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TWO DECADES OF FISCAL DECENTRALIZATION: ECONOMIC CONVERGENCE AND REGIONAL DISPARITY

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ABSTRACT

Indonesia's fiscal decentralization has increased the autonomy of regional governments in managing public expenditures. However, concerns persist about whether such autonomy effectively promotes regional economic convergence and reduces disparities. This study aims to evaluate the impact of fiscal decentralization, particularly government spending, on both economic convergence and regional inequality across 34 Indonesian provinces during 2010–2019. Using a two-step System Generalized Method of Moments (Sys-GMM) approach, the study incorporates key variables such as capital stock, education level, and the Human Development Index (HDI). The findings reveal that government spending, capital accumulation, and prior economic growth significantly contribute to economic convergence. Furthermore, the ratio of government spending to regional GDP has a negative and significant effect on the Gini index, indicating its role in reducing inequality. In contrast, education and HDI show statistically insignificant effects on disparity reduction, mainly due to low average educational attainment and uneven access. These results highlight the need for targeted policy to improve education quality and access. The study provides empirical evidence that supports more effective fiscal strategies to enhance regional development and promote equity.

KEYWORDS disparity; economic convergence; fiscal decentralization; government spending

INTRODUCTION

The beginning of the implementation of fiscal decentralization is strongly marked by the issuance of Law No. 22 of 1999 (as lastly revoked by Law Number 23 Year 2014 concerning Regional Government) and Law No. 25 of 1999 (as lastly revoked by Law Number 1 Year 2022 concerning Financial Relation between Central and Regional Governments). The regulation stipulates the nexus between the Central and Regional Governments in political decentralization, government administration, and the distribution of authority in economic and financial matters.

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One of the significant transformations that has taken place since the implementation of fiscal decentralization is the tremendous increase in the allocation of transfer funds from central government to the sub-regional authorities in the 2021 Indonesian State Budget by 145.06% compared to the previous period, from IDR 33.07 trillion to IDR 81.05 trillion, subsequently progressing to IDR 812.97 trillion in 2019 (Badan Kebijakan Fiskal, 2021). It further emphasizes the important aspect of fiscal decentralization, which is the delegation of expenditures as a consequence of the transfer of authority and responsibility to the regional government, followed by the delegation of income (Badan Kebijakan Fiskal, 2021; Hastuti, 2018). Therefore, fiscal decentralization broadens the responsibilities of regional governments in managing their regional finances, especially in the spectrum of regional spending. In this regard, local governments must ensure that regional expenditure has positive implications for economic development and the welfare of their regional community. Moreover, local government spending has increased every year.

Albeit its status as a G20 member and category as one of the largest economies in the world, Indonesia still poses many problems related to welfare. As a middle-income country, Indonesia's per capita income is relatively lower than its Asian peers. The World Bank even reported that its per capita gross domestic product (GDP) per 2021 was USD 4.29 thousand, ranked 5th in Southeast Asia, or was one of the lowest among the G20 members. Subsequently, inequality is still one of the major problems in Indonesia's economic development. It can be captured, among others, from the Gini Ratio, an indicator of overall expenditure inequality. Figure 2 shows the disparity in welfare from the Provincial Gini Ratio indicator 2019. In 2021, Indonesia's Gini ratio approached 0.373 and ranked 75th out of 162 countries (Index Mundi, 2022). Meanwhile, Badan Pusat Statistik (2022) recorded that as of March 2022, the Gini Ratio had risen to 0.384, with Yogyakarta, Jakarta, Gorontalo, West Java, Papua, and Southeast Sulawesi contributing regions of the highest Gini ratio. In addition to the Gini index, welfare disparities can also be seen from poverty severity (P2), which provides information about the distribution of spending among people experiencing poverty, because it considers the average monthly per capita expenditure of residents below the poverty line. The higher the index value, the higher the expenditure inequality among low-income people.

