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LOCAL GOVERNANCE: THE ROLE OF FISCAL TRANSFERS AND REGIONAL INNOVATION ON PROVINCIAL FISCAL INDEPENDENCE IN INDONESIA

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Abstract

Regional fiscal independence is a key indicator of fiscal decentralization performance in Indonesia. The objective of this study is to estimate the influence of the General Allocation Fund (DAU), Revenue Sharing Fund (DBH), Regional Innovation Index (IID), and Gross Regional Domestic Product (GRDP) on the fiscal independence of 34 provinces in Indonesia for the 2021 - 2025 period. This study is quantitative and uses panel data. Data collection methods include accessing sources from the Ministry of Finance, Statistics Indonesia (BPS), and the Ministry of Home Affairs, and are processed using panel data analysis. The estimation applies a series of diagnostic tests including the Chow, Hausman, Breusch-Pagan LM, Wooldridge, and Pesaran (Cross-Sectional Dependence) tests to ensure the accuracy of the estimates and model determination. The baseline Random Effects estimation shows that DBH has a negative and significant association with fiscal independence, while the Regional Innovation Index and GRDP have positive and significant associations. However, robustness checks using Fixed Effects and lagged GRDP specifications indicate that GRDP is the most consistent determinant of fiscal independence, whereas the estimated effects of DBH and regional innovation are sensitive to model specification. The General Allocation Fund (DAU) has a negative but statistically insignificant association with fiscal independence. These findings have strong policy implications for strengthening regional innovation capacity and increasing local economic productivity as a strategy towards sustainable fiscal independence during the implementation of Law Number 1 of 2022.

Keywords: *fiscal independence; DAU; DBH; innovation index; GRDP*

INTRODUCTION

One of the pillars of modern governance that aims to bring public services closer to the people while strengthening the financial capacity of local governments is through the implementation of fiscal decentralization. Oates (1972) laid the theoretical foundation through the concept of fiscal federalism, which states that the devolution of fiscal authority to subnational governments increases the efficiency of public resource allocation because local authorities have more accurate information about the preferences of their communities. Musgrave (1959) complements this framework by emphasizing the three main functions of government in the economy: allocation, distribution, and stabilization. Stabilization and redistribution functions should remain the domain of the central government, while allocation functions can be optimally decentralized to local governments.

The implementation of fiscal decentralization in Indonesia has been underway since 2001, beginning with the issuance of Laws Number 22 and Number 25 of 1999, which transferred significant government authority and fiscal resources to regional governments. Over the past two decades, the implementation of fiscal decentralization in Indonesia has shown uneven progress. In a comprehensive review of two decades of fiscal decentralization, the Ministry of Finance of the Republic of Indonesia (2021) noted that the disparity in fiscal independence between provinces is increasingly apparent, with provinces with urban economic bases and rich natural resources tending to be self-sufficient, while provinces with agrarian economies and limited access to fixed capital remain dependent on transfers from the central government.

The level of fiscal independence is measured by the ratio of Regional Original Income (PAD) to total regional revenue. An increase in this ratio indicates a region's decreasing dependence on central transfers and provides greater leeway for local governments to set budget priorities tailored to local needs (Ihwandi & Khoirunurrofik, 2023). Data from the Supreme Audit Agency (BPK) shows that as of 2024, no province in Indonesia is categorized as “very independent,” and only a handful of regions with a tax base for vehicles, large industries, and tourism consistently rank at the top of the independence index (NEXT Indonesia Center, 2025).

Fiscal independence data for 2021-2025 shows that the average level of provincial fiscal independence remains in the moderate category, with significant disparities between regions. The average provincial independence level for 2021–2025 was 42.31%. This indicates that, in general, some provinces consistently maintain high levels of fiscal independence, while others remain dependent on central transfers. This finding aligns with previous research, which found that many provinces in Indonesia are highly dependent on transfer funds, resulting in uneven levels of fiscal independence across regions. Differences in fiscal independence, potential local revenue (PAD), and economic structure contribute to significant disparities in fiscal independence between provinces (Arief, 2025).

