a selection of different methods. The following table illustrates the correlation coefficient matrix for the variables used in the assumed model.

Table 2. Correlation coefficient matrix for the variables used in the regression model

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) lpe	1.000				
(2) gini	0.129*	1.000			
	(0.012)				
(3) ind_kes	0.034	0.438*	1.000		
	(0.513)	(0.000)			
(4) ind_dik	0.052	0.646*	0.743*	1.000	
	(0.318)	(0.000)	(0.000)		
(5) ind_out	0.049	0.512*	0.785*	0.777*	1.000
	(0.348)	(0.000)	(0.000)	(0.000)	

** p<0.05*

Table 2 shows that there are some variables with a relatively high correlation coefficient, namely *ind_dik* (correlates highly with *ind_kes* by 0.743 points) and *ind_out* (correlates highly with both *ind_kes* and *ind_dik* by 0.785 and 0.777 points, respectively). Dormann et al. (2013) stated that generally, a correlation coefficient above 0.7 is seen as an indication of potential multicollinearity issues, and as such further examination is strongly advised. Therefore, the results displayed in **Table 2** warrant further examination in order to properly account for said issues. This examination is done using the Variance Inflation Factor (VIF) indicator, with results displayed in the following table.

Table 3. VIF for The Variables Used in The Regression Model

Variance inflation factor

	VIF	1/VIF
ind dik	3.644	.274
ind out	3.344	.299
ind kes	2.981	.335
gini	1.736	.576
Mean VIF	2.926	.

General consensus states that if a particular variable's VIF value is greater than 10, that variable in particular is indicated to have a high multicollinearity with other variables. O'Brien (2007) further argued that a VIF value between 5 and 10 could also indicate a multicollinearity issue, albeit to a more moderate degree. **Table 3** shows that none of the dependent variables have a VIF value greater than 5, which implies that there are no significant concerns about multicollinearity issues. Therefore, all of the variables included in the equation can still be used in the regression model.

With the issue of potential multicollinearity settled, the second step is to investigate the validity of the assumed model itself. As stated in the previous section, this study uses a two-way fixed effects model for its panel data regression. However, since there exists another model of panel data regression in the form of a random effects model, a comparison is needed to decide which model provides better estimation results. This is achieved by running a Hausman test, with results displayed in the following table.

Table 4. Hausman test result

Hausman (1978) specification test

	Coef.
Chi-square test value	64.425
P-value	0.000

Table 4 shows that the Hausman test yields a p-value of 0.000, which is less than the threshold of null hypothesis acceptance used in this study. Such a result (i.e., the p-value of 0.000 < 0.05) indicates that the null hypothesis is rejected, which in this case, stipulates that the fixed effect model should be preferred over the random effect model. While this generally validates the assumed model—in this case a two-way fixed effects model—to be the most preferable compared to its counterpart, this study also conducts an additional test to validate the significance of time-fixed effect, which until now exists solely on the basis of theoretical considerations—and therefore, is an

assumption. The result for the aforementioned test is as follows.

```
( 1)  2011.tahun = 0
( 2)  2012.tahun = 0
( 3)  2013.tahun = 0
( 4)  2014.tahun = 0
( 5)  2015.tahun = 0
( 6)  2016.tahun = 0
( 7)  2017.tahun = 0
( 8)  2018.tahun = 0
( 9)  2019.tahun = 0
(10)  2020.tahun = 0
(11)  2021.tahun = 0
(12)  2022.tahun = 0
(13)  2023.tahun = 0
       F( 13,   331) =  128.43
            Prob > F =    0.0000
```

Figure 2. Parameter test for the time-fixed variable used in the regression model

The p-value yield (0.0000) from this test is less than the threshold of $p < 0.05$, which indicates that the variable tested—*tahun*, the years of a particular observation in time—is significant. Consequently, the theoretical justifications for using a two-way fixed effects model panel data regression have been validated through both the Hausman test—comparing it with a random effects model—and the parameter test—ensuring the significance of a time-fixed variable. Furthermore, the equation that is used for the panel data regression has also been validated through the correlation coefficient matrix and VIF value test. The result for panel data regression using the two-way fixed effects model and the previously outlined equation is shown in the following table.

