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Village fiscal transfers and poverty alleviation in Java: Evidence from panel data analysis

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ABSTRACT

Poverty remains a persistent challenge in economic development and a central concern of Sustainable Development Goal 1. Although previous studies have examined the relationship between village fiscal transfers and poverty, most focus on a single transfer instrument and rarely assess village funds, village fund allocation, and local tax and retribution revenue sharing simultaneously over an extended period. This study examines the association between these three fiscal transfer instruments and poverty across 79 districts in Java from 2016 to 2023 using a balanced eight-year panel dataset. A fixed-effects model is employed, supported by descriptive statistics, panel-data diagnostic tests, hypothesis testing, and robustness checks. The results show that all three fiscal transfer instruments are significantly and negatively associated with poverty. village funds exhibit the strongest association, with a coefficient of -0.109, followed by local tax and retribution revenue sharing (-0.036) and village fund allocation (-0.014). The model is jointly significant, with an F-statistic of 173.344 ($p < 0.001$), while the adjusted R-squared of 0.957 indicates strong overall model fit, although part of this explanatory power reflects unobserved, time-invariant district characteristics captured by fixed effects. The negative associations remain robust after correcting for cross-sectional dependence using robust standard errors and after separate estimations for the pre- and post-COVID-19 periods. These findings suggest that strengthening village fiscal transfers, particularly village funds, alongside improved governance, transparency, accountability, and community participation, can support poverty reduction and help narrow regional disparities across Java. The study provides empirical evidence for designing more effective and equitable intergovernmental fiscal policies.

1. Introduction

Poverty is still a major issue in economic development. This is clear from its place as the first goal in the Sustainable Development Goals (SDGs), which aim to end extreme poverty by 2030 (United Nations, 2025). Global extreme poverty fell from 36% in 1990 to 9% in 2022, but progress has slowed recently because of the COVID-19 pandemic, ongoing conflicts, and climate change (United Nations, 2024). Indonesia, which has the fourth-largest population in the world, faces similar challenges in poverty reduction, and these efforts are further complicated by persistent regional disparities. The Central Statistics Agency reports that Indonesia's poverty rate dropped from 10.70% in September 2016 to 9.03 percent in 2024; nevertheless, substantial gaps persist between Java and other islands, as well as between urban and rural areas (BPS, 2024).

Figure 1 shows poverty trends in Java Island from 2016 to 2025 using the most recently available BPS data, providing broader context for the 2016–2023 study period analyzed in this paper. Poverty

in java generally declined between 2016 and 2025, although a temporary increase occurred during the COVID-19 pandemic before returning to a downward trajectory. As of March 2024, Java Island accounted for 52.59 percent of Indonesia's total poor population, even though the island's own poverty rate remained comparatively moderate. This pattern can be clarified by comparing Java's share of the national population with its share of the national poor population. As of mid-2024, Java Island was home to approximately 55.93 percent of Indonesia's total population, yet contributed 52.59 percent of the nation's poor population a share that is, in fact, slightly lower than its population share. If poverty were distributed proportionally to population size, Java's contribution to national poverty would mechanically be expected to be at least as large as its population share, simply because a larger population base produces a larger absolute number of poor individuals even at an average poverty rate. The fact that Java's poverty share (52.59 percent) falls slightly below its population share (55.93 percent) therefore suggests that poverty in Java is, if anything, somewhat less concentrated than population size alone would predict, reinforcing that Java's large absolute contribution to national poverty reflects demographic scale rather than an exceptionally severe poverty incidence within the island itself. Meanwhile, within Java, the gap between the rural poverty rate (11.79 percent) and the urban poverty rate (7.09 percent) remains substantial (BPS, 2024). These findings align with those of Muta'ali et al (2024), who argue that proximity to economic growth centers does not necessarily correlate with equitable welfare outcomes, underscoring the need for more precise fiscal policy interventions, particularly through enhanced transfers to villages (Muta'ali et al., 2024).

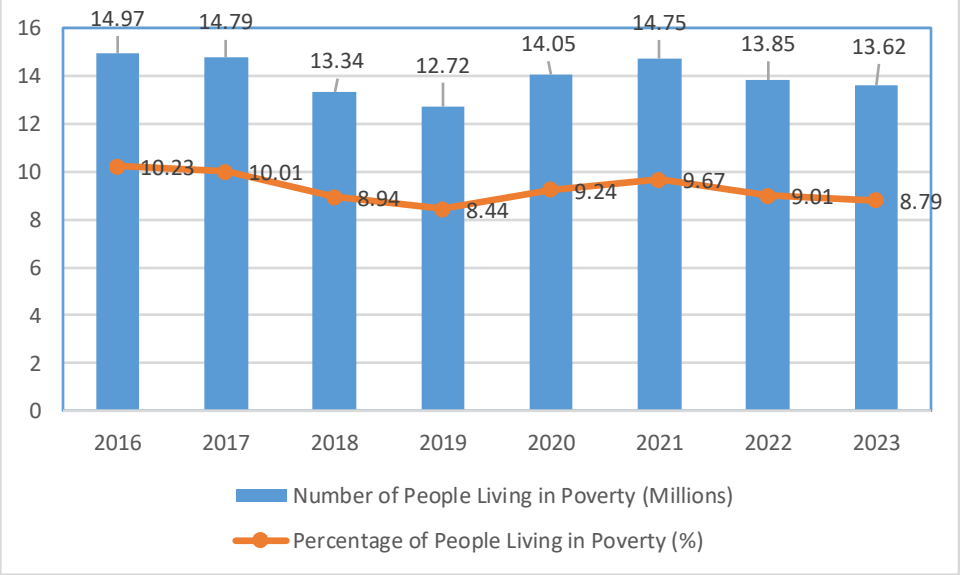

Figure 1. Poverty Dynamics in Java Island Period 2016-2025

The Indonesian government used fiscal decentralization to help overcome these problems by introducing the Law No. 6 of 2014 on Villages that will raise the amount of autonomy of the villages as the lowest administrative unit (Jenar et al., 2024). The policy is offered on three fiscal transfer systems in which, the village fund is provided under the state budget; the village fund allocation which is composed of at least 10 percent of the district balance fund; and the regional tax and retribution revenue sharing that is made up of at least 10 percent of the realised revenue. Government commitment to village development is reflected in the continuous increase in village funds, which reached IDR 624 trillion cumulatively during 2015–2024 (Direktorat Jenderal Perbendaharaan, 2024). This allocation underscores the position of villages as key stakeholders in national development and poverty alleviation efforts. However, despite this substantial increase in village fiscal transfers over the past decade, the reduction in rural poverty has not been proportionally significant, suggesting that the mere existence of fiscal transfers does not automatically translate into effective poverty alleviation outcomes.

