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ORIGINAL ARTICLE

Fiscal disparities in Indonesia in the decentralization era: Does general allocation fund equalize fiscal revenues?

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Abstract

This study analyses the level and trend of fiscal disparity among Indonesian districts. It also explores the determinants of fiscal disparity using two inequality decomposition methods: decomposition of the Gini coefficient and the coefficient of variation by revenue sources and decomposition of the Theil index by regions. Disparity in shared revenue has been large due to the very uneven spatial distributions of natural resources and tax bases. It is unambiguously an inequality-increasing fiscal transfer in Indonesia. A general allocation grant has served to equalize fiscal revenue, but overall fiscal disparity is still high. To reduce the disparity, it may be necessary to modify the general allocation formula since it appears to be defective. This study proposes a new allocation formula. Though the reduction in fiscal disparity is not substantial in the short run, the new formula would provide an incentive for resource-poorer district governments to raise their own source revenue. This could create a virtuous cycle if the additional own source revenue is used for local development, particularly education and infrastructure. Another option to reduce fiscal disparity would be the further expansion of special allocation grant. If the government allocates the special allocation fund effectively across districts in Indonesia, it could make a special allocation grant an inequality-decreasing fiscal transfer.

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KEYWORDS
decentralization, fiscal disparity, general allocation grant, Indonesia, inequality decomposition analysis

JEL CLASSIFICATION
H71; H77; R51

1 | INTRODUCTION

As the world's largest island country including more than 13,000 islands and 300 ethnic groups, large interregional inequalities in socio-economic indicators persist in Indonesia. In order to reduce inter-regional disparities and cope with periodic secessionist movements, Indonesia embarked on a 'Big Bang' decentralization in the aftermath of the 1997/98 financial crisis and the subsequent fall of the Suharto regime (Fitrani, Hofman, & Kaiser, 2005; World Bank, 2003). Two decentralization laws, Law 22/1999 on Regional Government and Law 25/1999 on the Fiscal Balance between the Central Government and the Regions, were implemented in 2001. Under the Law on Regional Government (revised by Law 32/2004), the hierarchical governance system linking district (regency and city or *kabupaten* and *kota*) governments to the central government through provincial governments was replaced by the system where district governments are granted greater autonomy (Brodjonegoro & Asanuma, 2000; Silver, Azis, & Schroeder, 2001).[1] The central government is responsible for religious affairs, national defence and security, judicial system, fiscal and monetary policy, foreign affairs and other specially designated functions such as macroeconomic planning and national standards, while authority over and responsibilities for most other functions, including education, health management and public works is devolved to regional governments, particularly district governments (Alm, Aten, & Bahl, 2001; Brodjonegoro & Asanuma, 2000). Decentralization is expected to make the government closer to the people, thereby ensuring the effective and efficient provision of public services in line with local needs and costs (Oates, 1999).

On the other hand, under the Law on Fiscal Balance between the Central Government and the Regions (revised by Law 33/2004), autonomous region subsidy (SDO: *Subsidi Daerah Otonom*) and presidential instruction development grants (Inpres: *Instruksi Presiden*), which have been implemented under the Suharto regime, were abolished and replaced by inter-governmental fiscal transfers including a general allocation grant (DAU: Dana Alokasi Umum), special allocation grant (DAK: *Dana Alokasi Khusus*) and shared revenues from natural resources and taxes (DBH: *Dana Bagi Hasil*) (Lewis, 2001; Silver et al., 2001). Fiscal revenues of regional governments now consist of these intergovernmental transfers, own source revenues (PAD: *Pendapatan Asli Daerah*) and other revenues including regional government borrowings.[2]

Due to unequal spatial distributions of population, natural resources, public infrastructure and economic activities, fiscal revenues vary among districts in Indonesia. By the Gini coefficient, inequality among districts in *per capita* fiscal revenue is greater than 0.4. However, the extent of inequality differs across revenue sources. Due to the uneven spatial distributions of natural resources and tax bases, shared revenues from DBH varies substantially among districts; disparity in DBH *per capita* exceeds 0.7 by the Gini coefficient. DAU, on the other hand, has a much smaller regional disparity, as the DAU funds are allocated relative to population size, land area and some other socioeconomic indicators. In other words, while DBH is a dis-equalizing revenue source, DAU serves to equalize fiscal revenues.

[1]Currently, Indonesia consists of 34 provinces, each of which has a representative's assembly and a provincial government led by a governor elected by popular vote for five-year term. Within each province, there are regencies (*kabupaten*) and cities (*kota*), each of which has a legislative body and a local government led by a regent (regency) or a mayor (city), who is elected by popular vote for five-year term. Members of a legislative body are also elected by popular vote for five-year term. Currently, there are 416 regencies and 98 cities. In this paper, districts refer to regencies (*kabupaten*) and cities (*kota*).
[2]Here, a regional government refers to either a provincial government or a district (regency or city) government.

Indonesia's decentralization was implemented to mitigate inter-regional inequality in welfare levels; but its effects remain uncertain.[3] How transfer funds, such as DBH, DAU and DAK, are allocated among districts and how effectively and efficiently they are used in local development are very important questions for policy makers and researchers. We should note here that poorer districts tend to have smaller amounts of shared revenues from DBH; thus, it is important to know how DAU and DAK could help reduce fiscal disparity created by DBH in favour of poorer districts. Against this background, this study is devoted to an analysis of the level and trend of fiscal disparity among districts and explores the determinants of fiscal disparity by two inequality decomposition methods: decomposition by revenue sources and decomposition by regions. Decomposition of fiscal disparity by revenue sources is conducted by using the Gini coefficient and the coefficient of variation since these inequality measures are additively decomposable by revenue sources. This decomposition method is useful in identifying which revenue sources tend to increase or decrease overall fiscal disparity. On the other hand, decomposition of fiscal disparity by regions is conducted by the Theil index *T* since this inequality measure is decomposable by regions, i.e., can be decomposed into the within- and between-region components.[4] This method is useful in identifying which region contributes most to overall fiscal disparity.

Since DAU accounts for more than 60% of total fiscal revenue, it is the most important source of fiscal disparity. This study thus critically evaluates how the DAU funds are allocated across districts and examines the extent to which the DAU allocation has equalized fiscal revenues. It also proposes a new DAU allocation formula, since the allocation system is defective in its effect on providing an incentive to raise PAD, as indicated by Fadliya and McLoed (2010) and Lewis and Smoke (2017). Among the other specific questions that are addressed in this study are as follows: (i) What is the level and trend of disparity in PAD *per capita* among districts? (ii) To what extent has DBH dis-equalized fiscal revenues? (iii) Has DAK equalized fiscal revenues? (iv) Are there any differences among five regions in mean DAU *per capita*, where Indonesia is divided into the following five island regions: Sumatra, Java-Bali, Kalimantan, Sulawesi and Eastern Indonesia? And (v) Are there any differences among the five regions in within-region disparity in DAU *per capita*?

The next section provides a review of literatures on regional inequalities and decentralization in Indonesia. Section 3 describes how fiscal revenues of regional governments are determined. Section 4 describes the data and the methods used, while Section 5 presents the empirical results. Section 6 proposes a new formula for the allocation of the DAU funds. The final section provides conclusions.

2 | LITERATURE REVIEW

Numerous studies have been conducted to analyse interregional inequalities in Indonesia. Among the recent studies are Tadjoeddin, Suharyo, and Mishra (2001), Akita and Alisjahbana (2002), Resosudarmo and Vidyattama (2006), Hill, Resosudarmo, and Vidyattama (2008), Vidyattama (2010), Akita, Kurniawan, and Miyata (2011), Vidyattama (2013), Hill and Vidyattama (2016). Tadjoeddin et al. (2001) used district-level GDP data to investigate the level and trend of interregional inequality over the period 1993–1998 by the Gini coefficient, the Theil index and the population-weighted coefficient of variation. Akita and Alisjahbana (2002) also used district-level GDP data to explore the determinants of interregional inequality over the period 1993–1998 by performing a two-stage Theil decomposition analysis.

[3]Hill and Vidyattama (2016), which analyzed the relationship between decentralization and regional development, suggested that decentralization had a minimal impact on regional development, although its political impacts have been far-reaching. According to them, inter-provincial inequality in per capita GDP, as measured by the population-weighted coefficient variation, has been quite stable at around 0.80–0.85 since the decentralization commenced in 2001.

[4]In most studies on regional development in Indonesia, analyses are usually conducted by dividing the country into five island regions: Sumatra, Java-Bali, Kalimantan, Sulawesi and Eastern Indonesia (see, for example, Hill et al., 2008 and Akita et al., 2011), where Eastern Indonesia includes the provinces of West Nusa Tenggara, East Nusa Tenggara, North Maluku, Maluku, West Papua and Papua.

Hill et al. (2008) used the coefficient of variation to investigate inter-provincial inequality in GDP *per capita* and household consumption expenditure *per capita* for the period 1975–2004. They also conducted an absolute β-convergence analysis across provinces over the period 1976–2004, that is, examined whether poorer provinces were catching up to richer ones. Hill and Vidyattama (2016) employed the population-weighted coefficient of variation to analyse inter-provincial inequality in GDP *per capita* and poverty incidence for the period 1975–2011. They also investigated inequality among districts in GDP *per capita* and poverty incidence, but only for 1999 and 2011.

