Research article

The miracle of anti-corruption efforts and regional fiscal independence in plugging budget leakage: evidence from western and eastern Indonesia

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ARTICLE INFO

ABSTRACT

The leakage of the *Anggaran Pendapatan dan Belanja Daerah* (APBD: Regional Revenue and Expenditure Budget) has been officially reported by the Corruption Eradication Commission of the Republic of Indonesia to have reached 40 per cent. The purpose of this study is to examine the effectiveness of measures to eradicate corruption and the ways that fiscal independence can stop the leakage of local governments budget in western (WI) and eastern (EI) Indonesia. This study uses the System GMM dynamic panel method and stochastic frontier analysis (SFA). The result finds that effort to eradicate corruption, such as reporting gratification can reduce budget leakage in WI and EI. The result also discovers that the public complaint has the effect of reducing budget leakage in EI, while it continues to grow in WI. Increase the status of the Audit Board (BPK's opinion) can increase budget leakage in WI and EI. Ratio of locally-generated revenue (RLGR) and ratio of transfer (RT) as fiscal independence proxies are defined as triggers for corruption in terms of budget leakage. The budget leakage is bigger in EI than WI, despite the fact that the increase in the leakage ratio the year before caused the leakage in the years that followed. Transparency efforts must continue to be encouraged for the realisation of a clean government.

1. Introduction

Corruption is still a plague in most countries in the world today. Corruption exist in all countries, no matter how advance their social and economic system are (Muçollari, 2018), and also a major obstacle to democratisation and good governance (Kalinowski, 2016). All throughout the world, local administrations are becoming more corrupt (Masters and Graycar, 2016). In Indonesia, the corruption phenomenon is growing root. Post Soeharto era, program for eradicating corruption aimed to increase the degree of transparency and governance (Umam et al., 2020).

The leakage of the *Anggaran Pendapatan dan Belanja Daerah* (APBD: Regional Revenue and Expenditure Budget) has been officially reported by the Corruption Eradication Commission of the Republic of Indonesia (KPK RI) to have reached 40 per cent.[1] The high leakage is in line

with the massive level of corruption in the local government. Based on KPK Report of 2020, 143 regional heads have been indicted in corruption cases with the most common cases of corruption in regional government are corruption in the APBD. This also confirms the trend of the Corruption Perception Index (CPI) during 2000 – 2021 which indicates that corrupt practices in various regions in Indonesia are in an emergency phase (see Fig. 1). Setiyono (2015) found that years after democratisation, Indonesia is almost at the lowest level of the CPI.

Meza and Pérez-Chiqués (2021) argue that ignoring the methods of corruption has resulted in the development of anti-corruption polices that frequently deal with dyadic type of corruption, rely excessively on formal institutions, and have been demonstrated to be unsuccessful. To prevent this ineffectiveness from occurring in local governments, the KPK has built a monitoring system such as a gratification report system, and an online public complaint. These were responded well

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Fig. 1. Indonesia corruption index, 2000-2021.

by all circles, both Non-Governmental Organisation (NGO) and civil society as shown by the increasing trend of reporting throughout the year.

To enhance the efficacy of decentralisation reforms, the federal government should investigate whether and how to supervise the use of decentralized resources by local governments (Funk and Owen, 2020). Decentralisation affords considerable opportunity to enhance government accountability (Baltaci and Yilmaz, 2006; Yilmaz et al., 2010). Nonetheless, it typically neglects local government (del Sol, 2013). Meanwhile, in Indonesia, *Badan Pemeriksa Keuangan Republik Indonesia* (BPK RI; The Audit Board of the Republic of Indonesia) also plays an active role in overseeing the regional financial budget balances. Therefore, in recent years each region has actively reported financial reports to the BPK. The BPK's response is quite rigid concerning oversight of regional budgets in which each region in Indonesia does not always receive good reports from this institution. In fact, there is imbalance between the western (WI) and eastern (EI) areas when it comes to the number of public complaints about corruption related indicators in the two regions, as well as scorecards for financial reports of those regions.

Inequality between WI and EI has become a public secret in Indonesia. Modernity and independence are usually synonymous with the WI, while underdeveloped and traditionally pinned in the EI. As autonomy progressed, the eastern region slowly began to be a priority for development policies (see Digdowiseiso et al., 2020; Siburian, 2020). Local governments pay a lot of attention to the area, although the dominance of the WI is quite high. However, one thing that makes them the same is the corruption which have been being endemic to all local government institutions in Indonesia.

This study views that fiscal decentralisation is one of the loopholes for corruption in local government. The nexus of fiscal decentralisation and corruption remains to exist (Corrado and Rossetti, 2018). Relationship between those two is far from over (Rosselló Villalonga, 2018). Ivanyna and Shah (2011) reveal that the two issues are still controversial and invite a lot of debate. Fiscal decentralisation policy is able to significantly reduce the level of corruption (Changwony and Paterson, 2019; Dong and Torgler, 2013). According to Hadiz (2004) decentralisation results in a more corrupt government, while Fisman and Gatti (2002) emphasise that the increase in transfer fund leads to abuse of power at the local government level.

Shon and Cho (2020) claim that a structured decentralisation policy contributes to the high rate of corruption. Corruption can reduce the beneficial effects of government spending (Huynh and Tran, 2020). Ko and Zhi (2013) assert fiscal decentralisation that is not managed properly may invite risk, especially if local authorities use excessive power. Even Pulido et al. (2020) reveal that corrupt authorities tend to be more

educated. Meanwhile, Martinez-Vazquez et al. (2017) state that manifestation of good governance is the low rate of corruption. Umam et al. (2020) expose that corruption increase during the decentralisation era in Indonesia and it is confirmed by Alfada (2019a) that the degree of fiscal decentralisation in Indonesia encourages the proliferation of corrupt practices.

This study contributes to the efforts of disclosing budget corruption practices in provinces in Indonesia from a regional point of view, namely WI and EI, which are always under debate by experts because of the various inequalities that occur between WI and EI including in terms of corruption and decentralisation. The purpose of this study is to examine the effectiveness of measures to eradicate corruption and the ways that fiscal independence can stop the leakage of local governments budget in WI and EI. The corruption eradication efforts initiated by the KPK are such as the gratification reporting system and the public complaint system for indications of corrupt practices in local government. In addition, this study added anti-corruption efforts from the aspect of regional financial audits led by BPK. Also, this study uses the point of view of regional fiscal independence. The two indicators of regional fiscal independence used are the ratio of independence that comes from the locally generated and the ratio of transfers from the central government to local governments. The two indicators of regional independence are contradictory in that the higher the regional original income, the more independent a region is, the opposite is the case with the regional transfer ratio. The data in this study comes entirely from trusted institutions such as the KPK, BPK, and the Ministry of Finance.

The fundamental question in this study is whether there are differences in the effects of anti-corruption efforts and regional fiscal independence on budget leakage in each province in WI and EI? To answer this question, the author relies on two analytical methods that are panel dynamic general method of moment (GMM) and stochastic frontier analysis (SFA). This study produced some surprising findings. First, from the aspect of efforts to eradicate corruption, there is a high level of corruption and a high level of public awareness of this extraordinary crime. Public complaint efforts were highly effective in reducing budget leakage in EI. Financial audit performance has not shown satisfactory results in preventing budget leakage in both WI and EI. Second, from the regional fiscal independence aspect, the ratio of locally-generated revenue (RLGR) increases the ratio of budget leakage in both regions, yet the ratio of transfer (RT) is able to reduce budget leakage in EI but not in WI.

This study is presented in four important sections. Section 2 describes a theory and literature review that describes a set of papers relevant to the topic; Section 3 describes the data and methodology; Section 4 describes the results and discussion; Section 5 is conclusion and policy implication.

2. Theory and literature review

This study relies on the theory of federalism to analyse budget leakage that occur in WI and EI. In general, this theory is separated from generation to generation. The initial generation is represented by analysis of Tiebout (1956) and Oates (1972). Meanwhile, the subsequent generation is represented by Besley and Coate (2003) and Lockwood (2002), who focus more on corrupt practises in the decentralisation dimension. These analyses are also neatly packaged by Mookherjee (2015).

Classical economic literature on fiscal federalism was first introduced by Tiebout (1956) and Oates (1972), but tends to ignore the problem of agency in government and only focuses on the benefits and costs of decentralisation from the perspective of efficient resource allocation. Tiebout places more emphasis on the preference of local public goods by citizens, which rationalises the decentralisation of spending decisions to local governments. This is due to the inability of central government to effectively distinguish between localities while providing local public goods. Meanwhile, Oates outlines a number of inef-

ficiencies caused by decentralisation: inter-jurisdictional externalities and the deterioration of scale economies. For example, countries with greater geographic or ethnic diversity should have more decentralised governments. According to Mookherjee (2015) fiscal transfers need to be designed with the aim of equitable development. However, this can create a classic principal-agent problem while creating procedures for intergovernmental budgetary transfer without even addressing the problems of corruption in government. Accordingly, the responsibility of local governments is confined to informing the central government of local requirement, which means that in this scenario there is no delegation of authority as in the decentralisation philosophy.

The subsequent-generation theory of fiscal federalism focuses on political economy and the problem of corruption (Mookherjee, 2015). The works by Besley and Coate (2003) and Lockwood (2002) criticise standardisation in the provision of centralised public goods made by the initial generation model on both idea and evidence. Their model yields normative conclusions similar to those of the initial generation literature. Less heterogeneity and larger spillovers favour centralisation (Mookherjee, 2015).

Furthermore, Myerson (2014) emphasises that the advantage of decentralised governance is that it provides screening tools for government talent and arrangements for officials to develop their reputation. This argument provides a rationale for decentralisation based on accountability in lack of jurisdictional diversity. Another argument in favour of decentralisation is made based on the competitiveness of various local administrations, which restricts the scope of government official corruption and rent-seeking. This argument was driven by Brennan and Buchanan (1980), which was continued by Arikan (2004) and Edwards and Keen (1996).