Village fiscal transfers may influence poverty reduction through several mechanisms. Fiscal transfers provide villages with additional financial resources to improve infrastructure, expand access to public services, support local economic activities, and implement community empowerment programs (Wakhid et al., 2025). These interventions can enhance productivity, create employment

opportunities, increase household income, and ultimately reduce poverty. However, the effectiveness of fiscal transfers is not guaranteed. According to Fiscal Federalism Theory, decentralization allows local governments to allocate resources more efficiently because they possess better information about local needs (Wang et al., 2024). In contrast, Agency Theory suggests that fiscal transfers may fail to achieve their objectives when local governments face governance problems such as weak accountability, limited administrative capacity, elite capture, or inefficient budget management (Salomo & Rahmayanti, 2023). This theoretical tension indicates that the relationship between village fiscal transfers and poverty reduction remains an empirical question that requires further investigation.

Although the government has invested substantially in village fiscal transfers, empirical research has yet to converge on clear evidence regarding their impact on poverty. Several studies assert that village funds can reduce poverty through employment generation and infrastructure improvement (Ajija & Solikah, 2022; Karim et al., 2024; Marhaeni et al., 2024). Conversely, other research shows that the effectiveness of such transfers depends heavily on local institutional capacity. Kadafi et al (2020) found that the impact of the village fund tends to be limited in regions characterized by weak governance. Madyan et al (2020) and Siburian (2020) emphasizes the importance of accountability, transparency, and community participation in facilitating effective fund transfers. Allign with Jumaiyah & Wahidullah (2019) founds the suboptimal management of village funds to low competency among village officials, ineffective activity planning, and weak monitoring mechanisms. These findings collectively demonstrate that, although village fiscal transfer policy holds considerable potential, structural and managerial constraints at the village level continue to impede its full implementation.

Recent empirical studies have provided mixed findings regarding the impact of village fiscal transfers on poverty levels. Research conducted by Kamuli et al (2023) argued that village funds play a significant role in reducing poverty through infrastructure development and local economic empowerment. For instance, Putra (2022) found that village fund programs contribute to poverty reduction by increasing rural employment and household consumption. On the other hand, other studies emphasize that the effectiveness of such transfers is highly dependent on governance quality, transparency, and institutional capacity at the village level (Liani et al., 2024). Furthermore, some findings indicate that the impact of fiscal transfers may vary across regions due to differences in administrative performance and local economic conditions (Saskia, 2026).

These mixed findings, however, do not in themselves constitute a research gap; rather, they point toward three specific and unaddressed shortcomings in the existing literature. First, the majority of prior studies examine village fiscal transfer instruments in isolation—typically focusing on the village fund alone—without jointly modeling the village fund, village fund allocation, and regional tax and retribution revenue sharing within a single empirical framework (Anam et al., 2023). This fragmented approach precludes any assessment of which instrument contributes most substantially to poverty reduction, or whether these instruments interact in complementary or substitutive ways. Second, to the best of our knowledge, relatively few studies have empirically examined the combined effect of these three instruments using panel data from Java Island districts during the post full implementation period of the Village Law (2016–2023), suggesting a spatial and temporal gap in the literature that this study seeks to address. Third, and relatedly, most existing studies rely on short observation windows—typically spanning one to three years—which are insufficient to capture the lagged and cumulative effects that fiscal transfers are theoretically expected to generate over the medium term (Siburian, 2022). Collectively, these three gaps suggest that the relative effectiveness of village funds, village fund allocation, and regional tax and retribution revenue sharing, when analyzed jointly over a sufficiently long time horizon, has received comparatively limited empirical attention.

This study addresses these gaps by offering several contributions relative to previous research. First, it jointly analyzes three major village fiscal transfer instruments village funds, village fund allocation, and regional tax and retribution revenue sharing within a single empirical model, rather than examining them in isolation. Second, it focuses on Java Island as a strategically important region characterized by high population density and significant poverty disparities. Third, it employs an eight-year balanced panel dataset (2016–2023), which is longer than the observation windows used in most prior studies and therefore better suited to capturing medium-term cumulative effects. Finally, by applying a Fixed Effects Model, this study controls for unobserved heterogeneity across

districts, thereby providing more robust empirical evidence on the effectiveness of village fiscal transfers in reducing poverty.

this study aims to examine the effects of village funds, village fund allocation, and regional tax and retribution revenue sharing on poverty levels across 79 districts in Java Island during the period 2016–2023, using a Fixed Effects Model applied to a balanced panel dataset. The analysis focuses on districts given their predominantly rural character, where village fiscal transfer programs are most intensively implemented. Based on the research gaps identified above, this study seeks to answer the following research questions: (1) How do village funds, village fund allocation, and regional tax and retribution revenue sharing individually affect poverty levels in Java Island districts during 2016–2023? (2) Which of these three village fiscal transfer instruments exhibits the strongest poverty-reducing effect? By answering these questions, this study is expected to make three contributions: identifying the relative effectiveness of each fiscal transfer instrument, providing empirical evidence on the medium-term impact of village fiscal transfer policy, and offering policy recommendations to optimize the design and allocation of fiscal transfers for more effective and sustainable poverty reduction at the sub-national level.

