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ANALYSIS OF THE IMPACT OF FISCAL DECENTRALIZATION ON REGIONAL FISCAL IMBALANCES: A CROSS-REGION CASE STUDY IN JAVA

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ABSTRACT

Research Originality — This study contributes to the discourse on fiscal decentralization by examining the impact of Law Number 1 of 2022 on Intergovernmental Financial Relations (UU HKPD) and the Transfer to Local Government (TKD) mechanism in Indonesia. Unlike previous studies, this research provides a comparative analysis of vertical fiscal imbalances (VFI) and horizontal fiscal imbalances (HFI) before and after the enactment of the HKPD Law, with a specific focus on local governments in Java.

Research Objectives — The primary objective of this study is to analyze the extent and trends of VFI and HFI resulting from fiscal policy, particularly through the TKD mechanism, both before and after the implementation of the HKPD Law. It further assesses the effectiveness of Revenue Sharing Funds (DBH) and the General Allocation Fund (DAU) in mitigating fiscal disparities at the regional level.

Research Methods — This study employs quantitative analysis, utilizing the Williamson Index, Theil Index, and Standard Deviation to measure fiscal imbalances. The research dataset consists of local government financial reports covering the period of 2018–2023.

Empirical Results — The findings indicate that VFI between the central and regional governments declined following the implementation of the HKPD Law, as evidenced by improved DBH allocations. Meanwhile, HFI initially increased but exhibited a downward trend in the post-HKPD period, with DAU playing a crucial role in reducing disparities among local governments. However, fiscal imbalances persist due to Indonesia's expenditure assignment principle, which grants local governments autonomy over expenditures while limiting their ability to generate revenue effectively.

Implications — The study confirms that the TKD policy under the HKPD Law has effectively reduced fiscal imbalances but remains insufficient to fully eliminate them due to structural constraints in local revenue generation. Policymakers should focus on strengthening local taxing power, optimizing regional revenue potential, and improving fiscal administration to enhance fiscal autonomy. Future research should consider longer timeframes and broader geographical coverage to evaluate comprehensively fiscal decentralization policies.

Keywords: fiscal decentralization, government budget systems, fiscal imbalance, Theil index, Williamson index, fiscal policy

JEL Classification: H30, H61, H72, H73, H77

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INTRODUCTION

Fiscal decentralization in Indonesia is inseparable from the implementation of regional autonomy, which was marked by the enactment of Law Number 22 of 1999 on Regional Government. This was followed by Law Number 25 of 1999 on the Fiscal Balance between the Central and Regional Governments, which provided the legal foundation for implementing fiscal decentralization in Indonesia. The introduction of

these laws raised expectations for improving public welfare through enhanced public service delivery, increased prosperity, local empowerment, and greater community participation at the regional level.

Escaleras and Chiang (2017) demonstrated that fiscal decentralization can enhance the business ecosystem, particularly in low-income countries. Meanwhile, empirical evidence from Organization for Economic Cooperation and Development (OECD) countries suggests that fiscal decentralization does not necessarily worsen the budgetary balance between central and regional governments. In fact, expenditure decentralization may even be beneficial in mitigating financial crises (Bartolini et al., 2018).

Research on fiscal decentralization in Indonesia has yielded diverse findings. For instance, Utama et al. (2017) found that between 1980 and 2015, fiscal

decentralization policies tended to promote economic growth rather than equitable distribution. Similarly, Negara and Khoirunurrofik (2021) found that income per capita convergence among Indonesian districts and municipalities improved when fiscal decentralization indicators were incorporated into the model.

In developing countries, fiscal decentralization may present challenges, including varied outcomes and potential effects on economic growth (Ahmad et al., 2016; Arif & Ahmad, 2020). However, it also offers benefits, such as an improved business environment and the potential to reduce income inequality (Canare et al., 2020). Nonetheless, the specific outcomes of fiscal decentralization can vary depending on each country's unique circumstances (Gadenne & Singhal, 2014; Bahl & Bird, 2018; Bojanic, 2020).

As part of its commitment to fiscal decentralization, the central government allocates financial transfers to regional governments through the State Budget (APBN) to support regional governance in accordance with statutory regulations. Additionally, regional governments are granted the authority to collect local revenue sources (PAD), particularly through Local Taxes and Levies (PDRD), and to improve fiscal management and governance.

As autonomous regions, local governments are entrusted with managing the Regional Budget (APBD) to provide optimal public services that contribute to the overall welfare of the Indonesian population. Fiscal decentralization plays a crucial role in promoting social justice and enhancing the quality of public service delivery to the community.

Eyraud and Lusinyan (2013) investigated the relationship between fiscal performance and local government financing structures and found that a reduction in vertical fiscal imbalance (VFI) is associated with an improvement in overall fiscal balance. VFI and horizontal fiscal imbalances (HFI) arise due to differences in regional economic size and structure, which result in variations in local revenue potential. Additionally, administrative factors such as human resources, information technology, legal frameworks, and financial management also influence revenue collection at the regional level (Cevik, 2017).

A study by Chinn and Ito (2022) highlighted that fiscal factors are a key determinant of fiscal imbalances and have contributed significantly to recent variations in fiscal imbalances globally, including in the United States and Germany. Similarly, Cabaleiro-Casal and Buch-Gómez (2015) demonstrated that certain public expenditure policies, particularly those related to basic public services, social protection, and economic activities, are closely linked to fiscal imbalance conditions.

To date, the government has made continuous efforts to improve the implementation of fiscal decentralization through various regulatory frameworks. However, diverse regional characteristics and administrative challenges in Indonesia present obstacles to designing a uniformly effective fiscal decentralization policy across all regions.

Empirical studies have shown that fiscal rules, including legislative frameworks, can mitigate fiscal imbalances. In India, Chakraborty and Dash (2017) found that the absence of fiscal rules contributes to fiscal imbalances. In response, the Indonesian government introduced Law Number 1 of 2022 on Financial Relations between the Central and Regional Governments (UU HKPD) as a fiscal decentralization strategy. This law aims to strengthen local tax systems, minimize VFI and HFI, enhance regional expenditure quality,

IMPLEMENTATION IN PRACTICE

- Vertical fiscal imbalances between the central and regional governments persist. However, these disparities can be mitigated through the implementation of fiscal decentralization policies, particularly via the revenue-sharing fund (DBH) mechanism as stipulated in Law No. 1/2022.
- Horizontal fiscal imbalances among regency and municipal governments in Java exhibited an increasing trend before the enactment of Law No. 1/2022 but showed a declining (improving) trend thereafter. Overall, the general allocation fund (DAU) policy has played a role in reducing horizontal fiscal disparities across Java.
- Such fiscal imbalances are inherent to the system, as Indonesia's decentralization framework follows the expenditure assignment principle, wherein local governments have the authority to manage expenditures but face constraints in revenue generation.

and harmonize central and local spending to improve public service delivery and overall welfare across Indonesia.

The Transfer to Local Governments (TKD) mechanism serves as a key revenue source for regional governments, and it is designed to reduce both VFI (between the central and regional governments) and HFI (among regions). Additionally, the TKD framework aims to enhance local government performance in delivering equitable public services. The redesign of intergovernmental transfers seeks to reduce fiscal imbalances and improve expenditure efficiency by implementing performance-based transfers.

The strategy for reducing VFI and HFI is centered on restructuring the management of TKD through the reformulation of Revenue Sharing Funds (DBH), General Allocation Funds (DAU), Special Allocation Funds (DAK), Special Autonomy Funds, Privileged Funds, and Village Funds, with an emphasis on performance-based regional governance. The disparity in revenue and expenditure authority between the central and regional governments is a key factor contributing to VFI.