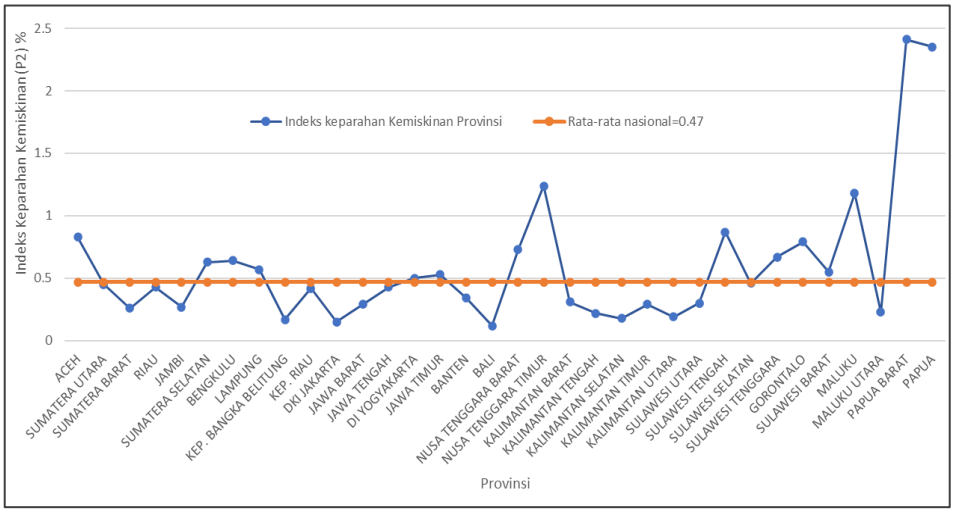

Figure 1. Poverty Severity Index (P2) 2020
Source: Central Bureau of Statistics, 2022

The figure above shows that the gap in the P2 index between regions is extensive, even though many surpass the national average. Economic inequality outlined above triggers in-depth concern on how effective fiscal decentralization is in Indonesia, especially regarding regional spending in economic convergence and dismantling economic disparities between regions. This paper examines whether fiscal decentralization of local government spending has positively contributed to economic convergence and whether it has implications for reducing economic inequality in the Indonesian sub-regions. In this regard, we put some factors which may potentially affect convergence and tackling economic disparity under scrutiny, namely capital stock, human capital, and government spending.

The debate on measuring fiscal decentralization effectiveness has been burgeoning in various economic literature, with economic convergence as one of the main topics. Economic convergence is a condition that occurs when two or more economies tend to achieve the same level of development and wealth. Theoretical discussion about income convergence between countries has become an extensively investigated topic by Robert Solow. The convergence hypothesis postulates that developing countries can grow at a faster rate than developed nations (Nwaogu & Ryan, 2015). The underlying basic assumption adopted is that diminishing returns in advanced regions are stronger (than in the developing nations), resulting in lower capital returns first occurring in capital-intensive countries, and their GDP per capita growth will slowly decrease. When the volume of capital in emerging and developing countries is small, the capital grows faster, creating a higher per capita GDP growth. In other words, Solow (1956) deduced that developing countries will grow faster than developed countries, resulting in convergence (catching-up effect).

Apart from capital-induced convergencies, Mankiw *et al.* (1992) employ human capital with a certain educational level to estimate that countries would converge similar to Solow's prediction, assuming constant population growth and capital accumulation. Korotayev and Zinkina (2014) suggest that middle-income countries have been converging with the high-income ones, but on the other hand,

the low-income countries (LIC) have been diverging from the middle-income ones, thanks to the lagging education and high population rate in LIC.

One of the focuses of the study is to examine whether labor and capital effectively affect economic growth and convergence. The Augmented Cobb-Douglas production function proposed in Solow (1957) the growth model has been widely used to explain the intercourse between human capital, capital, and labor to production (output). Capital, in terms of physical and human capital, significantly contributes to the region's economic growth and convergence. Gross fixed capital (GFC), as one form of physical capital, is expenditure on capital goods with a multi-year useful life and does not manifest as consumption goods. It includes residential and non-residential buildings, other infrastructure such as roads and airports, and machinery and equipment, but does not incorporate goods for military purposes. There are various empirical studies on the importance of physical capital (and its accumulation) on economic growth. Jileta (2016) claims that physical capital is correlated with economic strength, while Vandycke (2013) exhibits that the accumulation of physical capital is crucial for accelerating GDP growth in Eurasia. Physical capital formation also affects GDP in the long run in Indonesia (Prayogo, A. W., 2020) and Bangladesh (Pomi *et al.*, 2021).