2. Literature Review

2.1. Theoretical Framework

Fiscal Federalism Theory, developed by Oates (1999), holds that overall public spending becomes more effective when local governments manage it, because local governments are better positioned than the central government to identify and respond to the specific needs and preferences of their communities, operating in closer proximity to residents and possessing more granular information about local conditions. As observed in the Decentralization Theorem, local government provision is also superior to uniform central provision for goods whose benefits are confined to a specific region. This informational advantage translates into two concrete efficiency gains that are particularly relevant to poverty reduction. First, it improves allocative efficiency in public spending: because village governments can directly observe which households are poor and which infrastructure is missing, they can direct fiscal transfers toward interventions with the highest marginal impact on welfare, rather than applying a uniform program designed at the central level. Second, it improves the precision of poverty targeting: local officials can identify poor households through direct observation and community knowledge, which is more accurate and less costly than the proxy indicators and periodic surveys a distant central government must rely on (Faguet & Pöschl, 2015). In Indonesia the structure is applied in the village level through the Law No. 6 of 2014 on Villages which has three category of transfers; village funds, village fund allocation and regional tax and retribution revenue sharing. Such transfers have the objective of correcting fiscal variations in the levels of government, as well as enabling equal funds in the regions (Martinez-Vazquez, 2025). The theory promotes the idea that direct remittance to the villages could be positive in an attempt to utilize the resources better on poverty reduction since the village governments are more aware of the needs in the region than the central government (Oates, 1999; Martinez-Vazquez, 2025).

However, these efficiency gains are conditional rather than automatic; they depend on how transferred funds are managed at the local level. This relationship applies to the principal-agent dynamic in the management of public funds, where the central government is the principal of the regencies, regencies are the principals of the villages, and villages are the agents of the community, as described in Agency Theory (Jensen & Meckling 1976). This layered structure may lead to agency problems, such as adverse selection and moral hazard, which manifest concretely as elite capture, when local elites redirect fiscal transfers toward projects that serve their own interests, and as budget misuse, when weak oversight allows funds to be diverted from their intended purpose (Rajala & Jalonen, 2025). Effective management can minimize these agency issues through transparency, community participation, and effective auditing systems; empirical evidence reveals that the quality of local governance is the primary determinant of the success of the village fund and village fund allocation in reducing poverty (Madyan et al., 2020). In this sense, the net effect of fiscal decentralization on poverty reduction can be understood as the product of two competing forces: the positive efficiency and targeting gains generated by superior local information, and the potential efficiency losses generated by weak accountability and elite capture. In the design of village fiscal transfers, this theory highlights the importance of checks and balances to ensure that transferred funds are channeled toward poverty reduction rather than the interests of village elites.

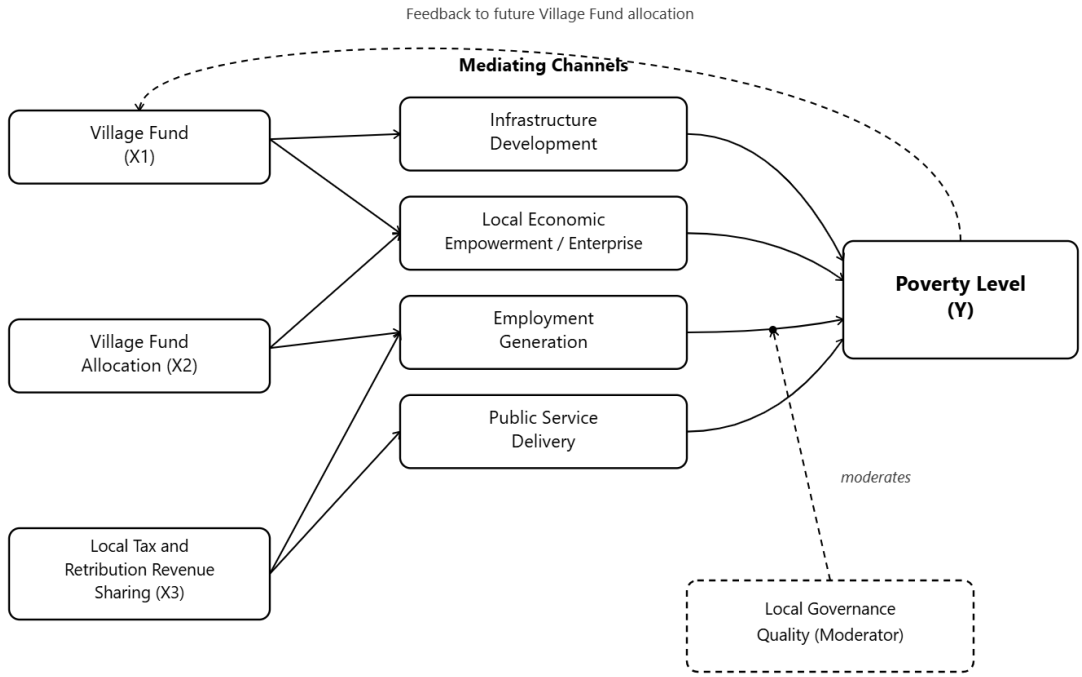

Figure 2. Conceptual Framework

Village fiscal transfers, particularly village funds, can influence poverty alleviation through both direct and indirect mechanisms. The direct mechanism operates when funds are allocated to programs that immediately improve household welfare, such as cash-for-work programs, social assistance, and basic service provision (Karnoto, 2024). The indirect mechanism operates through infrastructure development, the strengthening of local economic activity, and improvements in human capital, which raise household income and reduce poverty gradually over time (Fajri et al., 2025). This distinction matters because it implies that the poverty-reducing effect of village funds is unlikely to be fully observable within a single fiscal year; rather, it should be expected to accumulate over the medium term, which further motivates the use of multi-year panel data in this study. Recent studies provide further support for this dual-mechanism argument. According to Indartuti (2022) found that village funds enhance community economic capacity, reflecting the indirect mechanism, while Irawan (2023) emphasizes their role in improving infrastructure and local productivity, also consistent with the indirect pathway. Rammohan & Tohari (2023) found that village fund programs increase rural employment and household consumption, evidence that captures both mechanisms simultaneously. These findings reinforce the theoretical expectation that fiscal transfers at the village level can reduce poverty effectively when supported by proper governance and efficient allocation mechanisms.

Figure 2 shows the conceptual framework of this study. The three fiscal transfer instruments are hypothesized to affect poverty through four mediating channels: infrastructure development, local economic empowerment, employment generation, and public service delivery. Local governance quality is positioned as a moderating factor that determines the extent to which these mediating channels are translated into poverty reduction, consistent with the role of governance highlighted throughout the Discussion. The dashed arrow indicates that governance quality moderates the strength of the relationship between all four mediating channels and poverty outcomes collectively; it is drawn pointing toward a single representative point among the channel-to-poverty arrows for visual clarity, rather than to any one specific channel. The framework also incorporates a feedback loop specific to the village fund (X1): because a district's poverty rate is one of the explicit determinants used in the village fund allocation formula, poverty outcomes in one period influence the size of village fund transfers received in subsequent periods. This feedback mechanism does not apply to village fund allocation (X2) or local tax and retribution revenue sharing (X3), as their allocation formulas are based on district fiscal capacity and revenue-sharing principles rather than district poverty rates.

