

Fiscal Capacity Matters: Heterogeneous Revenue Effects of Intergovernmental Fiscal Reform in Indonesia

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Abstract

Indonesia continues to experience persistent disparities in regional fiscal capacity, which constrain local governments' ability to optimize own-source revenues. This study analyses the impact of the Law on Financial Relations between the Central and Regional Governments (HKPD Law) on Local Taxes and Retributions Revenues (LTRR), with an emphasis on the role of regional fiscal capacity. Using panel data from 209 regencies and municipalities in 10 Indonesian provinces for 2019–2024, regions are classified into high- and low-fiscal-capacity groups. This study offers a novel contribution by explicitly examining the heterogeneous impact of fiscal decentralization reform based on regional fiscal capacity using a causal Difference-in-Differences (DiD) framework. The results show that the HKPD Law positively affects LTRR. Regional fiscal capacity is a key determinant of revenue performance, with stronger effects observed in high-capacity regions. These findings indicate that the effectiveness of fiscal decentralization reforms depends on regional fiscal capacity. The findings provide important policy implications for designing differentiated fiscal decentralization strategies, particularly in developing countries, to ensure more equitable fiscal outcomes and sustainable regional fiscal autonomy.

Keywords: Fiscal Capacity; Local Revenue; Intergovernmental Fiscal Reform; Fiscal Decentralization; Indonesia.

1. Introduction

Fiscal decentralization is a policy instrument widely adopted to enhance the efficiency of resource allocation, improve local governments' responsiveness to local needs, and strengthen accountability in public service provision. By granting greater authority to local governments over revenue generation and expenditure management, fiscal decentralization is expected to reinforce fiscal autonomy and reduce dependence on central government transfers (Bahl & Bird, 2008; Martinez-Vazquez & McNab, 2003).

However, the literature emphasizes that the success of fiscal decentralization is not automatic and critically depends on the fiscal capacity of local governments to mobilize own-source revenues (Bird & Smart, 2002). Regional fiscal capacity reflects the structural ability of local governments to finance development needs and government operations through their own revenues. Regions with higher fiscal capacity typically benefit from broader economic bases, more effective tax administration systems, and a greater ability to exploit delegated fiscal authority. In contrast, regions with low fiscal capacity face constraints in optimizing local taxes and charges, resulting in continued reliance on fiscal transfers from the central government (Bird & Smart, 2002; Choi, 2021). Cross-country evidence from emerging economies confirms that devolving tax authority only improves revenue collection when these structural and institutional limitations are actively overcome (Anastasiou *et al.*, 2024; Bayraktar *et al.*, 2012; Caldeira *et al.*, 2023). Consequently, such organizational constraints frequently restrict local income maximization, widening regional disparities and causing fiscal decentralization reforms to generate heterogeneous impacts across regions (Besley & Persson, 2014). This condition suggests that fiscal decentralization reforms may generate heterogeneous impacts across regions.

In the Indonesian context, these challenges remained pronounced during the 2019–2024 period. Despite more than two decades of fiscal decentralization, disparities in regional fiscal capacity persist, with most regencies and municipalities classified in the low and very low fiscal capacity categories. This persists even in regions with substantial economic potential, as reflected in Gross Regional Domestic Product (GRDP) and demographic characteristics. The gap between economic potential and the realization of Local Taxes and Retributions Revenues (LTRR) indicates persistent structural constraints in local revenue mobilization (Alm & Farooq, 2024).

In response to these challenges, the Indonesian Government (2022) introduced a reform of fiscal decentralisation through Law No. 1 of 2022 on Financial Relations between the Central and Regional Governments (HKPD Law). This reform places the strengthening of local taxing power as one of its core pillars, primarily through the simplification of local tax instruments and improvements in the framework of local tax administration (Lewis, 2023). Conceptually, this reform aligns with fiscal decentralization literature emphasizing the role of enhanced subnational taxing authority in improving local revenue performance (Bahl & Bird, 2008).

Nevertheless, empirical evidence on the impact of central–local fiscal relations reforms on local revenue performance remains limited. Most existing studies have primarily focused on regulatory aspects or expenditure-side implications, while the effects of national fiscal reforms on the performance of Local Taxes and Retributions have received relatively little empirical attention. Moreover, there is a lack of studies that explicitly examine whether the impact of such fiscal reforms is homogeneous across regions or varies according to differences in regional fiscal capacity, particularly within a causal and medium-term analytical framework.

Beyond fiscal capacity, demographic characteristics such as population size may also influence local revenue performance, given that larger populations are closely associated with broader tax bases and a greater number of potential taxpayers (Martinez-Vazquez & McNab, 2003). Accordingly, assessing the impact of fiscal reforms requires consideration of the interaction between policy interventions, fiscal capacity, and regional characteristics in order to provide a more comprehensive understanding of local revenue outcomes. This study addresses the following research question: To what extent does the implementation of the HKPD Law affect local tax and retribution revenues (LTRR), and does this effect differ between regions with high and low fiscal capacity within a Difference-in-Differences framework? Specifically, this study exploits the implementation of the HKPD Law as a policy shock by comparing revenue outcomes before and after the reform 2019–2021 and 2022–2024, and between regions with high fiscal capacity (treatment group) and those with low fiscal capacity (control group). In addition,

population size is incorporated as a control variable to account for differences in demographic scale and tax base across regions.

In this context, this study aims to analyze the effect of fiscal decentralization reform on local revenue performance, while explicitly capturing heterogeneous treatment effects across regions with differing fiscal capacities. Unlike most existing studies that primarily focus on regulatory design or expenditure-side implications, this study contributes by examining the revenue-side impact of fiscal reform using a causal Difference-in-Differences approach and by identifying heterogeneous effects across regions as an aspect that remains largely unexplored in the existing literature. This highlights the importance of considering regional fiscal capacity in the design and evaluation of fiscal decentralization policies, particularly in developing countries where structural disparities across regions remain substantial.

2. Literature Review

Fiscal federalism theory provides the primary conceptual foundation for understanding the allocation of fiscal authority between central and local governments in decentralized systems. The devolution of fiscal authority is expected to improve allocative efficiency and enhance the responsiveness of local governments to local needs (Bahl & Bird, 2018; Oates, 1999). Musgrave (1959) argues that in a multilevel governance system, the functions of income redistribution and macroeconomic stabilization should be performed by the central government, while local governments are better positioned to carry out the allocative function in accordance with the principle of subsidiarity.