Bardhan and Mookherjee (2000) argue that it is difficult to predict in advance whether central or local governments will be more susceptible to elite control. This view of decentralisation that led to provincial protectionism was later formalised in a theoretical model by (Sonin, 2010). Sonin model emphasises the need for economic decentralisation accompanied by political centralisation (i.e., where regional governors cooperate with the federal government, because of the sanctions that the federal government can impose on the federal government). Cai and Treisman (2004) and Treisman (2007) offer counterarguments to the idea that competition between local governments necessarily decreases agency issues. Cai and Treisman (2005) contend that the argument for the beneficent effect of competition is contingent on the implicit assumption of jurisdictional homogeneity with respect to the productivity of the relevant factors. Poor regions may have more corruption and less business-friendly policies.

2.1. Literature review

Many scholars have been interested in the topic of how relationship between corruption and decentralisation. Some recent research by several scholars, for instance Ojeka et al. (2019) in Nigeria, found that corruption had a negative effect on company performance when monitored from an institutional point of view. Pulido et al. (2020) in Colombia, the effectiveness of public policies is able to strengthen public administration to avoid corrupt behaviour. There is also an effort to detect corrupt behaviour by Abraham et al. (2020), corruption and environmental sustainability by Ganda (2020), and corruption and inflation by Ayodeji (2020). However, this study focuses on Indonesia's budget leakage which emphasises the efforts to eradicate corruption and fiscal independence in the regions.

Several empirical literatures related to efforts to eradicate corruption in local governments are selected in this study. In South Korea, Kalinowski (2016) conducted a case study of successful and unsuccessful anti-corruption policies. That study examines the successes and challenges of eradicating corruption in South Korea since the start of democratisation in 1987. The results of the investigation show that South Korea has generally succeeded in controlling corruption. The

remaining problems can largely be explained by the legacy of authoritarian rule and the weakening of state autonomy through the concentration of economic power.

Meza and Pérez-Chiqués (2021) researched in Mexico. They used a variety of methods, including fifty extensive interviews in two cities and three polls of citizens and government officials. The approach focuses on the formation and organisation of networks that commit corrupt behaviours, and how opaqueness and insufficient checks and balances provide them with impunity. Corruption schemes are easy to develop and durable, able to bypass conventional anti-corruption tactics.

In Israel, Beeri and Navot (2013) provide a theoretical conceptualisation of institutionalised corruption in local government and highlight the structural variables that contribute to corruption. Based on a poll of 1,709 citizens of 156 local authorities and local authority data from separate databases, they assess institutional corruption at the local level and its link to the attitudes and characteristics of local officials and residents. Their analysis suggests that local corruption develops from structural elements at three levels: central-regional, local-local, and intra-local (factors related to local council performance and local democracy). Their investigation indicated relationships between characteristics of local governments and communities, citizens' evaluations of local performance, and citizens' perceptions of local corruption. The consequences of these findings in relation to routinely employed anti-corruption methods in local government are examined.

Muçollari (2018) asserts Albania ranked bottom in the area for the third consecutive year based on the corruption perception index in 2013. Albania is the most corrupt nation in Europe. Solving the corruption challenge requires sustained efforts in many areas and the long-term involvement of all local and international stakeholders. These efforts include: 1) Corruption of politicians and senior civil servants will not be tolerated if effective prosecution is not carried out.; 2) At the national level, an independent and effective corruption monitoring mechanism must be established hence anti-corruption policies can be evaluated.; 3) To ensure accountability, civil society organisations are indispensable; 4) Provide reliable and regular statistics on anti-corruption efforts (investigations, prosecutions, administrative actions, etc.; 5) All parties are involved in the monitoring and analysis of types of corruption in various public sectors.

Funk and Owen (2020) expose corruption in Brazil. They conducted random audits of more than 5,000 municipalities in Brazil from 2001 to 2012. Their findings were that audited municipalities performed better than unaudited municipalities. The top-down monitoring programme is quite effective in increasing transparency and accountability as well as providing better public services. Meanwhile, in Australia, New Zealand and the England focused studies on corruption and violations as evidenced from investigative reports of local governments (Purcell, 2015). Empirical findings indicate low support for audit committees overseeing allegations of corruption and misconduct. Respondents generally thought that the chief executive was the right person to manage the investigation.

Liu and Lin (2012) state that the audit system of Chinese government has played a crucial role in preserving financial order, government accountability and transparency. Their study used Chinese provincial panel data from 1999 to 2008 to examine government auditing's involvement in corruption prevention. Their findings are that the more severe the corruption in a province, the more discrepancies in government accounting local audit authorities find. Post-audit remedial activities are negatively connected to provincial corruption, showing that more corrective efforts lead to less corruption. Evidence on how government audits prevent corruption can help comprehend the role of local Chinese audit institutions in governance and enrich the literature on government auditing and corruption control.

Most research focuses on national government audits (Pfaff and Sanchirico, 2004; Santiso, 2006). Although national audit organisations are more prevalent, a few of nations have implemented top-down audit programs to monitor local administrations. Examples of countries

that have implemented municipal audit programs in the past include the United States (Coe, 2008), Indonesia (Olken, 2007), Mexico (De La O and García, 2014) and the England (Walker and Boyne, 2006).

On the other hand, this study employs gratification as one of the variables that encourage leakage in the APBD. Kuncoro (2004) reveals that competition in the bureaucracy in accepting gratification and bribes is the result of decentralisation. The bribes received by officials are taken from companies operating in each region. The bribes are obtained from the profits earned by each company. The bribery is an attempt by the company to escape from local regulations that can lead the company to the brink of suffering. According to Popov (2015) temporarily reducing bribes can improve participation by altering perceptions of inspectors and reducing bribes in the long run in response to a large enough crackdown on corruption, even if only temporary. The role of the community and NGOs is very important in controlling corruption from external parties. In Thailand, Prateeppornnarong (2021) researches that poor public engagement in anti-corruption efforts will render the Public Sector Anti-Corruption Commission (PACC) system ineffective. Meanwhile, Arifin et al. (2018) argue that more steps are necessary in Indonesia to combat widespread corruption as demonstrated by public complaints to the KPK. As a result, the press can act as a platform for anti-corruption efforts.

Pamungkas et al. (2018) reveal that based on the Indonesian State Finance Law (2003), in Indonesia, regional governments are required to submit financial reports to the Regional House of Representatives for examination by the Supreme Audit Agency (BPK). Generally, an audit report on government financial statements consists of an audit report on financial statements and two optional reports, namely compliance with legislation and an assessment of the internal control system.

This study proposes an audit approach and institutional transparency efforts led by BPK. Indeed, there are still discrepancies in audit results between WI and EI. Decentralized governance can encourage civil and bureaucratic involvement in promoting honesty and accountability (Slijepčević et al., 2020). Firman (2009) found that there is a weakness in the capacity of local institutions to implement decentralisation policies thereby they cannot run optimally. Some supporting literature, such as Ahlin (2001) asserts that the institutional effect of transparency and supervision at the local government level is effective in limiting corrupt practices. Experience in China, Ko and Zhi (2013) claim that strong law enforcement was capable of preventing corrupt practises during the decentralisation era.

Debate over the relationship between decentralisation and corruption continues. Decentralisation is an element of democracy as well as a public policy issue that needs special consideration (Pálné Kovács, 2020). The decentralisation process promises more efficient development through a bottom-up approach as well as the ability to empower local governments (Firman, 2009; Talitha et al., 2020). According to Rumayya et al. (2020), since being implemented in 2001 in Indonesia, the decentralisation policy has given broad powers and resources to stimulate economic activity. However, corruption practises in decentralisation have been widely exposed by most scholars. Huynh and Tran (2020) reveal that corruption can reduce the beneficial effect of government spending on improving public services. In Indonesia, Alfada (2019a) found that a disproportionate reliance on central government grant funds exacerbates corruption across the various regions. Similarly, Corrado and Rossetti (2018) analyse that the composition of public spending is inextricably linked to the level of corruption in Italy. Fiorino et al. (2015) researched of 24 OECD countries found a significant correlation between fiscal decentralisation and low corruption after three to five years. As the degree of fiscal decentralisation increases, it will affect corruption.

For non-corrupt countries, increasing the level of decentralisation has a positive contribution to the economy (Chalil, 2020). Countries with a high fiscal level will tend to have a low corruption rate (see Arikan, 2004; Oto-Peralías et al., 2013). Fisman and Gatti (2002) expose that government spending in a decentralised system has a significant

effect on reducing corruption rates in cross-country studies. Ivanyna and Shah (2011) found that government spending on decentralisation has a negative effect in the 158 countries studied. Corruption cases could be reduced in 150 countries with a fiscal decentralisation rate of 15 percent to 21 percent (Alfano et al., 2019).

In Indonesia, Lewis (2017) discloses that less corrupt regions received a positive impact from all components of expenditure, but over time, these regions became dependent on transfer funds. Alfada (2019b) researched the corruption threshold approach and data from 2004 to 2015 for 19 provinces found that corruption has a negative influence on growth in provinces with corruption levels below the 1.765-point threshold.