2.2. Previous Studies

The village fund is allocated using a formula that accounts for population, poverty rate, land area, and geographic difficulty, directly embedding local poverty conditions into the allocation rule rather than distributing funds uniformly—a formula design that operationalizes the poverty-targeting logic discussed above. Several studies find that village funds reduce poverty through infrastructure development, higher household consumption, and community economic empowerment (Anam et al., 2023; Rammohan & Tohari, 2023; Sari & Sunarya, 2025). These results are consistent with the efficiency argument in Section 2.1: because village funds are allocated through a need-based formula and implemented by governments with direct local knowledge, they can target spending more precisely than a centrally administered program. International evidence reinforces this pattern, showing that fiscal decentralization improves service delivery and reduces poverty when local governments have adequate administrative capacity (Bahl & Vazquez, 2022; Faguet & Pöschl, 2015; Martinez-Vazquez, 2025), consistent with the Second-Generation Theory of Fiscal Federalism's emphasis on governance as a precondition for effective transfers. the poverty-reducing effect of village funds operates through three channels: (1) productive infrastructure development that increases accessibility and reduces transaction costs; (2) economic empowerment programs that increase community production capacity; and (3) expanded basic services that support human resource development.

The village fund allocation comprises at least 10 percent of the district balance fund, net of the Special Allocation Fund. Because it is sourced from district revenue rather than the state budget, its size depends heavily on each district's fiscal capacity, producing wider disparities across districts than the nationally uniform village fund formula—implying that its poverty-reducing effectiveness should also vary more widely. Evidence supports this: effectiveness is highly contingent on governance quality, transparency, and community participation (Ardiputra et al., 2025), while implementation is often constrained by limited human resource capacity and weak accountability Warokka et al. 2025; Rusli et al., 2024) This governance-dependence is stronger than for the village fund precisely because there is no nationally standardized, need-based formula—placing more responsibility on local institutions to allocate funds appropriately, consistent with Agency Theory's prediction that longer principal-agent chains increase the risk of elite capture. Additional evidence confirms that well-managed transfers strengthen economic resilience (Huda et al., 2024) and that sound planning and monitoring are necessary for optimal outcomes (Lase et al., 2025).

Regional tax and retribution revenue sharing distributes at least 10 percent of realized district tax and retribution revenue to villages. Unlike the two instruments above, it follows a revenue-sharing rather than a need-based principle: villages that generate more tax revenue receive a larger share, so the instrument is not explicitly designed to target poverty but instead rewards villages for expanding their local tax base. Muthomi & Ndunda (2024) found that revenue decentralization is positively associated with economic growth, suggesting that greater fiscal autonomy can stimulate local economic activity that indirectly reduces poverty even without explicit targeting, while Akalbeo et al (2023) found that fiscal decentralization helps reduce structural unemployment, a key long-term driver of poverty. However, because this mechanism rewards existing tax capacity rather than need, it may disproportionately benefit already-stronger villages, widening rather than narrowing disparities (OECD, 2021; Vilela & Oplotnik, 2026) a trade-off that distinguishes this instrument from the other two and suggests its net poverty effect may be smaller or less consistent. Panggabean et al (2025) argued that fiscal capacity gains can still improve service delivery and indirectly reduce poverty, operating through the political-economic incentive Fiscal Federalism Theory predicts. villages have a direct financial incentive to support tax-base-expanding economic activity, and it is this incentive-driven activity rather than the transfer itself that is the primary channel to poverty reduction.

The hypothesis used in the study as follows:

H1 Village funds have a negative effect on poverty levels in Java Island districts.

H2 Village fund allocation has a negative effect on poverty levels in Java Island districts.

H3 Regional tax and retribution revenue sharing has a negative effect on poverty levels in Java Island districts.

3. Method

This study used a quantitative design using panel data (2016–2023) from 79 of the 85 districts in Java Island. The data combine both time-series and cross-sectional dimensions and are analyzed using panel data regression to determine the relationship between the variables. This approach allows the study to estimate the impact of fiscal transfers on poverty and to assess the strength of the relationship between the two. Descriptive statistics, panel-specific diagnostic tests (described below), the coefficient of determination, and hypothesis tests (t-test and F-test) are used to examine these relationships in detail. To estimate the relationship between village fiscal transfers and poverty levels, the following panel data regression model is specified as follows:

$$lnPov_{it} = \alpha_o + \beta_1 lnVF_{it} + \beta_2 lnVFA_{it} + \beta_3 lnRLTR_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

Where $lnPov_{it}$ is the logarithm of poverty levels in district i at time t; $lnVF_{it}$ is the logarithm of village funds; $lnVFA_{it}$ is the logarithm of village fund allocation; $lnRLTR_{it}$ is the logarithm of revenue sharing from local taxes and retributions; μ_i is the unobserved district-specific effects; ε_{it} is the error term; α_o is the constanta and $\beta_1 - \beta_3$ is the coefficient of independent variables.

Table 1. Definition of Variables

No	Variable	Definition	Measurement of Indicator	Data Source
1.	Poverty levels ($lnPov$)	Percentage of the population below the poverty line in each district per year	Headcount Index (P_0) = Percentage of poor population (Abdullah, 2022).	BPS (District/City Poverty Data and Information)
2.	Village fund ($lnVF$)	Total realisation of the village fund budget in each district per year	Total realisation of village funds per district per year (Nabilah, 2025).	BPS (Village Government Financial Statistics)
3.	Village fund allocation ($lnVFA$)	Total ADD budget distributed by the district to villages each year	Total allocation of village funds received by all towns in a district per year (Manurung et al., 2023).	BPS (Village Government Financial Statistics)
4.	Sharing of local taxes and levies ($lnRLTR$)	Realisation of the distribution of local tax and levy revenues to villages	Total realisation of regional tax and retribution revenue sharing (Rp) received by villages in a district per year (Ernansyah, 2022).	BPS (Village Government Financial Statistics)

This study intentionally does not include additional socioeconomic control variables such as regional GDP, unemployment, or education. Two considerations justify this modeling choice. First, the primary objective of this study is to isolate and compare the relative effectiveness of three related fiscal transfer instruments operating through the same village-level administrative channel, rather than to construct a comprehensive model of all determinants of poverty. Because regional economic growth and village fiscal transfers are likely to be jointly determined over time, introducing broader macroeconomic controls risks absorbing part of the variation the model is designed to explain (Bahl & Vazquez, 2022). Second, the Fifxed Effects Model already controls for all time-invariant district-specific characteristics—including geography, institutional quality, and socio-cultural factors—that would otherwise confound the estimated relationship between fiscal transfers and poverty. This parsimonious specification is consistent with comparable studies in the village fiscal transfer literature (Pesaran, 2004; Rammohan & Tohari, 2023; Sigit & Kosasih, 2020).