Fiscal dependency theory explains that regions that rely heavily on intergovernmental transfers can reduce the added value of their governments' ability to mobilize revenue independently. When regional spending needs are largely met through transfers from the central government, the incentive to increase regional taxes, encourage taxpayer participation, or optimize other sources of local revenue (PAD) tends to diminish. Therefore, fiscal transfer designs that fail to consider incentives have the potential to create fiscal dependency and hinder the strengthening of regional fiscal independence (Boadway & Shah, 2024).

Beyond transfer factors, the regional innovation dimension is receiving increasing attention in the fiscal decentralization literature. Law Number 1 of 2022 concerning Financial Relations between the Central Government and Regional Governments (HKPD Law) also emphasizes the importance of local taxing power and innovation in regional tax management as instruments for strengthening local revenue (Directorate General of Fiscal Balance, 2022). The Regional Innovation Index (IID), released by the Ministry of Home Affairs since 2019, has become an increasingly relevant measuring tool for capturing the innovation capacity of regional governance (Ministry of Home Affairs, 2025). Innovation using the most effective and efficient methods demonstrates the ability of regions to have better capacity to develop regional revenue sources, increase the efficiency of community access, and also encourage regional independence from the central government (Saksono, 2025).

Previous research has identified fiscal transfers and economic capacity as the primary determinants of fiscal independence (Syafri et al.,, 2024). However, the institutional capacity dimension represented by the IID has rarely been empirically tested using cross-provincial panel data in Indonesia. This study proposes an empirical model that positions fiscal independence as a function of the General Allocation Fund (DAU), Revenue Sharing Fund (DBH), the Regional Innovation Index, and GRDP at constant 2010 prices as proxies for regional economic capacity.

Empirically, several studies have examined the determinants of fiscal independence in Indonesia with varying focuses. Titaley, P., Patty, R., & Titalessy (2026) found that the General Allocation Fund (DAU) did not significantly impact fiscal independence in regencies/cities in Papua Province. This finding demonstrates that any increase in the DAU amount will reduce the level of regional independence, thus reinforcing the evidence that central transfers lead to fiscal dependence. Maryati & Muttaqin (2021) showed that the General Allocation Fund (DAU) positively impacts regional spending in regencies/cities in Central Java Province. This finding explains the function of the General Allocation Fund (DAU) as the primary fiscal transfer instrument, playing a role in maintaining regional financing capacity, although its impact on fiscal independence can vary depending on the region's financial capacity to optimize its own-source revenue (PAD).

Ihwandi & Khoirunurrofik (2023) analyzed 34 provinces for the 2011–2021 period and found that regional financial governance has a relevasnt relationship with inclusive economic development, indicating that fiscal independence and the quality of regional spending are mutually reinforcing. Meanwhile, Kusuma & Anwar (2023) analyzed fiscal dependence in Central Java regencies/cities and found that central transfers and economic growth not only have a positive impact but also increase structural dependence. From a policy perspective, the Organisation for Economic Co-operation and Development (2022) noted that high fiscal dependence does not solely reflect low PAD capacity but also reflects a transfer incentive design that does not encourage independent PAD mobilization.

However, the existing literature still presents an important empirical gap. Previous studies in Indonesia have predominantly examined fiscal transfers, local own-source revenue, and economic growth as determinants of regional fiscal independence. In contrast, institutional innovation has received substantially less attention as an explanatory factor, particularly in studies using provincial-level panel data. The Regional Innovation Index is important because it captures the institutional capacity of provincial governments to improve tax administration, public-service delivery, digital governance, and investment facilitation. These institutional improvements may strengthen the ability of provinces to mobilize local revenue and reduce their dependence on intergovernmental transfers. Therefore, this study extends previous research by incorporating the Regional Innovation Index together with DAU, DBH, and GRDP in a panel analysis of 34 Indonesian provinces during the 2021–2025 period. This period is particularly relevant because it reflects the early implementation phase of Law Number 1 of 2022 concerning Financial Relations between the Central Government and Regional Governments.

This study aims to (1) estimate the influence of DAU, DBH, Regional Innovation Index, and GRDP on the fiscal independence of 34 provinces in Indonesia for the 2021–2025 period;

(2) identify the best panel data model to explain variations in fiscal independence between provinces; and (3) formulate policy implications for local governments.