Table 5. Panel Data Regression Result

Regression results

lpe	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]
gini	.058***	.018	3.22	.001	.022	.093
ind_kes	.98***	.163	6.02	0	.66	1.301
ind_dik	-.059	.061	-0.97	.333	-.179	.061
ind_out	.144*	.078	1.84	.066	-.01	.297
2011	-.002	.003	-0.82	.411	-.007	.003
2012	-.003	.003	-0.85	.397	-.009	.004
2013	-.002	.004	-0.65	.516	-.01	.005
2014	-.003	.004	-0.71	.477	-.011	.005
2015	-.011**	.005	-2.15	.032	-.02	-.001
2016	-.007	.006	-1.27	.205	-.018	.004
2017	-.011*	.006	-1.79	.075	-.023	.001
2018	-.015**	.007	-2.11	.035	-.029	-.001
2019	-.02**	.008	-2.47	.014	-.035	-.004
2020	-.091***	.008	-11.36	0	-.107	-.075
2021	-.046***	.008	-5.40	0	-.063	-.029
2022	-.035***	.009	-3.74	0	-.054	-.017
2023	-.039***	.01	-3.74	0	-.059	-.018
Constant	-.797***	.142	-5.62	0	-1.076	-.518

Mean dependent var	0.049	SD dependent var	0.021
R-squared	0.852	Number of obs	375
F-test	112.525	Prob > F	0.000
Akaike crit. (AIC)	-2550.390	Bayesian crit. (BIC)	-2479.705

*** *p<.01*, ** *p<.05*, * *p<.1*

From **Table 5** above, it is known that the regression model that is used in the analysis is statistically significant—shown by the Prob>F value in respect to the DoC used in this study. This indicates that the hypothesis posited by this study is proven, in that there exists a correlation between economic GR and the general state of welfare—represented by HDI indices and Gini ratios—in a given region. Furthermore, the regression model yields an R-squared value of 0.852, which indicates that the model is able to explain 85.2% of the variance in the dependent variable by means of the independent variables. In the context of a two-way fixed effects model, the R-squared value reflects the explanatory power of the model within individual entities (i.e., within each of the 27 municipalities of West Java Province).

As to how exactly each independent variable correlates with the dependent variable, the Coef. column in **Table 5** shows the change in economic GR in response to the change of a single unit in the corresponding independent variable. The result shows that among the four independent variables used in the regression model, Gini (*gini*) and life expectancy indices (*ind_kes*) significantly affect economic GR (*lpe*), whereas education (*ind_dik*) and expenditure indices (*ind_out*) do not. Further discussion regarding the interpretation of the regression result is as follows.

1) **Inequality has a positive and significant effect on economic GR in a given municipality**. An increase of 1 unit in Gini index would result in an increase of 0.058 units in economic GR. While the exact effects of inequality on economic growth are highly debated, this study's finding seems to align with some of the other studies' findings, such as Forbes (2000), Herzer & Vollmer (2012), and Fonseca & Matray (2024). Forbes argued that higher inequality is associated with faster economic growth in the short and medium term, while Herzer & Vollmer (2012) added that the positive effects could also be present in the long run. Fonseca & Matray, as cited in the introduction section of this study, found that financial inclusion boosts entrepreneurship, employment, and wage growth but also increases inequality, particularly in areas with a low supply of skilled workers.

   Considering that many previous studies found that positive correlation between inequality and economic growth is generally seen in more economically developed and affluent countries, this study's finding might come across as

slightly unexpected. However, several explanations might support the correlation between the two variables found in the municipalities of West Java Province. Herzer & Vollmer (2012) posited that affluent individuals and businesses may have more resources to invest in economies with higher inequality, thus driving economic growth. Moreover, the concentration of wealth can lead to various economic benefits and advantages in a multitude of different contexts, such as in the context of efficient allocation of resources (Voitchovsky, 2014). The previous arguments might also resonate in some ways with what Castelló-Climent (2010) argued, that inequality spurs economic growth by creating diverse market segments. The presence of high-income groups can lead to demand for luxury goods and services, stimulating different sectors of the economy.

In the specific context of West Java Province, geographical and economic characteristics of its municipalities seem to align with the explanations laid out above. In West Java, economic activity is concentrated in urban areas, particularly in municipalities with a close proximity to major economic hubs like the national capital, Jakarta, and provincial capital, Bandung. Significant economic activity is also concentrated in the northwestern part of the province that has a developed industry sector. This implies that while some municipalities—that is, those that fall into those general classification—enjoy high economic output and growth, others might not enjoy the same level of economic development, thus creating a situation where inequality can thrive. As inequality is generally seen as undesirable, this study's finding of positive correlation between it and economic growth highlights a significant challenge faced by relevant authorities to balance the two variables.

The positive effects of inequality and life expectancy on economic growth identified in this study appear to be contemporaneous, as the data used covers a period of only 10 years. While some studies suggest that inequality can have both short-term and long-term positive effects on growth, the short time frame and the focus on contemporaneous relationships in this study prevent us from making strong conclusions about the long-term effects. Further research with longer time periods and a dynamic panel approach could shed light on whether these effects hold in the long term.