Based on the literature review above, there is still a niche of knowledge that can be explored related to efforts to eradicate corruption and regional fiscal independence toward budget leakage in Indonesia, particularly in the regional aspect. There is limited literature related to these indicators and budget leakage. Therefore, this study formulates the following hypotheses:

$H_{1A,B}$: Gratification affects the budget leakage both WI and EI significantly

$H_{2A,B}$: Public complaint affects the budget leakage both WI and EI significantly

$H_{3A,B}$: BPK's opinion affects the budget leakage both WI and EI significantly

$H_{4A,B}$: Ratio of locally-generated revenue affects the budget leakage both WI and EI significantly

$H_{5A,B}$: Ratio of transfer affects the budget leakage both WI and EI significantly

3. Data and methods

3.1. Data description

This study uses a sample of 32 provinces from 34 provinces in Indonesia. Provinces that not covered are DKI Jakarta Province and Kalimantan Utara Province. DKI Jakarta is not included because it was financially independent while Kalimantan Utara Province is a new province formed in 2012 and there would be limitations in data supply. The study applied data from 2010 to 2019. The 19 provinces covered by the WI are Aceh, Sumatera Utara, Sumatera Barat, Riau, Jambi, Sumatera Selatan, Bengkulu, Lampung, Jawa Barat, Jawa Tengah, Daerah Istimewa (DI) Yogyakarta, Jawa Timur, Kalimantan Tengah, Kalimantan Selatan, Kalimantan Timur, Kalimantan Barat, Banten, Bangka Belitung, and Kepulauan Riau. There are 13 provinces in EI, including Sulawesi Utara, Sulawesi Tengah, Sulawesi Selatan, Sulawesi Tenggara, Sulawesi Barat, Bali, Nusa Tenggara Barat, Nusa Tenggara Timur, Maluku, Maluku Utara, Papua, Papua Barat, and Gorontalo.

To examine the relationship between corruption eradication efforts and regional fiscal independence toward budget leakage, this study also refers to previous studies although there are several different benchmark variables (Alfada, 2019b; Fisman and Gatti, 2002; Rodríguez-Pose and Zhang, 2019). The dependent variable is the budget leakage of APBD in each province in WI and EI. However, to perform these calculations, this study uses the components of APBD expenditures (accumulation both of direct and indirect expenditures). Based on the finding of KPK, there is assumption of 40 percent budget leakage in equation (1). Construction of the budget leakage calculation is:

$$Budget\ leakage\ 40\%_{it} = (reg\ exp_{it} - emp\ spend_{it}) \times 40\% \qquad (1)$$

where, *budget leakage* $40\%_{it}$ is budget leakage in i province t. *reg exp*$_{it}$ year is the total expenditure of i province t. *emp spend*$_{it}$ year is personnel expenditure on indirect expenditure items. The independent variables consist of aspects of efforts to eradicate corruption and regional fiscal independence.

Table 1. Nomenclature.

Variables	Name	Measurements	Data availability	Data source
Dependent variable				
Budget leakage 40%	*BL*40	Local Governments Budget Leakage	32 provinces of 34 provinces in Indonesia: 2010 – 2019	DJPK, Ministry of Finance, RI
Independent variable				
Gratification	*Grat*	Cases of gratification	32 provinces of 34 provinces in Indonesia: 2010 - 2019	KPK RI
Public complaints	*PC*	Cases of public complaints	32 provinces of 34 provinces in Indonesia: 2010 - 2019	KPK RI
BPK's Opinion	*BO*	WTP (unqualified opinion) score 4; WDP (qualified opinion) score 3; OTP (adverse opinion) score 2; TMP (disclaimer opinion) score 1	32 provinces of 34 provinces in Indonesia: 2010 - 2019	BPK RI
Ratio of locally-generated revenue	*RLGR*	(Locally-generated revenue/total revenue) x 100%	32 provinces of 34 provinces in Indonesia: 2010 - 2019	DJPK, Ministry of Finance, RI
Ratio of transfer	*RT*	(Balancing fund/ regional revenue) x 100%	32 provinces of 34 provinces in Indonesia: 2010 - 2019	DJPK, Ministry of Finance, RI

Efforts to eradicate corruption place three variables, namely gratification, public complaints, and BPK's opinion. The gratification variable is taken from the effort of KPK in building an anti-corruption system, namely the gratification reporting system. According to Law No. 20 of 2001 concerning amendments to Law No. 31 of 1999 concerning the Eradication of Criminal Acts of Corruption. Elucidation of Article 12b paragraph (1) gratification is a gift in a broad sense, which includes the provision of money, rebates (discounts), commissions, interest-free loans, travel tickets, lodging facilities, tourist trips, free medical treatment, and other facilities.

The second variable taken from the corruption eradication effort built by the KPK is public complaints. The public complaint system can be carried out directly by people who feel that there is budget abuse in local government programs. The public can lodge a complaint at the KPK website such as www.kws.kpk.go.id. The KPK guarantees the anonymity of mechanism of public complaint.

The third variable in the effort to eradicate corruption is BPK's opinion. This study also uses the supervision variable from the central government related to the results of the evaluation of the financial balance sheets of local governments throughout Indonesia conducted by BPK. Financial reports prepared by ministries/agencies and local governments are financial accountability media presented per Government Accounting Standards (SAP). *Wajar tanpa Pengecualian* (WTP; Unqualified Opinion) is "*stating that the financial statements of the audited entity present fairly in all material respects, the financial position, results of operations and cash flows of a particular entity by applicable accounting principles common in Indonesia*". The next status is *Wajar Dengan Pengecualian* (WDP; Qualified) or an opinion with an exception: "*stating that the financial statements of the audited entity present fairly in all material respects, the financial position, results of operations and cash flows of the entity following generally accepted accounting principles in Indonesia, except for the impact of matters relating to the excluded*". The third status is *Tidak Wajar* (TW; Unfair) or unfair opinion: "*stating that the financial statements of the audited entity do not fairly present the financial position, results of operations, and cash flows of a particular entity per generally accepted accounting principles in Indonesia*". The last status is *Tidak Memberikan Pendapat* (TMP; Disclaimer of Opinion) or disclaimer" "*stating that the Auditor does not provide an opinion on the report if the scope of the audit conducted is not sufficient to provide an opinion*".

In the dimensions of regional financial independence, two variables are plotted as independent variables, namely the ratio of regional original income and the transfer ratio. The standard equations to obtain the regional independence ratio in equation (2) and equation (3).

$$RLGR = \frac{locally\ generated\ revenue_{it}}{total\ revenue_{it}} \times 100 \qquad (2)$$

$$RT = \frac{balancing\ fund_{it}}{total\ revenue_{it}} \times 100 \qquad (3)$$

where, *locally generated revenue*$_{it}$ is original income, consisting of regional taxes, regional levies, results of separated regional wealth management, and other legitimate income in i province and t year. *balancing fund*$_{it}$ year to year is transfer funds that it obtained from the central government consisting of tax revenue sharing/non-tax revenue sharing funds, general allocation funds, special allocation funds, other legitimate regional revenues, grants, adjustment funds, special autonomy, and others in i province t year. *total value*$_{it}$ year is the total revenue of the i province t year. The description of independent variables and dependent variables are then summarized in Table 1.

The methods used in this study are the dynamic panel GMM method and stochastic frontier analysis (SFA). The dynamic panel method is used because corrupt practises that cause budget leakage are dynamic. According to Baltagi (2005) and Gujarati (2004), the dynamic relationship in the model is characterised by adding the dependent variable lag as a regressor. Furthermore, the addition of lag in the dependent variable in the model causes estimates with fixed effects or random effects approaches to become biased and inconsistent estimators. To solve this problem, the panel data model can be estimated using the GMM approach. In addition to GMM testing, we also examined the analysis using the Fixed Effect Model and Pooled Least Square, and then compared them.

The second method is the SFA panel concept developed by (Battese and Coelli, 1995). In the SFA concept, the error term consists of two parts. One component captures the relative inefficiency of the stochastic frontier, while the other allows for random variation between policies and includes measurement error, statistical perturbation, and random error.

3.2. Unit root test and cointegration

The unit root test is carried out to see whether the data is stationary or not (Levin et al., 2002). The hypothesis in the unit root test is:

H_0 = Panel data is stationary

H_1 = Panel data is non-stationary

The decision to fail to reject H_0 is to look at the probability of Levin, Lin, and Chu ($\alpha \leq 5\%$). In addition, we also carry out cointegration tests. This test is used to see the existence of a long-term equilibrium relationship (Baltagi and Kao, 2001). The test is carried out using the Kao Residual Cointegration Test. Cointegration test can be determined by using the probability of the ADF value in the panel data. The hypothesis on the cointegration test is:

H_0 = There is no cointegration

H_1 = There is a cointegration

The decision to fail to reject H_1 is to look at the probability value of the ADF < 0.05 ($\alpha = 5\%$).

3.3. Dynamic panel data

Dynamic panel data regression is a regression method that adds a dependent variable *lag* to serve as an independent variable. Equation (4) and equation (5) are dynamic model in this study.

$$lnBL40_{WI\ i,t} = \delta_0 + \delta_1 lnBL_{WI\ i,t-1} + \delta_2 lnGrat_{WI\ it} + \delta_3 lnPC_{WI\ it}$$
$$+ \delta_4 lnBO_{WI\ it} + \delta_5 lnRLGR_{WI\ it} + \delta_6 lnRT_{WI\ it} + \mu_{WI\ i,t} \quad (4)$$

$$lnBL40_{EI\ i,t} = \beta_0 + \beta_1 lnBL_{EI\ i,t-1} + \beta_2 lnGrat_{EI\ it} + \beta_3 lnPC_{EI\ it}$$
$$+ \beta_4 lnBO_{EI\ it} + \beta_5 lnRLGR_{EI\ it} + \beta_6 lnRT_{EI\ it} + \mu_{EI\ i,t} \quad (5)$$

where i is the provinces in WI and EI, t is the year, δ and β are parameters, and μ is the error term. Arellano and Bond (1991) expressed GMM approach is used for two reasons. First, GMM is a common estimator that improves comparison and assessment. Second, GMM is a straightforward alternative to maximum likelihood. Therefore, two estimation procedures are used in the GMM framework to accommodate the inconsistency problem for estimating the dynamic panel model, namely: First Difference GMM (FD-GMM) and GMM System (Sys-GMM). FD-GMM is developed by Arellano and Bond (1991). The results of its development produce an unbiased, consistent, and efficient model. Meanwhile, Sys-GMM is the importance of utilizing initial conditions in generating efficient estimators from dynamic panel data models when T is small (Blundell and Bond, 1998). Also, they stated that system GMM combines first difference and level condition moments to estimate a system of equations.