To provide robustness evidence supporting the model's specification without additional socioeconomic control variables, this study conducts a robustness check based on sub-period estimation. The Fixed Effects Model is re-estimated separately for two sub-periods, 2016–2019 (pre-COVID-19) and 2020–2023 (COVID-19 and post-COVID-19 recovery), a period marked by substantial macroeconomic disruption. Comparing the direction and stability of the estimated coefficients across these two sub-periods, both estimated using the same Fixed Effects specification

as the full-sample model, provides an indication of whether the omission of time-varying macroeconomic control variables materially compromises the reliability of the core findings.

Table 1 shows the primary data used in this study are secondary data obtained from official reports published by the Central Statistics Agency (BPS), covering village funds, village fund allocation, local tax and retribution revenue sharing, and poverty rates. The sample consists of a purposively selected panel of 79 districts observed from 2016 to 2023. Data on poverty were sourced from District/City Poverty Data and Information, while fiscal transfer data were sourced from Village Government Financial Statistics. All districts in Java Island were considered, and districts were selected based on the following criteria: the district represents the smallest administrative unit encompassing village governments, complete data were available for the entire 2016–2023 period, and the district met the minimum population threshold required by the national statistics agency. The data used the 85 regencies across the six provinces of Java Island, Kepulauan Seribu Regency (DKI Jakarta) was excluded a priori, as DKI Jakarta's lowest administrative units are classified as kelurahan rather than desa, and are therefore structurally ineligible to receive village fund, village fund allocation, and local tax and retribution revenue sharing transfers. Of the remaining 84 regencies, five were further excluded for two distinct reasons. First, Pati and Jombang Regencies (Central Java and East Java, respectively) were excluded because official BPS village government financial statistics did not report any of the three fiscal transfer variables for 2021, indicating that these districts did not meet the minimum data availability threshold required for inclusion in the relevant BPS publication for that year. Second, Bondowoso, Majalengka, and Sumenep Regencies (East Java, West Java, and East Java, respectively) were excluded because, although complete data were available for village funds and village fund allocation, their local tax and retribution revenue sharing was recorded as zero in official BPS publications for one or more years during 2016–2023 most notably Sumenep, which reported zero realized local tax and retribution revenue sharing in four of the eight sample years (2016–2019). Although these zero values represent genuine reported figures rather than missing observations, they are incompatible with the logarithmic transformation applied to all variables in this study, since the natural logarithm of zero is undefined. Districts with such values were therefore excluded to preserve the validity of the log-linear specification. Based on these criteria, 79 districts were selected, yielding 632 district-year observations.

Village funds and village fund allocation are both fiscal transfer instruments and are included simultaneously in the model because they represent different policy mechanisms and funding sources. Village funds are allocated directly from the central government with a pro-poor orientation, while village fund allocation originates from district budgets and depends on local fiscal capacity. Including both variables in a single model allows this study to compare their relative effectiveness in reducing poverty. Multicollinearity tests (VIF < 10) confirm that there is no strong correlation between these variables, indicating that both can be included in the model without causing estimation bias. The result contains descriptive statistics were calculated for each research variable, including the minimum, maximum, mean, median, and standard deviation. The Chow test was then used to select between the Common Effect Model and the Fixed Effect Model (p-value < 0.05), and the Hausman test was used to select between the Random Effect Model and the Fixed Effect Model (Chi-Square probability < 0.05). The Fixed Effects Model offers several advantages: it controls for unobserved heterogeneity across districts that may influence poverty but are not directly measurable, such as cultural, institutional, and geographical characteristics; it increases the number of observations, improving the efficiency and reliability of the estimates; and it accounts for time-invariant characteristics, ensuring that the estimated effects of fiscal transfers are not biased by omitted variables that are constant over time.

4. Results and Discussion

A descriptive statistical analysis was performed to provide an overview of the data distribution. Table 2 shows the average poverty is 11.48%, with a standard deviation of 3.69%, indicating that poverty rates differ across districts in Java. The village fund has an average of Rp 248 billion and a standard deviation of Rp 96.4 billion. The village fund allocation averages Rp 131 billion, with a standard deviation of Rp 51.8 billion, indicating that fiscal capacity varies across districts. The regional tax and retribution revenue sharing averages Rp 24.2 billion with a standard deviation of Rp 39.8 billion, indicating large differences in regional revenue. Table 2 shows significant disparities in both poverty levels and fiscal capacity across districts in Java. The relatively high standard deviation of poverty rates indicates that economic development is unevenly distributed, with some districts

experiencing substantially higher poverty than others. Similarly, the variation in village funds and village fund allocation suggests differences in fiscal capacity and administrative priorities among districts, which may influence the effectiveness of poverty alleviation programs.

The large disparities in regional tax and retribution revenue sharing highlights the unequal ability of districts to generate local revenue. Districts with higher local revenue tend to have greater fiscal space to support development programs, while those with lower revenue remain more dependent on central government transfers. This condition may contribute to persistent regional inequality and suggests that fiscal decentralization alone is not sufficient without strong local economic capacity. In addition, the skewness and kurtosis values indicate that the data distribution is not perfectly normal, particularly for village fund allocation and revenue sharing, which show high positive skewness and kurtosis. This implies that a small number of districts receive significantly larger fiscal transfers compared to others. Economically, this reflects structural inequality in fiscal distribution, which may affect the overall impact of fiscal transfers on poverty reduction, which may affect the overall impact of fiscal transfers on poverty reduction, particularly in regions with varying institutional capacity (Bahl & Vazquez, 2022).