This study argues that regional fiscal independence is influenced by fiscal transfers from the central government, regional innovation capacity, and regional economic capacity. Regional fiscal independence is the ability of a regional government to meet public needs through its own collected revenue sources without assistance that causes dependence on central government transfers (Hasanah et al., 2025). In several studies, fiscal independence is generally represented by the contribution of local revenue (PAD) to total regional revenue or to external revenue sources, thus reflecting the region's ability to mobilize its own fiscal potential (Aryanto et al., 2024).

Revenue Sharing Funds (DBH) are assumed to have distinct characteristics because they originate from economic activities and revenue generated by regions. DBH reflects an economic base capable of generating tax and natural resource revenues, which are then redistributed to the producing regional government. High DBH revenues for a region indicate a relatively strong economic capacity. This can support increased regional fiscal independence and strengthen fiscal independence (Hasanah et al., 2025; Sofilda et al., 2023).

Innovation can be realized through digitalization of tax administration, simplification of public services, development of electronic payment systems, and policy innovations that support investment and economic activity. These innovations have the potential to increase the efficiency of regional tax and levy collection, expand the tax base, and enhance taxpayer participation. Silalahi & Khoirunurrofik (2024) demonstrated that regional innovation contributes to increased regional economic activity through improved governance and the quality of public services. This demonstrates that with good innovation, regions have the opportunity to increase their own regional revenue (PAD) and achieve higher levels of fiscal independence.

Regional economic capacity, in the form of GRDP (Gross Regional Domestic Product), is also a key determinant of fiscal independence. A high GRDP indicates substantial production, trade, investment, consumption, and asset ownership, which form the basis of regional taxes and levies. Strong economic growth encourages active taxpayer participation, thereby increasing the potential for regional revenue (PAD). Sagala (2024) found that GRDP and regional tax revenue in 34 provinces in Indonesia had a positive and significant impact. These findings indicate that increased economic activity in a region can increase regional tax revenue, which is a major contributor to PAD, thus potentially strengthening regional fiscal independence.

The relationship between the explanatory variables and fiscal independence can be explained through several mechanisms. First, the Regional Innovation Index reflects the institutional capacity of provincial governments to improve public administration and revenue management. Higher innovation capacity may support the digitalization of tax administration, integration of payment systems, simplification of licensing procedures, and improvement of taxpayer services. These improvements can reduce administrative costs, increase tax compliance, broaden the effective tax base, and ultimately raise local own-source revenue.

Second, GRDP represents the scale of regional economic activity. Higher GRDP reflects greater production, consumption, investment, trade, and asset ownership. These activities expand the potential tax base available to provincial governments, particularly through motor vehicle taxes, vehicle transfer fees, fuel taxes, surface water taxes, and other regional revenue sources. Therefore, economic expansion is expected to increase PAD and strengthen fiscal independence.

Third, DBH may create a fiscal moral hazard when provincial governments become increasingly reliant on revenue-sharing transfers. Although DBH improves short-term fiscal resources, large and predictable transfer receipts may reduce the incentive for local governments to intensify tax collection, explore new revenue sources, or improve local revenue administration. In this context, DBH may function as a substitute rather than a complement to local fiscal effort, thereby weakening fiscal independence. DAU may operate through a similar mechanism, although its effect may be weaker because DAU primarily functions as an equalization transfer designed to address fiscal gaps across regions.

METHODS

Data and Samples

The research approach is quantitative, using a panel data analysis study design that combines cross-section data from 34 provinces in Indonesia with time-series data for five years, 2021–2025. Therefore, a total of 170 observations will be tested (N = 34, T = 5). Data are sourced from the Regional Budget (APBD) realization published by the Directorate General of Fiscal Balance (DJPK), the Regional Innovation Index score from the Ministry of Home Affairs, and GRDP data from the Central Statistics Agency (BPS).

The dependent variable is fiscal independence (kf), defined as the percentage of PAD to total provincial revenue. The independent variables include the natural logarithm of DAU (ln_dau), the natural logarithm of DBH (ln_dbh), the Regional Innovation Index (iid), and the natural logarithm of GRDP at constant 2010 prices (ln_pdrb). Natural logarithmic transformation is applied to the variables to address distribution skewness, stabilize variance, and facilitate interpretation within a semi-log framework (Wooldridge, 2010).