Under Law 1/2022, fiscal imbalances are categorized into VFI (between the central and regional governments) and HFI (among local governments). Therefore, the first objective of this study is to analyze VFI and HFI caused by the TKD mechanism, particularly through DBH and DAU. Additionally, this study aims to examine the implementation of Law 1/2022 in addressing these imbalances. By doing so, the research seeks to contribute to discussions on fiscal decentralization and provide insights into the implementation of fiscal policies in Indonesia.

LITERATURE REVIEW

The concept of fiscal imbalance encompasses both VFI and HFI. VFI refers to the misalignment between revenue and expenditure across different levels of government (Di Liddo et al., 2016; Kowalik, 2016), while HFI reflects fiscal disparities among local governments due to differences in fiscal capacity (Kowalik, 2015; Di Liddo et al., 2016). Fiscal imbalance considers the impact of both VFI and HFI on local government fiscal performance (Di Liddo et al., 2019).

VFI measures the relationship between overall fiscal performance and local government financing structures. Eyraud and Lusinyan (2013) found that a 10-percentage-point reduction in VFI is associated with a 1% improvement in fiscal balance relative to GDP. Additionally, provincial budgetary strength influences VFI across U.S. states, affecting intergovernmental transfers and expenditure centralization (Kim, 2023). Therefore, the fundamental concept of fiscal imbalance revolves around disparities in revenue allocation and expenditure responsibilities between different levels of government and among regional governments.

VFI occurs when local government expenditures exceed their revenues, leading to fiscal shortfalls and increased risks of deficit accumulation and debt accumulation (Koley & Mandal, 2019; Timushev & Mikhaylova, 2023). In India, the decentralization of regional expenditure without a corresponding devolution of revenue has resulted in significant VFI at the state level (Koley & Mandal, 2019). Unequal regional fiscal revenue distribution contributes to fiscal imbalances, while efforts to narrow the fiscal gap help establish a modern intergovernmental fiscal relationship through financial coordination and regional equity (Zhang et al., 2021).

HFI, often referred to as regional tax imbalance, tends to be more severe than VFI, particularly in developing countries. In federal systems, public finance structures often create both vertical and horizontal fiscal disparities, which in turn affect intergovernmental fiscal relations (Kowalik, 2015).

VFI has been identified as a factor that hinders local government accountability and fiscal performance. In India, empirical evidence suggests that a one-percentage-point reduction in VFI correlates with a decline in the average primary deficit of state governments (Koley & Mandal, 2019). Additionally, unbalanced regional revenue distribution may contribute to fiscal imbalances, influencing the formation of modern fiscal relationships between central and local governments through financial coordination and regional equilibrium (Zhang et al., 2021).

HFI impacts local government fiscal behavior and expenditure efforts (Di Liddo et al., 2019). Over time, VFI has increased, affecting state autonomy and mechanisms for addressing fiscal imbalances (Searle, 2020).

Long-term intergovernmental cooperation influences expenditure centralization and revenue decentralization. However, political influence in fiscal policy tends to be short-term oriented, with limited long-term impact on fiscal centralization and decentralization (Kim, 2023).

Previous studies have provided valuable insights into the impact of HFI on intergovernmental relations and policy coordination. These studies also highlight the influence of central government fiscal efforts, the degree of VFI, and the effects of intergovernmental cooperation on expenditure centralization and revenue decentralization. Moreover, they examine the implications of fiscal decisions at the regional level. Although

these studies do not explicitly address the impact of HFI on policy coordination, they still offer important perspectives on how fiscal imbalances shape intergovernmental dynamics.

In summary, VFI arises from the misalignment between local governments' expenditure needs and revenue capacity, ultimately leading to deficits and debt accumulation. The implications of VFI within federalism affect subnational accountability and fiscal performance. Meanwhile, HFI, particularly in developing countries, presents significant challenges to intergovernmental fiscal relations. Addressing HFI at the regional level requires identifying and quantifying fiscal disparities to develop effective equalization mechanisms. However, while existing research provides insights into the causes and implications of fiscal imbalances, studies on specific strategies to address HFI at the regional level remain limited.

Intergovernmental transfers play a crucial role in mitigating fiscal imbalances. These transfers can help reduce VFI by integrating performance-based incentives to enhance service delivery (Yilmaz & Zahir, 2020). Additionally, well-coordinated reforms are necessary to achieve economies of scale, improve revenue collection, and optimize expenditure composition at the subnational level, all of which contribute to reducing VFI (Cevik, 2017). Fiscal policies, including tax and expenditure regulations, influence fiscal imbalances. Policymakers face challenges in achieving horizontal equity while simultaneously addressing vertical equity concerns (Miller, 2017).

The causes of fiscal imbalance within a country can be attributed to the structure of public expenditure policies and the implementation of fiscal regulations. Fiscal imbalance can affect local government behavior, business cycle synchronization, and fiscal policy cycles. Strategies to address fiscal imbalances include implementing fiscal rules and using tax policies for resource allocation. Fiscal policy plays a pivotal role in influencing aggregate demand, managing financial cycles, and significantly impacting long-term economic well-being.

METHODS

Various methods have been developed to measure fiscal imbalances, including regression analysis and indices, such as the Gini Index (Di Liddo et al., 2016; Eyraud & Lusinyan, 2013; Schneider et al., 2017). The impact of fiscal policy on income imbalance has been widely studied, with findings indicating that fiscal policy plays a role in reducing income disparities. However, the interaction between fiscal policy and institutional quality expands the scope of analysis within this research field (Nguyen, 2023). Long before these studies, analytical models were developed by researchers as foundational frameworks for fiscal policy worldwide (Conyers, 1981; Cheema & Rondinelli, 1983; Bahl & Wallich, 1992; Oates, 1993; Bird & Vaillancourt, 1998; Davoodi & Zou, 1998; Vaillancourt, 1998; Woller & Phillips, 1998; Yilmaz, 2001; Martinez-Vazquez & McNab, 2001; Ebel & Yilmaz, 2002; Thieben, 2003; Breuss & Eller, 2004; Adam & Bevan, 2005; Akai et al., 2007).

This study employs secondary data, comprising budget and financial realization data obtained from the Directorate General of Fiscal Balance (DJPK) of the Indonesian Ministry of Finance, covering the period from 2018 to 2023. The objects of the research include all local governments in Java, except for six districts/municipalities in the Special Capital Region (DKI) of Jakarta, as fiscal decentralization policies in this province are implemented at the provincial level (Hartandi & Adrison, 2022). Consequently, the total research sample consists of 113 district/municipal governments and six provincial governments.

Vertical Fiscal Imbalance (VFI)

Conventionally, VFI is measured using various techniques based on a combination of fiscal aggregates. One of the most commonly used indicators is the proportion of local government expenditures financed by PAD (Collins, 2002; Ebel & Yilmaz, 2002). A variant of this measure is formulated as the ratio of PAD to total expenditures.

Hunter (1977) proposed three alternative measures of VFI, each based on different concepts of independent revenue sources for local governments: (1) PAD, (2) PAD plus DBH, and (3) PAD plus DBH and unconditional grants. Another widely used VFI indicator is the proportion of TKD, where an increase in TKD corresponds to a rise in VFI (Rodden & Wibbels, 2002; McLean, 2004). This study employs two approaches to analyze VFI: (1) the ratio of total PAD to total regional expenditures and (2) the ratio of total PAD plus DBH to total regional expenditures. In this context, DBH represents the potential local revenue sources of each region and serves as an instrument for the implementation of fiscal decentralization policies.