Resosudarmo and Vidyattama (2006) used a provincial panel data set to examine whether there was a conditional β-convergence across provinces over the period 1993–2002 and explore the determinants of provincial growth in GDP *per capita*. Vidyattama (2010) also used provincial panel data to analyse the determinants of provincial growth in GDP *per capita* over the period 1985–2005. Meanwhile, Vidyattama (2013) used district-level data on GDP and Human Development Indicator to investigate whether the economic performance of neighbouring districts has a significant impact on the speed of convergence across districts by employing a β-convergence growth equation with spatial lags of the dependent variable and the spatial error term. Finally, Akita et al. (2011) used provincial GDP data by industrial sector to explore the determinants of interregional inequality for the period 1983–2004 by decomposing the population-weighted coefficient of variation in two dimensions, that is, by regions and industrial sectors.

The studies described above measured interregional inequality in GDP *per capita*, consumption expenditure *per capita* and/or Human Development Indicator by employing various inequality indices and investigated convergence across provinces or districts. But, to the best of our knowledge, none of these and other studies on interregional inequality measured interregional disparities in fiscal capacity, which is considered an important factor of regional development. Though our study does not investigate the impacts of fiscal decentralization on regional economic development, it is important to know the level and trend of disparities in fiscal capacity among districts to investigate how the changes in fiscal capacity have affected regional development dynamics.

There have also been many studies on administrative and fiscal decentralization in Indonesia. Among them, Brodjonegoro and Asanuma (2000), Alm et al. (2001), Lewis (2001), Silver et al. (2001), Bahl and Tumennasan (2004) and Brodjonegoro and Martinez-Vazquez (2005) presented the evolution and characteristics of administrative and fiscal decentralization in the early stages of decentralization. Fitrani et al. (2005) examined the proliferation of district governments under decentralization and explored political, fiscal and economic incentives for creating new district governments.[5] Firman (2009, 2013) also investigated the proliferation of district governments and its effects on local development. Firman (2013) argued that most of the newly established district governments have not performed their intended functions of reducing poverty and promoting local development. The author argued also that the proliferation of district governments has resulted in many new government positions and institutions and this has led to an additional burden to the national budget, while at the local level, the territorial splits have brought about many conflicts, disputes and tensions between the parent district and the newly created one.

Lewis (2006) analysed cost efficiency of local tax administration using a stochastic cost frontier model with local tax data for 224 districts and found that district governments, on average, administered local taxes inefficiently though there is large variation across district governments in the capacity of administering local taxes efficiently. Fadliya and McLoed (2010) critically evaluated the system of fiscal transfers, such as DBH, DAU and DAK introduced in 2001 and found that there are large differences among districts in the levels of *per capita* fiscal transfers. They argued that the system of fiscal transfers is deficient and needs to be modified. Shah, Qibthiyyah, and Dita (2012) reviewed the allocation formula of the DAU funds and proposed alternative allocation formulas. They argued that these alternative formulas could enhance efficiency and accountability. Based on district-level data on fiscal revenues and expenditures from 2001 to 2009, Lewis and Smoke (2017) investigated the existence of perverse incentives in the system of intergovernmental fiscal transfers and their negative impacts on district government behavior

[5]Since the two decentralization laws were implemented in 2001, many new districts have been established by being split off from existing districts. In 2001, there were around 350 districts; but since then the number of districts has increased substantially, and now there are more than 500 districts.

using a government budget model. They argued from the empirical results that there is no evidence to suggest that the magnitude of intergovernmental transfers, in general, provides a disincentive for district governments to increase their own-source revenues.

3 | FISCAL REVENUES OF REGIONAL GOVERNMENTS UNDER FISCAL DECENTRALIZATION

As discussed in the introduction, after the implementation of Law 25/1999 in 2001, revenues of regional (provincial and district) governments consist of PAD, DBH, DAU, DAK and other revenues including regional government borrowings. While PAD is a revenue generated within each region, DBH, DAU and DAK are funds transferred from the central government to regional governments.

3.1 | Own source revenues (PAD)

Own-source revenue (PAD) comprises regional taxes, user charges and fees. The main taxes of provincial governments include taxes on motor vehicles, transfer of the ownership of motor vehicles, motor vehicle fuel and cigarettes. On the other hand, the main taxes of district (regency and city) governments include taxes on restaurants, hotels, advertisements, street lighting, entertainment, parking and ground water. In addition to revenues from these taxes, district governments are entitled to receive certain proportions of provincial tax revenues. PAD thus depends very much on the services sector.

3.2 | Shared revenues (DBH)

Shared revenues (DBH) comprise revenues from natural resources and taxes. Under the natural resource revenue sharing scheme, revenues generated by natural resources must be shared between the central government and regional governments. Regions (provinces and districts) are entitled to receive 15% of oil revenue, 30% of gas revenue, and 80% of revenues from other natural resources (i.e., forestry, fishery and general mining). With a few exceptions, of the amount given to the producing regions, 20% goes to the provincial government, 40% to the producing district government, and the remaining 40% is shared equally among the non-producing district governments in the province (Brodjonegoro & Asanuma, 2000; Brodjonegoro & Martinez-Vazquez, 2005; Bahl & Tumennasan, 2004). Under the revised decentralization law in 2004 (Law 33/2004), which was fully implemented in 2008, the shares of producing regions were increased to 15.5 and 30.5%, respectively, for oil and gas, and geothermal energy has been added to the list of other natural resources (Soesastro & Atje, 2005). We should note however that the special autonomous provinces of Aceh, West Papua and Papua receive 70% of their oil and gas revenues (Agustina, Schulze, & Fengler, 2012; Brodjonegoro & Martinez-Vazquez, 2005).

Meanwhile, under the tax revenue sharing scheme, regions (provinces and districts) receive 20% of the revenue from personal income tax, and the rest is retained by the central government (Brodjonegoro & Martinez-Vazquez,-2005). Of the amount allocated to regions, 40% goes to the provincial government, while 60% goes to the district governments. Regions also receive 90% and 80%, respectively, of revenues from property tax (PBB: *Pajak Bumi dan Bangunan*) and fees on the transfers of land and building ownership (BPHTB: *Bea Perolehan Hak atas Tanah dan Bangunan*), while the rest is shared equally among all districts in Indonesia (Brodjonegoro & Martinez-Vazquez, 2005).[6]

[6]Currently, 100% of these property taxes belong to district governments.

Of the amount allocated to the regions, 20% goes to the provincial government and 80% to the district governments.

3.3 | General allocation grant (DAU)

General allocation grant (DAU) is a fiscal equalization grant from the central government to regional (provincial and district) governments and also a general-purpose block grant where only general provisions are given to each regional government as to the allocation of the grant (Brodjonegoro & Martinez-Vazquez, 2005). Under the fiscal decentralization law, the total pool of the DAU funds is set at 25% of planned net domestic revenues (= domestic revenues minus shared revenue funds transferred to the central government) in the central government budget. But, since 2008, the proportion has increased to at least 26%. The shares for provincial and district governments are 10% and 90%, respectively. While formula for the allocation of the DAU funds have undergone some changes, DAU consists of three major components: basic allocation, equal lump sum amount and fiscal gap allocation.[7] The Appendix discusses, in greater detail, the way how DAU and total fiscal revenue are determined for each district from 2001 to 2012.

3.4 | Special Allocation Grant (DAK)

Special allocation grant (DAK) is given to regional (provincial and district) governments to assist with specific activities that relate to national priorities. Initially, DAK was used to fund only reforestation. But, in 2003, the following core activities were added to the DAK activity list: education, health, roads, irrigation, governance, and infrastructure (Fadliya & McLeod, 2010). While DAK for reforestation was terminated in 2005, the following activities have been added gradually since 2004: marine and fishery, water and sanitation, agriculture, environment, family planning, forestry, rural infrastructure and trade (Fadliya & McLeod, 2010). With the expansion of the DAK activity list, the number of districts receiving DAK has been increasing gradually and in 2012, most districts received DAK.

4 | DATA AND METHOD

4.1 | Data

This study uses district-level fiscal revenue data obtained from the Ministry of Finance and district-level population data obtained from the Central Bureau of Statistics.[8] The data set includes data on own source revenue (PAD), shared revenues from taxes and natural resources (DBH), general allocation grant (DAU) and special allocation grant (DAK) from 2001 to 2012. Due to missing observations, it does not cover all districts.[9] It does not include Jakarta districts either since no DAU is allocated to these districts. We should note that since the data set accounts for more than 98% of total number of districts, the result will not be changed qualitatively even if missing observations are included. Figure 1 presents fiscal revenues of district governments by revenue sources (shares of PAD, DBH, DAU and DAK). DAU had the largest share at more than 60% of total fiscal revenue of district governments, which is

[7]Equal lump sum amount was abolished in 2006.

[8]District-level fiscal revenue data by revenue sources are not publicly available, and the data for 2012 is the most recent data that we can access at the time of writing this article. On the other hand, district-level population data can be accessed from the website of the Central Bureau of Statistics.

[9]For example, the data set includes 331, 334, 357, 419, 476 and 491 districts, respectively, in 2001, 2003, 2005, 2007, 2009 and 2012. The number of districts included in the data set has increased over the study period, because many new districts have been established by being split off from existing districts since the decentralization was commenced in 2001 (Firman, 2013).