The specification test is carried out to obtain a good estimation output value. According to Arellano and Bond (1991) the specification test was carried out with two events, namely Sargan test (validity) and Arellano-Bond test (consistency). The hypothesis of Sargan test as follows:

H_0: condition of overidentifying restriction on valid model estimation.
H_1: the condition of overidentifying restriction on the estimation model is not valid.

The decision failed to reject H_0 if p-value $> \alpha$, this means that the estimated model used is valid. Meanwhile, Arellano-Bond test was conducted to determine the correlation between one residual component and other residual components in Sys-GMM models. The proposed hypothesis is as follows:

H_0: there is no autocorrelation in the residual order i.
H_1: there is autocorrelation in residual order i.

The decision fails to reject H_0 if p-value$>\alpha$. This means that the consistency of the GMM Arellano Bond is shown by the statistically significant value in AR(2).

3.4. Stochastic frontier analysis (SFA)

The second method that is relied upon in this study is SFA. The efficiency function model is written in the following equation (6).

$$Y_{i,t} = f(X_{i,t}\beta) + V_{i,t} - U_{i,t} \quad (6)$$

where $Y_{i,t}$ is the budget leakage on APBD ($i = 1, 2, 3 \ldots, N$) in the tth period ($i = 1, 2, 3 \ldots, T$). $X_{i,t}$ is a vector whose values was input variables for budget leakage in province i during t. β is the estimated parameter. $V_{i,t}$ and $U_{i,t}$ are random variable. Yet, $V_{i,t}$ independent and identically as well as independent towards $U_{i,t}$. $U_{i,t}$ is non-negative. The effect of technical inefficiency in SFA is written in equation (7).

$$TE = \exp(-U_{it}) \quad (7)$$

where U_{it} is the variable indicated the model inefficiency. Originally, U_{it} wrote as $U_{i,t} = z_{i,t}\delta + w_{it}$ which z_{it} is a variable vector related with technical inefficiency in budget leakage over time. w_{it} refers to a random variable with normal distribution that has been shortened and a mean and variance of zero. These hypotheses are congruent with $U_{i,t}$

being a non-negative truncation of the distribution (Battese and Coelli, 1995).

The Cobb and Douglas (1928) function has been selected as the functional form of the boundary of production function in this work, among various different types (see equation (8)):

$$lnY_{it} = \alpha_0 + \sum_{i=1}^{M} \alpha_{i,t} lnX_{i,t} + (V_{i,t} - U_{i,t}) \quad (8)$$

where Y_{it} is an output. α_0 is an efficiency parameter and $X_{i,t}$ is the input. ln is the natural logarithm and α_1 ($i = 1, 2, \ldots M$) are the output elasticities with regard to each input and return to scale which are represented by $\sum_{i=1}^{M} \alpha_{i,t}$. Accordingly, author adopts the SFA model. This study introduced three variables of anti-corruption efforts: *Grat, PC* and *BO* as well as two variables of decentralisation: *RLGR* and *RT*.

The random effect of the above equation consists of external random ($V_{i,t}$) and internal random ($U_{i,t}$) which is specified as an inefficiency variable. The efficiency effect in this study is a decrease in budget leakage from the APBD, while the inefficiency effect means a larger budget leakage. The function of budget leakage or technical inefficiency is written in equation (9).

$$\mu_{it}\delta_0 + \delta_1(corr.\ eradication\ efforts)_{it} + \delta_2(reg.\ fiscal\ independence)_{it} + w_{it}$$
$$(9)$$

This study introduces originality in recognising the bias effect of anti-corruption efforts and fiscal independence in explaining the inefficiency between the optimal and observed frontiers. The SFA model in the case of government spending corruption has also been carried out by Sahnoun and Abdennadher (2020).

4. Result and discussion

This study depicts the spatial processing of each variable in 32 provinces in WI and EI in order to capture an overview of the differences between the two regions. The results of spatial processing in the form of maps of dependent variables can be seen in Fig. 2. The figure presents a description of the spatial data of the 40 percent budget leakage.

Fig. 2 presents that there are seven provinces in WI with an average leakage rate exceeding IDR2,267 hundred million (equivalent to US$156,334,827). In EI, only the province of Papua experienced the highest leakage rate. Thus, the average distribution of gratification data in the two regions described in Fig. 3 below. The average cases of gratification are concentrated in the provinces located on the island of Java. The highest cases occurred in Jawa Barat, followed by Jawa Tengah and Jawa Timur.

Comparatively speaking, EI has less cases than WI. The widespread dispersion of agglomeration in the area is regarded to be the primary cause of the numerous incidents of gratification that took place in different provinces. In most cases, gratification cases involve more businessmen and bureaucrats that have some interests, such as project tenders, permits, and other pragmatic interests. The gratification variable has never been tested in previous study, even though gratification is a crucial element of corruption that can trigger more dangerous follow-up actions.

The lack of gratification cases that occurred in EI may just be artificial. There is a possibility that gratification will not be reported to the KPK because the KPK offices are not located in all provinces in Indonesia. Therefore, corruptors will have more flexibility in places with less oversight. Gratification can be self-reported by individuals or caught red-handed. Fig. 4 provides the distribution of the number of public complaints suspected of corrupt practises in each province, both in WI and EI.

Most public complaints are in Jawa Barat, Jawa Timur, Jawa Tengah, Sumatera Utara, Sumatera Selatan, Riau, Kepulauan Bangka Belitung, Sumatera Selatan, and Kalimantan Timur. The high number of
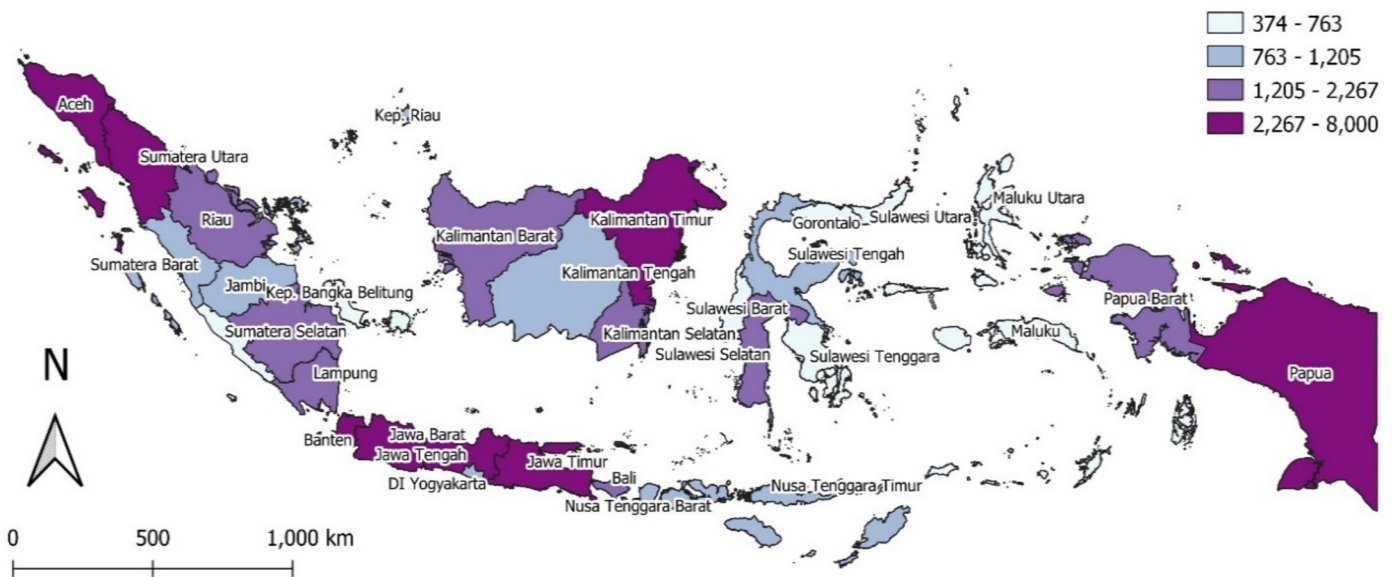
Fig. 2. The average of budget leakage of 2010-2019 (Hundreds of millions of rupiah).

Fig. 3. The average of gratification (2010-2019).

public complaints in Jawa Barat and Jawa Timur due to the large number of activists concerned with monitoring public funds and corrupt practices. In addition, the rampant growth of non-governmental organisations engaged in economic crimes is the cause of the large number of complaints in the two provinces at WI. In EI, not many institutions engage in monitoring public funds, so it is certain that corrupt practises in the regions will easily escape public scrutiny. Therefore, it will be difficult to avoid budget leakage at lower levels, especially when coupled with the incumbent's control over NGOs and the press. The control provided by the local government is also part of the corrupt practice. Commonly, NGOs are given promises and bribes in the form of project work. Likewise, the press, journalists, and directors were given tips so that they only cover the positive side of development without investigating matters related to financial crimes. According to Freille et al. (2007) there is strong relationship between political and economic on press toward corruption. Brunetti and Weder (2003) suggest that press should be system control of corruption in various countries.

The results of the average BPK opinion in the last 10 years in Fig. 5 describe that the two provinces that still have very low average scores are Maluku and Maluku Utara. Four provinces with "unqualified" status are 2 representatives from WI, i.e., Bengkulu and Jawa Barat, while representatives from EI are Nusa Tenggara Barat and Sulawesi Selatan. In addition, other provinces on average have "qualified" status.