Nevertheless, the literature underscores that the benefits of fiscal decentralization are not automatic. The effectiveness of fiscal decentralization critically depends on the fiscal capacity and administrative capability of local governments to manage the authority delegated to them. In the absence of sufficient fiscal capacity, decentralization may instead reinforce local governments' dependence on transfers from the central government and constrain improvements in local revenue performance (Bahl & Bird, 2008; Fisman & Gatti, 2002). Conversely, recent studies emphasize that when local governments possess high-intensity and efficient tax administration, fiscal decentralization can be successfully translated into high-quality economic development (Li & Gu, 2025). Fiscal decentralization can be broadly defined as the transfer of authority from the central government to local governments in the management of public revenues and expenditures (Nursini, 2016).

From a policy perspective, fiscal decentralization rests on four main pillars. The first pillar is expenditure assignment, which governs the allocation of responsibilities for public service provision across different levels of government (Martinez-Vazquez & McNab, 2003). The second pillar is revenue assignment, which determines the revenue sources available to each level of government, including local governments' authority to levy local taxes and charges. The third pillar concerns intergovernmental transfers, which are designed to address horizontal and vertical fiscal imbalances while mitigating socio-economic disparities across municipalities (Bird & Smart, 2002; Mainali et al., 2022). The fourth pillar relates to local governments' access to financing mechanisms, particularly subnational borrowing, to support development financing (Smoke, 2001). Within this framework, fiscal decentralization is expected to promote regional fiscal autonomy, defined as the ability of local governments to finance public expenditures without excessive reliance on central government transfers.

In the Indonesian context, the reform of financial relations between the central and local governments through Law No. 1 of 2022 (HKPD Law) represents a policy response to structural weaknesses in the fiscal decentralization system, particularly the relatively low contribution of Local Taxes and Retributions to local government financing (Directorate General of Fiscal Balance, 2022). Existing studies on the HKPD Law have largely focused on regulatory design and expenditure-side implications. Regional House of Representatives (DPRD) of Central

Java Province (2024) documents significant restructuring of LTRR instruments and intergovernmental transfer arrangement, while Hamdani & Zaenudin (2023) highlight constraints on personnel expenditure aimed at improving fiscal efficiency. However, empirical evidence directly examining the impact of the HKPD Law on local revenue performance remains limited

From the revenue perspective, several studies suggest that the HKPD Law has the potential to enhance local revenues through tax simplification and the streamlining of local charges. Purba & Salomo (2024) argues that simplifying tax structures can improve taxpayer compliance and monitoring, while Cahyadi *et al.* (2023) and Peprah *et al.* (2025) show that tax reform and modernization contribute positively to revenue performance. Policy-oriented literature further emphasizes that clearer and more specific regulations improve fiscal policy implementation and local tax collection (Alm & Farooq, 2024).

Based on the theoretical and empirical arguments above, fiscal reform through the implementation of the HKPD Law is expected to enhance local revenue performance by improving tax administration efficiency and expanding the tax base. Therefore, the first hypothesis is formulated as follows:

H1: The implementation of the HKPD Law has a significant positive effect on local tax and retribution revenues (LTRR).

Nevertheless, the extent of fiscal autonomy is strongly conditioned by regional fiscal capacity. Recent empirical tests demonstrate that statutory tax assignments provided by central policies do not automatically translate into meaningful fiscal independence without robust local administrative capability (Mauri, 2024). Consequently, fiscal capacity is not solely reflected in the magnitude of own-source revenues but also encompasses regional economic strength, resource endowments, population size and characteristics, the quality of tax administration, and the fiscal policy framework established by the central government (Bahl & Bird, 2018). In the Indonesian context, regional fiscal capacity is measured through the Regional Fiscal Capacity Index, which incorporates own-source revenues, intergovernmental transfers, and other financing sources (Ministry of Finance, 2021). Regions with higher fiscal capacity generally enjoy greater autonomy in setting development priorities and are better able to manage fiscal policies effectively (Choi, 2021). In the Indonesian decentralized context, enhanced fiscal authority and strategic local government spending have been empirically proven to stimulate regional industrial growth and structural development (Wiryawan & Otchia, 2022). The literature also indicates that strengthening fiscal capacity contributes to improvements in public service efficiency, enhances local government accountability, and stimulates regional economic growth and human development (Sakti *et al.*, 2024; Setiawan *et al.*, 2022; Sofilda *et al.*, 2023)

Local taxing power constitutes a core element of fiscal capacity. It refers to the authority of local governments to establish, levy, and administer local taxes and charges in accordance with prevailing regulations (Directorate General of Fiscal Balance, 2022; OECD, 1999). Through this authority, local governments are expected to tailor tax policies to local economic conditions and optimize revenue from sources such as property taxes, motor vehicle taxes, and user charges (Bahl & Bird, 2008; Devas, 1988). Nevertheless, the expansion of local taxing power does not automatically translate into higher revenues. Its effectiveness depends on fiscal administrative capacity, human resource quality, and taxpayer compliance (Bird & Slack, 2014; Devas, 1988). In this context, the integration of digital financial technologies, such as electronic tax reporting and mobile payment systems, has emerged as a critical tool to bridge administrative capacity gaps and significantly enhance tax revenue mobilization in developing economies (Apeti & Edoh, 2023; Bellon *et al.*, 2022). Consequently, in regions with weak institutional capacity, increased taxing authority may yield limited or delayed revenue effects.

Moore (2004) argues that taxation is fundamental to state-building by promoting accountability and strengthening the quality of governance. Accordingly, fiscal capacity not only determines revenue levels, but also conditions local governments' responses to fiscal decentralization reforms.

Conceptually, the relationship between local taxation and local public expenditure is also explained through the Wicksellian connection, which highlights the direct link between taxes paid by citizens and the benefits derived from public services (Bird & Smart, 2002). This mechanism is expected to enhance accountability and improve the efficiency of public resource allocation. Therefore, while fiscal decentralization creates opportunities for improving local revenue performance, these opportunities can only be fully realized when supported by adequate fiscal capacity and effective tax administration.

Empirical studies further demonstrate that fiscal capacity plays a critical role in shaping revenue performance and the success of fiscal decentralization. Sakti et al. (2024) find that fiscal decentralization and fiscal capacity positively affect inclusive growth, while Nursini & Tawakkal (2019) show that decentralization yields significant effects only when the tax assignment pillar effectively increases Local Taxes and Retributions. Although some studies note that tax potential does not always perfectly correlate with fiscal capacity (Rafsanjani & Agustina, 2022), the majority of the literature identifies fiscal capacity as a key determinant of local tax revenue (Bird & Smart, 2002; Nursini & Tawakkal, 2019).

The evidence above suggests that fiscal capacity is a key structural determinant of local revenue performance. Regions with stronger fiscal capacity are better able to mobilize own-source revenues and respond effectively to fiscal policies. Thus, the second hypothesis is formulated as follows:

H2: Regional fiscal capacity has a significant positive effect on local tax and retribution revenues (LTRR).