The average provincial fiscal independence of 42.31 percent with a standard deviation of 15.70 percent indicates significant heterogeneity. The minimum value of 6.61 percent reflects provinces with a strong level of dependence on central transfers and the maximum value of 73.21 percent reflects provinces with relatively high fiscal independence, confirming the existence of large fiscal disparities among Indonesian provinces. The large range of fiscal independence values indicates that the ability of provincial governments to finance regional expenditures from their own revenue sources is still very diverse, reflecting differences in economic capacity and regional revenue bases between regions.

The relatively small variation in the General Allocation Fund (DAU) indicates that this transfer serves as an instrument for fiscal equalization between regions, thus minimizing differences between provinces. The Regional Revenue Sharing Fund (DBH) has a large between-value variance (SD = 1.49), reflecting the uneven distribution of natural resource revenues between regions. The Regional Innovation Index averages 53.78, with a range of

15.69 to 90.84, indicating a wide disparity in innovation capacity. Meanwhile, the Gross Regional Domestic Product (GRDP) exhibits a very small within-value variance (0.086), indicating stable economic growth in the short term. This is consistent with Lewis's (2023) findings regarding the heterogeneity of regional governance capacity in Indonesia.

Model Specifications

This research model was developed based on the view that the level of regional fiscal independence is influenced by the interaction between fiscal transfer policies, regional economic capacity, and the institutional capacity of local governments. In a fiscal decentralization system, transfers from the central government play a crucial role in supporting regional financing capacity and reducing inter-regional fiscal disparities. However, fiscal transfers that are not designed with incentives for increasing fiscal effort in mind have the potential to reduce regional incentives to optimize local revenue (PAD) and strengthen their fiscal independence (Boadway & Shah, 2024). Based on the information above, the study of regional fiscal independence is modeled as a function of the General Allocation Fund (DAU) and Revenue Sharing Fund (DBH), which represent the primary instruments of fiscal transfer from the central government to local governments, as follows:

$$kf = f(dau, dbh) \quad \ldots(1)$$

Innovation as a manifestation of institutional capacity improves the effectiveness of management and the quality of public services, as well as the effectiveness of regional revenue management. Various studies show that regional innovation contributes to strengthening regional economic and fiscal independence through improved governance and the digitalization of public services (Saksono, 2025; Silalahi & Khoirunurrofik, 2024). Therefore, the relationship is modeled as:

$$kf = f(\text{Regional Innovation Index}) \quad \ldots(2)$$

GRDP represents a region's economic capacity, which serves as the foundation for generating regional income. The greater the economic activity reflected in GRDP, the greater the opportunity for local governments to increase regional revenue and strengthen their fiscal independence (Dharmawati et al., 2024).

$$kf = f(grdp) \quad \ldots(3)$$

Based on the above approach, the mathematical relationship between the variables used in the model is as follows.

$$kf_{it} = \alpha + \beta_1(dau)_{it} + \beta_2(dbh)_{it} + \beta_3 iid_{it} + \beta_4 grdp_{it} + \mu_i + \varepsilon_{it} \quad \ldots(4)$$

where:

kf = regional fiscal independence
α = Constant
β1, β2, β3, β4 = Coefficients to be estimated
dau = General Allocation Fund
dbh = Revenue Sharing Fund

iid = Regional Innovation Index
grdp = 2010 constant-price GRDP
μ = Individual fixed effects
ε = Error term

Estimation quality is essential to reduce potential statistical problems, so all variables are converted into natural logarithm notation. Logarithms are used as a transformation method to control variance and reduce heterogeneity between variables, as well as address the potential for heteroscedasticity that commonly occurs in time-series economic data (Wooldridge, 2010). Furthermore, the logarithmic model allows for the interpretation of coefficients in terms of elasticities. The regression model used in the final stage of this study is as follows:

$$kf_{it} = \alpha + \beta_1 \ln\_(dau)_{it} + \beta_2 \ln\_(dbh)_{it} + \beta_3 \, iid_{it} + \beta_4 \ln\_(pdrb)_{it} + \mu_i + \varepsilon_{it} \quad \ldots(5)$$