Table 2. Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
Poverty (%)	11.48	10.96	3.69	4.01	24.11
Village fund (Rp billion)	248.0	243.0	96.4	12.9	589.0
Village fund allocation (Rp billion)	131.0	119.0	51.8	0.009	594.0
Local tax and levy sharing (Rp billion)	24.2	11.9	39.8	0.006	304.0
N	632	632	632	632	632

Source: data processed

A deeper cross-sectional analysis reveals substantial disparities across districts in Java. The maximum poverty rate of 24.11% indicates that certain districts still experience significantly higher levels of poverty, while the minimum value of 4.01% reflects relatively more developed districts with better economic conditions. This wide range suggests that poverty is not evenly distributed, but rather concentrated in specific regions. the distribution of fiscal transfers also varies considerably across districts. The village fund ranges from Rp 12.9 billion to Rp 589 billion, indicating differences in allocation size that may be influenced by population, geographic conditions, and policy priorities. The village fund allocation and revenue sharing variables show even greater disparities, with maximum values reaching Rp 594 billion and Rp 304 billion, respectively, while their minimum values remain extremely low. This suggests that some districts have significantly greater fiscal capacity than others. these cross-sectional differences highlight structural inequality among districts, where regions with larger fiscal transfers and stronger local revenue capacity are more likely to experience faster poverty reduction. In contrast, districts with limited fiscal resources may face constraints in implementing effective poverty alleviation programs. This condition reinforces the importance of fiscal equalization mechanisms to ensure that less developed regions are not left behind in the decentralization process (OECD, 2021).

Table 3 shows the Chow test results show a Cross-section F probability value of 0.0000 (< 0.05), so that the Fixed Effect Model (FEM) is more appropriate than the Common Effect Model (CEM). This finding indicates that district-level characteristics differ in ways that affect poverty levels and should be controlled for in the estimation model. the Hausman test has a p-value of 0.0000, which is below 0.05. This result indicates that the Fixed Effects Model (FEM) fits better than the Random Effects Model (REM). The findings suggest that the individual effects of the districts are associated with the independent variables, so FEM is needed to obtain unbiased estimates. Table 3 shows all three panel data models, namely the CEM, FEM, and REM and shows varying results in terms of coefficient magnitude and explanatory power. The Fixed Effect Model (FEM) produces a substantially higher adjusted R-squared (0.954) compared to the CEM (0.182) and REM (0.243). This large gap, however, should not be interpreted as straightforward evidence that the FEM captures

the relationship between fiscal transfers and poverty more accurately. Because the FEM estimates a separate intercept for each of the 79 districts, its adjusted R-squared mechanically absorbs the explanatory power of these district-specific dummy variables, in addition to that of the three fiscal transfer variables themselves. The CEM does not include such district-specific intercepts, and the REM treats district effects as a random rather than a fixed component, so their considerably lower R-squared values are not directly comparable to that of the FEM on a like-for-like basis. Accordingly, the substantially higher adjusted R-squared of the FEM is expected on statistical grounds, given the additional degrees of freedom it uses to estimate district fixed effects, and should not by itself be read as proof that the FEM better explains the true relationship between fiscal transfers and poverty.

Table 3. Result of Panel Data

Variable	CEM	FEM (Ordinary SE)	REM
Cons	12.55341	6.433***	13.96470
	()	(9.236)	()
$lnVF$	5.59E-12	-0.109***	-9.48E-12
	()	(-8.363)	()
$lnVFA$	-1.24E-11	-0.014**	-1.20E-12
	()	(-2.066)	()
$lnRLTR$	-3.48E-11	-0.036***	8.90E-13
	()	(-5.991)	()
Adjusted R^2	0.182331	0.957	0.242773
F-statistic	47.90186	173.344***	68.43471
Diagnostic Tools			
Chow Test	0.000		
Hausman Test		0.000	

Source: data processed

Table 3 shows the three independent variables have statistically significant negative associations with the level of poverty. The village funds show the largest coefficient at -0.109, followed by regional tax and levy revenue sharing at -0.036 and village fund allocation at -0.014. Such differences imply that the magnitude of the association between each fiscal transfer instrument and poverty varies. The adjusted R-squared of 0.957 indicates that the full model—comprising the three fiscal transfer variables together with the district fixed effects—accounts for 95.7 percent of the variation in poverty levels across districts and over time. It is important to note that, because the Fixed Effects Model absorbs all time-invariant differences between districts, such as geography, institutional legacy, and socio-cultural characteristics, a substantial share of this explanatory power is likely attributable to these unobserved district-specific factors rather than to the three fiscal transfer variables alone. Accordingly, the adjusted R-squared should be interpreted as a measure of the overall fit of the fixed-effects specification, and not as evidence that the fiscal transfer variables alone explain 95.7 percent of the variation in poverty.

Table 4 shows the robust standard errors adjust only the estimated variance of the coefficients rather than the coefficients themselves. However, the standard errors and corresponding p-values change: the statistical significance of village funds becomes comparatively weaker after correction (p-value increasing from 0.0000 to 0.0108), while the significance of village fund allocation strengthens (p-value decreasing from 0.0393 to 0.0001), and the significance of Local Tax and Levy revenue sharing remains materially similar (p-value increasing marginally from 0.0000 to 0.0060). Importantly, all three coefficients remain statistically significant at the 5 percent level after correcting for cross-sectional dependence, indicating that the negative association between village fiscal transfers and poverty is robust to this correction. However, the strength of statistical evidence is not uniformly robust across variables: as noted above, the evidence for village funds is comparatively more sensitive to this correction, reflected in its larger increase in p-value, whereas the evidence for village fund allocation and local tax and levy revenue sharing remains comparatively more stable.

To further assess the robustness of the model specification in the absence of additional time-varying socioeconomic control variables, the Fixed Effects Model is re-estimated separately for two sub-periods: 2016–2019 (pre-COVID-19) and 2020–2023 (the COVID-19 pandemic and subsequent recovery period). This period split provides a useful robustness check because the COVID-19

pandemic represents a substantial, unanticipated macroeconomic shock; if the estimated relationships between village fiscal transfers and poverty were highly sensitive to unobserved time-varying macroeconomic conditions, this sensitivity would likely manifest as instability in the coefficients across these two sub-periods.