However, the literature also indicates that the effects of fiscal reforms are not homogeneous across regions. Policy effectiveness is strongly influenced by the fiscal and institutional capacity of local governments to respond to regulatory changes (Fisman & Gatti, 2002; Fjeldstad & Moore, 2008). Regions with stronger fiscal capacity and more developed tax administration systems are generally better able to capitalize on tax simplification and expanded local taxing authority, while regions with lower fiscal capacity may experience delayed or limited revenue gains (Choi, 2021; Dabla-Norris et al., 2020). Comparative studies on fiscal decentralization also demonstrate that decentralization reforms often produce heterogeneous outcomes across jurisdictions due to variations in economic structures, institutional quality, and governance arrangements (Faguet, 2014; Rodden, 2004).

From the perspective of the Tiebout model, regions with higher fiscal capacity are better able to provide high-quality public services, which in turn enhance taxpayer compliance and expand the local tax base (Tiebout, 1956). This mechanism suggests that regions with stronger fiscal capacity are more responsive to fiscal policy changes and are more likely to experience greater revenue gains following fiscal reform. Building upon these arguments, the effectiveness of fiscal reform is expected to vary across regions depending on their fiscal capacity and institutional readiness. Therefore, the third hypothesis is formulated as follows:

H3: The implementation of the HKPD Law has a heterogeneous effect on local tax and retribution revenues (LTRR), with stronger effects observed in regions with higher fiscal capacity.

In addition to the main explanatory variables, demographic characteristics such as population size are incorporated as control variables to account for variations in regional tax bases. Population size reflects the scale of economic activity and the number of potential

taxpayers within a region, which directly influences local revenue capacity. Regions with larger populations tend to have broader tax bases and higher levels of economic activity, thereby increasing revenue potential (Martinez-Vazquez & McNab, 2003). Empirical evidence in the Indonesian context also supports this relationship, showing that population size is positively associated with local revenue performance and fiscal capacity (William & Harjanto, 2024; Yuliadi, 2023). Controlling for population size is therefore essential to ensure that the estimated effects of fiscal reform are not biased by differences in demographic structure across regions.

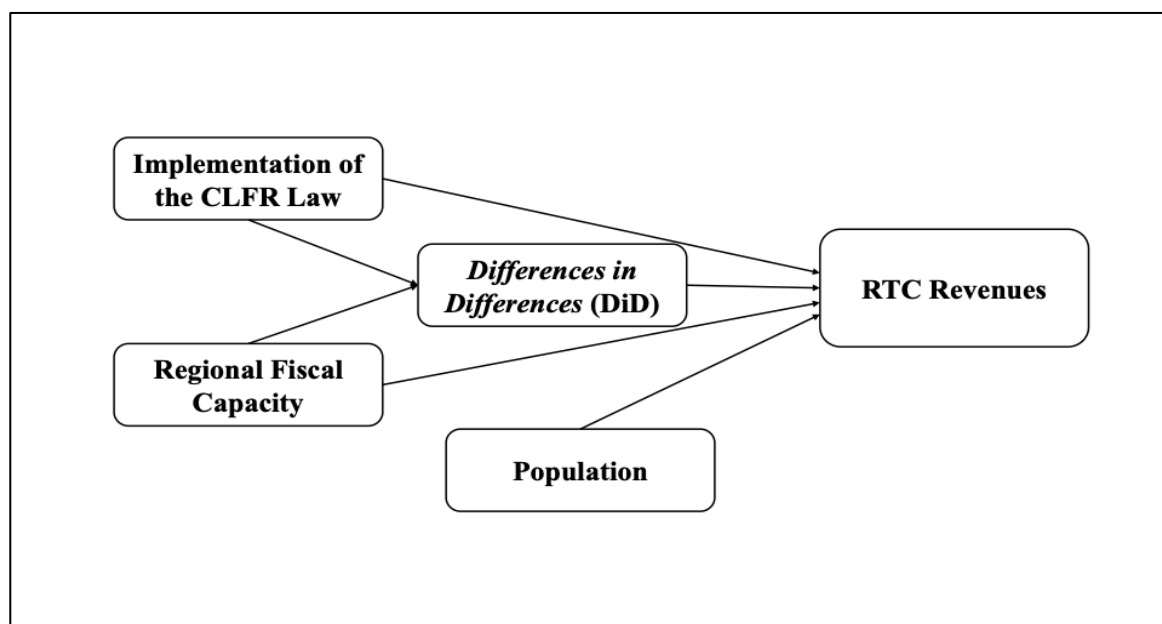


Figure 1. Conceptual Framework

3. Methods

3.1 Data Description

This study employs secondary data in the form of a panel dataset covering 209 regencies and municipalities across 10 provinces in Indonesia over the period 2019–2024. The secondary data consist of population size, Local Taxes and revenues, and regional fiscal capacity. Data on fiscal capacity and LTRR revenues were obtained from the Directorate General of Fiscal Balance, while population data were sourced from Indonesia’s Central Bureau of Statistics. Ten provinces included in the analysis were West Java, East Java, Central Java, North Sumatra, Banten, DKI Jakarta, South Sulawesi, Lampung, South Sumatra, and Riau. The selection of these ten provinces is based on their large population size and the diversity of their socioeconomic conditions, which allows for a more comprehensive analysis of regional heterogeneity in fiscal capacity and local revenue performance.

To support the empirical analysis, this study constructs variables within a Difference-in-Differences (DiD) framework to assess the effect of the HKPD Law implementation on local revenue performance. The HKPD Law is treated as a policy intervention occurring in 2022 and is proxied by a post-reform dummy variable, which takes the value of 1 for the period 2022–2024 and 0 for the period 2019–2021. Regional fiscal capacity (*RFC*) is proxied by a dummy variable equal to 1 for regions classified as having high fiscal capacity and 0 for those with low fiscal capacity, thereby distinguishing the treatment and control groups. Population size (*POP*) is included as a control variable to account for differences in regional economic scale and tax base

across regencies and municipalities.

In this framework, the DiD estimator is defined as the interaction between the post-reform period and regional fiscal capacity ($HKPD\ Law \times RFC$), capturing the differential effect of the HKPD Law implementation between treatment and control groups. Table 1 presents the definition, measurement, and classification of variables used in this study.