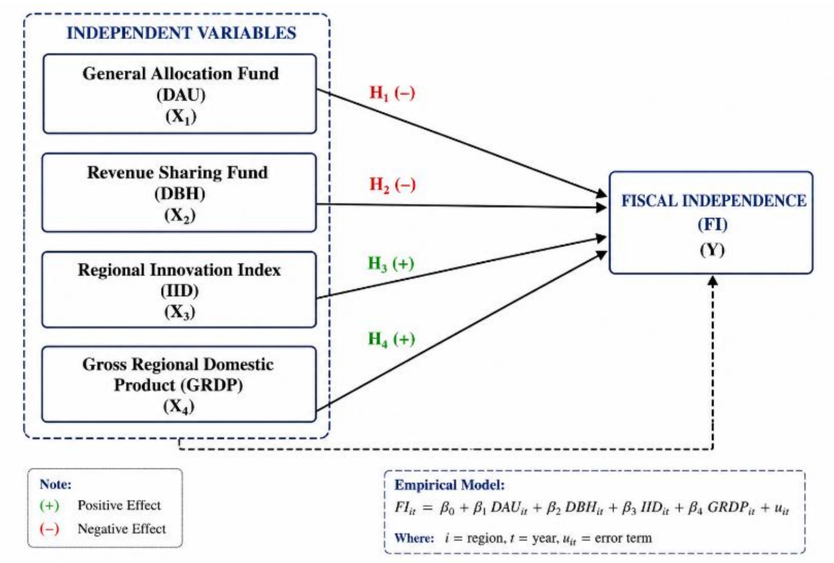

Figure 1. Conceptual Framework

Source: Authors' elaboration, 2026.

Hypothesis

Based on the empirical model above, this study establishes four main hypotheses, each of which tests the influence of independent variables on regional fiscal independence (kf). These hypotheses are formulated as follows:

H_1: DAU has a negative and significant effect on fiscal independence.

H_2: DBH has a negative and significant effect on fiscal independence.

H_3: IID has a positive and significant effect on fiscal independence.

H_4: GRDP has a positive and significant effect on fiscal independence.

Hypothesis testing will be conducted at a significance level of $\alpha = 0.05$. The effect is declared significant if the p-value of each coefficient is less than 5%.

Estimation Stages

The selection of the appropriate estimation model is carried out through a series of tiered diagnostic tests as is common in panel data estimation, consisting of the Chow test, the Hausman test, the Breusch-Pagan LM test, the Wooldridge test for autocorrelation, and the Pesaran CD test for cross-sectional dependence, which are explained as follows:

1. Chow Test (F-test): Compares Fixed Effects (FE) with Pooled OLS. The significance of the test indicates the presence of unobserved individual effects.
2. Hausman Test: Determines whether FE or Random Effects (RE) is more consistent. If it fails to reject H_0 ($p > 0.05$), RE is more efficient and is used as the primary estimator.
3. Breusch-Pagan LM Test: Confirms the superiority of RE over Pooled OLS through the error component variance test.
4. Wooldridge Test: Detects first-order autocorrelation in panel residuals.
5. CSD Mean Test: Detects cross-sectional dependence arising from common shocks that affect all or some provinces simultaneously.

Table 1. Diagnostic Test Results and Model Selection

Diagnostic Test	Statistics	Prob.	Decision
Chow test (F-test)	F(33, 130) = 19.60	0.0000	FE is better than Pooled OLS
Hausman test	chi2(4) = 4.41	0.3537	RE is more efficient than FE
Breusch-Pagan LM test	chibar2(01) = 187.20	0.0000	RE is better than Pooled OLS
Wooldridge (Autocorrelation)	F(1, 33) = 72.78	0.0000	There is first-order autocorrelation
CSD (Pesaran)	24.591	0.0000	There is cross-sectional dependence

Source: Processed Stata Data, 2026.

The Hausman test results show Prob > χ^2 = 0.3537 > 0.05, so the null hypothesis stating no systematic difference in the FE and RE estimators fails to be rejected, and RE is selected as a consistent and efficient estimator. The Breusch-Pagan test with chibar2(01) = 187.20 (p = 0.000) confirms the superiority of RE over Pooled OLS by confirming the existence of a significant error component variance at the unit level ($\sigma^2\_u > 0$). These results establish the Random Effects Model as the baseline estimator. The Fixed Effects Model is reported only as an alternative specification for robustness purposes and does not replace the baseline Random Effects Model.