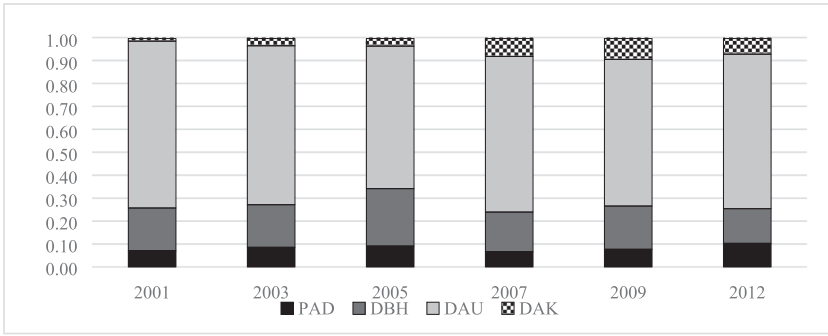


FIGURE 1 Fi*scal revenues of districts by revenue sources in Indonesia (shares of PAD, DBH, DAU and DAK)*
Source: Author's calculation based on fiscal data from Ministry of Finance

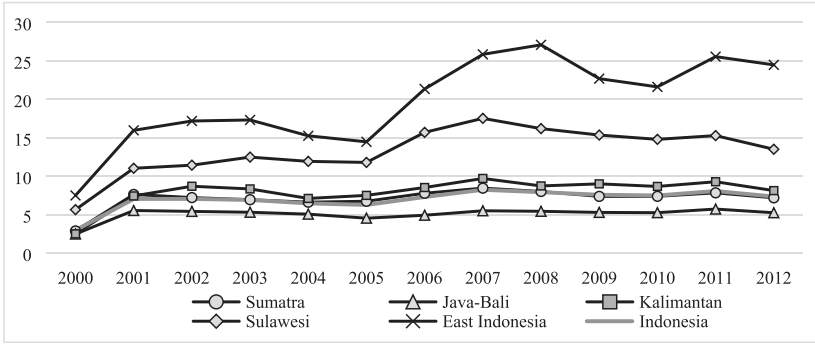


FIGURE 2 Fiscal revenues of districts as % of GRDP
Source: Authors' calculations based on fiscal data from the Ministry of Finance and GRDP data from the Central Bureau of Statistics

followed by DBH and PAD. Though not shown in the figure, more than half of DBH is generated by natural resources. On the other hand, DAK had the smallest share; but it has been increasing gradually with the expansion of DAK activities.

There is, however, large variation across regions in the structure of fiscal revenues of district governments. While DAU had the largest share in Sumatra and Kalimantan, the share, at around 60% and 50% respectively, was smaller than that in Indonesia as a whole. Since these two regions are rich in natural resources, the share of DBH is relatively large, amounting to 25% and 40% of total fiscal revenue respectively, which are compared to less than 20% in Indonesia as a whole. On the other hand, DAU accounted for more than 70% of total fiscal revenue in Java-Bali, Sulawesi and Eastern Indonesia, while the share of DBH amounted to less than 15%. Except in Kalimantan, the share of DAK has been increasing gradually.

Figure 2 presents fiscal revenues of district governments as percentage of GDP. The decentralization in 2001 raised total fiscal revenue substantially from 3% to 7% of GDP. For the first 5 years under the decentralization, however, total fiscal revenue as percentage of GDP has declined slightly; but after reaching the bottom in 2005 at 6.3%, it started to increase. In 2012, it was 7.3% of GDP. Among five regions, Java-Bali had the smallest fiscal revenue as percentage of GRDP, which has been around 5%. Sumatra and Kalimantan followed next, respectively, at around 7% and 8%, though there were some fluctuations. On the other hand, Sulawesi and Eastern Indonesia had much larger fiscal revenues as percentage of GRDP. In Sulawesi, fiscal revenues have risen to 17.5% in 2007; but after reaching

the peak, it started to decrease. It was 13.5% in 2012. Eastern Indonesia is the poorest region and its fiscal revenue has been very large as percentage of GRDP. Between 2001 and 2004, it was around 15–17% of GRDP. But, after reaching the bottom in 2005, it started to rise and in 2012, it was around 25% of GRDP. A rapid rise in fiscal revenues in Sulawesi and Eastern Indonesia in 2006 is due mainly to the expansion of DAK activities in these regions as well as an increase in DAU.[10]

4.2 | Method

This study employs the Gini coefficient, the coefficient of variation and the Theil index T to measure fiscal disparity across districts, as they satisfy several desirable properties, such as anonymity, income homogeneity, population homogeneity and the Pigue-Dalton principle of transfer (Anand, 1983). While the Gini coefficient and the coefficient of variation are additively decomposable by revenue sources, the Theil index T is additively decomposable by regions. It should be noted that the Gini coefficient cannot be decomposed into the between-region and within-region components, since the residual component emerges if there are overlaps between regions in the distribution of *per capita* fiscal revenue. The "squared" coefficient of variation can be decomposed into the between-region and within-region components, but not the coefficient of variation. On the other hand, the Theil index T cannot be decomposed by revenue sources. Since fiscal revenues depend on population, we measure disparity in *per capita* fiscal revenue rather than disparity in fiscal revenues. Hereafter, we use "fiscal disparity" to denote 'disparity in *per capita* fiscal revenue' unless otherwise noted.

4.2.1 | Decomposition of fiscal disparity by revenue sources: Gini coefficient

Let $\boldsymbol{y} = (y_1, y_2, \cdots, y_n)$ denote the distribution of *per capita* fiscal revenue for n districts and μ be its mean. These districts are indexed by their ranks with respect to *per capita* fiscal revenue and $i(\boldsymbol{y})$ is the ranking of districts. Then, fiscal disparity is measured by the Gini coefficient as follows:

$$G = \frac{2}{n\mu} cov(i(\boldsymbol{y}), \boldsymbol{y}).$$

Suppose that total fiscal revenue is composed of K revenue sources (i.e., PAD, DBH, DAU, and so on) such that $y_i = y_{1i} + y_{2i} + \cdots + y_{Ki}$ and $\mu = \mu_1 + \mu_2 + \cdots + \mu_K$ where i refers to district i. Then, the Gini coefficient G can be decomposed additively as follows (Fei, Ranis, & Kuo, 1978; Pyatt, Chen, & John, 1980):

$$G = \sum_{k=1}^{K} w_k C_k = \sum_{k=1}^{K} w_k R_k G_k, \tag{1}$$

where w_k, C_k, G_k and R_k are, respectively, the share of fiscal revenue from source k, the concentration ratio for source k, the Gini coefficient for source k and the rank correlation ratio for source k, which are given, respectively, by $w_k = \frac{\mu_k}{\mu}$, $C_k = \frac{2}{n\mu_k} \mathrm{cov}(i(\boldsymbol{y}), \boldsymbol{y}_k)$, $G_k = \frac{2}{n\mu_k} \mathrm{cov}(i(\boldsymbol{y}_k), \boldsymbol{y}_k)$ and $R_k = \frac{\mathrm{cov}(i(\boldsymbol{y}), \boldsymbol{y}_k)}{\mathrm{cov}(i(\boldsymbol{y}_k), \boldsymbol{y}_k)}$ where $\boldsymbol{y}_k = (y_{k1}, y_{k2}, \cdots, y_{kn})$ and $i(\boldsymbol{y}_k)$ is the ranking of districts in the distribution of *per capita* fiscal revenue from source k. If we define $g_k = \frac{R_k G_k}{G}$, then we have:

[10] In Sulawesi and Eastern Indonesia, the number of DAK activities has been increased, particularly after 2005. Additionally, the formula for fiscal needs has been changed since 2006, and this has increased total amount of DAU in these two regions (see Equation A5 in the appendix).

$$1 = \sum_{k=1}^{K} w_k g_k, \tag{2}$$

g_k is called the relative concentration ratio of the kth revenue source. If g_k is greater (smaller) than one, then the kth revenue source is considered an inequality-increasing (decreasing) component.

4.2.2 | Decomposition of fiscal disparity by revenue sources: Coefficient of variation

Fiscal disparity can also be measured by the coefficient of variation (*CV*) as follows:

$$CV = \frac{\sigma}{\mu},$$

where σ is the standard deviation of the distribution of *per capita* fiscal revenue for n districts. Similar to the Gini coefficient, the coefficient of variation CV can be additively decomposed by revenue sources as follows (Shorrocks, 1982):

$$CV = \sum_{k=1}^{K} w_k \rho_k CV_k, \tag{3}$$

where ρ_k and CV_k are, respectively, the coefficient of correlation between the distribution of *per capita* fiscal revenue from source k and the distribution of *per capita* total fiscal revenue and the coefficient of variation for source k, which are given by $\rho_k = \frac{cov(y_k, y)}{\sigma_k \sigma}$ and $CV_k = \frac{\sigma_k}{\mu_k}$ where σ_k is the standard deviation of the distribution of *per capita* fiscal revenue from source k. If we define $s_k = \rho_k \frac{CV_k}{CV}$, then we have:

$$1 = \sum_{k=1}^{K} w_k s_k, \tag{4}$$

s_k is called the relative concentration coefficient of the kth revenue source. If s_k is greater (smaller) than one, then the kth revenue source is considered an inequality-increasing (decreasing) component.