The visualisation of the RLGR gap between WI and EI is perfectly clear in Fig. 6. Two provinces in EI that have a ratio of more than 100 per cent are Bali and Sulawesi Selatan while two provinces which occupy the highest level are Nusa Tenggara Timur and Sulawesi Utara. The other nine are in moderate condition. In contrast, none of them in WI are in moderate condition. The 19 provinces are categorised as high, especially those located on the island of Java where most of the concentration of Indonesia's growth centres. Most scholars think that the island of Java still plays a central role in the Indonesian economy, where industrial, trade, and government centres are located on this island. Accordingly, it is easy for these provinces to extract local revenue.
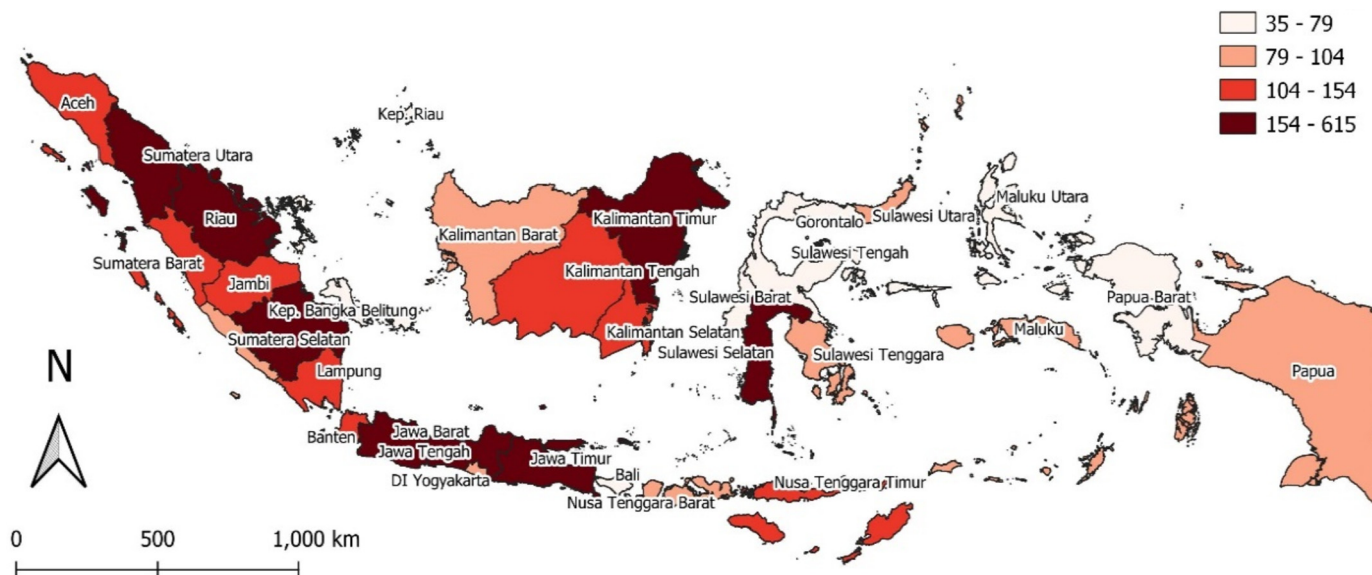
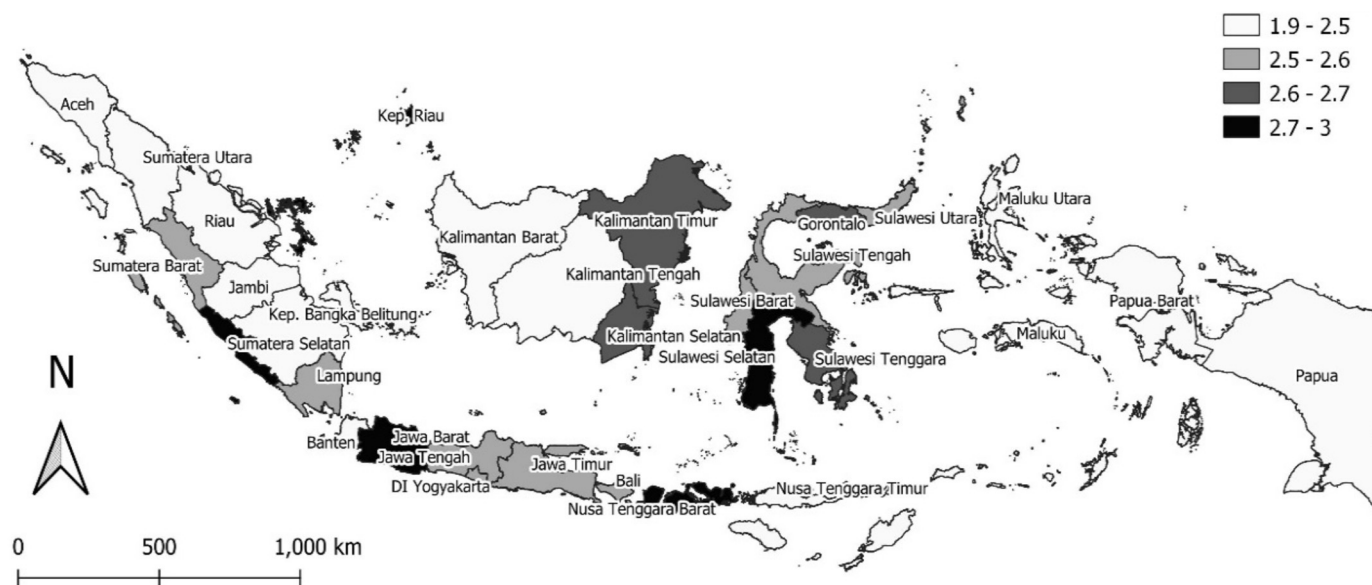**Fig. 4.** The average of public complaints (2010-2019).

Fig. 5. The average of BPK's Opinion (2010-2019).

In Fig. 7, the lowest average ratio is 5, and the highest is 66. The map of RT is more or less the same as the previous ratio, specifically RLGR, where WI is more dominant than EI. Only 1 province in WI is classified as the lowest i.e. Aceh, while others are in the same condition as the average of RLGR. The same thing happened in EI, where only Bali and Sulawesi Selatan were at a "high" level. In the two pictures above, it appears that our initial premise is that the inequality of fiscal independence between regions in WI and EI will hinder equitable development.

4.1. Descriptive analysis

The statistical descriptions of WI and EI are shown in Table 2 and Table 3. There are no multicollinearity problems in these results.

Table 2 and Table 3 depict the aspect of eradicating corruption, efforts to reported gratifications and public complaints are dominated by provinces in WI. Meanwhile, cases of EI tend to be fewer. This could be due to the much lower population and the small number of NGOs. In addition, from the aspect of decentralisation, there is a striking differ-

ence between WI and EI, especially in the average leakage rate. Budget leakage in EI tends to be greater than in WI. In reference to Fig. 2, the province with the highest leakage rate is Papua. In addition, big differences also occur in the aspect of decentralisation, namely from two components, RLGR and RT. Based on these figures, the provinces in WI are more independent than EI and at the same time are still rely on central government transfer funds.

4.2. Uni root test and cointegration

Levin, Lin, & Chu's test shows that in EI all variables are stationary. In addition, the transformation and first difference models are also stationary (see Appendix A). Therefore, further tests can be continued to see result of cointegration.

Cointegration test is used to test the existence of a long-term equilibrium relationship. The test is carried out using the Kao Residual Cointegration Test. The cointegration result shows that the ADF value is <0.05 (see Appendix A). The test results show that there is a long-term equilibrium relationship on the variables.

Fig. 6. The average of RLGR of 2010-2019 (percentage).

Fig. 7. The average of RT of 2010-2019 (percentage).

Table 2. Descriptive Statistics of WI.

Variable	Mean	Median	S.D.	Min	Max
BL40	2.51e + 012	1.53e + 012	2.15e + 012	5.84e + 011	8.00e + 012
GRAT	32.80	10.40	55.60	3.20	237.00
PC	204.00	133.00	167.00	41.10	615.00
BO	2.59	2.60	0.19	2.200	3.00
RLGR	132.00	98.90	87.10	49.60	308.00
RT	45.20	43.80	13.70	14.20	65.70

Table 3. Descriptive Statistics of EI.

Variable	Mean	Median	S.D.	Min	Max
BL40	1.16e + 012	7.72e + 011	9.14e + 011	3.74e + 011	3.62e + 012
GRAT	7.54	5.40	7.61	2.20	27.50
PC	78.80	80.90	44.70	34.60	203.00
BO	2.51	2.60	0.30	1.90	3.00
RLGR	58.40	40.10	58.20	11.00	211.00
RT	26.70	24.30	16.30	4.90	60.40

4.3. Result and discussion

Three conditions that need to be considered before analysing the dynamic panel data model are instrument validity, consistency, and unbiasedness. As can be seen in Appendix A, the result of all instruments on WI and EI are declared valid, consistent, and unbiased.

The estimation results of Model 1-SR and Model 2 in WI in Table 4 show that *lnGrat* and *lnPC* are significant, which means they reject H_0 with p value ≤ 1 per cent and p value ≤ 5 per cent. The other three variables, namely *lnBO*, *lnRLGR* and *lnRT*, did not significantly affect budget leakage at WI. However, the estimation results of Model 1-SR and Model 2 in EI are quite different from WI which shows that only *lnGrat* (Model 1-SR) is declared insignificant to budget leakage while the other four

Table 4. Estimation result of the models in WI and EI.