Discussions focusing on the effect of government spending on economic growth have received significant attention. Government spending is considered to have a positive and significant influence on economic growth, including in South Eastern Europe (Alexiou, 2009) and in Indonesia (Magdalena & Suhatman, 2020), as well as increasing economic convergence in China (Luintel, Matthews, Minford, Valentinyi, & Wang, 2020). However, it is worth noting that government spending will also have a positive and significant impact on the economy if it does not exceed a certain threshold (Aydin & Esen, 2019). The impact of government spending on economic growth will be higher in more democratic countries (Plümper & Martin, 2003). However, empirical findings also reveal a negative nexus between government spending and economic growth. By investigating extensive empirical findings, Mitchell (2014) concludes that exceptional government spending correlates with or attenuates economic growth, primarily through the crowding-out effect, decreasing total factor productivity, and inefficiency.

It has become a common consensus that human capital has a significant positive effect on economic growth, including education. Many countries and regions have invested heavily in education, but the educational development goals arranged by governments have not always been achieved, especially in developing countries. This suggests that the effect of investment in education may vary in different stages of economic growth, and that the heterogeneous impact deserves further empirical research. Some economists argue that higher attainment in formal education leads to higher economic growth, contributing to human capital (Robert E. Lucas, 1988; Romer, 1990). Then according to Ding *et al.* (2021), human capital (proxied by education) has a greater output elasticity than physical capital, and green GDP is more sensitive to human capital.

However, there is also literature denoting that education has a weak correlation (Bils & Klenow, 2000) or does not have a significant impact on economic growth (Levine & Renelt, 1992). Barro (2001) also found that males' primary education did

not significantly contribute to economic growth, nor did females' higher education. It shows that the labor market has not utilized highly educated women correctly. The debate about the intercourse between education and inequality has also emerged. Participation in higher education (by which increasing the chances of life and success) is considered to reduce the gap/inequality between those with access to education and those without access due to social disadvantages (Machin, 2011). Subsequently, the liberalization and stratification of higher education exacerbate the gap between the impoverished and the "elite" group (Brown, 2017).

While extensive studies have examined the impact of fiscal decentralization on economic growth, limited empirical research has simultaneously assessed its dual effects on economic convergence and regional disparity across Indonesia. Prior studies often isolate economic growth or inequality without integrating these outcomes within a unified econometric framework. Moreover, the specific roles of capital stock, education, and government spending are rarely analyzed collectively using dynamic panel models at the provincial level. This study addresses that gap by applying a two-step System GMM approach to measure fiscal decentralization's contribution in reducing interregional disparities and accelerating convergence across provinces in Indonesia.

The novelty of this research lies in its dual approach to simultaneously analyze economic convergence and inequality reduction using a two-step System Generalized Method of Moments (Sys-GMM) estimator. It also introduces a comparative lag-coefficient validation technique to ensure the model's robustness, a method rarely applied in Indonesian fiscal studies. Furthermore, the study highlights the statistically insignificant role of education and HDI in reducing disparity, challenging conventional assumptions and offering a new perspective on policy priorities in developing economies.

This study aims to investigate the impact of fiscal decentralization, particularly local government spending, on economic convergence and regional disparity in Indonesia. By including fixed capital formation, education levels, and human development index as explanatory variables, the research evaluates their respective contributions to economic growth and inequality reduction among Indonesia's 34 provinces from 2010 to 2019.

The findings of this study provide critical insights for policymakers and regional governments in optimizing public expenditure to drive equitable growth. The research supports evidence-based decision-making by confirming the significant role of fiscal decentralization in reducing disparity and promoting convergence. It also highlights the urgent need to enhance education quality and access, allowing public investments to reduce inequality and promote inclusive economic development across regions more effectively.

RESEARCH METHOD

This study employs the Central Bureau of Statistics (BPS) secondary data. The data utilized is Regional Gross Domestic Product/ RGDP data (with 2010 as base year and constant price), capital stock or gross fixed capital formation, the average length of schooling for residents aged 15 years and over, and the ratio of government spending per province, as well as the Gini ratio. This study does not

use sampling but rather exploits the population (34 provinces in Indonesia). The observed period is 2011-2019. The years of 2020 and 2021 were excluded from the study period due to the COVID-19 pandemic, which disrupted the economy with varying magnitudes between regions. Including those years would have caused concern that it would generate a biased result. This paper uses panel data because it has several advantages over cross-sectional and time series studies. First, the estimator is more accurate as the explanatory variables vary in the two dimensions. Secondly, panel data reduces identification problems (Firdaus, 2011).