Horizontal Fiscal Imbalance (HFI)

Unlike VFI, HFI lacks a clear definition due to the absence of consensus on the nature of fiscal disparities among local governments and the complexities of its measurement. In every country, jurisdictions at the same level of government exhibit varying degrees of wealth, with HFI arising from disparities in available resources. Consequently, HFI is closely linked to differences in fiscal capacity across

regions. This study employs three indicators to analyze HFI: (1) PAD, (2) PAD plus DBH, and (3) PAD plus DBH and DAU. In this context, DAU serves as a fiscal decentralization policy instrument.

The regional economics literature (Bilal, 2023; Cowell, 1985; Easterlin, 1961; Krusell & Smith Jr., 1998; Madan & Yadav, 2022; Malakar & Mishra, 2017; Mao & Ma, 2021; Moskowitz & Grinblatt, 1999; Sharma & Sharma, 2022; Shen et al., 2023), offers various measures of regional disparities, ranging from simple to highly complex indices. Some commonly used regional disparity indices include the coefficient of variation, Theil's entropy index, Williamson index, maximum-to-minimum ratio, Atkinson index, relative mean deviation, and Gini coefficient. These indices reflect the complexity of measuring regional disparities, and no single index can fully capture all dimensions of fiscal inequality.

The use of Theil's index in disparity studies was pioneered by Cowell (1985), who popularized it for hierarchical decomposition analysis. Several scholars have demonstrated the advantages of this index, contributing to its continued relevance in contemporary research (Malakar & Mishra, 2017; Mao & Ma, 2021; Madan & Yadav, 2022; Shen et al., 2023).

Easterlin (1961); Krusell and Smith Jr. (1998); Angeletos and Pavan (2007); Moskowitz and Grinblatt (1999); Sharma and Sharma (2022); and Bilal (2023) have conducted studies on cross-sectional dispersion in interregional disparities. From this perspective, convergence occurs when regional dispersion decreases over time, commonly measured by the standard deviation of the logarithm of per capita income.

This study begins with an analysis of VFI and HFI across Java, where convergence is defined as a decline in dispersion over time. Dispersion is typically measured using the standard deviation (StDev) of fiscal capacity across regions, calculated as follows:

$$StDev = \sqrt{\frac{\sum(x-\bar{x})^2}{(n-1)}} \quad (1)$$

where x represents the data: \bar{x} is the sample mean, and n is the number of observations.

Additionally, fiscal imbalance is assessed using the weighted coefficient of variation (CV_w), a modified Williamson index for measuring interregional fiscal disparities (Barro & Sala-I-Martin, 1992):

$$CV_w = \frac{\sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2 \frac{P_i}{P}}}{\bar{Y}} \quad (2)$$

where CV_w represents the weighted coefficient of variation or Williamson index at the provincial level, P_i is the population of district/city i ; P is the total provincial population; Y_i represents local fiscal capacity (PAD, DBH, DAU) per capita for district/city i ; and \bar{Y} is the average per capita fiscal capacity for all regions.

The study also calculates Theil's index (IC), which is decomposable and provides insights into both within-region and between-region disparities:

$$IC = \sum_i y_i \log \log \left(\frac{y_i}{x_i} \right) = IC_{br} + IC_{wr} \quad (3)$$

$$IC_{br} = \sum_r Y_r \log \log \left(\frac{Y_r}{X_r} \right) \quad (4)$$

$$IC_{wr} = \sum_r Y_r \left[\sum_i \left(\frac{y_i}{Y_r} \right) \log \left(\frac{\frac{y_i}{Y_r}}{\frac{x_i}{X_r}} \right) \right] \quad (5)$$

where IC represents total fiscal imbalance, IC_{br} denotes between-group imbalance, and IC_{wr} denotes within-group imbalance. The variables y_i and x_i represent the regional proportions of fiscal capacity (PAD + DAU + DBH) and population for district/city i relative to the province. Similarly, Y_r and X_r represent the corresponding values at the provincial level, while Y_{ir} indicates the regional proportion of fiscal capacity for district/city i relative to the province.

Although the Williamson and Theil indices have been widely used to analyze regional fiscal disparities, regional convergence alone does not indicate the statistical significance of the observed trends. Therefore, this study employs regression analysis of CV_w , IC , and $StDev$ against time trends to assess the significance of fiscal dispersion trends using the following equation:

$$Y_t = a_1 + a_2 T + e_t \quad (6)$$

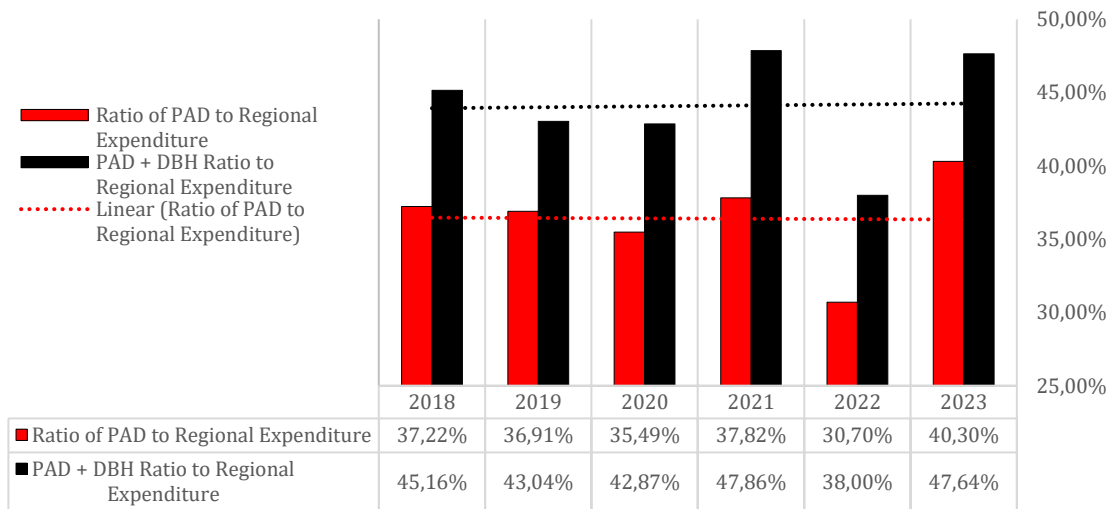
where Y represents an indicator variable CV_w , IC , and $StDev$; T denotes the time trend over the period 2018–2022 (pre-Law 1/2022) and 2018–2023 (post-Law 1/2022). The coefficients from both periods are compared in terms of direction, magnitude, and statistical significance to evaluate the policy changes. Here, t represents the time series, and e_t is the error term.

RESULTS AND DISCUSSION

Vertical Fiscal Imbalance (VFI)

Local governments lack sufficient "own-source revenues" to cover their expenditures. Revenues under their direct control consistently fall short of their spending needs. Figure 1 illustrates the comparison between local government revenues and expenditures, confirming that VFI persists over time.

Figure 1 Regional VFI in Java, 2018–2023



(Source: Ministry of Finance, Republic of Indonesia, 2023; processed by the authors)

Before the enactment of Law No. 1/2022, the ratio of PAD to regional expenditure exhibited a declining trend, decreasing from 37.22% in 2018 to 30.70% in 2022. However, after the implementation of Law No. 1/2022, the ratio increased beyond its initial observation, reaching 40.30% in 2023. This improvement in VFI occurred following the central government’s fiscal transfers to local governments, particularly through DBH. Consequently, the overall VFI level improved, as indicated by the increase in the ratio of PAD and DBH to regional expenditure from 45.16% in 2018 to 47.64% in 2023, demonstrating the significant impact of Law No. 1/2022 in mitigating VFI.