2) **Life expectancy index has a positive and significant effect on economic GR in a given municipality.** An increase of 1 unit in the life expectancy index would result in an increase of 0.98 units in economic GR. This positive effect can be attributed to significant improvements in human capital development, enhanced stability, and investment climate. Improved life expectancy is closely linked to better overall health, which enhances worker productivity. A healthier population can work more efficiently, thus directly contributing to higher economic output. As Aghion et al. (2010) pointed out, the relationship between health and growth highlights the critical role that longevity plays in fostering economic development by boosting labor productivity and encouraging investments in skill development as well as other economic activities in general.

   Higher life expectancy also often correlates with greater social and political stability, which is crucial for creating a conducive environment for economic activities and long-term investments. Stable regions attract both domestic and foreign investors by reducing risks associated with political and social unrest. Acemoglu & Johnson (2007) highlighted how increased life expectancy can lead to sustained economic growth through improved governance and reduced volatility. This stability fosters a favorable investment climate, allowing resources to be allocated more efficiently and driving economic expansion.

3) **Education Index has a negative yet insignificant effect on economic GR in a given municipality.** The education index, which in essence encompasses metrics such as enrollment ratios and attainment levels, is generally seen as a critical indicator of human capital development within a region. Considering that it is widely accepted that education index *should* have a positive effect towards economic GR, the negative effect found in this study could be the result of other controlling factors that are not taken into account in the regression model and equation.

   The following arguments might imply the existence of such unaccounted factors.

First, the education index used in this study focuses on quantitative measures like enrollment rates and years of schooling, which may not fully capture the qualitative aspects crucial for fostering economic development. Education systems often prioritize basic educational outcomes without sufficiently developing higher-order skills such as critical thinking, problem-solving, and technical expertise. According to Hanushek & Woessmann (2012), these advanced skills are essential for individuals to significantly contribute to sustained economic growth. Moreover, there is often a significant mismatch between the skills acquired through education and the actual demands of the labor market. Even if education levels are high on paper, if graduates lack the specific skills needed in emerging industries or sectors, their economic impact may be limited.

This discrepancy can undermine the potential positive effects of education on economic growth, as highlighted by the World Bank (2018). Lastly, regional disparities in education quality and access can further diminish the education index's impact on economic growth within specific contexts, such as West Java. Becker (2009) discussed how disparities between urban centers, where educational resources and opportunities are typically more abundant, and rural areas with limited access to quality education can significantly affect regional economic dynamics. In West Java, such variations between affluent urban areas and rural communities could contribute to uneven economic growth rates, despite overall improvements in the educational index at the regional level.

4) **Income Index has a positive yet insignificant effect on economic GR in a given municipality.** Most commonly, this variable is measured by means of an income index, which uses per capita gross income of a given area. Such income metrics reflect not only the ability to consume goods and services but also the potential for savings and investment, which are fundamental drivers of economic growth. According to Deaton (2010), higher income levels stimulate consumer spending, thereby increasing demand for products and services. This in turn would foster further economic expansion and growth. The World Bank (2018) further explained how savings and investments induced by higher income per capita would be beneficial for economic growth. Savings and investments contribute to capital formation in a variety of sectors, which in turn enhances productivity and supports long-term economic growth. Another significant aspect of higher incomes is their potential to reduce poverty and income inequality. Acemoglu & Johnson (2007) argue that rising income levels can lead to poverty alleviation and a more equitable distribution of wealth, fostering social cohesion and bolstering economic stability.

Statistically insignificant correlation between income index and economic GR found in this paper might be explained by a difference between the income index commonly used in HDI calculations and the income index used by BPS in HDI calculations. As the previous passage suggests, income index is usually calculated using per capita gross income of a given populace. However, BPS used per capita monthly expenditure to calculate the index. The use of monthly expenditure—and thus the reason for the insignificant result found in this paper—could then be explained by the following arguments. Deaton (2010) noted that monthly per capita expenditure may not accurately reflect long-term income stability or economic capacity. Since expenditure patterns can fluctuate due to short-term consumption behaviors rather than indicating sustained income levels necessary for significant investment and growth, such volatility might obscure the true economic potential of households and communities, thereby diminishing the income index's predictive power in economic growth models.