The diagnostic tests indicate the presence of heteroskedasticity, autocorrelation, and cross-sectional dependence. Therefore, province-clustered robust standard errors are used to address heteroskedasticity and within-province serial correlation. Given the short time dimension of the panel (T = 5), the cross-sectional dependence result is acknowledged as a limitation, and the estimation results are interpreted cautiously.

Potential endogeneity may arise in the relationship between GRDP and fiscal independence. Higher GRDP can expand the regional tax base and increase local own-source revenue, while higher fiscal independence may also enable provincial governments to finance productive expenditure that supports economic activity. To reduce concerns regarding simultaneity, this study applies a robustness specification using the one-period lagged value of GRDP. The lagged GRDP variable is expected to affect current fiscal independence through the previous period's economic base, while reducing the possibility that current fiscal independence simultaneously affects current GRDP. The main Random Effects Model is retained because the Hausman and Breusch-Pagan LM tests indicate that the Random Effects estimator is more appropriate than Fixed Effects and Pooled OLS for the baseline specification. Nevertheless, the results are interpreted as empirical associations rather than definitive causal effects.

RESEARCH RESULTS AND DISCUSSION

Results

Multicollinearity Test

Before interpreting the regression coefficients, to avoid serious multicollinearity problems, the variance inflation factor (VIF) is used, which can bias the estimates. All VIF values must be well below the conventional threshold of 10, with this model having a mean VIF of 2.00. This confirms that each independent variable carries sufficiently unique information and that each coefficient can be interpreted independently (Wooldridge, 2010).

Random Effects Model Estimation Results with Robust Standard Errors

Table 2. Random Effects Model Estimation Results

Variables	Coefficient	Robust SE	z-statistic	p-value
ln_(dau)	-1.82	1.6909	-1.08	0.280
ln_(dbh)	-2.28***	0.607	-3.77	0.000
iid	0.10**	0.0458	2.19	0.029
ln_(pdrb)	12.98***	1.2054	10.77	0.000
Constant	-276.60***	46.138	-6.00	0.000

***p < 0.01; ** p < 0.05; * p < 0.10
Source: Processed Stata Data, 2026.

Table 2 presents the results of the Random Effect Model (REM) estimation, which shows a within R^2 of 0.2017, a between R^2 of 0.7229, and an overall R^2 of 0.6817. The overall R^2 value indicates that approximately 68.17% of the variation in fiscal independence in the model can be explained by the General Allocation Fund, Revenue Sharing Fund, Regional Innovation Index, and Gross Regional Domestic Product variables. This means that the model has a fairly good explanatory ability for variations in fiscal independence between provinces and over time. Meanwhile, the intra-class correlation coefficient (ρ) value of 0.8112 indicates that approximately 81.12% of the residual variation comes from differences in unobserved fixed characteristics between provinces, while the remaining 18.88% comes from variations within provinces over time, with the following model:

$$kf\_it = -276.6 - 1.82 ln\_(dau) - 2.28 ln\_(dbh) + 0.10 iid + 12.98 ln\_(pdrb)$$

These findings indicate that interprovincial heterogeneity plays a very dominant role in explaining variations in fiscal independence in Indonesia. This heterogeneity is likely related to differences in economic capacity, resource potential, governance quality, and fiscal characteristics that are not fully captured by the variables used in the model.

Table 3. Robustness Check Results

Variables	Baseline REM	Fixed Effects Model	REM with Lagged GRDP
ln_dau	-1.83 (1.69)	-1.10 (1.07)	-1.74 (1.59)
ln_dbh	-2.287*** (0.61)	-1.61 (1.07)	-1.18 (0.78)
iid	0.100** (0.05)	0.07 (0.05)	-0.02 (0.05)
ln_pdrb	12.981*** (1.21)	17.753*** (2.78)	—
L.ln_pdrb	—	—	11.153*** (1.27)
Constant	-276.600***	-469.982***	-240.991***
Observations	170.00	168.00	135.00
Number of provinces	34.00	34.00	34.00
Estimator	Random Effects	Fixed Effects	Random Effects
Clustered robust SE	Yes	Yes	Yes

Notes: Robust standard errors clustered at the provincial level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.
Source: Processed Stata Data, 2026.