As mentioned before, the first objective of this research is to investigate the nature and contribution of government spending, capital stock, and education to economic convergence. There are two critical issues in testing the convergence hypothesis. The first issue is to prove whether there is a convergence process. The second question is whether the convergence estimation is consistent. By combining the growth theory of Solow, also Barro (2001), the model for testing the economic convergence hypothesis is formulated as follows:

$$g_{it} = \lambda g_{it-1} + \beta C_{it} + \psi^k X_{it} + e_{it},$$

where *g* is economic growth proxied by RGDP, *C* is capital stock, and *X* represents other components. We decompose *X* into two variables, namely education level and government spending. Several variables will be expressed in natural logarithmic form to reduce the possibility of heteroscedasticity due to differences in variable units. Therefore, our first estimation is described in the following equation:

$$\ln y_{it} = \lambda \ln y_{it-1} + \beta \ln C_{it} + \omega_1 Edu_{it} + \omega_2 \ln Gov_{it} + e_{1it}, \quad \ldots\ldots\ldots (1)$$

The second aim of this paper is to examine whether, during the 2010-2019 period, the ratio of local government spending positively affected reducing disparities between regions (as measured by the Gini index). Based on some of the empirical research results above, the specifications for the second model are as follows:

$$Gini_{it} = \lambda Gini_{i1-1} + \omega_3 rGov_{it} + \omega_4 Edu_{it} + \omega_5 HDI_{it} + e_{2it}, \quad \ldots\ldots\ldots\ldots (2)$$

where *i* denotes province, *t* represents period (year), and λ is convergence coefficient. The speed of economic convergence is denoted by 1-λ. The variables being explored can be seen in the following table:

Table 1. Research Variables

Variables	Description
y_{it}	RGDP/capita
y_{it-1}	prior year RGDP/ capita
C	capital stock modal, or Gross Fixed Capital Formation, based on 2010 Constant Prices, according to expenditure (million Rupiah)
Edu	The average year of schooling spent by residents aged 15 years or above to attain all educational types ever attended.
Gov	government spending by province (in million Rupiah)
rGov	government spending to provincial RGDP ratio
$Gini_{it}$	regional gini ratio
$Gini_{it-1}$	prior year gini ratio

Variables	Description
HDI	provincial Human development Index
e	*error term*

Estimation and Model Specification Test

In addition to its advantages, the utilization of panel data may render a problem. There is a possibility of the occurrence of heterogeneity when the proportion of cross-sectional data is significant. The regression in both models is dynamic because it includes the RGDP lag, an explanatory variable. Endogeneity bias may arise if the individual fixed effects and the dependent lag variables correlate. Such an endogeneity problem can be overcome by using the Generalized Method of Moments (GMM) as described by Arellano and Bond (1991). The GMM estimator is expected to be able to provide robust estimation results without having accurate information regarding the distribution of error terms. There are at least two reasons for applying the GMM approach. First, GMM is a common estimator that provides a framework for comparison and evaluation. Second, GMM offers a simple alternative to other estimators, especially maximum likelihood. However, the GMM estimator is not without weaknesses. The use of GMM may bring drawbacks in some ciscumstances includes: (i) the GMM estimator is asymptotically efficient with large sample sizes, but less efficient with limited (finite) sample sizes; and (ii) this estimator sometimes requires several programming implementations, thus software that supports the application of the GMM approach is needed.

Two estimation procedures are commonly used in the GMM framework: first-difference GMM (FD-GMM) and system GMM (Sys-GMM). The two procedures above consist of one-step and two-step models, where the two-step model and robust Standard Error (SE) are more efficient and reduce the risk of heteroscedasticity and autocorrelation. We have three criteria in determining the best GMM model, namely: (1) Valid instrument, a condition occurs when correlation between the instrument variable and the error component does not exist; (2) Consistency of the estimation result, by which is examined using the autocorrelation test; and (3) Unbias between the FEM estimator and the PLS estimator.

To determine the "best" model estimate, we carry out several procedures, including:

1) Dynamic panel model specification test
   Estimation is first performed using the FD-GMM method, then the instrument's validity is examined using the Sargant Test, whilst a consistency test employing the Arellano-Bond test. Sargant's Test is used to identify the validity of overidentifying conditions. The null hypothesis is that the instrument variable is not correlated with error, or that the residual data of the GMM estimate is homoscedastic. Meanwhile, the Arellano-Bond Test (A-B Test) ensures that the error term is not correlated serially in first difference of order, so that the estimates obtained are consistent with the null hypothesis, indicating no autocorrelation. Autocorrelation occurs due to the lag of the dependent variable as a regressor and individual effect characterizing heterogeneity among individuals.