Variable	WI			EI		
	Model 1-SR	Model 1-LR	Model 2	Model 1-SR	Model 1-LR	Model 2
*lnBL*40 (*lag* 1)	0.288*			0.819***		
	(0.175)			(0.039)		
lnGrat	-0.051***	-0.072***	0.136***	-0.006	-0.035	-0.013***
	(0.007)	(0.018)	(0.029)	(0.011)	(0.067)	(0.003)
lnPC	0.166**	0.233***	0.559***	-0.062**	-0.344**	0.101***
	(0.084)	(0.085)	(0.060)	(0.026)	(0.169)	(0.019)
lnBO	0.006	0.009	0.709***	0.067*	0.372**	0.772***
	(0.084)	(0.119)	(0.174)	(0.041)	(0.188)	(0.133)
lnRIR	0.211	0.029	0.587***	0.302***	1.669**	1.310***
	(0.094)	(0.127)	(0.090)	(0.089)	(0.813)	(0.104)
lnRFD	0.437	0.615	-0.955***	-0.624***	-3.452**	-1.806***
	(0.320)	(0.506)	(3.08e-52)	(0.226)	(1.802)	(0.125)
constant	6.461***		454.619***	6.110***		27.344***
	(2.744)		(8.60e-52)	(0.992)		(0.421)
Sigma U			4.79e-62***			0.091
			(1.5e-131)			(9.426)
Sigma V			9.87e-52***			0.395***
			(8.5e-116)			(0.026)
Gamma			4.85e-11***			0.232
			(8.5e-116)			(9.428)

Legend: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.
Number in the parentheses is standard error; Model 1-SR is System GMM for short run estimation; Model 1-LR is System GMM for long run estimation; Model 2 is stochastic frontier model of Battese and Coelli.

variables are significant at *p* value ≤ 1 per cent and *p* value ≤ 5 per cent. These estimates are also considered as the results of short-term estimates of budget leakage in each region.

The result of the stochastic frontier in Model 2 indicates better estimation results than in Model 1. Model 2 in WI and EI depicts that all variables have a significant effect at the *p* value ≤ 1 per cent level on budget leakage. As a result, all H_0 are rejected in both WI and EI. However, each model has its advantages. For dynamic panels, the author can rely on them to estimate the long-term effect of budget leakage in WI and EI. In addition, the dynamic panel model can also calculate the convergence of the two regions. Meanwhile, the stochastic frontier is relied on to estimate the efficiency and inefficiency of budget leakage in WI and EI.

The estimation results of Model 3 show that in WI and EI, the efficiency estimator variables have a significant effect on budget leakage. In EI, budget leakage can be cut by 1.3 per cent for every 1 per cent increase in efforts to get rid of corruption through gratification reporting. WI, on the other hand, increased budget leakage by 13.6 per cent. Meanwhile, the estimated direction of *lnPC* and *lnBO* is inversely proportional to *lnGrat*, both of which have a positive direction in EI but have a positive direction for all eradication corruption variables in WI. This means that an increase of 1 per cent in efforts to eradicate corruption through public complaints and financial audits by the BPK increases budget leakage in the WI by 55.9 per cent and 70.9 per cent, respectively. Likewise, in EI, budget leakage will increase by 10.1 per cent and 77.2 per cent if there is an increase in public complaints and an increase in the status of BPK's opinion by 1 per cent. This also happens in the long term, when there will be an increase in budget leakage by 23.3 per cent in WI and 10.1 per cent in EI every year. However, efforts to restore public awareness must continue in the future to combat corruption that occurs in Indonesia (Isra et al., 2017).

What happened at WI was an anomaly. However, this is understandable because the number of public complaints that increase every year to the KPK is not proportional to the number of human resources at the KPK, especially investigators. Probably, the public cannot separate cases that need to be investigated by the KPK. Moreover, since the KPK Law was revised in 2019, the KPK can only investigate corruption cases that are suspected to have cost the state more than 1 billion rupiah. If

the alleged corruption is below 1 billion rupiah, the case will be transferred to the Police and the Prosecutor.

The fact shows that the status of the BPK does not guarantee a low level of budget leakage. KPK found the fact that the regional WTP status was being trafficked. Since 2005 until now, there have been 29 members of the BPK who have been caught in the case of trading the status of BPK's Opinion. For instance, in Bekasi City 2017, a BPK auditor was arrested on suspicion of smoothing the status of a WTP. In Sulawesi Utara Province in 2012, the same thing happened. We also highlight the transaction sampling process during BPK audits. For example, BPK examines regional government assets whose transactions total IDR500,000,000 (US\$34,482), so the next process will focus on transactions with that nominal value. In addition, the complexity and magnitude of transactions in each local government are obstacles in the audit process, so audits usually take more than the current year. Eradication efforts through institutional strengthening also answer the seventh question of the Svensson (2005) paper that relatively few efforts to eradicate corruption have succeeded.

Table 4 also provides the results of the estimation of the long-term effect on budget leakage in both WI and EI. It appears that the efforts to eradicate corruption carried out by the KPK have had a significant effect on budget leakage in the WI, except for *lnBO*. Meanwhile, in EI, all variables have a significant effect on 5 per cent and are rejected H_0, except for the *lnGrat* variable. According to Ko and Zhi (2013) strong law enforcement was capable of preventing corrupt practices during the decentralisation era. In the long run, 1 per cent increase in gratification can reduce budget leakage by 7.2 per cent in WI and 1.3 per cent in EI. Gratification reporting by recipients is carried out through the reporting system built by the KPK. According to Castro and Lopes (2022) to curb corruption, electronic services are one of the efforts that need to be taken.

The inefficiency variables obtained from the decentralisation dimension, namely *lnRLGR* and *lnRT*. The result shows that in WI and EI, 1 per cent increase in local revenue, will reduce budget leakage by 58.7 per cent and 131 per cent, respectively. This result confirms argument made by Goel and Nelson (2011), Prud'homme (1995), and Shon and Cho (2020) that decentralisation system tends to encourage corrupt practices. The more independent a region becomes, the greater

the potential for stakeholders to take advantage of power to take actions that are detrimental to regional finances. Meanwhile, if there is an increase of 1 per cent in *lnRT*, it will reduce budget leakage by 95.5 per cent in WI and 180.6 per cent in EI. This is different from Alfada (2019a) that found disproportionate reliance on central government grant funds exacerbates corruption across the country's various regions.

Gamma (γ) is the ratio of the variance parameters of random error and technical efficiency effects, sigma V and sigma U, which scale between 0 and 1. The results show that in WI and EI, the estimation of gamma value is higher than zero. However, the gamma value in WI is lower than in EI. These results imply a random component of the technical inefficiency effect and provide a better estimate of budget leakage efficiency. In fact, the effect of technical inefficiency is significant in WI, but not in EI.

The long-term effect of the decentralisation dimension seems to only have a significant effect in EI. 1 per cent increase in *lnRLGR* could result in 166.9 per cent more budget leakage. Meanwhile, when there is an increase in *lnRT* by 1 per cent, it will reduce budget leakage by 345.2 per cent in the long term. It seems that the large central government subsidy is able to reduce the long-term leakage rate. This could be because of the transfer mechanism, whereby the purpose of providing central government assistance such as general allocation funds and special allocation funds is to be subsidies given to regions with clear objectives. Accordingly, these things can curb corruption in the regions. This fact is also compatible with a study conducted in 150 countries with a fiscal decentralisation rate of 15 per cent to 21 per cent, corruption cases could be reduced (Alfano et al., 2019).

One of the advantages of panel dynamics estimation is that it incorporates the dependent variable lag into the model, allowing us to observe dynamic adjustments. The dynamics of adjustment refers to the decline in convergence process or the level of budget leakage in each province. WI convergence is 124.45 per cent which is the elasticity of the budget leakage gap in WI will be reduced by 124.45 per cent per year and it does not take long to bridge the gap between regions in WI. In contrast to EI, where the average convergence at each level is 19.95 per cent, the elasticity of budget leakage will decrease by 19.95 per cent annually. Extra efforts are needed in EI to close regional disparities and prevent budget leakage. Ultimately, the closeness between government and people enabled by decentralisation provides administrators and citizens with a better opportunity to change the values of public services while reforming government structures (Joaquin, 2004). On the other hand, Shah (2008) states if corruption is about governance and governance is about the exercise of state power, the fight against corruption requires strong leadership and local ownership if it is to be successful and sustainable.

5. Conclusion

The official government statement through the KPK regarding budget leakage reaching 40 per cent at the local government level is concerning. To estimate the leakage, the author examines two aspects based on previous empirical and theoretical findings, namely anti-corruption efforts and regional fiscal independence. This study uses the System GMM dynamic panel method and SFA. The result finds that effort to eradicate corruption, such as reporting gratification can reduce budget leakage in WI and EI. The result also discovers that the public complaint has the effect of reducing budget leakage in EI, while it continues to grow in WI. Increase the status of the Audit Board (BPK's opinion) can increase budget leakage in WI and EI. It is probably that the large number of complaints at the WI causes the investigation of corruption crimes to be slowly. Lastly, to increase the status of BPK's opinion, can increases budget leakage both in WI and EI.

The low quality of local governance in both WI and EI further exacerbates the decentralisation system. The oligarchy power attached to the backs of regional heads is often a burden on the public budget. It

is common knowledge that regional development projects are shared with the Success Team. In short, development is a fertile field for oligarchs which according to Umam (2021) requires empirical evidence to guarantee a more transparent business-politics environment. Moreover, the limited reach of KPK has become an obstacle to the efforts to eradicate corruption in the regions. The central government should be concerned with placing the KPK throughout WI and EI rather than just in the centre of the capital due to the size of these two regions. Efforts to eradicate corruption should also be the attention of other institutions such as the Attorney and the Police, even though the public's trust in both institutions continues to decline. It seems that the focus of public is only on the KPK. Accordingly, greater strength and authority, including in terms of wiretapping, should be given in its entirety.

BPK's opinion is one of the benchmarks for good governance. Unfortunately, financial irregularities continue to exist even though financial performance in various provinces has reached WTP. This may be due to two factors. First, is the limitation of audit sampling. The sampling nature of the audit creates a loophole for budget corruption. Second is complexity. In this case, the auditors are faced with a very large number of transactions in the government as well as a limited time and the increasingly sophisticated fictitious reporting made by individuals in the regions, so that the practise of irregularities is increasingly undetected. Moreover, the practise of bribery among BPK auditors is often an obstacle to the efforts to eradicate corruption in the regions.