4.2.3 | Decomposition of fiscal disparity by regions: Theil index *T*

Suppose that n districts are classified into m mutually exclusive and collectively exhaustive regions.[11] Then, overall fiscal disparity is given by the Theil index T as follows:

$$T = \frac{1}{n} \sum_{i=1}^{m} \sum_{j=1}^{n_i} \left(\frac{y_{ij}}{\mu} \right) \ln \left(\frac{y_{ij}}{\mu} \right),$$

[11] In this study, districts are classified into the following five island regions as explained in the introduction: Sumatra, Java-Bali, Kalimantan, Sulawesi and Eastern Indonesia.

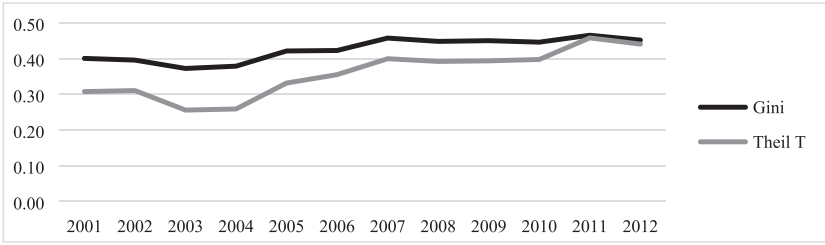


FIGURE 3 Fiscal disparity by the Gini coefficient and the Theil index *T*
Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics

where μ , n_i and y_{ij} are, respectively, mean *per capita* fiscal revenue of all districts, the number of districts in region *i*, and *per capita* fiscal revenue of *j*th district in region *i*. The Theil index *T* can then be decomposed into the within-region component (T_W) and the between-region component (T_B) as follows (Bourguignon, 1979; Shorrocks, 1980):

$$T = \sum_{i=1}^{m} \left(\frac{n_i \mu_i}{n \mu} \right) T_i + \sum_{i=1}^{m} \left(\frac{n_i \mu_i}{n \mu} \right) \ln \left(\frac{\mu_i}{\mu} \right) = T_W + T_B, \tag{5}$$

where μ_i and T_i are, respectively, mean *per capita* fiscal revenue of districts in region *i*, and the Theil index *T* for fiscal disparity in region *i*.

5 | EMPIRICAL RESULTS

5.1 | Levels and trends of fiscal disparities

Figure 3 presents fiscal disparity across districts as measured by the Gini coefficient and the Theil index *T*. These two inequality measures show a similar trend pattern.[12] According to the Gini coefficient, after declining to 0.37 in 2003, fiscal disparity started to increase when the laws in 1999 were revised in 2004 and reached the highest at 0.47 in 2011. Though it declined slightly in 2012, it was 0.45, much larger than the lowest value in 2003.

Figure 4 presents disparities in PAD, DBH, DAU and DAK by the Gini coefficient.[13] Disparity in DAK was the highest among four revenue sources in 2001 and 2002 since there was only one DAK activity (reforestation) in these two years and much of DAK was allocated to districts in Kalimantan. But, as the number of DAK activities has increased, the disparity has been declining gradually. In 2012, only four districts did not receive any DAK grant and disparity in DAK went down to 0.55 by the Gini coefficient. Since 2003, disparity in DBH has been the highest, exceeding 0.65. There has been wide variation in *per capita* DBH across districts due to the very uneven distribution of natural resources and tax bases. In 2012, 80% of districts had their *per capita* DBH less than the mean, while 10% of districts had their *per capita* DBH more than twice as much as the mean and these districts are mostly in the resource rich provinces of Riau, Riau Islands, East Kalimantan, West Papua and Papua.

[12]Though not shown in the figure, fiscal disparity by the coefficient of variation has a similar trend pattern to the ones by the Gini coefficient and the Theil index *T*.

[13]"Disparities in PAD, DBH, DAU and DAK" mean "disparities among districts in per capita PAD, DBH, DAU and DAK." Though not shown in Figure 4, fiscal disparity by the coefficient of variation has a similar trend pattern to the one by the Gini coefficient.

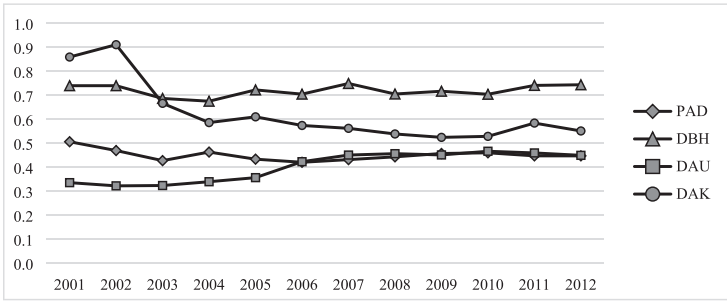


FIGURE 4 Fiscal disparities by the Gini coefficient
Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics

Disparities in PAD and DAU were much smaller than disparity in DBH but had different trend patterns. While disparity in PAD showed a declining trend before 2006, disparity in DAU exhibited an increasing trend. As a result, these two disparities have been very similar to each other since 2006; by the Gini coefficient, the disparities have been in the range of 0.42–0.46. Disparity in DAU rose sharply to 0.42 in 2006 from 0.35 by the Gini coefficient. In 2006, a lump sum equal DAU was abolished in an effort to mitigate the proliferation of districts. This lump sum component is, in fact, an inequality-increasing rather than decreasing component, since high-density poorer districts tend to have a smaller *per capita* lump sum amount. If this DAU component was not terminated, disparity in DAU would have been even higher.

5.2 | Effects of fiscal transfers (DBH, DAU and DAK) on fiscal disparity

In order to investigate the effects of fiscal transfers (DBH, DAU and DAK) on overall fiscal disparity, we decompose overall fiscal disparity by revenue sources using the Gini coefficient and the coefficient of variation (see Equations 1, 2, 3 and 4). The result is shown in Table 1 and Figure 5.[14] No matter which inequality measure we use, relative concentration ratio or coefficient for DBH was greater than one, while that for DAU was less than one. This confirms that DBH is an inequality-increasing fiscal transfer, while DAU is an inequality-decreasing fiscal transfer. However, relative concentration ratio or coefficient for DAU rose prominently in 2006 and since then has been quite stable at around 0.9, suggesting that DAU's inequality-reducing effect has been weakened since 2006. Though relative concentration ratio or coefficient for DAK was greater than one, it has been declining gradually, and since 2007 it has been very close to one.

It is instructive to see how fiscal disparity changes as DBH and DAU are added to PAD. Figure 6 presents disparities in PAD, PAD + DBH and PAD + DBH + DAU as measured by the Gini coefficient.[15] If we add DBH to PAD, fiscal disparity rose substantially to 0.60–0.65. If we further add DAU to the sum of PAD and DBH, fiscal disparity returned to the level of disparity in PAD. Since the share of DAK is small, adding DAK will not change the disparity very much.

5.3 | Between- and within-region disparities in *per capita* DAU

Since DAU accounts for more than 60% of total fiscal revenue, we explore the determinants of disparity in DAU by conducting a Theil decomposition analysis by regions (see Equation 5). Figure 7 presents the decomposition result.[16]

[14]Though not shown in Figure 5, the coefficient of variation has a similar result to the one based on the Gini coefficient.
[15]"Disparity in A + B" means "disparity in per capita A + B among districts," where A and B are fiscal revenues.
[16]To check whether the result is robust or not, the Gini coefficient is also used to estimate within-region disparities. The result is very similar to the one by the Theil index *T* qualitatively, thus it is not presented. It should be noted that the Gini coefficient cannot be decomposed into the within and between-region inequality components.

TABLE 1 Decomposition of Fiscal Disparity among Districts by Revenue Sources

		Gini Coefficient			Coefficient of Variation		
	% Share	Gk	% Contrib.	gk	CVk	% Contrib.	sk
2001							
PAD	6	0.50	4	0.75	1.94	3	0.62
DBH	23	0.74	39	1.70	2.55	50	2.19
DAU	70	0.33	54	0.78	0.77	44	0.62
DAK	2	0.86	3	1.68	3.19	3	1.92
Total revenue		0.40			0.98		
2003							
PAD	6	0.43	4	0.67	1.00	4	0.58
DBH	22	0.68	35	1.63	2.21	43	1.97
DAU	66	0.32	52	0.78	0.73	45	0.68
DAK	5	0.66	8	1.56	2.04	8	1.50
Total revenue		0.37			0.86		
2005							
PAD	6	0.43	3	0.48	1.06	2	0.32
DBH	29	0.72	45	1.59	2.48	59	2.08
DAU	60	0.35	45	0.75	0.76	33	0.54
DAK	6	0.61	7	1.24	1.91	6	1.07
Total revenue		0.42			1.02		
2007							
PAD	4	0.43	2	0.46	1.08	1	0.31
DBH	19	0.75	26	1.41	2.57	27	1.42
DAU	67	0.45	61	0.91	1.16	61	0.91
DAK	10	0.56	11	1.09	1.52	12	1.11
Total revenue		0.46			1.16		
2009							
PAD	5	0.45	3	0.62	1.16	2	0.36
DBH	20	0.71	27	1.37	2.36	25	1.25
DAU	64	0.45	58	0.91	1.27	63	0.99
DAK	11	0.52	11	1.02	1.25	10	0.90
Total revenue		0.45			1.16		
2012							
PAD	6	0.45	3	0.45	1.15	2	0.27
DBH	17	0.74	24	1.42	3.45	27	1.57
DAU	69	0.45	65	0.93	1.39	62	0.89
DAK	8	0.55	9	1.05	2.11	10	1.23
Total revenue		0.45			1.41		

Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics.