Table 4. Result of FEM after Robust Standard Error

Variable	FEM (Robust SE)
Cons	6.433***
	(8.172)
$lnVF$	-0.109**
	(-3.441)
$lnVFA$	-0.014***
	(-8.633)
$lnRLTR$	-0.036***
	(-3.883)
Adjusted R^2	0.957
F-statistic	173.344***

Source: data processed

Table 5 shows the sub-period estimates indicate that the negative sign of all three coefficients remains consistent across both the pre-COVID-19 period and the COVID-19 and post-recovery period, providing directional support for the hypothesized relationships even under the substantial macroeconomic disruption caused by the pandemic. However, statistical significance is weaker in both sub-periods compared to the full-sample estimates, particularly for village funds and village fund allocation during 2020–2023. This attenuation in statistical significance is consistent with the substantially reduced time-series dimension in each sub-sample (T = 4, compared to T = 8 in the full sample), which mechanically increases the standard errors of Fixed Effects estimators regardless of the stability of the underlying relationship. This sub-period analysis, based on a consistent Fixed Effects specification across both sub-periods, offers partial, though not unqualified, support for the robustness of the model's specification in the absence of additional time-varying socioeconomic control variables. We report this result transparently, including the sub-periods in which statistical significance is not attained at conventional levels, and note this as an area for further investigation in future research with longer sub-period time spans.

Table 5. FEM Estimation for Full and Sub-Samples

Variable	Coefficient (2016–2019)	p-value	Coefficient (2020–2023)	p-value	Coefficient (Full Sample)	p-value
C	7.854**	0.0181	7.286*	0.0784	6.433***	0.0001
	(4.708)		(2.629)		(8.172)	
$lnVF$	-0.153*	0.0864	-0.115	0.2774	-0.109**	0.0108
	(-2.517)		(-1.324)		(-3.441)	
$lnVFA$	-0.012*	0.0709	-0.039	0.2143	-0.014***	0.0001
	(-2.748)		(-1.571)		(-8.633)	
$lnRLTR$	-0.050*	0.0612	-0.038**	0.0321	-0.036***	0.0060
	(-2.927)		(-3.794)		(-3.883)	
Adj R^2	0.952		0.979		0.957	
F-Stat	77.98***	0.0000	181.13***	0.0000	173.34***	0.0000
N	316		316		632	

Source: data processed

This study does not observe the district-level expenditure composition of village fiscal transfers, official national statistics provide direct, verifiable evidence on how village fund spending has been allocated over time. According to Central Bureau Statistics of Village Government Financial Statistics, the Village Development Sector (Bidang Pelaksanaan Pembangunan Desa) which encompasses infrastructure projects such as village roads, irrigation channels, and clean water

facilities was by far the largest expenditure category in the earlier years of the study period, accounting for approximately 55.3 percent of total village government expenditure nationally in 2016 (BPS, 2017) and 57.46 percent in 2017 (BPS, 2018). By 2023, however, this share had declined markedly to 37.60 percent, while the share allocated to Disaster, Emergency, and Urgent Response (Bidang Penanggulangan Bencana, Keadaan Darurat, dan Mendesak) rose sharply from below 1% in 2016–2017 to 8.78 percent, and the share allocated to Community Empowerment rose from 6–8 percent to 10.76 percent over the same period (BPS, 2024). This shift is consistent with regulatory changes introduced from 2020 onward that mandated village cash transfer programs (Bantuan Langsung Tunai Desa) and food security allocations in response to the COVID-19 pandemic and subsequent extreme poverty reduction mandates. This evolving expenditure composition offers a plausible structural explanation for the sub-period robustness results reported in Table 5, the comparatively weaker statistical significance of village funds during the 2020–2023 sub-period may partly reflect this shift away from infrastructure-heavy spending the transmission channel most directly supported by the elasticity estimated in this study toward a more diversified allocation that includes direct cash assistance, a channel with a more immediate but potentially less persistent effect on measured poverty. Nevertheless, because expenditure composition data disaggregated to the district level were not available for this study, this explanation remains a plausible interpretation based on national aggregate patterns rather than a directly tested mechanism, and represents an important avenue for future research using more granular village-level expenditure data.

The estimation results indicate a significant negative association between village funds and the level of poverty with the coefficient of -0.109 (t-statistic = -3.441; robust p-value = 0.0108). An increase in village funds by 1% is accompanied by a decrease in the rate of poverty by 0.109%. Among the three fiscal transfer instruments analyzed, the village fund has the largest estimated association with poverty reduction in Java's regencies. These findings are consistent with the findings of Rammohan & Tohari (2023), who discovered that the village fund program reduced poverty in rural areas and raised household consumption in Indonesia. Anam et al (2023) also discovered that the village fund assists in eliminating poverty through enhancing infrastructure and increasing economic productivity in the area. The village fund alleviates poverty in three key expressions. To start with, infrastructure like village roads, irrigation as well as markets can make people to travel more easily, as well as reduce costs of transactions. Second, programmes that favour the local economy, like development of micro-enterprises, education and availability of capital can be used to boost the production. Third, improved fundamental services in health and education enhance better human resource in the long run. The three channels support and complement one another and contribute to a more significant effect on poverty reduction. The results confirm the Theory of Fiscal Federalism that opines that fiscal devolution can help in streamlining how social resources are distributed since village administrations are better placed to serve the needs of their communities (Oates, 1999; Rammohan & Tohari, 2023; Anam et al., 2023).

Kadafi et al (2020) found that the poverty-reducing effect of village funds is considerably weaker in underdeveloped districts, and Jumaiyah & Wahidullah (2019) found suboptimal village fund outcomes to low competency among village officials and weak monitoring mechanisms. The contrast between these findings and the present study's results suggests that the average effect estimated here may mask meaningful heterogeneity: districts with stronger administrative capacity likely experience a considerably larger poverty-reducing effect from village funds than districts with weaker capacity, even though the average effect across all 79 districts remains negative and significant. these findings strongly support the core principle of Fiscal Federalism, which emphasizes that decentralized fiscal authority allows local governments to allocate resources more efficiently according to local needs. Village governments, being closer to the community, possess better information regarding local economic conditions, enabling more targeted and effective poverty alleviation strategies. This aligns with recent international evidence suggesting that fiscal decentralization can enhance public service delivery and reduce poverty when local governments have sufficient administrative capacity and accountability mechanisms (Otoo & Danquah, 2021; Mardalena et al., 2023). Therefore, the effectiveness of village funds in this study not only reflects the magnitude of fiscal transfers but also the importance of institutional capacity at the local level in translating financial resources into tangible welfare improvements.