2) The Use of Sys-GMM
Suppose the results of the validity and consistency tests using the FD-GMM method do not yield an unbiased estimator and a valid and consistent instrument. In that case, the estimation is continued by utilizing the Sys-GMM method. Sys-GMM consistency was also carried out using a post estimation test through two specification tests, the Sargant and the Arellano-Bond tests. In this case, several alternatives of GMM methods were tested, viz 1-step Sys-GMM with and without robust standard errors, and 2-step Sys-GMM with and without robust standard errors.
3) Comparison and selection of an unbiased model
A further post-estimation test ensures that the model generates the best estimate. The unbiased GMM model has an independent variable lag coefficient that lies between the fixed-effect model (FEM) and pooled least squares (PLS).

The result of validity and consistency testing performed for the selection of the specification model is depicted in the following table:

Table 2. Summary of Validity and Consistency Testing for GMM Model Selection

Model (1)-Economic Convergence							
dependent variable	**SE**	***Test***	**desc**	**FD-GMM**		**Sys-GMM**	
				1-step	**2-steps**	**1-step**	**2-steps**
ln y	standard	Sargant	chi^2	217.8269	29.64328	228.9907	31.76092
			p> chi^2	0.0000	0.7242	0.0000	0.8968
		A-B *test*	order-2 z				0.66007
			p>z				0.5092
	robust	Sargant	chi^2				-
			p> chi^2				-
		A-B *test*	order-2 z	0.068738	0.00523	0.6829	0.0369
			p>z	0.4918	0.9958[1)]	0.4947	0.9706[2)]
Model (2) --- Regional Disparity							
dependent variable	**SE**	***Test***	**desc**	**FD-GMM**		**Sys-GMM**	
				1-step	**2-steps**	**1-step**	**2-steps**
	standard	Sargant	chi^2		18.30586		21.46198

[1)] *The Sargant test value shows that estimation is valid, but it is biased due to the insignificance of all variables*
[2)] *A-B test value denotes that estimation is consistent, but it is biased due to the insignificance of all variables*

Gini			$p > chi^2$	0.9910	0.9975
		A-B *test*	order-2 z	1.1586	1.3155
			p>z	0.2466	0.1883
	robust	Sargant	chi^2		-
			$p > chi^2$		-
		A-B *test*	order-2 z	1.024	1.4235
			p>z	0.30558	0.1546

Based on the above examination, a comparison of the lag coefficient (1) of the dependent variable (which becomes the explanatory variable) of the alternative GMM models with the FEM and PLS models is as follows:

Table 3. Comparison of GMM Alternative Models

var	FEM	FD-GMM 1-step robust SE	FD-GMM 2-step	SYS-GMM 2-step	SYS-GMM 2-step robust SE	PLS
ln y_{it-1}	0.80624793***	0.73575824***	0.73873878***	0.90566802***	0.8758686	0.96596602***
Gini $_{it-1}$	0.30412868***	0.31370033**	0.33608742***	0.50336449***	0.5033645***	0.82388531***

*** *significant at p<0.001, ** significant at p<0.01*

From the comparability result of the three alternative GMM models with FEM and PLS, *ln* y and Gini are best estimated by using SYS-GMM with 2-step because the coefficients lag (1) of ln y and lag (1) Gini are between FEM and PLS, which means that the model generates unbiased estimate. SYS-GMM 2-step robust SE is not selected due to the inefficiency of such an alternative.

RESULT AND DISCUSSION

The simulation result is depicted in the following table:

Table 4. Estimation Output Using 2-Step Sys-GMM

Dependent variable: ln y
Number of observations: 304
Number of groups: 34
Number of instruments: 48

Variable	Coefficient	Std. Error	z
ln y_{it-1}	0.905668***	0.0072399	125.09
ln C	0.0282747***	0.0064883	4.36
ln Gov	0.0104512***	0.001047	9.98
Edu	0.0107843***	0.0010564	10.21
constant	1.055556***	0.0385819	27.36

Wald chi^2	335104.63		
$p>chi^2$	0.0000		
Significant at: * $p<0.05$ ** $p<0.01$ *** $p<0.001$*			
Dependent variable: Gini			
Number of observations: 207			
Number of groups: 23			
Number of instruments: 48			
Variable	Coefficient	Std. Error	z
$Gini_{it-1}$	0.5033645***	0.0431991	11.65
rGov	-0.1142713***	0.0311254	-3.67
Edu	-0.0106552	0.0157518	-0.68
HDI	-0.0012476	0.0027054	-0.46
constant	0.3716188***	0.0492376	7.55
Wald chi^2	695.21		
$p>chi^2$	0.0000		
Significant at: * $p<0.05$ ** $p<0.01$ *** $p<0.001$*			