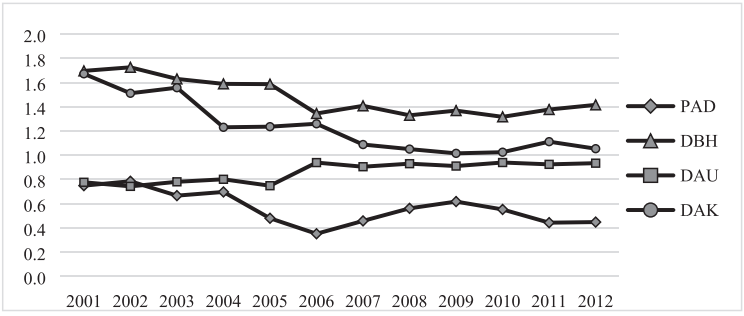


FIGURE 5 Relative concentration ratio for fiscal transfers (DBH, DAU and DAK) by the Gini coefficient
Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics

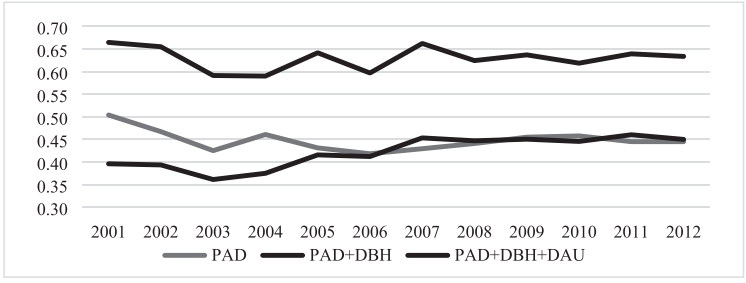


FIGURE 6 Changes in fiscal disparity by the Gini coefficient
Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics

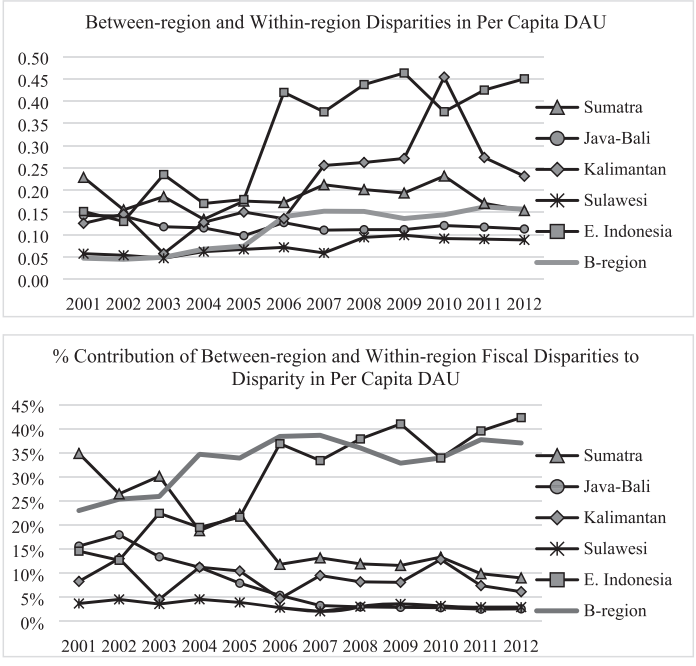


FIGURE 7 Decomposition of disparity in *per capita* DAU by regions by the Theil Index T
Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics

While Java-Bali showed a slight decreasing trend in within-region disparity, Kalimantan and Eastern Indonesia exhibited an increasing trend.[17] Sulawesi also showed an increasing trend, but not as much as Kalimantan and

[17]Kalimantan had a very large disparity in 2010; but this is due to an exceptionally large *per capita* DAU registered by *kabupaten* Tana Tidung in East Kalimantan (now in North Kalimantan), though the reason is unknown. Without this *kabupaten*, its within-region disparity will be decreased to 0.31.

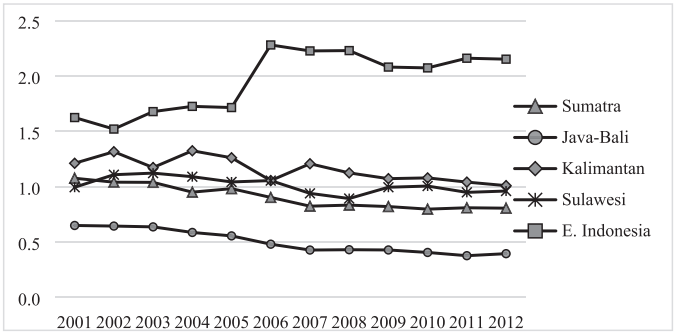


FIGURE 8 Mean *Per capita* DAU by region (Indonesia = 1.0)
Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics

Eastern Indonesia. As shown by the contributions of within-region disparities to overall disparity in DAU, the rapid rise in Eastern Indonesia's within-region disparity appears to have been the major contributor to the rise in disparity in DAU in 2006. It accounted for 37% of total disparity in 2006, up from 22% in 2005.

Under decentralization, a large number of new districts have been created in Eastern Indonesia by splitting, particularly in the sparsely populated province of Papua. According to our data set, between 2001 and 2012, the number of districts has increased from 40 to 91 in Eastern Indonesia, but most of the increases have occurred in Papua. This might have raised Eastern Indonesia's within-region disparity in DAU substantially, since those districts that were split might have a much larger *per capita* DAU for their wage bill than before if they increased the total number of their government officials after splitting.[18]

Another factor of the rise in disparity in DAU in 2006 would be the increase in the between-region disparity, as the disparity rose from 0.07 to 0.14 by the Theil index T and its contribution rose from 34% to 38%. According to Figure 8, which presents mean *per capita* DAU by region relative to Indonesia's mean *per capita* DAU (= 1.0), Eastern Indonesia raised its mean *per capita* DAU conspicuously in 2006, while the other four regions exhibited a declining trend. In other words, Eastern Indonesia not only raised its within-region disparity but also its mean *per capita* DAU relative to Indonesia's mean *per capita* DAU in 2006, and this seems to have raised disparity in DAU. Eastern Indonesia's large within-region disparity and large mean *per capita* DAU have persisted until 2012.

If Eastern Indonesia is excluded, disparity in DAU would have been much smaller since 2006. For example, in 2007, 2009 and 2012, the Gini coefficient would be 0.36, 0.36 and 0.34, respectively. These values are much smaller than the ones when Eastern Indonesia is included. Furthermore, the between-region disparity in DAU would have been much smaller since 2006, if Eastern Indonesia is excluded.

5.4 | Effects of Fiscal Transfers (DBH, DAU and DAK) on Fiscal Disparity: Excluding Eastern Indonesia

Since Eastern Indonesia had a much larger mean *per capita* DAU than the other four regions, it is instructive to examine the effects of fiscal transfers on fiscal disparity by excluding Eastern Indonesia. Figure 9 present the result of a decomposition analysis by revenue sources. DBH is unambiguously an inequality-increasing fiscal transfer since its relative concentration ratio was ranging from 1.6 to 1.8 by the Gini coefficient, which is larger than the ratio when Eastern Indonesia is included. On the other hand, DAU is an inequality-decreasing fiscal transfer as its relative concentration ratio was around 0.7–0.8. There was a slight increasing trend, but the ratio was much smaller than 1.0. These observations signify that when Eastern Indonesia is excluded, DAU has had a stronger revenue equalizing effect, even after 2006.

[18]This was indicated by Firman (2013).

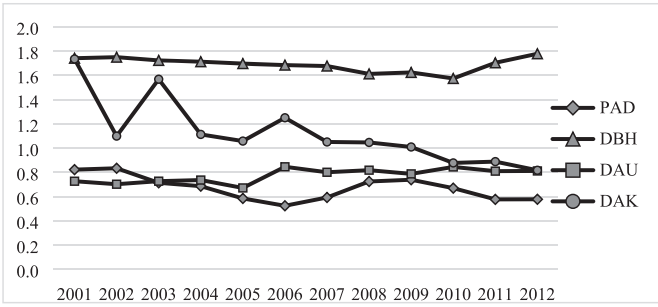


FIGURE 9 Relative concentration ratio for fiscal transfers (DBH, DAU and DAK) by the Gini coefficient: excluding Eastern Indonesia
Source: Authors' calculations based on fiscal data from the Ministry of Finance and population data from the Central Bureau of Statistics

Even if Eastern Indonesia is excluded, disparity in DAK has been declining gradually with the expansion of DAK. According to Figure 9, DAK's relative concentration ratio has been smaller than one since 2010 by the Gini coefficient (since 2007 by the coefficient of variation), signifying that DAK has become an inequality-decreasing fiscal transfer together with DAU. This suggests that the expansion of DAK will be an effective means to reduce overall fiscal disparity. We should note that there was a very high correlation between the distributions of *per capita* DAU and *per capita* DAK across districts at around 0.8. This is true whether Eastern Indonesia is included or not. This means that those districts that have a large (small) *per capita* DAU tend to have a large (small) *per capita* DAK.

6 | DESIGNING A NEW DAU ALLOCATION FORMULA

While DAU has served to equalize fiscal revenues across districts, fiscal disparity is still very high at around 0.4 by the Gini coefficient. To further reduce fiscal disparity, the formula for fiscal transfers may need to be modified. This section proposes a new formula for the allocation of DAU funds as DAU has played an important role in determining fiscal disparity.