Table 1. Definition and Measurement of Variables

Variable	Definition	Measurement	Role in Model	Data Source
LTRR	Local taxes and retributions revenue	Total local tax and retribution revenues	Dependent variable	Directorate General of Fiscal Balance (DJPK)
HKPD Law	Fiscal reform dummy (HKPD Law)	1 = post-reform period (2022–2024), 0 = pre-reform period (2019–2021)	Time treatment variable (Post)	Law No. 1 of 2022
RFC	Regional fiscal capacity	1 = high fiscal capacity, 0 = low fiscal capacity	Group (treatment vs control)	Ministry of Finance
DiD (HKPD $\times$ RFC)	Interaction term between HKPD and fiscal capacity	Dummy interaction (HKPD $\times$ RFC)	Main variable of interest (DiD estimator)	Constructed variable
Pop	Population size	Total population	Control variable	Central Bureau of Statistics (BPS)

3.2 Methods

The panel dataset is divided into two time periods based on the fiscal capacity classification applied to all regencies and municipalities within the ten selected provinces. Upon the enactment of the Law No. 1 of 2022, the government classified regencies and municipalities into two broad fiscal capacity groups: high fiscal capacity comprising medium, high, and very high categories and low fiscal capacity comprising low and very low categories. This study follows the same classification scheme for all regencies and municipalities included in the selected provinces.

Prior to conducting the empirical analysis, data adjustments were performed by excluding provinces exhibiting extreme outlier values. Following the outlier adjustment, normality tests were conducted. Variables that did not satisfy the normality assumption were subsequently transformed using natural logarithms. Based on the normality tests, two variables Local Taxes and Retributions Revenues and population were found not to follow a normal distribution and were therefore log-transformed.

In addition to testing for normality, this study conducts classical assumption tests to ensure compliance with the requirements of the Best Linear Unbiased Estimator (BLUE) in regression analysis. Furthermore, model specification tests determine the most appropriate panel data estimation method among the Common Effect Model (CEM), Random Effect Model (REM), and Fixed Effect Model (FEM). The Chow test is employed to choose between FEM and CEM, where a probability value > 0.05 indicates the use of CEM, while a probability value below 0.05 favors FEM. The Lagrange Multiplier test, using the chi-bar-square (χ^2) statistic, is applied to select between REM and CEM, with REM preferred when the p-value is below 0.05 and CEM otherwise. Finally, the Hausman test determines the choice between REM and FEM, where a probability value greater than 0.05 supports REM, whereas a value below 0.05 favors FEM.

Furthermore, to ensure the validity of the Difference-in-Differences (DiD) estimation,

this study performs a parallel trends test. This test is critical to verify that the treatment and control groups share a similar trend in the dependent variable during the pre-treatment period. The null hypothesis (H_0) states that the trends are parallel. This study employs both graphical diagnostics and formal statistical tests, including the parallel-trends test and the Granger causality test for anticipation effects. P-value > 0.05 in these tests indicates that the parallel trends assumption is satisfied, allowing for a valid causal interpretation of the DiD estimator.

This study employs a panel data regression framework combined with DiD approach to identify the causal impact of the implementation of the law on intergovernmental fiscal relations (HKPD Law) on Local Taxes and Revenues. The model captures both temporal variation (pre- and post-reform) and cross-sectional differences (high vs. low fiscal capacity).

The empirical model is specified as follows:

$$LTRR_{it} = \alpha + \beta_1 HKPD\ Law_{it} + \beta_2 RFC_{it} + \beta_3 DiD_{it} + \beta_4 Pop_{it} + u_i + \varepsilon_{it}$$

Where $LTRR$ denotes Local Taxes and Revenues. $HKPD\ Law$ represents the implementation of the HKPD Law, proxied by a dummy variable equal to 1 for the post-reform period (2022–2024) and 0 for the pre-reform period (2019–2021). RFC denotes regional fiscal capacity, proxied by a dummy variable equal to 1 for regions with high fiscal capacity and 0 for those with low fiscal capacity. POP denotes population size and is included as a control variable.

Subscript t indicates the year of observation, i denotes the regency/municipality unit, and ε represents the idiosyncratic error term, and u_i is the region-specific random error component. DiD refers to the Difference-in-Differences interaction term between the implementation of the Law No. 1 of 2022 and regional fiscal capacity ($HKPD\ Law_t \times RFC_i$).

4. Results

Classical Assumption Tests

To enhance the empirical robustness of the analysis and to ensure that the estimated model adequately satisfies the classical assumptions, this study performed several diagnostic tests, including tests for normality, heteroskedasticity, autocorrelation, and multicollinearity. The first diagnostic test conducted examines whether the data are normally distributed.

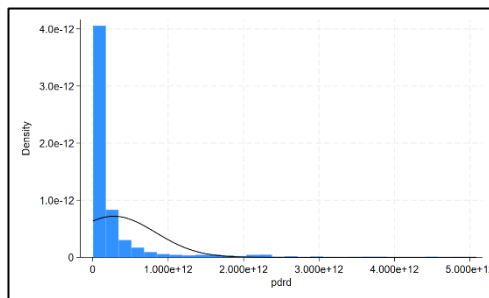


Figure 2. Distribution of Average LTRR Revenues by Regency/Municipality

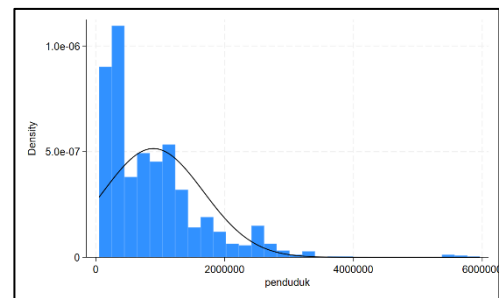


Figure 3. Distribution of the Average Population across Districts/Municipalities

Two variables were found not to satisfy the normality assumption required for Ordinary Least Squares (OLS) regression at the initial stage, namely the average Local Taxes and Revenues and the average population of regencies/municipalities across the ten observed provinces. Figures 2 and 3 illustrate that these variables are not normally distributed. Consequently, a logarithmic transformation was applied, after which the variables

satisfied the normality assumption, as shown in Figures 4 and 5. The results of the normality test indicate that the data conform to the assumption of normal distribution.

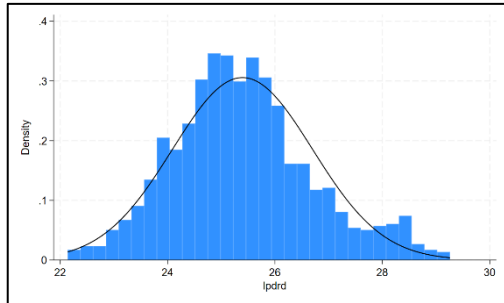


Figure 4. Distribution of the Average Log of LTRR Revenue Across Regencies/Cities

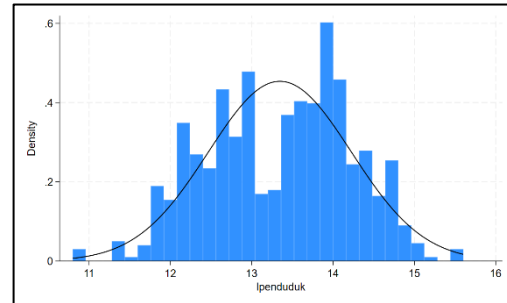


Figure 5. Distribution of the Average Log of Population Across Regencies/Cities

The first diagnostic test conducted examines whether the data are normally distributed. Two variables were found not to satisfy the normality assumption required for Ordinary Least Squares (OLS) regression at the initial stage, namely the average Local Taxes and Retributions Revenues and the average population of regencies/municipalities across the ten observed provinces. Figures 2 and 3 illustrate that these variables are not normally distributed. Consequently, a logarithmic transformation was applied, after which the variables satisfied the normality assumption, as shown in Figures 4 and 5. The results of the normality test indicate that the data conform to the assumption of normal distribution.