Table 1 Implementation of Fiscal Decentralization Policies in Reducing VFI in Java

Vertical Imbalance		Pre and Post Law No. 1/2022 (2018–2022)				Conclusion
		Pre-Law No. 1/2022 (2018–2022)		Post-Law No. 1/2022 (2018–2023)		
		m	sig.	m	sig.	
Before-After DBH Intervention	PAD-to-Expenditure Ratio	-0.0121	***	-0.0003	***	Increasing, but slowing (Improving)
	PAD + DBH-to-Expenditure Ratio	-0.0095	***	0.0006	***	Decreasing (Improving)
	Conclusion	Increasing, but slowing (Improving)		Decreasing (Improving)		

Significance levels: ***1%, **5%, *10%

(Source: Ministry of Finance, Republic of Indonesia, 2023; processed by the authors).

Table 1 presents the implementation of fiscal policies before and after Law No. 1/2022, along with the impact of DBH policy interventions. Before Law No. 1/2022, the slope of the PAD-to-expenditure ratio was -0.0121, while after the law’s enactment, it improved to -0.0003. This indicates that the PAD-to-expenditure ratio increased but at a slower rate. Meanwhile, the slope of the PAD + DBH-to-expenditure ratio shifted from -0.0095 before Law No. 1/2022 to 0.0006 afterward, signifying a reduction in VFI.

Regarding the impact of DBH interventions, the data indicate that before Law No. 1/2022, VFI increased but at a decelerating rate, whereas after the law's implementation, VFI declined at an accelerated pace.

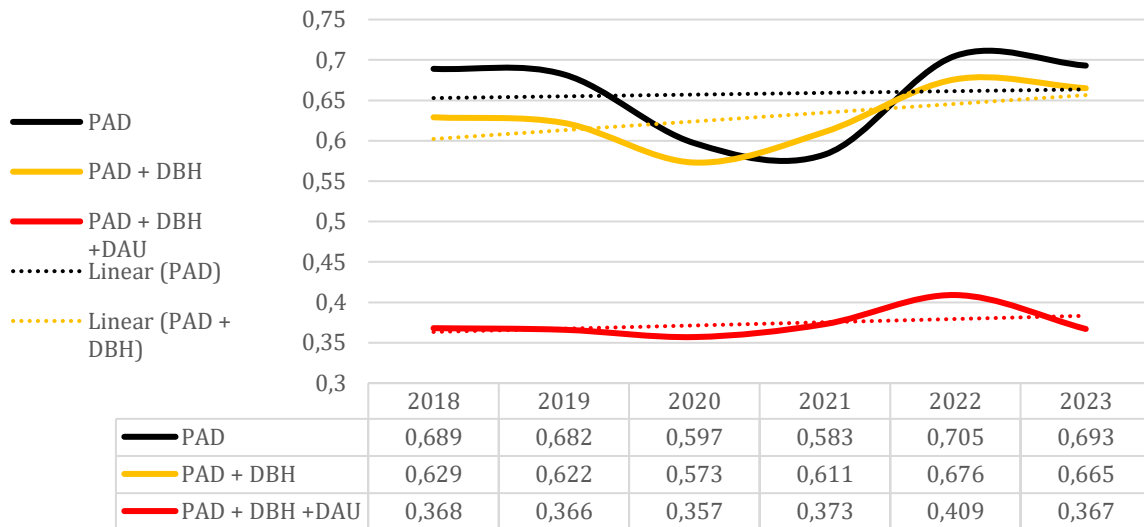
Horizontal Fiscal Imbalance (HFI)

1. Williamson Index

DAU have been effective in reducing HFI across regions. The level of HFI across Java, measured using the Williamson Index, is highest when calculated based solely on PAD. The introduction of DBH intervention has helped reduce this imbalance, and the addition of DAU intervention further enhances the reduction. DAU intervention is capable of reducing horizontal fiscal imbalances

Figure 2 illustrates the overall trend of the Williamson Index from 2018 to 2023, showing that while HFI generally increased over time, there was a noticeable decline in fiscal disparity in 2023. Using PAD as the sole indicator, the HFI level rose from 0.689 in 2018 to 0.693 in 2023. With DBH intervention, the imbalance slightly decreased from 0.629 in 2018 to 0.665 in 2023. The most significant reduction was observed when DAU intervention was included, bringing the index from 0.368 in 2018 to 0.367 in 2023.

Figure 2 Interregional HFI in Java, 2018–2023 (Williamson Index)



(Source: Ministry of Finance, Republic of Indonesia, 2023; processed by the authors)

Law No. 1/2022 has improved the effectiveness of DAU in mitigating HFI (regional fiscal convergence). However, when examining the policy implementation before and after the enactment of Law No. 1/2022, it is evident that using only PAD as an indicator suggests that HFI has worsened. Similarly, even with the intervention of DBH, the imbalance has continued to increase post-enactment.

Table 2 Implementation of Fiscal Decentralization Policies in Reducing HFI in Java (Williamson Index)

Horizontal Imbalance		Pre and Post Law No. 1/2022				Conclusion
		Pre-Law No. 1/2022 (2018–2022)		Post-Law No. 1/2022 (2018–2023)		
		m	sig.	m	sig.	
Before–After DBH Intervention	PAD	-0.0066	***	0.0023	***	Increased (Worsened)
	PAD+DBH	0.0083	***	0.0108	***	Increased, Accelerated (Worsened)
	Conclusion	Increased (Worsened)		Decreased, Accelerated (Improved)		
Before–After DBH + DAU Intervention	PAD+DBH+DAU	0.0090	***	0.0041	***	Increased, Slowed Down (Improved)
	Conclusion	Decreased, Slowed Down (Improved)		Decreased, Slowed Down (Improved)		

Significance levels: ***1%, **5%, *10%

(Source: Ministry of Finance, Republic of Indonesia, 2023; processed by the authors)

Unlike DBH interventions, DAU interventions, while initially increasing HFI, have resulted in a slower rate of worsening, indicating an overall improvement in fiscal conditions. This suggests that before the enactment of Law No. 1/2022, DBH intervention led to a deterioration of HFI. However after the law’s implementation, the imbalance began to decline and accelerated toward improvement. Furthermore, DAU interventions—both before and after Law No. 1/2022—consistently contributed to reducing fiscal imbalance, albeit at a slower rate. This indicates that while regional disparities persist, the rate at which they improve has increased.

The impact of DAU interventions in reducing HFI is evident across different provinces. Fiscal disparities have declined, particularly in Banten and Yogyakarta, following the introduction of DBH and DAU interventions, along with the implementation of Law No. 1/2022. However, disparities have continued to widen in East Java, Central Java, and West Java, as depicted in Table 3.