Under the Law on Fiscal Decentralization (Law 25/1999, revised by Law 33/2004), from 2008 onward, general allocation grant (DAU) is determined by

$$\mathrm{DAU} = \max\{\mathrm{BA} + \mathrm{FG}, 0\}, \tag{6}$$

where basic allocation (BA) is given to each district to cover 100% of the total wage bill of the district government (Agustina et al., 2012), while fiscal gap (FG) is determined by the difference between fiscal need (FN) and fiscal capacity (FC) given by equation A5 in the appendix. As presented in the appendix, total fiscal revenue for a district is given by:

TFR = PAD + DBH + max{BA + (FN − PAD − DBH), 0} + DAK.

As shown in Figure 10,[19] district governments can be classified into three groups depending on the values of FN, BA + FN and PAD + DBH, for which total fiscal revenue (TFR) is given by:

$$\mathrm{TFR} = \begin{cases} \mathrm{BA} + \mathrm{FN} + \mathrm{DAK} & \text{if } \mathrm{BA} + \mathrm{FN} > \mathrm{FN} \geq \mathrm{PAD} + \mathrm{DBH}\ (\mathrm{Group}\ 1) \\ \mathrm{BA} + \mathrm{FN} + \mathrm{DAK} & \text{if } \mathrm{BA} + \mathrm{FN} > \mathrm{PAD} + \mathrm{DBH} > \mathrm{FN}\ (\mathrm{Group}\ 2) \\ \mathrm{PAD} + \mathrm{DBH} + \mathrm{DAK} & \text{if } \mathrm{PAD} + \mathrm{DBH} \geq \mathrm{BA} + \mathrm{FN} > \mathrm{FN}\ (\mathrm{Group}\ 3) \end{cases}. \tag{7}$$

[19]In Figure 10, the left column presents fiscal expenditures, while the right column shows fiscal revenues. It should be noted that DAK is allocated to cover 100% of expenditures necessary to cover the costs of specific activities that relate to national priorities.

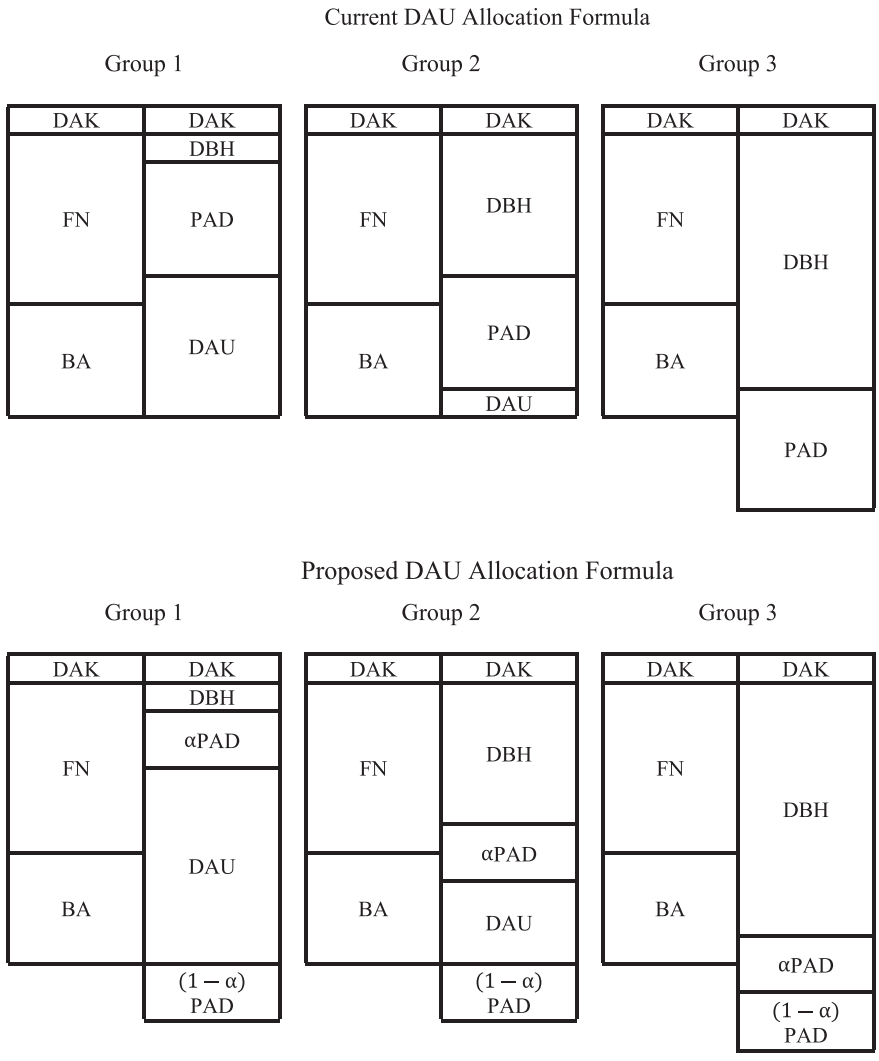


FIGURE 10 Total fiscal revenue

These three groups can be described as follows: group 1—districts poor in own source and shared revenues (BA +FN > FN ≥ PAD+DBH). In this case, total fiscal revenue is given by the sum of basic general allocation grant (BA), revenue to cover fiscal needs (FN) and special allocation grant (DAK). Since the sum of own source revenue (PAD) and shared revenue (DBH) is smaller than FN, it cannot cover FN, and thus the district will receive general allocation grant to fill the fiscal gap (FG≥ 0) plus BA, in other words, DAU = BA+FG ≥ BA.

Group 2—districts relatively rich in own source and shared revenues (BA+FN ≥ PAD+DBH > FN). In this case, total fiscal revenue is the sum of basic general allocation grant (BA), revenue to cover fiscal needs (FN) and special allocation grant (DAK). Since the sum of own source revenue (PAD) and shared revenue (DBH) is greater than FN, it can more than cover FN; thus, the fiscal gap is negative (FG< 0) and thus the district will not receive the full amount of basic general allocation grant, in other words, DAU = BA+FG < BA.

Group 3—districts rich in own source and shared revenues (PAD+DBH > BA+FN > FN). In this case, total fiscal revenue is the sum of own source revenue (PAD), shared revenue (DBH) and special allocation grant

(DAK). Since the sum of PAD and DBH is greater than the sum of basic general allocation grant (BA) and fiscal needs (FN), the sum of BA and FG is negative (BA+FG< 0) and thus the district will not receive general allocation grant at all, in other words, DAU = 0. In this case, the surplus could be used to finance additional local development activities that are not included in fiscal needs (FN). It should be noted, however, that in reality, much of the surplus might be saved or could be misused in those activities that are not conducive to local development.

As shown by Equation 7, TFR does not include PAD for districts in groups 1 and 2, since PAD is cancelled out when determining TFR. If the district governments realize this fact, they have hardly any incentive to increase PAD since the rise in PAD will reduce DAU according to Equation 6. Since basic allocation (BA) is intended to finance the wage bill and DAK is used to assist with specific activities that relate to national priorities, an amount equivalent to fiscal need (FN) is the only amount which could be used for local public services, such as education, healthcare services and public works.

In order to increase total fiscal revenue for districts in groups 1 and 2, the DAU allocation formula may need to be modified. The following provides a new proposed formula for the allocation of the DAU funds (second chart in Figure 10).

$$\mathrm{DAU} = \max\{\mathrm{BA} + (\mathrm{FN} - \mathrm{FC}), 0\}, \tag{8}$$

where FC = αPAD+DBH $0 \le \alpha < 1$.

Using Equation 8, total fiscal revenue (TFR) will be given by:

$$\mathrm{TFR} = \begin{cases} (1-\alpha)\mathrm{PAD} + \mathrm{BA} + \mathrm{FN} + \mathrm{DAK} & \text{if } \mathrm{BA} + \mathrm{FN} > \mathrm{FN} \ge \alpha\mathrm{PAD} + \mathrm{DBH}\ (\text{Group } 1) \\ (1-\alpha)\mathrm{PAD} + \mathrm{BA} + \mathrm{FN} + \mathrm{DAK} & \text{if } \mathrm{BA} + \mathrm{FN} > \alpha\mathrm{PAD} + \mathrm{DBH} > \mathrm{FN}\ (\text{Group } 2). \\ \mathrm{PAD} + \mathrm{DBH} + \mathrm{DAK} & \text{if } \alpha\mathrm{PAD} + \mathrm{DBH} \ge \mathrm{BA} + \mathrm{FN} > \mathrm{FN}\ (\text{Group } 3) \end{cases}$$

$\alpha = 1$ corresponds to the current allocation formula. If $\alpha = 0$, total fiscal revenue includes the full amount of PAD for all districts and thus, district governments will have a strong incentive to raise PAD to increase total fiscal revenue.