Table 2. Variables VIF Score

Variable	VIF	1/VIF
DiD	4.73	0.211313
HKPD Law	3.73	0.267844
RFC	2.67	0.374489
Log Pop	1.66	0.601909
Mean VIF	3.20	

Tests for heteroskedasticity and autocorrelation were conducted by comparing the REM regression results estimated with conventional standard errors and those estimated using robust standard errors and a clustered variance–covariance estimator (VCE cluster). The comparison shows no significant differences in the coefficient of determination, Prob > χ^2 , estimated coefficients, or p-values for each explanatory variable. These findings suggest that the regression model is stable and free from heteroskedasticity and autocorrelation issues. Test on VIF shows that the score is still below 10 for each variable so there is no problem. Based on the correlation tests conducted among the variables, no variable was found to have a coefficient above 0.8; therefore, all variables are free from symptoms of multicollinearity.

Table 3. Variables Correlation Matrix

Variable	Log LTRR	HKPD Law	RFC	DiD	Log Pop
Log LTRR	1.0000				
HKPD Law	0.1175	1.0000			
RFC	0.6066	0.0000	1.0000		
DiD	0.3790	0.7598	0.4597	1.0000	
Log Pop	0.7743	0.0211	0.6306	0.3038	1.0000

Test of data panel was conducted to determine the most appropriate analytical model for the use of panel data, namely the Chow Test (CEM vs. FEM), the Lagrange Multiplier Test (CEM vs. REM), and the Hausman Test (REM vs. FEM). Based on the results of the Chow Test, the probability value was greater than the F-statistic (Prob > 0.000), indicating that the Fixed Effects Model (FEM) was preferred. Furthermore, the Lagrange Multiplier test yielded a probability value greater than the chi-bar-square statistic (0.000), suggesting that the Random Effects Model (REM) was more appropriate than the Common Effects Model (CEM). In the Hausman test, the probability value exceeded the chi-square statistic (Prob > χ^2 = 0.9711), indicating that the REM was preferable to the FEM.

Accordingly, this study employs the Random Effects Model (REM) to analyze the effects of the implementation of the Law on Financial Relations between the Central and Local Governments, fiscal capacity, and the Difference-in-Differences (DiD) approach on local tax and retribution revenues across districts/municipalities in ten provinces in Indonesia. According to Gujarati & Porter (2009), GLS is a transformation of the Ordinary Least Squares (OLS) method that satisfies the fundamental assumptions of the least squares framework and is regarded as a BLUE, as it produces efficient standard error estimates.

Descriptive Statistics

The treatment group consists of 153 regencies/cities, while the control group comprises 56 regencies/cities. The variables LTRR and Population have been transformed into logarithmic form to normalize their distribution. Overall, the descriptive statistical summary of the collected data, namely the logarithm of LTRR revenue, the distribution of regional fiscal categories, and the logarithm of population size is presented in Table 4.

Table 4. Descriptive Statistics

Variable		Mean	Std.Dev	Min	Max	Obs
Log of LTRR	Overall	25.395	1.305	22.139	29.257	N=1254
	between		1.27	22.497	29.099	n=209
	within		0.307	24.419	27.117	T=6
HKPD Law	Overall	0.5	0.5	0	1	N=1254
	between		0	0.5	0.5	n=209
	within		0.5	0	1	T=6
RFC	Overall	0.732	0.443	0	1	N=1254
	between		0.443	0	1	n=209
	within		0	0.732	0.732	T=6
DiD	Overall	0.366	0.481	0	1	N=1254
	between		0.221	0	0.5	n=209
	within		0.427	-0.133	0.866	T=6
Log Pop	Overall	13.345	0.879	10.798	15.601	N=1254
	between		0.88	10.876	15.542	n=209
	within		0.035	13.088	13.544	T=6

Parallel Trend Test

To ensure the validity of the Difference-in-Differences (DiD) estimation, the study verifies the parallel trends assumption. Specifically, the 'Observed Means' plot in Figure 6 reveals that during the 2019-2021 period, both the treatment and control groups exhibited nearly identical movement patterns in LTRR maintaining a consistent gap between their respective means. This constant distance indicates that both groups were influenced by similar macroeconomic factors prior to the enactment of Law No. 1 of 2022.

Furthermore, the 'Linear-trends model' aligns both trajectories during the pre-policy phase, confirming that the slopes of their growth paths were statistically equivalent. A notable change is observed only after the vertical treatment line in 2021, where the high fiscal capacity group shows a steeper upward trajectory compared to the control group. The pattern after 2021 reflects a Difference-in-Differences effect, where regions with stronger fiscal capacity experienced faster LTRR growth due to the policy intervention. This visual trend is also proven by formal statistical testing. As presented in Table 5, the parallel-trend test yields a p-value of 0.6349, which significantly exceeds the conventional 0,05 significance threshold. This result implies a failure to reject the null hypothesis (H_0), thereby confirming that no significant difference in trends between the treatment and control groups before the intervention. In other words, both groups were moving in a similar way prior to the policy, which supports the parallel trends assumption in the Difference-in-Differences approach. This suggests that any changes observed after the intervention are more likely due to the policy rather than pre-existing differences.