Table 3a Interregional HFI in Java by Province, 2018–2023 (Williamson Index)

Provinsi	PAD per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
Banten	0,598	0,615	0,593	0,576	0,536	0,543
Jabar	0,567	0,572	0,508	0,511	0,531	0,541
Jateng	0,667	0,644	0,598	0,552	0,623	0,622
DIY	0,579	0,596	0,601	0,543	0,512	0,540
Jatim	0,692	0,649	0,625	0,561	0,645	0,622

Table 3b Interregional HFI in Java by Province, 2018–2023 (Williamson Index)

Provinsi	PAD+DBH per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
Banten	0,472	0,485	0,521	0,503	0,549	0,517
Jabar	0,486	0,450	0,459	0,425	0,466	0,500
Jateng	0,512	0,529	0,551	0,550	0,598	0,631
DIY	0,519	0,481	0,491	0,496	0,511	0,462
Jatim	0,727	0,733	0,634	0,729	0,719	0,771

Table 3c Interregional HFI in Java by Province, 2018–2023 (Williamson Index)

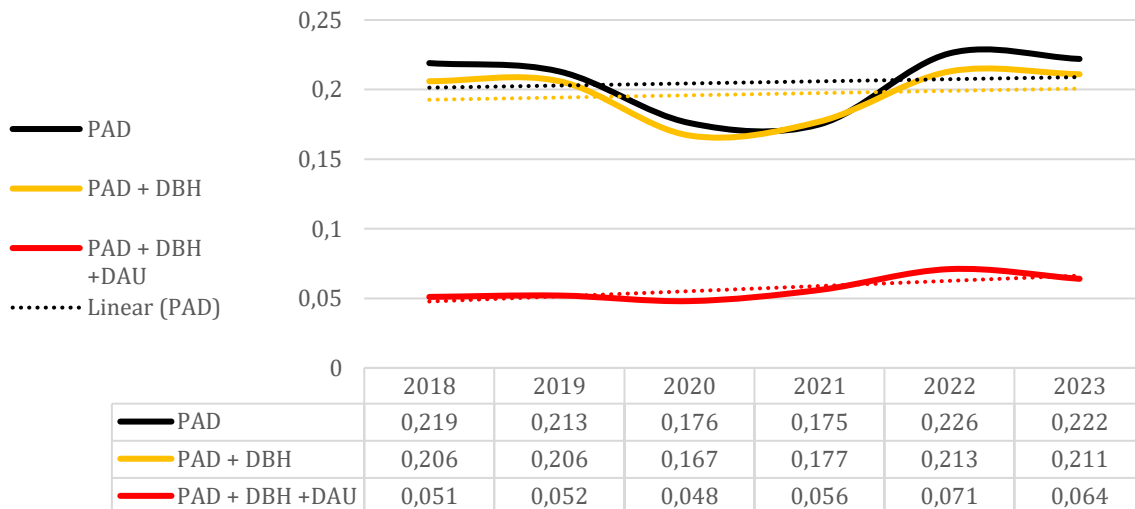
Provinsi	PAD+DAU+DBH per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
Banten	0,264	0,283	0,317	0,285	0,296	0,311
Jabar	0,332	0,311	0,304	0,278	0,303	0,302
Jateng	0,315	0,319	0,344	0,351	0,369	0,358
DIY	0,285	0,271	0,308	0,321	0,330	0,264
Jatim	0,387	0,395	0,367	0,419	0,415	0,390

(Source: DJPK, processed, 2023)

2. Theil Index Analysis

Similar to the Williamson Index, the Theil Index also illustrates that DAU interventions have played a crucial role in reducing both interregional and intra-regional HFI. The pattern observed in the Theil Index confirms that DBH interventions alone contribute to decreasing HFI, and the inclusion of DAU interventions leads to an even more significant reduction in disparities.

Figure 3 Interregional HFI in Java, 2018–2023 (Theil Index)



(Source: Ministry of Finance, Republic of Indonesia, 2023; processed by the authors)

Although the overall trend of HFI increased between 2018 and 2023, fiscal disparities declined notably in 2023 across all indicators, whether measured using PAD alone, PAD plus DBH, or PAD plus DAU. Specifically, the Theil Index for PAD-based HFI increased slightly from 0.219 in 2018 to 0.222 in 2023, while with DBH intervention, the imbalance initially decreased to 0.206 in 2018 but slightly increased again to 0.211 in 2023. The most substantial reduction occurred with DBH + DAU intervention, where HFI fell significantly from 0.051 in 2018 to 0.064 in 2023.

Law No. 1/2022 has enhanced the effectiveness of the DAU in mitigating HFI (regional fiscal convergence). When examining the policy implementation before and after the enactment of Law No. 1/2022, it is evident that using PAD as an indicator or incorporating the DBH as an intervention has led to

Table 4 Implementation of Fiscal Decentralization Policy in Reducing Interregional HFI in Java (Theil Index)

Vertical Disparity		Pre- and Post-Law No. 1/2022				Conclusion
		2018-2022		2018-2023		
		m	sig.	m	sig.	
Pre- and Post-DBH Intervention	PAD	-0.0025	***	0.0014	***	Increased (Worsened)
	PAD+DBH	-0.0016	***	0.0016	***	Increased (Worsened)
	Conclusion	Decreased, Slowed Down (Improved)		Decreased, Accelerated (Improved)		
Pre- and Post-DBH+DAU Intervention	PAD+DBH+DAU	0.0044	***	0.0036	***	Increased, Slowed Down (Improved)
	Conclusion	Decreased, Accelerated (Improved)		Decreased, Accelerated (Improved)		

Significance levels: ***1%, **5%, *10%

Source: Ministry of Finance of the Republic of Indonesia (2023), processed by the authors

horizontal fiscal imbalances, indicating an overall increase in disparities. However, when DAU is introduced as an additional intervention, the imbalances show improvement post-Law No. 1/2022, albeit at a slower pace.

It can also be concluded that DBH intervention, both before and after the enactment of Law No. 1/2022, contributed to reducing fiscal disparities, although the pace of improvement was slow. When DAU was further introduced, fiscal imbalances were mitigated even further, leading to a sharper reduction in disparities.

A decomposition approach using the Theil Index reveals that, regardless of whether PAD alone or PAD with DBH and DAU interventions were used as indicators, overall fiscal imbalances showed an increasing trend. However, a decline was observed in 2023. Moreover, fiscal disparities were generally reduced with DBH intervention and significantly diminished when DAU was included. As illustrated in Table 5, interregional disparities in Java were predominantly absorbed within regions rather than across provincial boundaries.

Table 5a Interregional HFI in Java by Province, 2018–2023 (Theil Index)

Index	PAD per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
ITintra	0,194	0,191	0,162	0,165	0,184	0,205
ITinter	0,025	0,022	0,014	0,009	0,018	0,016
IT	0,219	0,213	0,176	0,175	0,202	0,222

Table 5b Interregional HFI in Java by Province, 2018–2023 (Theil Index)

Index	PAD + DBH per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
ITintra	0,180	0,182	0,151	0,163	0,180	0,191
ITinter	0,027	0,024	0,016	0,014	0,020	0,021
IT	0,206	0,206	0,167	0,177	0,200	0,211

Table 5c Interregional HFI in Java by Province, 2018–2023 (Theil Index)

Index	PAD+DAU+DBH per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
ITintra	0,045	0,046	0,043	0,051	0,056	0,057
ITinter	0,006	0,006	0,004	0,005	0,007	0,007
IT	0,051	0,052	0,048	0,056	0,063	0,064

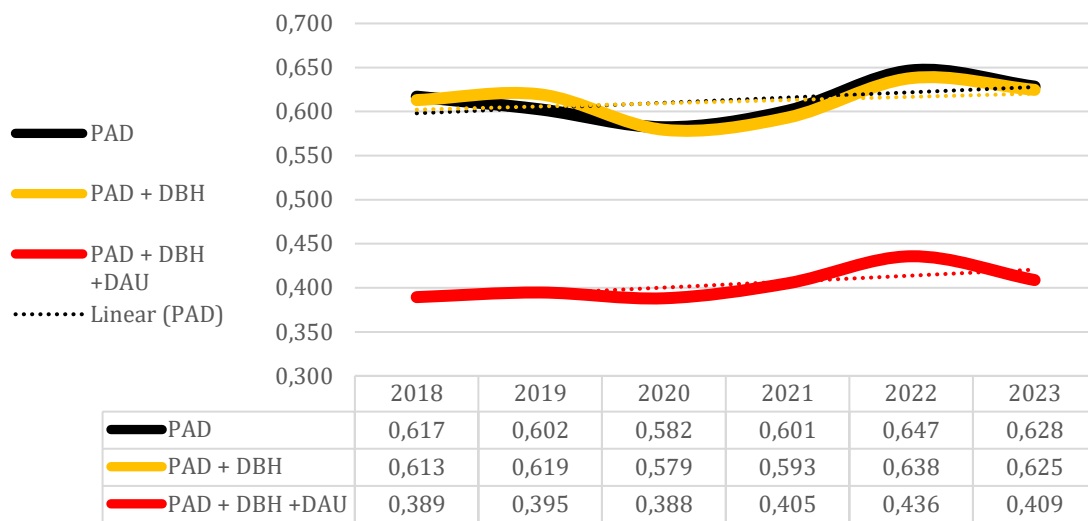
Source: DJPK, processed (2023)

3. Standard Deviation Approach

DAU intervention has been effective in reducing HFI. Using a standard deviation approach, the observed patterns closely align with those derived from the Williamson Index and the Theil Index. Specifically, DBH intervention contributed to a reduction in disparities, and the addition of DAU further accelerated this reduction despite the overall trend showing an increase from 2018 to 2023.