The ability of the regions to explore the locally generated revenue is still low, which is shown by the RLGR and RT indicators. Amid the euphoria of the delegation of authority from the central government to local governments, instead of growing independently, corruption is increasingly rampant in the era of decentralisation both at WI and EI. In this study, RLGR and RT as decentralisation proxies are defined as triggers for corruption in terms of budget leakage. The budget leakage is bigger in EI than WI, despite the fact that the increase in the leakage ratio the year before caused the leakage in the years that followed.

Policy implication:

The results of the study have several policy implications, especially those of an institutional nature.

- The gratification reporting system built by the KPK has been running well and should be maintained so that it is still obeyed by all parties. However, this system is still passive, meaning that the KPK only waits for the gratification report within 30 days when the recipient receives the gratification from the prospective briber. In this case, this system is relatively weak in efforts to eradicate corruption because the practise of gratification will only exist when reported to the KPK.
- The public complaint system built by the KPK is a breakthrough in curbing corruption. However, empirically it has not run optimally considering the centralised system and the role of the KPK is only as an ad-hoc institution. Preferably, this institution can be properly maximised by establishing inter-provincial networks and not being centralised in the central government. Efforts to eradicate corruption will be much more effective because of the massive corruption activity in the regions since the decentralisation era.
- Regional financial audits by BPK do not seem to provide a guarantee for the implementation of good and clean governance. The results show that there is a contradiction in the status of BPK's opinion on the level of leakage. Therefore, the BPK audit system needs to be studied further. Another crucial thing is to apply a deterrent effect for auditors caught in the case of trading in the status of BPK's opinion. The system revolution and auditor mentality must be carried out immediately before this institution loses public trust. BPK, as the only government audit agency, is now truly in the public spotlight.

- The independence of a region is measured by its ability to generate local revenue. However, the fact is that the more independent a region is, the greater the chance for budget leakage. Therefore, the best policy that can be implemented is to strengthen budget oversight involving all stakeholders. Transparency efforts must continue to be encouraged for the realisation of a clean government. Collaborative governance is urgently needed today.
- On the other hand, the less independent a region is, the more budget leakage is reduced in the region. This is understandable because the budget disbursed by the central government to the regions has clear and detailed objectives. In addition, previously available pure regional budget funds may be used to cover deficiencies in regional development projects. In fact, the independence of a region is not expected, but the facts show that it is better if it is independent. This brings us into the debate over the theory of sand or grease. The policy that can be taken is to maintain the subsidy scheme while at the same time assisting the governance of local governments that are highly dependent on this mechanism, especially in the eastern region of Indonesia, which has difficulty achieving financial independence.

Declarations

Author contribution statement

Ade Paranata: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

Data availability statement

The data that has been used is confidential.

Declaration of interests statement

The author declares no conflict of interest.

Additional information

No additional information is available for this paper.

Acknowledgements

Appendix A

Unit root test

Unit root test at level

Variable	EI		WI	
	Levin, Lin, & Chu		Levin, Lin, & Chu	
	$p-value$	description	$p-value$	description
BL40	0.000	Stationary	0.000	Stationary
Grat	0.000	Stationary	0.000	Stationary
PC	0.000	Stationary	0.000	Stationary
BO	0.000	Stationary	0.000	Stationary
RLGR	0.000	Stationary	0.000	Stationary
RT	0.000	Stationary	0.000	Stationary

Unit root test at level (transform)

Variable	EI		WI	
	Levin, Lin, & Chu		Levin, Lin, & Chu	
	$p-value$	description	$p-value$	description
BL40	0.000	Stationary	0.000	Stationary
Grat	0.000	Stationary	0.050	Stationary
PC	0.000	Stationary	0.000	Stationary
BO	0.000	Stationary	0.000	Stationary
RLGR	0.000	Stationary	0.000	Stationary
RT	0.000	Stationary	0.000	Stationary

Unit root test at first difference

Variables	EI		WI	
	Levin, Lin, & Chu		Levin, Lin, & Chu	
	$p-value$	description	$p-value$	description
BL40	0.000	Stationary	0.000	Stationary
Grat	0.000	Stationary	0.000	Stationary
PC	0.000	Stationary	0.000	Stationary
BO	0.000	Stationary	0.000	Stationary
RLGR	0.000	Stationary	0.000	Stationary
RT	0.000	Stationary	0.000	Stationary

Cointegration test

	EI		WI	
	t-value	Probability	t-value	Probability
Cointegration test at level				
ADF	-7.125	0.000	-3.589	0.000
Cointegration test at first difference				
ADF	-6.555	0.000	-9.854	0.000

Panel dynamics GMM test

Sargan test

Budget leakage	WI				EI			
	FD-GMM	p_{value}	Sys-GMM	p_{value}	FD-GMM	p_{value}	Sys-GMM	p_{value}
40%	30.661	(0.432)	38.925	(0.383)	36.396	(0.404)	51.004	(0.188)
Obs.	113		132		103		116	
Provinces	19		19		13		13	

Arellano-Bond test of WI

Budget leakage	Sys-GMM			
	m_1	p_{value}	m_2	p_{value}
40%	-2.2201	(0.0264)	1.6244	(0.1043)

Arellano-Bond test of EI

Budget leakage	Sys-GMM			
	m_1	p_{value}	m_2	p_{value}
40%	-2.4587	(0.0139)	-0.1174	(0.9065)

Unbiased Test

Budget leakage	WI			EI		
	Sys-GMM	FEM	PLS	Sys-GMM	FEM	PLS
40%						
Lag-1	0.28803345	0.22075513	0.51826920	0.81905651	0.73329037	0.85464966
N	132	132	132	116	116	116

Fixed Effect Model (*FEM*), *Pooled Least Square* (*PLS*).

References

Abraham, J., Kurniadi, M.A., Andangsari, E.W., Ali, M.M., Manurung, R.H., Warnars, H.L.H.S., 2020. Prediction of guilt and shame proneness based on disruption to psychological contract: a new light for corruption prevention. Heliyon 6 (June), e04275.

Ahlin, C.R., 2001. Corruption: Political Determinants and Macroeconomic Effects. Working Paper. Vanderbilt University.

Alfada, A., 2019a. Does fiscal decentralization encourage corruption in local governments? Evidence from Indonesia. J. Risk Financ. Manag. 65 (2), 111–131.

Alfada, A., 2019b. The destructive effect of corruption on economic growth in Indonesia: a threshold model. Heliyon 5 (October), e02649.

Alfano, M.R., Baraldi, A.L., Cantabene, C., 2019. The effect of fiscal decentralization on corruption: a non-linear hypothesis. Ger. Econ. Rev. 20 (1), 105–128.

Arellano, Manuel, Bond, Stephen, 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Rev. Econ. Stud. 58 (2), 277–297.

Arifin, Z., Handayani, E.P., Virdaus, S., 2018. Combating corruption in the procurement by the press. IOP Conf. Ser. Earth Environ. Sci., 1–5.

Arikan, G.G., 2004. Fiscal decentralization: a remedy for corruption? Int. Tax Public Finance 11, 175–195.

Ayodeji, I.O., 2020. Panel logit regression analysis of the effects of corruption on inflation pattern in the Economic Community of West African states. Heliyon 6 (December), e05637.

Baltaci, M., Yilmaz, S., 2006. Keeping an eye on subnational governments: Internal control and audit at local levels. The International Bank for Reconstruction and Development/The World Bank, 35864. 1–29.

Baltagi, B.H., 2005. Econometric Analysis of Panel Data, third edition. John Wiley & Sons.

Baltagi, B.H., Kao, C., 2001. Nonstationary panels, cointegration in panels and dynamic panels: a survey. In: Baltagi, B.H., Fomby, T.B., Hill, R. Carter (Eds.), Nonstationary Panels, Panel Cointegration, and Dynamic Panels, vol. 15. Emerald Group Publishing Limited, pp. 7–51.

Bardhan, P., Mookherjee, D., 2000. Capture and governance at local and national levels. Am. Econ. Rev. 90 (2), 136–139.

Battese, G.E., Coelli, T.J., 1995. A model for technical inefficiency effects in a stochastic frontier production function for panel data. Empir. Econ. 20 (2), 325–332.

Beeri, I., Navot, D., 2013. Local political corruption: potential structural malfunctions at the central–local, local–local and intra-local levels. Public Manag. Rev. 15 (5), 712–739.

Besley, T., Coate, S., 2003. Centralized versus decentralized provision of local public goods: a political economy approach. J. Public Econ. 87 (26), 11–37.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. J. Econom. 87 (1), 115–143.

Brennan, G., Buchanan, J.M., 1980. The Power to Tax: Analytical Foundations of a Fiscal Constitution. Cambridge University Press, Cambridge.

Brunetti, A., Weder, B., 2003. A free press is bad news for corruption. J. Public Econ. 87 (7–8), 1801–1824.

Cai, H., Treisman, D., 2004. State corroding federalism. J. Public Econ. 88 (3), 819–843.

Cai, H., Treisman, D., 2005. Does competition for capital discipline governments? Decentralization, globalization, and public policy. Am. Econ. Rev. 95 (8), 17–30.

Castro, C., Lopes, I.C., 2022. E-government as a tool in controlling corruption. Int. J. Public Adm., 1–14.

Chalil, T.M., 2020. Rethinking corruption on fiscal decentralization and global competitiveness Nexus. Compet. Rev. 30 (5), 507–527.

Changwony, F.K., Paterson, A.S., 2019. Accounting practice, fiscal decentralization and corruption. Br. Account. Rev. 51, 1–21.

Cobb, C., Douglas, P., 1928. A theory of production. Am. Econ. Rev. 18 (1), 139–165.