Discussion

The Influence of DAU on Fiscal Independence

Changes in the General Allocation Fund (DAU) during the observation period have not been proven to affect the level of fiscal independence of provinces in Indonesia. This insignificance indicates that the DAU's primary function as a fiscal equalization instrument has not directly influenced regions' ability to increase local revenue. As a general transfer (block grant), the DAU is utilized more to support overall regional financing needs rather than specifically encouraging increased regional revenue capacity. Consequently, increases in the DAU are not always accompanied by changes in the level of fiscal independence.

Hakim & Busnetty (2024) found that the General Allocation Fund (DAU) had no effect on the level of financial independence in districts/cities in West Java Province. This study indicates that the amount of DAU received by a region does not automatically increase its ability to finance its expenditures from its own revenue sources. Nurvaliza & Putra (2024) found that general allocation funds (DAU) had a negative and insignificant contribution to the movement for regional independence in West Sumatra. The use of the General Allocation Fund by local governments, among other things, is to close the fiscal gap resulting from the difference between available fiscal capacity and basic needs such as personnel expenditures.

The Influence of DBH on Fiscal Independence

Revenue Sharing Funds (DBH) have a negative and significant effect on fiscal independence ($\beta = -2.2865$; $z = -3.77$; $p < 0.01$), thus H_2 is accepted. A 1% increase in DBH decreases fiscal independence by approximately 0.023 percentage points. This finding indicates that the greater the DBH revenue received by a province, the lower its level of fiscal independence. These results indicate that revenue sharing transfers still play a role as a funding source that partially replaces regional incentives to increase PAD.

This finding can be explained through the mechanism of fiscal dependency. Relatively large DBH receipts can reduce fiscal pressure on local governments to optimize regional revenue sources because some spending needs are met through transfers from the central government. The more revenue-sharing funds a local government receives, the less financially independent the region becomes. From a fiscal federalism perspective, intergovernmental transfers that are not accompanied by incentives to increase fiscal effort have the potential to lead to substitution behavior, namely when transfer receipts become a substitute, rather than a complement, for efforts to increase regional revenue (Andrianda & Rosada, 2024; Boadway & Shah, 2024).

The Influence of Regional Innovation Index on Fiscal Independence

The Regional Innovation Index (IID) has a positive and significant effect on fiscal independence ($\beta = 0.1002$; $z = 2.19$; $p = 0.029$), thus H_3 is accepted. Each one-point increase in IID leads to a 0.100-point increase in fiscal independence, ceteris paribus. This finding indicates that regional innovation is not only related to improvements in government administration but also to increased regional fiscal independence. This positive relationship likely occurs through various mechanisms, such as digitalization of tax administration, improving the quality of public services, strengthening the investment climate, and implementing e-government that increases efficiency, transparency, and accountability in regional revenue management. Through these mechanisms, regional governments have the potential to increase their own local revenue (PAD) without having to directly increase the tax burden.

These findings align with government policy, which positions innovation as a key instrument in strengthening regional fiscal independence (Ministry of Home Affairs, 2025). These findings are also consistent with those of Silalahi & Khoirunurrofik (2024), who demonstrated that regional innovation acts as a catalyst for regional economic development by improving the quality of governance and the effectiveness of public services. Thus, regional innovation can be viewed as a factor supporting the sustainable strengthening of regional fiscal independence.

The Influence of GRDP on Fiscal Independence

The estimation results on the GRDP variable show a positive and significant influence on fiscal independence ($\beta = 12.9806$; $z = 10.77$; $p < 0.01$), so H_4 is accepted. A 1% increase in GRDP causes an increase in fiscal independence of approximately 0.130 percentage points, ceteris paribus. The large z-statistic value indicates that GRDP is the variable that has the greatest influence on fiscal independence compared to other variables in the model.

The results show that regional economic capacity is the primary foundation for establishing regional fiscal independence. Higher GRDP reflects greater economic activity, including production, trade, consumption, and investment, which opens up the regional tax base and levies. The greater the economic activity in a region, the greater the opportunity for local governments to increase their own regional revenue, thus enhancing their fiscal independence. This finding is relevant to the direction of regional fiscal reform, which emphasizes the importance of strengthening regional revenue capacity through optimizing tax sources and enhancing the regional fiscal base (Lewis, 2023).