Based on the estimated output using the 2-step System GMM, it can be noticed that all explanatory variables (previous year's economic growth, fixed capital stock, local government spending, and level of education) each have a positive and significant effect on economic growth (y). Based on the value of the lag (1) y coefficient, which is positive, H1 is accepted. In other words, from 2010 to 2019, the economies among provinces in Indonesia experienced convergence. The convergence speed is 1 - 0.905668 or 9.4332% per annum. This means the average province will take more than 10 years to catch up, so its economic growth will become 90% of the average national RGDP. From the t-test value, it can be seen that local government spending (Gov) has a positive and significant effect on economic growth, thus hypothesis H2 is accepted.

Meanwhile, from the estimated output of the dependent variable Gini, it is known that the ratio of regional government spending has a negative and significant effect on the Gini variable, or in other words the higher the ratio of government spending, the more impact it will have on reducing regional inequality for the 2020-2019 period. Therefore, the hypothesis H3 is accepted. The convergence rate (reduction in disparity) is 49.6% per year, which means that it takes approximately 2.1 years for regions to reduce inequality to 50% of the national average of inequality, or more than 4 years for regional inequality to converge to the national level of economic gap, with the condition that the ratio of local government spending to RGDP is not lower than the ratio of local government spending to RGDP in the study.

Furthermore, even though the level of education (Edu) and the human development index (HDI) have a negative effect on the Gini ratio, or in other words, the HDI has an impact on reducing economic disparities, the impact is not statistically significant. Of course, this is acceptable because the "Edu" proxy used is the average number of years spent by residents aged 15 years and over pursuing all types of education attained. *The Central Bureau of Statistics* recorded that in 2018, 2019, 2020, and 2021, the average length of schooling for residents aged 15 years and over, including all types of education that they have attended, is only 8.3,

8.5, 8.64, and 8.7 years, or roughly equivalent to junior high school. Details of the average length of school from 2010 to 2021 are enclosed in Appendix 1.

Indeed, it indicates the low level of Indonesia's educational attainment. Human capital is indispensable for productivity, notably for augmenting economic output. This becomes the underlying reason why the impact of "education" on economic growth or the abatement of inequalities is statistically insignificant.

Subsequently, unequal access to education contributes to increasing inequality. This is because individuals with abundant access to higher education will be more prosperous (or have higher incomes), while residents without access or who lack access to education tend to earn lower incomes. Consequently, such circumstances exacerbate the income disparities. This is in line with previous findings (Barro, 2001; Bils & Klenow, 2000; Brown, 2017; Levine & Renelt, 1992).

CONCLUSION

To conclude, this study confirms that fiscal decentralization—granting greater authority to regional governments in managing local spending—has positively contributed to economic growth and significantly reduced regional inequality in Indonesia from 2010 to 2019, as evidenced by a convergence rate of approximately 9% per year. Other variables such as prior economic growth, capital stock, government spending, and education level also positively and significantly influenced regional economic performance. The ratio of government spending to regional GDP had a notable negative effect on the Gini ratio, indicating its effectiveness in reducing economic disparities. However, despite their expected contributions, education level and the Human Development Index were statistically insignificant in narrowing inequality, mainly due to limited educational attainment and unequal access to education. This reinforces existing findings that disparities in access to quality education deepen income inequality. Therefore, it is recommended that regional spending be directed more effectively toward improving education quality, such as enhancing teacher welfare, expanding infrastructure (e.g., schools, libraries, internet), increasing research and development, and ensuring universal access to education. Similarly, public investments should focus on strengthening human resource development in health and employment to enhance HDI and mitigate disparities. Nevertheless, this study has limitations, including not excluding oil and gas contributions from RGDP, which may skew growth estimations for resource-rich provinces; the lack of exploration of bidirectional causality between capital and growth, or HDI and inequality; and the omission of spatial or infrastructure factors such as transportation hubs, urban market size, and foreign investment. Future research should address these limitations by employing disaggregated RGDP data, incorporating spatial econometrics, and exploring non-linear or threshold effects to understand fiscal decentralization's role in equitable development fully.

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