Regions characterized by a large informal sector, such as parts of West Java, could also pose additional challenges to using conventional measures of income index. The World Bank (2016) highlights that informal sector activities, which include unregistered businesses and income sources outside formal economic channels, can contribute significantly to regional economies. These informal activities are often underreported or not captured in official income statistics; as such, this might relate to the decision to make calculations based on expenditure instead. This discrepancy can lead to an underestimation of overall economic

activities and potential, thereby weakening the observed relationship between income (measured by expenditure) and economic growth. However, these findings show that the presence of such large informal economic activities might make predictions of economic growth difficult, as the informal economic activities are not directly linked to economic growth. This argument is noted by Acemoglu & Johnson (2007), who argued that within regions where formal sector activities are concentrated in urban centers while rural areas rely heavily on informal economic activities, disparities can distort the relationship between income indices and economic growth.

The interpretation of each coefficient assumes ceteris paribus conditions, meaning that all other factors are held constant. This ensures that the observed relationships between independent and dependent variables reflect their isolated effects.

CONCLUSION

This study investigates the interplay between inequality, components of the Human Development Index (HDI), and regional economic growth in West Java Province using a panel data regression analysis. The findings reveal a statistically significant model, with an R-squared value of 0.852, indicating the variables' relevance in explaining economic growth variations across the municipalities of West Java. Among these, the Gini index and life expectancy index positively and significantly impact growth, suggesting that inequality may stimulate economic activity under certain conditions and that public health improvements enhance labor productivity and create a stable investment climate. Conversely, the education and income indices show non-significant effects, potentially due to unaccounted factors like qualitative disparities in education or the informal sector's role in income measures. These results challenge conventional views on inequality and highlight the need for more nuanced analyses to address the complexities of regional economic dynamics in West Java, emphasizing the importance of health investments and a deeper understanding of education and income's roles in fostering sustainable growth.

Derived from the Results and Discussion section and supported by findings in prior studies, this research proposes the following interventions to foster sustainable economic growth across the analyzed variables:

1. Inequality: Large corporations, recognized as key drivers of economic growth, should be allowed to expand freely. To complement their growth, the government should establish frameworks that encourage symbiotic relationships between large corporations and MSMEs. By mentoring and supporting MSMEs within their supply chains, corporations can assist in scaling these smaller enterprises. As an incentive, the government could introduce reward systems tied to the success of such mentoring efforts, fostering long-term engagement and shared benefits across the ecosystem. This approach creates a virtuous cycle where large corporations, MSMEs, and the government mutually benefit while driving inclusive and equitable economic development.
2. Life Expectancy: Expanding access to healthcare and improving service standards are imperative to strengthen human capital. Collaborations with private entities to manage healthcare facilities, such as puskesmas in underserved areas, can address personnel shortages while maintaining governmental oversight to ensure accountability and accessibility. Such initiatives not only enhance workforce productivity and reduce healthcare inequalities but also attract investments by creating a healthier, more stable economic environment. These measures contribute to both immediate social welfare and long-term economic resilience.
3. Education: Despite the negative relationship between education and economic growth observed in this study, previous research highlights the pivotal role of education in long-term economic advancement. Policymakers should address this discrepancy by designing programs that ensure seamless transitions across educational levels, particularly in regions with high dropout rates. Structured pathways from primary to tertiary education can reduce dropouts and align educational outcomes with labor market demands, fostering skills that directly contribute to regional economic growth. Implementing such initiatives in both urban and rural settings promotes equitable access to education and economic opportunities, mitigating disparities across regions.
4. Income: Strengthening household incomes through the development of MSMEs aligns closely with recommendations for addressing inequality. As MSMEs scale up, the resulting increase in household incomes

can stimulate consumption, savings, and investments, thereby energizing both the formal and informal sectors. Over time, this dynamic fosters economic stability, reduces income disparities, and cultivates a more inclusive and sustainable economic ecosystem.

This study has several limitations, including the use of fixed-effects regression models that do not fully capture dynamic interactions or causal relationships over time and the reliance on expenditure-based income data, which underrepresents informal sector activities prevalent in West Java. Additionally, the analysis excludes factors such as institutional quality and environmental variables, which may influence economic growth. Future research could address these gaps by employing dynamic panel models, such as Generalized Method of Moments (GMM), and incorporating additional dimensions like employment quality and sectoral productivity.

The findings highlight the complex relationships between inequality, HDI components, and economic growth in West Java. While income inequality negatively affects growth, improved health and education indices contribute positively to economic performance. Policies should focus on reducing disparities and promoting human development to foster sustainable growth.

In conclusion, tackling inequality and enhancing human development are critical for achieving a balanced and resilient regional economy. Policymakers should adopt targeted strategies that integrate growth and equity to ensure inclusive development for all sectors of society in West Java.

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