Village fund allocation is significantly and negatively associated with poverty, with a coefficient of -0.014 (t-statistic = -8.633; robust p-value = 0.0001). This effect is smaller in magnitude than that of village funds, but the results demonstrate that a 1% increase in village fund allocation is associated

with a 0.014% decrease in the poverty rate. This smaller effect is likely because village fund allocation is based on the fiscal capacity of each district, which leads to wide disparities in the amount allocated and its efficiency. These results can be compared to Sigit & Kosasih (2020), who employed panel data on Indonesian districts and cities between 2015 and 2018 and found that their results also indicated a negative and significant impact on the poverty levels. It is essential that the quality of local governance plays a crucial role in the success of village fund allocation and this is consistent with the agency theory, which emphasizes the factor of an effective system of government to decimate agency problems. Ardiputra et al (2025) determined that village fund allocation has an important role in ensuring the success of the rural development through good governance, transparency, and involvement of community in the process of planning and budgeting. Warokka et al (2025) observed that village fund allocation may be useful in alleviating poverty, but its effects are limited by factors including the lack of skilled labor force, inappropriate infrastructure, and low village level accountability. This research has indicated that the capacity building of village institutions and the establishment of an effective monitoring system are the requirements that should be undertaken in order to make the village fund allocation more effective in alleviating poverty. In the context of Fiscal Federalism, this result indicates that intergovernmental transfers that depend on local fiscal capacity may produce unequal outcomes across regions. While decentralization provides flexibility, it may also widen disparities if local governments have different levels of administrative efficiency and fiscal capacity. This is consistent with international findings that highlight the "asymmetric decentralization effect," where regions with stronger institutions benefit more from fiscal transfers compared to less developed areas (Nakatani et al., 2022; Ilyasa et al., 2025). Consequently, the relatively smaller impact of village fund allocation in this study suggests that without strong governance and equalizing mechanisms, fiscal decentralization may not fully achieve its poverty reduction objectives.

The distribution of local taxes and levies shows a clear negative association with poverty, with a coefficient of -0.036 (t-statistic = -3.883; robust p-value = 0.0060). This implies that a 1% increase in the allocation of local taxes and levies is associated with a 0.036% reduction in poverty rates. The magnitude of the effect of local tax and levy sharing falls between that of village funds and village fund allocation, reflecting the distinct features of a revenue-sharing system based on benefit-based income and tax sharing. This outcome can be compared to Muthomi & Ndunda (2024), who noted that revenue decentralisation positively correlates with increased economic growth in the district level in Kenya. The findings are that by sharing revenue with the local governments through giving them more authority over income, the local economies can prosper and minimize poverty. According to the Theory of Fiscal Federalism, a share of the regional taxes and levies can help in alleviating the poverty as it will provide an incentive to local government to increase and utilize this revenue towards development. The sharing of regional tax and levies among villages encourages them to promote economic activities capable of increasing the tax base in the villages. According to Akalbeo et al (2023) discovered that fiscal decentralisation assists in the reduction of structural unemployment, which is one of the greatest issues behind long-term poverty. To conclude, the revenue sharing Mechanism on Local Taxes and Levies is not only a way of giving transfers on the fiscal front, but also assists in motivating the village governments towards contributing towards productive economic activities which will help reduce poverty. Revenue sharing mechanisms are designed not only to redistribute resources but also to create incentives for local governments to enhance their own-source revenue. This dual function explains why revenue sharing can contribute to poverty reduction both directly and indirectly through economic growth stimulation. However, OECD (2021) emphasize that such mechanisms may also reinforce regional inequalities if wealthier regions generate more revenue and thus receive larger shares. Therefore, while revenue sharing in this study shows a significant impact on poverty reduction, its long-term effectiveness depends on balancing efficiency incentives with equity considerations in fiscal policy design.

5. Conclusion

This study examines the association between village funds, village fund allocation, and local tax and retribution revenue sharing and poverty levels in regencies across Java from 2016 to 2023. The findings provide robust statistical evidence that village fiscal transfers are significantly and negatively associated with poverty, though, as with any observational panel study, these estimates reflect strong statistical associations net of time-invariant district characteristics rather than experimentally established causal effects. Among the three instruments, village funds show the most substantial

association, followed by revenue sharing and village fund allocation, suggesting that direct transfers from the central government with a pro-poor, need-based allocation formula are associated with larger reductions in poverty than instruments whose allocation depends on local fiscal capacity. These results highlight the potential relevance of fiscal decentralization for addressing regional disparities, particularly in areas where poverty remains higher in rural regions compared to urban areas. The model's explanatory power, while high, should be interpreted with caution, as it partly reflects unobserved, time-invariant district characteristics captured by the fixed-effects specification rather than the fiscal transfer variables alone. However, the effectiveness of these transfers is not solely determined by the amount of funding, but also by the quality of governance, institutional capacity, and the ability of local governments to manage resources efficiently.

this study emphasizes the need to strengthen monitoring and evaluation systems, improve transparency and accountability, and enhance community participation at the village level to maximize the impact of fiscal transfers. In addition, better coordination among different transfer schemes is necessary to ensure a more balanced and equitable distribution of resources across regions. Despite its contributions, this study has several limitations. Consistent with the modeling rationale discussed in the Method section, it focuses only on fiscal transfer variables and does not explicitly incorporate governance quality or institutional performance as explanatory factors, nor time-varying macroeconomic controls such as economic growth, unemployment, and human development indicators. While the Fixed Effects Model controls for time-invariant differences across districts, it cannot fully rule out the possibility that part of the estimated effect of village fiscal transfers reflects unobserved, time-varying regional economic conditions. Therefore, future research is recommended to incorporate these variables, subject to data availability, in order to provide a more comprehensive understanding of the mechanisms through which fiscal decentralization affects poverty reduction.

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