Law No. 1/2022 has strengthened DAU's role in mitigating HFI. Analyzing policy implementation before and after Law No. 1/2022, PAD as an indicator shows that fiscal disparities worsened, with an

Figure 4 Interregional HFI in Java, 2018–2023 (Standard Deviation)



Source: Ministry of Finance of the Republic of Indonesia (2023), processed by the authors.

accelerating trend. Similarly, when PAD was combined with DBH, the disparities continued to worsen at an increasing rate. However, with the inclusion of DAU, the disparities improved, albeit with a slower pace of change. This suggests that the implementation of Law No. 1/2022, alongside DBH and DAU interventions, contributed to a reduction in fiscal imbalances.

At the regional level, the impact of DBH and DAU interventions resulted in a general decline in fiscal imbalances. In Banten and the Special Region of Yogyakarta, disparities decreased, whereas in other provinces, disparities increased. However, the overall fiscal imbalance situation improved significantly with DBH and DAU interventions, as depicted in Table 6.

Table 6a Interregional HFI in Java by Province, 2018–2023 (Standard Deviation)

Provinsi	PAD per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
Banten	0,843	0,845	0,835	0,828	0,845	0,811
Jabar	0,613	0,593	0,567	0,556	0,603	0,597
Jateng	0,540	0,543	0,538	0,553	0,578	0,597
DIY	0,649	0,616	0,557	0,566	0,561	0,574
Jatim	0,616	0,589	0,576	0,642	0,635	0,634

Table 6b Interregional HFI in Java by Province, 2018–2023 (Standard Deviation)

Provinsi	PAD + DBH per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
Banten	0,777	0,793	0,763	0,747	0,916	0,777
Jabar	0,569	0,545	0,533	0,504	0,555	0,562
Jateng	0,538	0,552	0,541	0,552	0,576	0,595
DIY	0,637	0,611	0,555	0,560	0,558	0,576
Jatim	0,635	0,655	0,595	0,650	0,647	0,640

Table 6c Interregional HFI in Java by Province, 2018–2023 (Standard Deviation)

Provinsi	PAD+DAU+DBH per Kapita (Rp/Jiwa)					
	2018	2019	2020	2021	2022	2023
Banten	0,322	0,341	0,365	0,356	0,385	0,399
Jabar	0,338	0,325	0,333	0,325	0,353	0,347
Jateng	0,372	0,380	0,383	0,395	0,409	0,406
DIY	0,312	0,306	0,298	0,316	0,324	0,309
Jatim	0,433	0,446	0,427	0,461	0,461	0,441

Source: DJPK, processed (2023)

Discussion

The findings indicate that fiscal imbalances persist across Java. This aligns with previous studies on VFI conducted by Eyraud and Lusinyan (2013), Koley and Mandal (2019), Kim (2023), and Timushev and Mikhaylova (2023) in various regions. HFI, though less frequently discussed in the literature compared to vertical disparities, also remains significant. As noted in Kowalik's study (2015) on Germany, HFIs among governments are smaller than inter-state disparities in the United States, yet they still exist.

Table 7 Implementation of Fiscal Decentralization Policy in Reducing Intra-Regional HFI in Java (Standard Deviation)

Horizontal Disparity		Pre- and Post-Law No. 1/2022				Conclusion
		2018-2022		2018-2023		
		m	sig.	m	sig.	
Pre- and Post-DBH Intervention	PAD	0.0058	***	0.0060	***	Increased, Accelerated (Worsened)
	PAD + DBH	0.0023	***	0.0036	***	Increased, Accelerated (Worsened)
	Conclusion	Decreased, Slowed (Improved)		Decreased, Slowed (Improved)		
Pre- and Post-DAU Intervention	PAD + DBH +DAU	0.0103	***	0.0068	***	Increased, Slowed Down (Improved)
	Conclusion	Decreased, Accelerated (Improved)		Decreased, Accelerated (Improved)		

Significance levels: ***1%, **5%, *10%

Source: Ministry of Finance of the Republic of Indonesia (2023), processed by the authors

Horizontal imbalances, driven by variations in local fiscal capacity, tend to worsen following major fiscal reforms (Zhang et al., 2021). Identifying these imbalances is crucial in developing mechanisms to address them. However, this study finds that fiscal reforms have had the opposite effect, improving fiscal balance rather than exacerbating disparities.

These disparities can be attributed to the unequal distribution of local fiscal revenues, leading to fiscal imbalances and influencing the structure of financial relations between central and local governments through financial coordination (Zhang et al., 2021). In Indonesia's budget system, fiscal imbalances arise due to the asymmetric allocation of revenue and expenditure responsibilities between central and local governments. Law No. 1/2022 recognizes both vertical (between central and local governments) and horizontal (among local governments) fiscal imbalances.

The implementation of fiscal policies, such as Law No. 1/2022 on Central-Local Government Financial Relations (UU HKPD), has been shown to reduce fiscal imbalances in Indonesia. This aligns with Chakraborty and Dash's (2017) findings that weak fiscal regulations exacerbate fiscal imbalances. Governments must implement corrective mechanisms (Di Liddo et al., 2019; Searle, 2020), as seen in this case through fiscal decentralization reforms under Law No. 1/2022, which improved both vertical and horizontal fiscal balances through the restructuring of DBH and DAU transfers. This reinforces the argument that fiscal factors significantly influence disparities (Chinn & Ito, 2022).

Achieving fiscal balance requires local governments to generate sufficient PAD to cover their expenditures without relying on fiscal transfers. In line with the local taxing power principle under Law No. 1/2022, both local governments and the Ministry of Finance must collaborate to enhance local revenue generation. Given the untapped potential of many regions, this remains a key policy priority.

Furthermore, fiscal independence is a crucial indicator of local governments' ability to finance their expenditures autonomously. Enhancing fiscal self-sufficiency is essential for the success of regional autonomy and for improving public service delivery (Cevik, 2017; Miller, 2017; Yilmaz & Zahir, 2020).

CONCLUSION

Based on the findings and discussion presented earlier, conclusions can be drawn regarding both VFI and HFI. Several key points emerge from this study. First, VFI between the central and regional governments persist; however, these imbalances can be mitigated by implementing fiscal decentralization policies, particularly through the DBH mechanism as regulated by Law No. 1/2022. VFIs are inherent to Indonesia's decentralization model, which follows the principle of expenditure assignment, granting regional governments autonomy over spending while limiting their revenue-generating authority.