Based on the estimation results of this study, increasing regional fiscal independence depends not only on fiscal transfer policies but is also significantly influenced by the region's ability to create sustainable economic growth. Therefore, increasing economic productivity, investment, and regional business activity are crucial factors in strengthening regional fiscal independence in the long term. The higher the economic activity of a region, the greater the potential for tax and levy revenues that the local government can collect. An increase in GRDP reflects increased production, trade, investment, and public consumption activities, which ultimately increase the regional tax base. Similarly, Sagala (2024) found that GRDP has a positive and significant impact on regional tax revenue. By increasing regional tax revenue, the capacity of Regional Original Income also encourages and strengthens a region's fiscal independence.

Robustness Checks and Endogeneity Considerations

To assess the sensitivity of the baseline Random Effects Model, this study estimates two alternative specifications. First, a Fixed Effects model with province-clustered robust standard errors is estimated to control for time-invariant provincial characteristics. Second, the Random Effects model is re-estimated using one-period lagged GRDP to reduce concerns regarding simultaneity between current economic activity and fiscal independence.

The Fixed Effects results show that GRDP remains positive and statistically significant ($\beta = 17.753$; $p < 0.01$). This finding confirms that the positive relationship between regional economic activity and fiscal independence is not solely driven by time-invariant differences across provinces. The lagged GRDP specification also produces a positive and statistically significant coefficient ($\beta = 11.153$; $p < 0.01$), indicating that the economic capacity of a province in the previous period is positively associated with its current fiscal independence. These results provide consistent evidence that GRDP is the most robust determinant of provincial fiscal independence in Indonesia.

The coefficient of DAU remains negative and statistically insignificant across the baseline, Fixed Effects, and lagged GRDP specifications. This result indicates that DAU does not show a stable direct relationship with provincial fiscal independence during the observation period.

For DBH, the coefficient remains negative in all model specifications. However, its statistical significance is only observed in the baseline Random Effects Model and disappears in the Fixed Effects and lagged GRDP models. Therefore, the negative association between

DBH and fiscal independence should be interpreted cautiously, as the statistical evidence is sensitive to the estimation specification.

The Regional Innovation Index is positive and significant in the baseline model but becomes statistically insignificant in the Fixed Effects model and negative but insignificant in the lagged GRDP specification. This result suggests that the estimated effect of regional innovation on fiscal independence is sensitive to model specification and may partly reflect differences in innovation capacity across provinces rather than within-province changes over time. Consequently, the positive effect of innovation should be interpreted as preliminary evidence rather than conclusive causal evidence.

Building on these findings, several policy directions are suggested. The central government needs to design transfer mechanisms that establish performance-based incentives, such as expanding and strengthening the matching grant model that links additional transfer amounts to increases in local revenue (PAD), in line with Boadway & Shah (2024) recommendation to shift from gap-filling transfers toward accountability- and fiscal-effort-based transfers. Although the association between the Regional Innovation Index and fiscal independence is sensitive to model specification, the baseline findings suggest that investments in digital tax administration, training for regional revenue officials, and public-service innovation may support local revenue mobilization; the central government may also facilitate the exchange of innovation practices across provinces, while future research further assesses their causal fiscal effects. Finally, the structural transformation of provincial economies away from dependence on extractive commodities toward downstream industries, modern agriculture, tourism, and the digital economy should be viewed not only as an economic agenda but also as a medium-term strategic fiscal agenda, since greater added value and diversity in economic activity broaden the tax base and strengthen fiscal independence.

CONCLUSION

This study examines the determinants of provincial fiscal independence in Indonesia during the 2021–2025 period using a Random Effects Model as the baseline estimator. The results show that DAU and DBH are negatively associated with fiscal independence, although only DBH is statistically significant in the baseline model and its effect is not robust across alternative specifications. Likewise, the Regional Innovation Index and GRDP are positively associated with fiscal independence; however, only GRDP remains consistently significant across all robustness checks, indicating that regional economic capacity is the most robust determinant of provincial fiscal independence.

This study is limited by the short observation period, and the findings should therefore be interpreted as empirical associations rather than definitive causal relationships. Strengthening provincial fiscal independence requires improving local revenue mobilization through performance-based transfers, stronger tax administration, public-service innovation, and regional economic transformation. Future research should employ longer panel data and more advanced estimation methods to provide stronger causal evidence.

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