To examine how the new formula will affect fiscal disparity, we first define the following ratio:[20]

$$\mathrm{RATIO} = \frac{\mathrm{PAD} + \mathrm{DBH}}{\mathrm{TFR} - \mathrm{DAK}}. \tag{9}$$

For groups 1 and 2, this ratio will be given by:

$$\mathrm{RATIO} = \frac{\mathrm{PAD} + \mathrm{DBH}}{\mathrm{BA} + \mathrm{FN}}.$$

Since BA+FN > PAD+DBH for these groups, we have RATIO < 1. As a simulation analysis, we set RATIO < 0.6 to identify districts in groups 1 and 2. In 2012, 463 districts out of 491 districts meet this criterion. In other words, 28 districts are assumed to be in group 3; they are mostly in the resource rich provinces of Riau, Riau Islands and East Kalimantan. We next set $\alpha = 0.5$ and an amount equivalent to 0.5PAD is added to total fiscal revenue for districts in groups 1 and 2. Under this setting, fiscal disparity will be 0.444 by the Gini coefficient, which is smaller than the value in 2012 (0.452). If we set $\alpha = 0$ and an amount equivalent to PAD is added to total fiscal revenue for districts in groups 1 and 2, then fiscal disparity will be further reduced to 0.437. It should be noted that with this

[20]RATIO is employed to identify districts in groups 1 and 2.

arrangement, total DAU funds need to be increased; thus, some adjustments may be necessary to keep the DAU funds unchanged.[21]

The reduction in fiscal disparity is not substantial in the short run under the new formula. However, district governments in groups 1 and 2 would have an incentive to raise PAD if α is smaller than one since a certain proportion of PAD will be added to total fiscal revenue ($(1-\alpha)$PAD for groups 1 and 2 in Figure 10). This amount is beyond the amount that is necessary to cover fiscal needs (FN) and wage bills (BA). This could create a virtuous cycle if this additional amount is used for local development, particularly education and infrastructure. In practice, α may be changed depending on the value of RATIO defined by equation 9. One possible arrangement would be:

$$\alpha = \begin{cases} 0 & \text{if} \quad 0 < \text{RATIO} \le 0.3 \\ 0.3 & \text{if} \quad 0.3 < \text{RATIO} \le 0.6 \\ 0.6 & \text{if} \quad 0.6 < \text{RATIO} \le 0.9 \\ 1 & \text{if} \quad 0.9 < \text{RATIO} \le 1 \end{cases}.$$

With this arrangement, resource-poorer districts will add a larger proportion of PAD to total fiscal revenue. By the Gini coefficient, fiscal disparity will decline to 0.439 in 2012.

7 | CONCLUSIONS

This study analysed the level and trend of fiscal disparity across districts and explored the determinants of fiscal disparity by two inequality decomposition methods: decomposition by revenue sources and decomposition by regions. The following summarizes major findings. First, disparity in *per capita* fiscal revenue across districts (fiscal disparity) was very high and appears to have been increasing since the decentralization laws in 1999 were revised in 2004. Second, among four revenue sources, disparity in *per capita* shared revenue (DBH) has been the highest since 2003 due to the very uneven spatial distribution of natural resources and tax bases. DBH is unambiguously an inequality-increasing fiscal transfer. Third, disparity in *per capita* general allocation grant (DAU) was much smaller; but it exhibited an increasing trend. While DAU has served as an inequality-decreasing fiscal transfer, its inequality-reducing effect has been weakened since 2006. Fourth, Eastern Indonesia appears to have been responsible for the rise in disparity in *per capita* DAU, as its within-region disparity and mean *per capita* DAU relative to Indonesian average have risen prominently since 2006. Fifth, whether Eastern Indonesia is included or not, disparity in *per capita* DAK has been declining gradually with the expansion of DAK.

While DAU has served to equalize fiscal revenues across districts, fiscal disparity is still very high. Whether Eastern Indonesia is included or not, it is around 0.4 by the Gini coefficient. To further reduce the disparity, it may be necessary to modify the DAU allocation formula. This study proposed a new allocation formula, under which fiscal disparity was found to decline to a certain extent. Though the reduction in fiscal disparity is not substantial in the short run, the new formula would provide an incentive for resource-poorer districts to raise own source revenue (PAD). This could create a virtuous cycle if the additional PAD amount is used for local development, particularly education and infrastructure. There are, however, a number of issues in the way how to increase PAD since local tax bases are very limited and how effectively the additional amount of PAD is used to promote local development since there is a possibility that the additional amount is misused in those activities that are not conducive to local development. Another option to reduce fiscal disparity would be the further expansion of DAK, as the expansion of DAK appears to have lowered disparity in *per capita* DAK. If the government allocates the DAK funds effectively across districts, then it could make DAK an inequality-decreasing fiscal transfer.

[21]As described in subsection 3.3, the total pool of the DAU funds has been set at 26% a since 2008. With α = 0.5, total necessary DAU funds would be 27.7% of net national domestic revenue, *ceteris paribus*.

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APPENDIX A.

Using the following variables, this appendix describes how *DAU* and total fiscal revenue are determined for each district from 2001 to 2012, where subscript *i* denotes district $i.AR_i$ = land area (index, relative to average land area);

BA_i = basic *DAU* allocation to cover 100% of wage bill (= W_i);

BAW_i = basic *DAU* allocation to cover a certain proportion of wage bill;

CP_i = construction price index (average = 1);

DAK_i = special allocation grant;

DAU_i = general allocation grant;

DAUG = total *DAU* funds allocated to district governments to finance their fiscal gap;

DAUT = total *DAU* funds allocated to district governments;

DAUW = total *DAU* funds allocated to district governments to finance their wage bills;

DBH_i = shared revenue (= $DBHR_i$+$DBHT_i$);

$DBHR_i$ = shared revenue from natural resources;

$DBHT_i$ = shared revenue from personal income and property taxes;

EQ = equal lump sum amount given to each district as part of *DAU*;

FC_i = fiscal capacity;

FG_i = fiscal gap;

FGA_i = fiscal gap *DAU* allocation;

FN_i = fiscal needs;

HDI_i = human development indicator (average of $1/HDI_i$ = 1);

HR_i = indicator of human resources;
ID_i = indicator of industrial development;
Inpres = presidential instruction specific grants;
n = total number of districts;
NR_i = indicator of natural resources;
PAD_i = own source revenue;
$PGRDP_i$ = *per capita GRDP* (index, relative to average *per capita GRDP*);
POP_i = population (index, relative to average population);
POV_i = poverty index;
SDO = routine subsidies to autonomous regions
TFR_i = total fiscal revenue;
W_i = actual wage bill for government officials.

A.1 | General allocation grant (DAU) for each district government from 2001 to 2012

DAU consists of three major components: basic allocation, equal lump sum amount and fiscal gap allocation. The following describes the way how these components are determined (Brodjonegoro & Martinez-Vazquez, 2005; Fadliya & McLeod, 2010; Hofman, Kaiser, & Sjahrir, 2006).

1. In 2001

(1) Basic allocation

Basic allocation is determined on a 'hold harmless' basis relative to the following two subsidies from the central government in the pre-decentralization period: *SDO* and *Inpres*. In other words, basic allocation for a district is made not to harm the district in terms of its fiscal capacity and at least as much as the sum of *SDO* and *Inpres* grants allocated to the district in 2000. Total basic allocation constitutes 80% of *DAUT*

(2) In addition to the basic allocation, a lump sum equal amount (*EQ*) is given to each district to cover fixed overhead costs of the district. Total lump sum amount allocated to district governments accounts for 1.5% of *DAUT*.

(3) Fiscal gap allocation

Fiscal gap allocation (FGA_i) is determined as follows. We first define the fiscal gap of district i as:

$$FG_i = FN_i - FC_i \tag{A1}$$

where FN_i and FC_i are defined, respectively, by:

FN_i = average fiscal expenditure $\times \frac{1}{4}(POP_i + AR_i + CP_i + POV_i)$ and

FC_i = average fiscal revenue $\times \frac{1}{3}(ID_i + NR_i + HR_i)$.

Then, using equation A1, FGA_i is given by:

$$FGA_i = FGA_i = DAUG \times \frac{FG_i}{\sum_{1}^{n} FG_i}, \tag{A2}$$

where *DAUG* accounts for 18.5% of *DAUT*.

2. In 2002

(1) Basic allocation: Basic allocation is determined for each district to cover a certain proportion of the actual wage bill of the district based on the following formula:

$$BAW_i = DAUW \times \frac{W_i}{\sum_1^n W_i}, \tag{A3}$$

where $BAW_i < W_i$. *DAUW* constitutes 50% of *DAUT*

(2) In addition to the basic allocation to finance the wage bill, a lump sum equal amount is given to each district to cover fixed overhead costs of the district. Total lump sum amount allocated to district governments accounts for 10% of *DAUT*.

(3) Fiscal gap allocation: Fiscal gap allocation (FGA_i) is determined as follows. We first define the fiscal gap of district *i* as:

$$FG_i = \begin{cases} FN_i - FC_i & if\ FN_i - FC_i \geq 0 \\ 0 & if\ FN_i - FC_i < 0 \end{cases}, \tag{A4}$$

where FN_i is defined by:

FN_i = average fiscal expenditure $\times(0.4POP_i+0.1AR_i+0.4CP_i+0.1POV_i)$, while FC_i is defined by:

$$FC_i = PAD_i + 0.75DBHR_i + DBHT.$$

Then, FGA_i is given by Equation A2, where *DAUG* accounts for 40% of *DAUT*.

(4) Adjustment based on the hold harmless clause.

Based on the fiscal gap allocation formula given by Equations A2 and A4, some districts, particularly natural resource rich districts, would receive *DAU* amount less than that in the previous year. Therefore, some adjustments are made to ensure that no district will receive less than the *DAU* amount in the previous year.