Second, HFI between regional governments exhibited an increasing trend before the implementation of Law No. 1/2022. However, after its enactment, a decline in these imbalances was observed, indicating improvement. In general, the DAU policy has proven effective in reducing horizontal fiscal disparities. Nevertheless, the overall effectiveness of fiscal decentralization policies in addressing fiscal imbalances through the TKD mechanism under Law No. 1/2022 has yet to be demonstrated with greater accuracy.

To address both VFI and HFI, reforms in TKD distribution and adjustments to PDRD must align with the unique characteristics and economic potential of each region. TKD reform should ensure that DAU and DBH allocations are based on both performance and actual fiscal needs. Regions with lower fiscal capacity should

receive proportional transfers, while those with strong fiscal management should be incentivized. Adjustments to PDRD should provide greater flexibility for local governments to determine tax and retribution rates—for instance, optimizing hotel and restaurant taxes in tourism areas or increasing Land and Building Tax (PBB) for the industrial sector in manufacturing hubs. Additionally, the digitalization of tax and retribution systems could enhance transparency and facilitate local revenue collection. The central government should offer technical assistance and financial incentives to regions that successfully improve their PAD, thereby promoting fiscal independence and reducing reliance on central transfers. This approach would lead to a more equitable fiscal distribution, strengthen regional fiscal capacity, and significantly reduce fiscal disparities.

This study provides an initial assessment of the impact of fiscal decentralization policies on interregional fiscal imbalances in Java, given that the policy's implementation is still in its early stages and data availability remains limited. As such, further research is needed to expand the scope beyond Java and examine fiscal imbalance patterns across diverse economic contexts. Long-term analysis is also necessary to evaluate the sustained impact of Law No. 1/2022 on regional fiscal balance. Future studies could explore the effectiveness of performance-based fiscal transfers in encouraging local governments to enhance PAD. Additionally, investigating innovative tax policies—such as environmentally-based taxation and regional investment incentives—could strengthen sustainable fiscal capacity. Lastly, further research on fiscal governance and budget transparency is essential to ensure that fiscal decentralization effectively reduces regional fiscal disparities.

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REFERENCES

- Adam, C. S., & Bevan, D. L. (2005). Fiscal deficits and growth in developing countries. *Journal of Public Economics*, 89(4), 571–597. <https://doi.org/10.1016/j.jpubeco.2004.02.006>
- Ahmad, I., Arif, M. Z., & Khalid, M. (2016). From fiscal decentralisation to economic growth: The Role of complementary institutions. *Pakistan Development Review*, 55(4), 761–780. <https://doi.org/10.30541/v55i4i-iipp.761-780>
- Akai, N., Nishimura, Y., & Sakata, M. (2007). Complementarity, fiscal decentralization and economic growth. *Economics of Governance*, 8(4), 339–362. <https://doi.org/10.1007/s10101-007-0032-5>
- Angeletos, G.-M., & Pavan, A. (2007). Efficient use of information and social value of information. *Econometrica*, 75(4), 1103–1142. <https://doi.org/10.1111/j.1468-0262.2007.00783.x>
- Arif, U., & Ahmad, E. (2020). A framework for analyzing the impact of fiscal decentralization on macroeconomic performance, governance and economic growth. *Singapore Economic Review*, 65(1), 3–39. <https://doi.org/10.1142/S0217590818500194>
- Bahl, R., & Bird, R. M. (2018). Fiscal decentralization and local finance in developing countries: Development from below. In *Fiscal Decentralization and Local Finance in Developing Countries: Development from Below*. Edward Elgar Publishing. <https://doi.org/10.4337/9781786435309>
- Bahl, R. W., & Wallich, C. (1992). Intergovernmental fiscal relations in China. *The World Bank, Country Economics Department*, 1–45.
- Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100(2), 223–251. <https://doi.org/10.1086/261816>
- Bartolini, D., Sacchi, A., Salotti, S., & Santolini, R. (2018). Fiscal decentralization in times of financial crises. *CESifo Economic Studies*, 64(3), 456–488. <https://doi.org/10.1093/cesifo/ifx008>
- Bilal, A. (2023). The geography of unemployment. *Quarterly Journal of Economics*, 138(3), 1507–1576. <https://doi.org/10.1093/qje/qjad010>
- Bird, R. M., & Vaillancourt, F. (1998). Fiscal decentralization in developing countries: an overview. *Fiscal Decentralization in Developing Countries*, 1, 1–48.
- Bojanic, A. N. (2020). The empirical evidence on the determinants of fiscal decentralization. *Revista Financas y Politica Economica*, 12(1), 271–302. <https://doi.org/10.14718/REVFANANZPOLITECON.V12.N1.2020.2656>
- Breuss, F., & Eller, M. (2004). The optimal decentralisation of government activity: normative recommendations for the European constitution. *Constitutional Political Economy*, 15(1), 27–76. <https://doi.org/10.1023/B:COPE.0000017962.76744.33>
- Cabaleiro-Casal, R., & Buch-Gómez, E. (2015). Public spending policies and budgetary balances: evidence from Spanish municipalities. *Lex Localis*, 13(4), 973–994. <https://doi.org/10.4335/13.3.973->