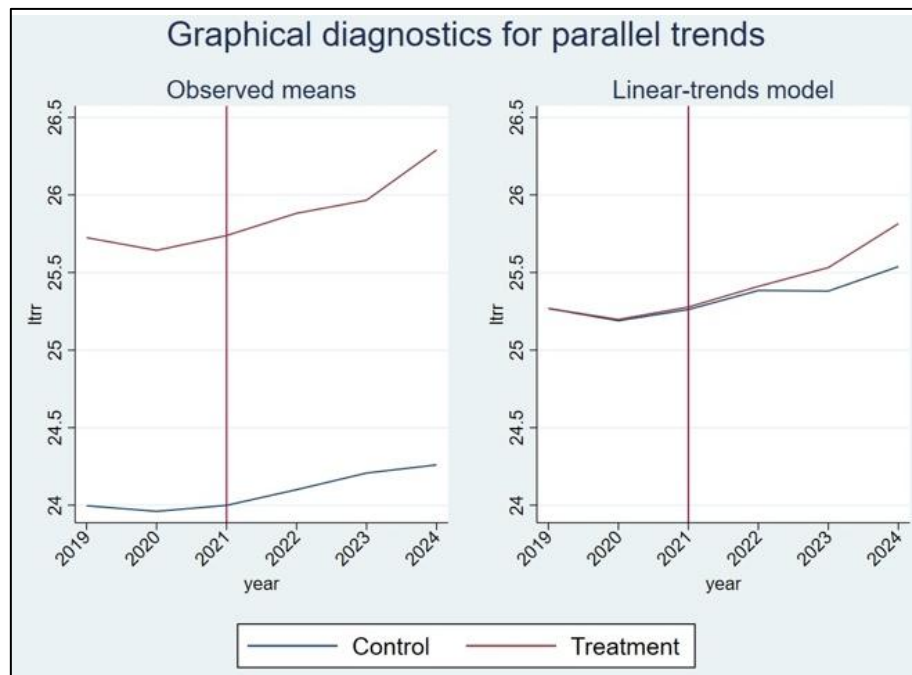


Figure 6. Visual Parallel Trend Test

Furthermore, this result is supported by the Granger Causality test, which yields a p-value of 0.2459 ($p > 0,05$), indicating no significant predictive relationship between the variables. This finding is important as it verifies that there are no significant anticipation effects prior to the actual implementation of Law No. 1 of 2022. In modern econometric literature, satisfying this parallel trends assumption and ruling out anticipatory behavior is the fundamental prerequisite for establishing a valid causal interpretation in a Difference-in-Differences framework (Roth et

al., 2023). In other words, local government did not change their fiscal behavior before the policy in a way that influenced the LTRR. Overall, these results support the internal validity of the model and suggest that the parallel trends assumption is satisfied. Therefore, the DiD results likely reflect the causal effect of fiscal capacity classification, rather than being driven by pre-existing differences or other external factors.

Table 5. Parallel Trends and Granger Causality Test Results

Test	Statistic (F)	P Value	Conclusion
Parallel-Trend Test	0.23	0.6349	Assumption Satisfied (Homogeneous Pre-treatment Trends)
Granger Causality Test	1.41	0.2459	Assumption Satisfied (No Anticipation Effect)

Estimation Results

Overall, all independent variables exhibit statistically significant effects at the 1 percent level on the LTRR across the sampled provinces. The HKPD Law variable records a coefficient of 0.155 with a standard error of 0.031, the regional fiscal capacity variable shows a coefficient of 0.518 with a standard error of 0.150, the DiD interactions term has a coefficient of 0.157 with a standard error of 0.036, and the logarithm of population variable yields a coefficient of 0.950 with a standard error of 0.073.

Table 6. Estimation results of the effect of HKPD Law, RFC, DiD, Pop on Log LTRR

Variable	Coefficient	Conversion to LTRR effect (not in log)	P-value	Support for Hypotheses
HKPD Law	0.155*** (0.031)	$(e^{0.155}-1) \times 100\%$ = 16.85%	0.000 (Significant)	H1 Supported
RFC	0.518*** (0.150)	$(e^{0.518118}-1) \times 100\%$ = 67.86%	0.001 (Significant)	H2 Supported
DiD	0.157*** (0.036)	$(e^{0.15767}-1) \times 100\%$ = 17.08%	0.000 (Significant)	H3 Supported
Pop (Log)	0.950*** (0.073)	Log-log specification; Coefficient represents elasticity (95%)	0.000 (Significant)	
Constant	12.19*** (0.913)	Not economically interpreted	0.000 (Significant)	
R-squared:	0.634			
No of Observation	1254			
No of groups	209			
chi2	768.66			
Prob > chi2	0.0000			

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Since the dependent variable, local tax and retribution revenues (LTRR), is specified in logarithmic form, the coefficients of dummy variables, namely the HKPD Law, fiscal capacity, and DiD interactions, cannot be interpreted as absolute changes in revenue levels. Instead, these coefficients capture proportional changes in local tax and retribution revenues, which

require exponential transformation using the formula $(e^{\beta} - 1) \times 100\%$. By contrast, the population variable is also expressed in logarithmic form; therefore, its coefficient can be directly interpreted as an elasticity, indicating the percentage change in local tax and retribution revenues associated with a one-percent change in population. Table 6 reports the estimation results of the effects of the HKPD Law, fiscal capacity, DiD interactions, and population on local tax and retribution revenues using the Random Effects Model.

After applying the exponential transformation, the coefficient of the HKPD Law variable corresponds to an increase of approximately 16.85 percent in local tax and retribution revenues following the enactment of the HKPD Law. This result indicates that the implementation of the fiscal decentralization reform is associated with a positive aggregate effect on local revenue performance. The regional fiscal capacity variable yields an estimated effect of approximately 67.86 percent, indicating that districts and municipalities with medium-to-high fiscal capacity generate substantially higher local tax and retribution revenues compared to regions with low fiscal capacity, *ceteris paribus*. This finding highlights the structural importance of fiscal capacity in shaping local revenue outcomes and suggests that regions with stronger fiscal bases are better positioned to capitalize on fiscal decentralization reforms. Furthermore, the positive and statistically significant DiD coefficient implies that the HKPD Law produced an additional increase of approximately 17.08 percent in LTR revenues in the treated regions relative to the control group after the policy was implemented. This result provides evidence of a positive differential policy impact, suggesting that the HKPD reform has not only increased revenues in aggregate but has also generated stronger gains in regions subject to the treatment.

Finally, the coefficient of the logarithm of population is estimated at 0.950, indicating that a 1 percent increase in population is associated with an increase of approximately 0.95 percent in local tax and retribution revenues. This near-unit elasticity underscores the strong linkage between demographic scale and local revenue-generating capacity. The overall R-squared value of 0.634 suggests that approximately 63 percent of the variation in local tax and retribution revenues is explained by the HKPD Law, fiscal capacity differences, the DiD effect, and population size, indicating a strong explanatory performance of the model. The remaining 37 percent is attributable to other factors not captured within the specified model.

5. Discussion

5.1. Effect of the HKPD Law on Local Revenue Performance

Fiscal decentralization in Indonesia has been implemented since 2001; however, its impact on local government revenues remains uneven due to pronounced geographical and socio-economic disparities across regions. Own-source revenues, particularly local taxes and retributions, continue to vary widely, reflecting differences in economic bases and administrative capacity. As a result, regional fiscal autonomy remains relatively limited. In response to these persistent challenges, the central government enacted Law No. 1 of 2022 (HKPD Law), which aims to strengthen local governments' capacity to mobilize and optimize their revenue potential through a more harmonized fiscal framework.