3. In 2003

(1) Basic allocation; Basic allocation is determined for each district according to equation A3, where *DAUW* constitutes 45% of *DAUT*.

(2) In addition to the basic allocation to finance the wage bill, a lump sum equal amount is given to each district to cover fixed overhead costs of the district. Total lump sum amount allocated to district governments accounts for 5% of *DAUT*.

(3) Fiscal gap allocation: Fiscal gap allocation is determined for each district according to Equations A2 and A4, where *DAUG* accounts for 50% of *DAUT*.

(4) Adjustment based on the hold harmless clause

Some adjustments are made to ensure that no district will receive less than the total *DAU* amount in the previous year.

4. In 2004 and 2005

(1) Basic allocation: Basic allocation is determined for each district according to equation A3, where *DAUW* constitutes 40% of *DAUT*

(2) In addition to the basic allocation to finance the wage bill, a lump sum equal amount is given to each district to cover fixed overhead costs of the district. Total lump sum amount allocated to district governments accounts for 5% of the *DAU* funds.

(3) Fiscal gap allocation: Fiscal gap allocation is determined for each district according to Equations A2 and A4, where *DAUG* accounts for 55% of *DAUT*. However, FC_i is given by:

$$FC_i = 0.5PAD_i + DBHR_i + DBHT$$

(4) Adjustment based on the hold harmless clause

Some adjustments are made to ensure that no district will receive less than the total *DAU* amount in the previous year

5. In 2006 and 2007

(1) Basic allocation: Basic allocation is determined for each district to cover 100% of the total wage bill of the district rather than a certain proportion of the total wage bill.

(2) The lump sum *DAU* component was abolished in 2006 to reduce the proliferation of districts, since this component was thought to give an incentive to split districts.

(3) Fiscal gap allocation: Fiscal gap allocation is made after deducting total amount of basic allocation determined above from *DAUT*; it is determined for each district according to Equations A2 and A4. However, FN_i and FC_i are given, respectively, by:FN_i = average fiscal expenditure $\times \left(0.3POP_i + 0.15AR_i + 0.3CP_i + 0.1\left(1/HDI_i\right) + 0.15PGRDP_i\right)$ and

$$FC_i = PAD_i + DBHR_i + DBHT_i \tag{A5}$$

(4) Adjustment based on the hold harmless clause: Some adjustments are made to ensure that no district will receive less than the total *DAU* amount in the previous year.

6. From 2008 onward

(1) Basic allocation

Basic allocation is determined for each district to cover 100% of the total wage bill of the district, in other words, $BA_i = W_i$.

(2) Total *DAU* allocation (basic allocation + fiscal gap allocation)

Total *DAU* allocation for each district is determined according to the following formula:

$$DAU_i = \begin{cases} BA_i + FG_i & \text{if } FG_i \geq 0 \\ BA_i + FG_i & \text{if } FG_i < 0 \text{ and } BA_i + FG_i \geq 0. \\ 0 & \text{if } FG_i < 0 \text{ and } BA_i + FG_i < 0 \end{cases} \tag{A6}$$

In Equation A6, $FG_i = FN_i - FC_i$, while FN_i and FC_i are given by A5.

(3) Hold harmless clause has been abolished, and thus no adjustment is made based on the hold harmless clause.

A.2 | Total fiscal revenue (*TFR*) for each district government from 2001 to 2012

Total fiscal revenue (*TFR*) for each district government consists of *PAD*, *DBH*, *DAU*, *DAK* and other revenues. The following provides formula for total fiscal revenue, where, for simplicity, other fiscal revenues are assumed to be zero

1. In 2001

$$TFR_i = PAD_i + DBH_i + DAU_i + DAK_i,$$

where $DAU_i = EQ + BA_i + FGA_i$

$$= 0.015DAUT(1/n) + 0.8DAUT\left(w_i/\sum_1^n w_i\right) + 0.185DAUT\left(FG_i/\sum_1^n FG_i\right).$$

Based on the hold harmless clause, some adjustments are made for *DAU* to ensure that no district will receive less than the sum of *SDO* and *Inpres* in 2000.

2. In 2002

$$TFR_i = PAD_i + DBH_i + DAU_i + DAK_i,$$

where $DAU_i = EQ+BA_i+FGA_i$

$$= 0.1DAUT(1/n) + 0.5DAUT\left(w_i/\sum_1^n w_i\right) + 0.4DAUT\left(FG_i/\sum_1^n FG_i\right),$$

where $0.5DAUT\left(w_i/\sum_1^n w_i\right) \le W_i$. Based on the hold harmless clause, some adjustments are made for *DAU* to ensure that no district will receive less than *DAU* in the previous year.

3. In 2003

$$TFR_i = PAD_i + DBH_i + DAU_i + DAK_i,$$

where $DAU_i = EQ+BA_i+FGA_i$

$$= 0.05DAUT(1/n) + 0.45DAUT\left(w_i/\sum_1^n w_i\right) + 0.5DAUT\left(FG_i/\sum_1^n FG_i\right),$$

where $0.45DAUT\left(w_i/\sum_1^n w_i\right) \le W_i$. Based on the hold harmless clause, some adjustments are made for *DAU* to ensure that no district will receive less than *DAU* in the previous year.

4. In 2004 and 2005

$$TFR_i = PAD_i + DBH_i + DAU_i + DAK_i,$$

where $DAU_i = EQ+BA_i+FGA_i$

$$= 0.05DAUT(1/n) + 0.4DAUT\left(w_i/\sum_1^n w_i\right) + 0.55DAUT\left(FG_i/\sum_1^n FG_i\right),$$

and $0.4DAUT\left(w_i/\sum_1^n w_i\right) \le W_i$. Based on the hold harmless clause, some adjustments are made for *DAU* to ensure that no district will receive less than *DAU* in the previous year.

5. In 2006 and 2007

$$TFR_i = PAD_i + DBH_i + DAU_i + DAK_i,$$

where $DAU_i = BA_i+FGA_i$

$$= W_i + DAUG\left(FG_i/\sum_1^n FG_i\right),$$

where $DAUG = DAUT - \sum_1^n W_i$. Based on the hold harmless clause, some adjustments are made for *DAU* to ensure that no district will receive less than *DAU* in the previous year.

6. From 2008 onward

$TFR_i = PAD_i+DBH_i+DAU_i+DAK_i$

$= PAD_i+DBH_i+\max\{BA_i+FG_i, 0\}+DAK_i$

$= PAD_i+DBH_i+\max\{BA_i+(FN_i - FC_i), 0\}+DAK_i$

$= PAD_i+DBH_i+\max\{BA_i+(FN_i - PAD_i - DBH_i), 0\}+DAK_i,$

where $BA_i = W_i$.

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Resumen. En este estudio se analiza el nivel y las tendencias de la disparidad fiscal entre los distritos indonesios. También se exploran los determinantes de la disparidad fiscal mediante dos métodos de descomposición de la desigualdad, a saber, la descomposición del coeficiente de Gini y el coeficiente de variación por fuentes de ingresos y la descomposición del índice de Theil por regiones. La disparidad de los ingresos compartidos ha sido grande, debido a distribuciones espaciales muy desiguales de los recursos naturales y las tasas de impuestos. Inequívocamente, en Indonesia esto supone una transferencia fiscal que aumenta la desigualdad. Para igualar los ingresos fiscales se ha empleado una subvención de asignación general, pero la disparidad fiscal general sigue siendo alta. Para reducir la disparidad, podría ser necesario modificar la fórmula de asignación general, ya que parece ser defectuosa. Este estudio propone una nueva fórmula de asignación. Aunque la reducción de la disparidad fiscal no es sustancial a corto plazo, la nueva fórmula proporcionaría un incentivo para que los gobiernos de los distritos más pobres recauden de sus propias fuentes de ingresos. Esto podría crear un círculo virtuoso si los ingresos adicionales de fuentes propias se utilizan para el desarrollo local, en particular la educación y la infraestructura. Otra opción para reducir la disparidad fiscal podría ser la ampliación de las subvenciones de asignaciones especiales. Si el gobierno asigna el fondo de asignación especial de manera efectiva en todos los distritos de Indonesia, podría lograr que la subvención de asignaciones especiales sea un tipo de transferencia fiscal que disminuya la desigualdad.

抄録: 本研究では、インドネシアの地方行政区間の財政格差のレベルと傾向を分析する。また、財政格差の決定要因を、ジニ係数と歳入源別変動係数の分解、テイル指数の地域別分解という、不等式を分解する2つの方法を用いて検討する。分配される税収の格差は、天然資源と課税基盤の分布が空間的に非常に不均一であることが大きな原因である。これは明らかにインドネシアにおける不平等を拡大させる財政移転である。普通交付金は財政収入の平準化に役立ったが、全体的な財政格差は依然として大きい。不均衡を減らすためには、通常の割り当て方式に欠陥があると考えられるため、その修正が必要である可能性がある。本研究では、新しい配分式を提案する。縮小される財政格差は短期的にはそれほど大きなものではないが、新方式では資源の乏しい地方政府が自らの財源収入を増やすためのインセンティブが与えられる。これは、追加的な財源収入が地域開発、特に教育とインフラに使われる場合、好循環が得られる可能性がある。財政の不均衡を是正するもう一つの選択肢は、特別配分を拡大することである。政府が特別配分基金をインドネシアの各地区に効果的に配分すれば、特別配分補助金を、不平等を減少させる財政移転とすることができる。

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