- 994(2015)
- Canare, T., Francisco, J. P., & Caliso, R. A. C. (2020). Decentralization and income inequality in a panel and cross-section of countries. *Journal of International Development*, 32(4), 543–579. <https://doi.org/10.1002/jid.3468>
- Cevik, S. (2017). Size matters: fragmentation and vertical fiscal imbalances in Moldova. *Empirica*, 44(2), 367–381. <https://doi.org/10.1007/s10663-016-9325-7>
- Chakraborty, P., & Dash, B. B. (2017). Fiscal reforms, fiscal rule, and development spending: How Indian states have performed? *Public Budgeting and Finance*, 37(4), 111–133. <https://doi.org/10.1111/pbaf.12161>
- Cheema, G. S., & Rondinelli, D. A. (1983). *Implementing decentralization programmes in Asia. Local capacity for rural development*.
- Chinn, M. D., & Ito, H. (2022). A requiem for “blame it on Beijing” interpreting rotating global current account surpluses. *Journal of International Money and Finance*, 121. <https://doi.org/10.1016/j.jimonfin.2021.102510>
- Collins, D. J. (2002). The 2000 reform of intergovernmental fiscal arrangements in Australia. *Proceedings of The International Symposium on Fiscal Imbalance*.
- Conyers, D. (1981). Decentralization for regional development: a comparative study of Tanzania, Zambia and Papua New Guinea. *Public Administration and Development*, 1(2), 107–120.
- Cowell, F. A. (1985). Multilevel decomposition of Theil’s index of inequality. *Review of Income and Wealth*, 31(2), 201–205. <https://doi.org/10.1111/j.1475-4991.1985.tb00508.x>
- Davoodi, H., & Zou, H. (1998). Fiscal decentralization and economic growth: a cross-country study. *Journal of Urban Economics*, 43(2), 244–257.
- Di Liddo, G., Longobardi, E., & Porcelli, F. (2016). Measuring horizontal fiscal imbalance: the case of Italian municipalities. *Local Government Studies*, 42(3), 385–419. <https://doi.org/10.1080/03003930.2016.1150836>
- Di Liddo, G., Longobardi, E., & Porcelli, F. (2019). Fiscal imbalances and fiscal effort of local governments. *B.E. Journal of Economic Analysis and Policy*, 19(3). <https://doi.org/10.1515/bejeap-2018-0315>
- Easterlin, R. A. (1961). Israel’s development: past accomplishments and future problems. *Quarterly Journal of Economics*, 75(1), 63–86. <https://doi.org/10.2307/1883204>
- Ebel, R. D., & Yilmaz, S. (2002). Concept of fiscal decentralization and worldwide overview. *International Symposium on Fiscal Imbalance*, 13–14.
- Escaleras, M., & Chiang, E. P. (2017). Fiscal decentralization and institutional quality on the business environment. *Economics Letters*, 159, 161–163. <https://doi.org/10.1016/j.econlet.2017.07.019>
- Eyraud, L., & Lusinyan, L. (2013). Vertical fiscal imbalances and fiscal performance in advanced economies. *Journal of Monetary Economics*, 60(5), 571–587. <https://doi.org/10.1016/j.jmoneco.2013.04.012>
- Gadenne, L., & Singhal, M. (2014). Decentralization in developing economies. *Annual Review of Economics*, 6, 581–604. <https://doi.org/10.1146/annurev-economics-080213-040833>
- Hartandi, B. A., & Adrison, V. (2022). Ketepatan waktu dalam penetapan APBD oleh kepala daerah: peran siklus politik. *Indonesian Treasury Review: Jurnal Perbendaharaan, Keuangan Negara Dan Kebijakan Publik*, 7(3), 271–286. <https://doi.org/https://doi.org/10.33105/itrev.v7i3.436>
- Hunter, J. S. H. (1977). *Federalism and Fiscal Balance*. ANU Press.
- Kim, K. (2023). How gubernatorial budgetary power and interest groups affect vertical fiscal imbalances in the US states: Focusing on fiscal centralization and decentralization. *Public Budgeting and Finance*, 43(2), 53–81. <https://doi.org/10.1111/pbaf.12344>
- Koley, M., & Mandal, K. (2019). Vertical fiscal imbalances and its impact on fiscal performance: a case for indian states. In *Opportunities and Challenges in Development: Essays for Sarmila Banerjee*, 243–282. https://doi.org/10.1007/978-981-13-9981-7_12
- Kowalik, P. (2015). Horizontal fiscal imbalance in Germany. *Business and Economic Horizons*, 11(1), 1–13. <https://doi.org/10.15208/beh.2015.01>
- Kowalik, P. (2016). Measurement of vertical fiscal imbalance in Germany. *Argumenta Oeconomica*, 37(2), 131–146. <https://doi.org/10.15611/aoe.2016.2.05>
- Krusell, P., & Smith Jr., A. A. (1998). Income and wealth heterogeneity in the macroeconomy. *Journal of Political Economy*, 106(5), 867–896. <https://doi.org/10.1086/250034>
- Madan, S., & Yadav, M. (2022). Decomposing skill based wage inequality in India: an application of Theil index. *Indian Journal of Labour Economics*, 65(4), 967–979. <https://doi.org/10.1007/s41027-022-00405-6>
- Malakar, K., & Mishra, T. (2017). Application of Gini, Theil and concentration indices for assessing water use inequality. *International Journal of Social Economics*, 44(10), 1335–1347. <https://doi.org/10.1108/IJSE-01-2016-0017>

- Mao, C. C., & Ma, Z. X. (2021). The analysis of the regional economic growth and the regional financial industry development difference in China based on the Theil index. *International Journal of Economics and Finance Studies*, 13(1), 128–154. <https://doi.org/10.34109/ijefs.202112228>
- Martinez-Vazquez, J., & McNab, R. M. (2001). Cross-country evidence on the relationship between fiscal decentralization, inflation, and growth. *Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association*, 94, 42–47. <http://www.jstor.org/stable/41954701>
- McLean, I. (2004). Fiscal federalism in Australia. *Public Administration: An International Quarterly*, 8(1), 21–38. <https://doi.org/doi:10.1111/padm.2004.82.issue-1>
- Miller, G. J. (2017). Government fiscal policy impacts. In *Handbook of Public Sector Economics* (pp. 425–523). <https://doi.org/10.4324/9781315093185-17>
- Moskowitz, T. J., & Grinblatt, M. (1999). Do industries explain momentum? *Journal of Finance*, 54(4), 1249–1290. <https://doi.org/10.1111/0022-1082.00146>
- Negara, B., & Khoirunurrofik, K. (2021). Dampak desentralisasi fiskal terhadap konvergensi pendapatan perkapita antar kabupaten/kota di Indonesia. *Indonesian Treasury Review: Jurnal Perbendaharaan, Keuangan Negara dan Kebijakan Publik*, 6(1), 1–18. <https://doi.org/https://doi.org/10.33105/itrev.v6i1.185>
- Nguyen, V. B. (2023). From fiscal policy to income inequality in advanced economies: does institutional quality hinder? *Romanian Journal of Economic Forecasting*, 26(1), 165–184. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85153932430&partnerID=40&md5=eeb19314324d5ff9fc42bf80ae74c6b5>
- Oates, W. E. (1993). Fiscal decentralization and economic development. *National Tax Journal*, 46(2), 237–243.
- Rodden, J., & Wibbels, E. (2002). Beyond the fiction of federalism: Macroeconomic management in multitiered systems. *World Politics*, 54(4), 494–531. <https://doi.org/doi:10.1353/wp.2002.0016>
- Schneider, M. P. A., Kinsella, S., & Godin, A. (2017). Redistribution in the age of austerity: evidence from Europe 2006–2013. *Applied Economics Letters*, 24(10), 672–676. <https://doi.org/10.1080/13504851.2016.1221030>
- Searle, B. (2020). Intergovernmental fiscal relations in Australia. In *Intergovernmental Transfers in Federations* (pp. 163–184). <https://doi.org/10.4337/9781789900859.00017>
- Sharma, P., & Sharma, N. (2022). An examination of per capita income convergence in emerging market economies. *Global Journal of Emerging Market Economies*, 14(3), 319–347. <https://doi.org/10.1177/09749101211034111>
- Shen, H., Luo, T., Gao, Z., Zhang, X., Zhang, W., & Chuang, Y.-C. (2023). Digital financial inclusion and the urban–rural income gap in China: empirical research based on the Theil index. *Economic Research-Ekonomika Istrazivanja*, 36(3). <https://doi.org/10.1080/1331677X.2022.2156575>
- Thieben, U. (2003). Fiscal decentralisation and economic growth in high-income OECD countries. *Fiscal Studies*, 24(3), 237–274. <http://www.jstor.org/stable/24438466>
- Timushev, E. N., & Mikhaylova, A. A. (2023). Federal transfers: Leeway to higher regional debt? *Voprosy Ekonomiki*, 2023(5), 23–49. <https://doi.org/10.32609/0042-8736-2023-5-23-49>
- Utama, Z., Khusaini, M., & Wahyudi, S. (2017). Kebijakan fiskal di persimpangan, pro growth atau pro poor? *Indonesian Treasury Review: Jurnal Perbendaharaan, Keuangan Negara Dan Kebijakan Publik*, 2(2), 67–81. <https://doi.org/https://doi.org/10.33105/itrev.v2i2.28>
- Vaillancourt, F. (1998). The institutional setting. *Fiscal Decentralization in Developing Countries*, 152.
- Woller, G. M., & Phillips, K. (1998). Fiscal decentralisation and IDC economic growth: an empirical investigation. *The Journal of Development Studies*, 34(4), 139–148.
- Yilmaz, S. (2001). Review of governance, decentralization and reform in China, India and Russia. *National Tax Journal*, 54(4), 853–860. <http://www.jstor.org/stable/41789592>
- Yilmaz, S., & Zahir, F. (2020). Intergovernmental transfers in federations: studies in fiscal federalism and state-local finance series. In *Intergovernmental Transfers in Federations*. <https://doi.org/10.4337/9781789900859>
- Zhang, K., Zhang, W., & Wan, X. (2021). Tax sharing and fiscal imbalances: reconstruction of the VAT sharing system in China. *China Finance and Economic Review*, 10(2), 22–43. <https://doi.org/10.1515/cfer-2021-0009>