The empirical results of this study indicate that the implementation of the HKPD Law has generated a positive and statistically significant effect on local tax and retribution revenues across the sampled provinces. This finding supports H1, which posits that the HKPD Law has a significant effect on local revenue performance. This outcome is consistent with the primary objectives of the HKPD Law, particularly in improving fiscal administrative efficiency. The observed increase in local tax and retribution revenues, ranging from approximately 16,85 percent, reflects a substantial improvement in administrative efficiency following the implementation of the HKPD Law. The law consolidates several types of local taxes and

retributions into a simpler structure, such as the merger of hotel and restaurant taxes into the Specific Goods and Services Tax, as well as the integration of advertisement taxes with street lighting taxes. This simplification has reduced overlaps in tax objects, accelerated administrative processes, and lowered the administrative costs of taxation.

In addition, HKPD Law also expands the tax base and enhancing taxpayer compliance. The HKPD Law also broadens the tax base by integrating population identification data (National Identification Number/NIK), electronic transaction records, and property data. This integration enhances local governments' capacity to identify potential taxpayers who were previously unregistered. The increase in local tax and retribution revenues reflects not only higher transaction volumes and adjustments in tax rates, but also improved taxpayer compliance. Several districts and municipalities have implemented integrated digital payment systems, which have further encouraged taxpayers to accurately fulfill their fiscal obligations. The modernization of regional tax administration through digital channels reduces compliance costs and significantly boosts revenue mobilization (Okunogbe & Santoro, 2023).

These findings are consistent with the study by Cahyadi *et al.* (2023) and Peprah *et al.* (2025), which demonstrates that reforms and modernization of the tax system contribute significantly to increased tax revenues. Similarly, Purba & Salomo (2024) argues that the simplification of tax structures, consistent with the principles later embodied in the HKPD Law, can enhance taxpayer compliance and administrative efficiency, ultimately improving local tax administration. The results of this study also support the theory of fiscal federalism (Oates, 1999), which emphasizes the importance of a clear allocation of fiscal authority between central and local governments in order to achieve efficiency in public service provision. The reforms introduced through the HKPD Law represent a concrete application of the subsidiarity principle as articulated by Musgrave (1959), whereby resource allocation authority is delegated to subnational governments to enhance fiscal effectiveness.

Furthermore, this study reinforces public finance theory, which posits that improvements in administrative efficiency can reduce the tax effort required to generate each unit of tax revenue (Musgrave & Musgrave, 1989), thereby promoting an increase in net local revenues. This empirical evidence is particularly pronounced in provinces and districts/municipalities with relatively high fiscal capacity, such as North Sumatra, DKI Jakarta, and Banten. The HKPD Law is structured around four main pillars: enhancing local taxes and retributions, improving the quality of local government expenditure, strengthening institutional capacity, and reducing vertical and horizontal fiscal imbalances. The successful implementation of these four pillars is highly dependent on the conditions and capabilities of local governments. Among these pillars, two are of particular significance for local governments, namely the quality of public spending and the enhancement of local tax and retribution revenues. Overall, it can be concluded that the fiscal policy framework established under the HKPD Law has, in aggregate, contributed to an increase in own-source revenues through mechanisms that strengthen fiscal governance, expand the tax base, and harmonize local tax regulations.

5.2. Effect of Fiscal Capacity on Local Revenue

Consistent with the initial research hypothesis and the broader empirical literature, the results of this study confirm that regional fiscal capacity has a strong and positive effect on local tax and retribution revenues. This finding supports H2, indicating that fiscal capacity is a key determinant of local revenue performance. The estimated coefficient indicates that districts and municipalities with medium to high fiscal capacity generate approximately 67.86 percent higher local tax and retribution revenues than regions with low fiscal capacity, holding other factors constant. This finding underscores the structural importance of fiscal capacity as a key determinant of local revenue performance.

According to Bahl & Bird (2018), a region's fiscal capacity is shaped by its economic potential, natural resource endowments, and the design of central government policies, all of which contribute to fiscal asymmetries across regions. In the Indonesian context, these asymmetries are reflected in fiscal transfer mechanisms that complement local revenue capacity by supporting regions with lower fiscal potential. However, since intergovernmental transfers can inadvertently dampen regional tax efforts (Mauri & Peter, 2025), regions with stronger fiscal capacity possess inherent advantages in mobilizing local revenues through more effective tax administration and broader tax bases.

This interpretation is consistent with Nursini & Tawakkal (2019), who argue that fiscal capacity is a key determinant of the success of fiscal decentralization and long-term regional fiscal autonomy. Regions with higher fiscal capacity are better positioned to implement regulatory reforms, adopt administrative innovations, and internalize changes in fiscal policy frameworks such as those introduced under the HKPD Law. Moreover, Alm & Farooq (2024) emphasize that clear and well-defined fiscal regulations play a crucial role in improving tax collection performance. Robust regulatory frameworks provide legal certainty, reduce ambiguity in tax administration, and help close enforcement gaps that may otherwise lead to inefficiencies within the tax system. In this regard, the HKPD Law strengthens the legal foundation for local governments to optimize Own-Source Revenue through a taxation system that is simpler, more transparent, and more accountable.

5.3. Heterogeneous Effects of the HKPD Law

The statistically significant Difference-in-Differences (DiD) interaction effect indicates that the impact of the HKPD Law on local government revenues is heterogeneous across regions, depending on the level of fiscal capacity in each jurisdiction. Regions with higher fiscal capacity are better able to capitalize on the implementation of the HKPD Law, while regions characterized by weaker fiscal institutions tend to experience more limited revenue responses. This disparity underscores a fundamental insight in public finance literature, which demonstrates that while tax decentralization can enhance local efficiency, its revenue benefits are inherently asymmetrical and heavily skewed toward jurisdictions with stronger initial economic and institutional endowments (Bellofatto & Besfamille, 2021). This finding is also consistent with the study by Fisman & Gatti (2002), who emphasize that institutional capacity plays a crucial role in determining the effectiveness of fiscal decentralization policies.

Within the context of the HKPD Law, fiscal capacity reflects not only revenue potential, but also administrative capability, the quality of tax officials, and the robustness of fiscal governance systems that support policy implementation. This aligns with broader evidence suggesting that good governance is a fundamental prerequisite for maximizing the regional development benefits of fiscal decentralization (Onofrei et al., 2022). Regions with more professional tax administrations and well-developed fiscal data infrastructure are therefore able to adapt more rapidly to regulatory changes and translate fiscal reforms into tangible revenue gains. This interpretation aligns with Fjeldstad & Moore (2008), who underscore that the success of fiscal reforms depends strongly on the integrity of tax administration and the legitimacy of local governments in the eyes of citizens, which in turn enhances taxpayer compliance and revenue sustainability.

In addition, Choi (2021) and Sakti et al. (2024) note that regions with higher fiscal capacity tend to enjoy greater autonomy in managing development priorities and revenue sources, whereas regions with lower fiscal capacity remain more dependent on central government support and face institutional constraints. These differences help explain why the revenue effects of the HKPD Law are not evenly distributed across regions in Indonesia. From a policy perspective, this finding underscores the importance of incorporating asymmetric

implementation strategies into fiscal reforms. Targeted technical assistance, fiscal incentives, and institutional capacity-building measures are therefore essential to ensure that all regions can benefit more equitably from the HKPD reform.

5.4. Role of Population as a Control Variable

This study also incorporates population as a control variable, which is found to make a substantial contribution to local government revenues. The estimation results demonstrate that larger populations are associated with greater opportunities for increasing local revenues derived from taxes and retributions. As population size increases, the potential tax base that can be mobilized by local governments also expands.

This finding supports the argument of Martinez-Vazquez & McNab (2003), who emphasize that population size is a key determinant of fiscal capacity, as it influences economies of scale and the volume of regional economic activity. Larger populations are associated with greater revenue potential from property taxes, motor vehicle taxes, and local consumption taxes. In the Indonesian context, regions with large populations, particularly those located on Java Island, tend to generate higher levels of own-source revenue compared to less populous regions, which generally remain more dependent on central government fiscal transfers. These results are further reinforced by studies conducted by Yuliadi (2023) in Indonesia as a whole country and William & Harjanto (2024) in Banten, all of which demonstrate that population growth has a positive effect on local tax revenues.

From a fiscal policy perspective, these findings indicate that local revenue planning should explicitly incorporate demographic factors as a foundation for assessing tax potential. Regions with larger populations possess greater opportunities for tax optimization. As population density increases, the diverse policy choices and fiscal behaviors of local governments become instrumental in capturing localized economic rents (Agrawal et al., 2022). However, they also require efficient administrative systems to prevent revenue leakages. Within the context of the HKPD Law, policies that strengthen population data systems and promote the integration of population-based taxation are likely to play a critical role in supporting increases in local tax and retribution revenues (PDRD). Accordingly, these findings underscore the importance of the demographic dimension in analyzing regional fiscal capacity. Population size should be viewed not only as an indicator of fiscal burden, but also as a source of fiscal potential. Therefore, local fiscal management that is adaptive to demographic dynamics constitutes a key factor in enhancing the success of fiscal decentralization and the effectiveness of HKPD Law implementation.

6. Conclusion

The implementation of the Law on Financial Relations between the Central and Local Governments has been shown to have a positive and statistically significant effect on increasing local tax and retribution revenues. This finding confirms that the reform of central–local fiscal relations under the HKPD Law has been effective in promoting the optimization of own-source revenues and strengthening regional fiscal autonomy. However, regional fiscal capacity emerges as a key determinant of LTRR performance, with regions possessing higher fiscal capacity consistently generating a larger share of LTRR. This indicates that the effectiveness of national fiscal policies is highly contingent upon initial fiscal conditions and the structural capacity of regions, such that uniform policy implementation may lead to uneven outcomes.

Furthermore, the impact of the HKPD Law exhibits significant heterogeneity across different levels of fiscal capacity, with stronger effects observed in regions with higher fiscal capacity. The policy implications of these findings suggest that regulatory reforms must be accompanied by strategies aimed at strengthening regional fiscal capacity in order to avoid

exacerbating horizontal fiscal disparities. Accordingly, the implementation of the HKPD Law should be supported by enhanced administrative capacity in LTRR management, improvements in the quality of human resources, and more differentiated policy approaches. These may include performance-based incentive schemes and more intensive technical assistance for regions with lower fiscal capacity, to ensure that the benefits of the reform are distributed more equitably and sustainably.

7. Implication of research

The implication of this research is that regulatory reforms should be complemented by policies that strengthen regional fiscal capacity, so that the reforms do not unintentionally widen horizontal fiscal disparities among regions. In this context, the implementation of the HKPD Law needs to be supported by improvements in administrative capacity for managing LTRR, as well as by efforts to enhance the quality of human resources at the regional level. In addition, more differentiated policy measures are required, such as performance-based incentive mechanisms and more targeted technical assistance for regions with relatively lower fiscal capacity. These measures are important to ensure that the outcomes of the reform can be distributed more fairly and sustained over the long term. Practically, this study offers guidance for policymakers in designing decentralization reforms that balance efficiency with equity. It highlights the importance of aligning regulatory changes with institutional readiness at the subnational level, particularly in developing countries with different regional capacities. Theoretically, this research contributes to the fiscal decentralization literature by highlighting the role of administrative capacity as a key factor shaping distributional outcomes. It extends existing frameworks by demonstrating that without complementary capacity-building measures, decentralization policies may produce unequal development effects across regions. More broadly, the findings are relevant for other developing countries, emphasizing that without capacity strengthening, decentralization reforms risk exacerbating regional inequality.

8. Limitation of study and future research

This study has several limitations that should be acknowledged. First, the scope of the analysis is limited to ten provinces in Indonesia. While these provinces provide useful insights into the research topic, they may not fully represent the diverse economic, social, and institutional conditions across all regions of Indonesia. Second, the time horizon of the analysis remains relatively short, particularly in capturing the post-reform period following the implementation of the HKPD Law. A limited post-treatment window may constrain the ability to fully observe the dynamic effects of the reform and may weaken the robustness of the causal interpretation derived from the Difference-in-Differences (DiD) approach.

Therefore, future research is encouraged to expand the geographical coverage by including a larger number of provinces in Indonesia. A broader dataset would allow for a more comprehensive analysis and provide a deeper understanding of regional variations. In addition, future studies should consider extending the observation period to incorporate a longer post-reform window, which would enable a more robust assessment of the persistence and dynamics of policy effects, as well as strengthen the causal interpretation of the empirical findings. The inclusion of additional control variables may also further enrich the analysis.

Authors' contributions and responsibilities

Author 1 was responsible for developing the analytical framework and contributed to the conceptualization of the study. In addition, Author 1 was involved in writing the manuscript and reviewing the draft to ensure the coherence and quality of the overall paper. Author 2 contributed primarily to the methodological design of the study and conducted the data collection process.



Author 2 also participated in preparing the initial version of the manuscript by writing the original draft. Author 3 was responsible for providing the research resources and conducting the literature review to support the theoretical foundation of the study. Furthermore, Author 3 contributed to reviewing and improving the manuscript draft. Author 4 carried out the formal analysis and was responsible for data curation to ensure the accuracy and consistency of the dataset used in the study.

Competing interests

The authors declare no conflict of interest with respect to the research and publication of this article.

Data availability statement

The data is available upon request to the corresponding author.

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