Coe, C.K., 2008. Preventing local government fiscal crises: emerging best practices: zasoby elektroniczne Biblioteki Głównej. Public Adm. Rev. 68 (4), 759–767.

Corrado, G., Rossetti, F., 2018. Public corruption: a study across regions in Italy. J. Policy Model. 40 (6), 11261139.

De La O, A.L., García, F.M., 2014. Do federal and state audits increase compliance with a grant program to improve municipal infrastructure (AUDIT study): study protocol for a randomized controlled trial. BMC Public Health 14 (912), 1–11.

Digdowiseiso, K., Sugiyanto, E., Setiawan, H.D., 2020. Fiscal decentralisation and inequality in Indonesia. Econ. Reg. 16 (3), 989–1002.

Dong, B., Torgler, B., 2013. Causes of corruption: evidence from China. China Econ. Rev. 26, 152–169.

Edwards, J., Keen, M., 1996. Tax competition and Leviathan. Eur. Econ. Rev. 40 (1), 13–34.

Fiorino, N., Galli, E., Padovano, F., 2015. How long does it take for government decentralization to affect corruption? Econ. Gov. 16, 273–305.

Firman, T., 2009. Decentralization reform and local-government proliferation in Indonesia: towards a fragmentation of regional development. Rev. Urban Reg. Dev. Stud. 21 (2–3), 143–157.

Fisman, R., Gatti, R., 2002. Decentralization and corruption: evidence across countries. J. Public Econ. 83 (3), 325–345.

Freille, S., Haque, M.E., Kneller, R., 2007. A contribution to the empirics of press freedom and corruption. Eur. J. Polit. Econ. 23 (4), 838–862.

Funk, K.D., Owen, E., 2020. Consequences of an anti-corruption experiment for local government performance in Brazil. J. Policy Anal. Manage. 39 (2), 444–468.

Ganda, F., 2020. The influence of corruption on environmental sustainability in the developing economies of Southern Africa. Heliyon 6 (July), e04387.

Goel, R.K., Nelson, M.A., 2011. Measures of corruption and determinants of US corruption. Econ. Gov. 12, 155–176.

Gujarati, D.N., 2004. Gujarati: Basic Econometrics, fourth edition. New York.

Hadiz, V.R., 2004. Decentralization and democracy in Indonesia: a critique of neo-institutionalist perspectives. Dev. Change 35 (4), 697–718.

Huynh, C.M., Tran, H.N., 2020. Moderating effects of corruption and informality on the fiscal decentralization—economic growth nexus: insights from OECD countries. Ann. Public Coop. Econ. 92 (2), 355–373.

Isra, S., Yuliandri, Amsari, F., Tegnan, H., 2017. Obstruction of justice in the effort to eradicate corruption in Indonesia. Int. J. Law Crime Justice 51, 72–83.

Ivanyna, M., Shah, A., 2011. Decentralization and corruption: new cross-country evidence. Environ. Plann., C. Gov. Policy 29 (2), 334–362.

Joaquin, E.T., 2004. Decentralization and corruption: the bumpy road to public sector integrity in developing countries. Public Integr. 6 (3), 207–219.

Kalinowski, T., 2016. Trends and mechanisms of corruption in South Korea. Pac. Rev. 29 (4), 625–645.

Ko, K., Zhi, H., 2013. Fiscal decentralization: guilty of aggravating corruption in China? J. Contemp. China 22 (79), 35–55.

Kuncoro, A., 2004. Bribery in Indonesia: some evidence from micro-level data. Bull. Indones. Econ. Stud. 40 (3), 329–354.

Levin, A., Lin, C.-F., James Chu, C.-S., 2002. Unit root tests in panel data: asymptotic and finite-sample properties. J. Econom. 108 (1), 1–24.

Lewis, B.D., 2017. Local government spending and service delivery in Indonesia: the perverse effects of substantial fiscal resources. Reg. Stud. 51 (11), 1695–1707.

Liu, J., Lin, B., 2012. Government auditing and corruption control: evidence from China's provincial panel data. China J. Account. Res.

Lockwood, B., 2002. Distributive politics and the costs of centralization. Rev. Econ. Stud. 69 (3), 13–37.

Martinez-Vazquez, J., Lago-Peñas, S., Sacchi, A., 2017. The impact of fiscal decentralization: a survey. J. Econ. Surv. 31 (4), 1095–1129.

Masters, A.B., Graycar, A., 2016. Making corruption disappear in local government. Public Integr. 18 (1), 42–58.

Meza, O., Pérez-Chiqués, E., 2021. Corruption consolidation in local governments: a grounded analytical framework. Public Adm. 99 (3), 530–546.

Mookherjee, D., 2015. Political decentralization. Annu. Rev. Econ., 231–249.

Muçollari, O., 2018. Anti-corruption strategies versus public services and good governance in Albania. Jindal Global Law Rev. 9 (1), 93–107.

Myerson, R., 2014. Constitutional structures for a strong democracy: considerations on the government of Pakistan. World Dev. 53, 46–64.

Oates, W.E., 1972. Fiscal Federalism. Harcourt, New York.

Ojeka, S., Adegboye, A., Adegboye, K., Umukoro, O., Dahunsi, O., Ozordi, E., 2019. Corruption perception, institutional quality and performance of listed companies in Nigeria. Heliyon 5 (October), e02569.

Olken, B.A., 2007. Monitoring corruption: evidence from a field experiment in Indonesia. J. Polit. Econ. 115 (2), 200–249.

Oto-Peralías, D., Romero-Ávila, D., Usabiaga, C., 2013. Does fiscal decentralization mitigate the adverse effects of corruption on public deficits? Eur. J. Polit. Econ. 32, 205–231.

Pálné Kovács, I., 2020. Changing patterns and general dilemmas in Hungarian territorial governance. In: Local Governance in the New Urban Agenda, pp. 47–64.

Pamungkas, B., Ibtida, R., Avrian, C., 2018. Factors influencing audit opinion of the Indonesian municipal governments' financial statements. Cogent Bus. Manag. 5 (1), 1540256.

Pfaff, A., Sanchirico, C.W., 2004. Big field, small potatoes: an empirical assessment of EPA's self-audit policy. J. Policy Anal. Manage. 23 (3), 415–432.

Popov, S.V., 2015. Decentralized bribery and market participation. Scand. J. Econ. 117 (1), 108–125.

Prateeppornnarong, D., 2021. Fighting corruption while having hands tied: a case study of Thailand's public sector anti-corruption commission. J. Asian Afr. Stud. 56 (2), 1–15.

Prud'homme, R., 1995. The dangers of decentralization. World Bank Res. Obs. 10 (2), 201–220.

Pulido, N.R., Poveda, A.C., Carvajal, J.E.M., 2020. Corruption and institutions: an analysis for the Colombian case. Heliyon 6 (September), e04874.

Purcell, A.J., 2015. Australian local government corruption and misconduct. J. Financ. Crime 23 (1), 102–118.

Rodríguez-Pose, A., Zhang, M., 2019. Government institutions and the dynamics of urban growth in China. J. Reg. Sci. 59 (4), 633–668.

Rosselló Villalonga, J., 2018. Fiscal centralization: a remedy for corruption? SERIEs 9, 457–474.

Rumayya, Rammohan, A., Purwono, R., Harymawan, I., 2020. The local economy and re-election of incumbent district leaders in Indonesia. Heliyon 6 (May), e04098.

Sahnoun, M., Abdennadher, C., 2020. Education and corruption: a stochastic frontier analysis: evidence from developed and developing countries. J. Knowl. Econ. 11, 968–981.

Santiso, C., 2006. Banking on accountability? Strengthening budget oversight and public sector auditing in emerging economies. Public Budg. Finance.

Setiyono, B., 2015. Does governance reform in a democratic transition country reduce the risk of corruption? Evidence from Indonesia. In: Corruption, Good Governance and Economic Development: Contemporary Analysis and Case Studies, pp. 217–255.

Shah, A., 2008. Why fighting corruption remains a losing battle. In: Governance, Risk, and Compliance Handbook, pp. 133–152.

Shon, J., Cho, Y.K., 2020. Fiscal decentralization and government corruption: evidence from U.S. states. Public Integr. 22 (2), 187–204.

Siburian, M.E., 2020. Fiscal decentralization and regional income inequality: evidence from Indonesia. Appl. Econ. Lett. 27 (17), 1383–1386.

Slijepčević, S., Rajh, E., Budak, J., 2020. Determinants of corruption pressures on local government in the E.U. Econ. Res.-Ekon. Istraz. 33 (1), 3492–3508.

del Sol, D.A., 2013. The institutional, economic and social determinants of local government transparency. J. Econ. Policy Reform 16 (1), 90–107.

Sonin, K., 2010. Provincial protectionism. J. Comp. Econ. 38 (2), 111–122.

Svensson, J., 2005. Eight questions about corruption. J. Econ. Perspect. 19 (3), 19–42. http://www.jstor.org/stable/4134971.

Talitha, T., Firman, T., Hudalah, D., 2020. Welcoming two decades of decentralization in Indonesia: a regional development perspective. Territ. Politic. Gov. 8 (5), 690–708.

Tiebout, C.M., 1956. A pure theory of local expenditures. J. Polit. Econ. 64 (4), 16–24.

Treisman, D., 2007. The Architecture of Government. Cambridge University Press.

Umam, A.K., 2021. Understanding the influence of vested interests on politics of anti-corruption in Indonesia. Asian J. Political Sci. 29 (3), 255–273.

Umam, A.K., Whitehouse, G., Head, B., Adil Khan, M., 2020. Addressing corruption in post-Soeharto Indonesia: the role of the corruption eradication commission. J. Contemp. Asia 50 (1), 125–143.

Walker, R.M., Boyne, G.A., 2006. Public management reform and organizational performance: an empirical assessment of the U.K. Labour government's public service improvement strategy. J. Policy Anal. Manage. 25 (2), 371–393.

Yilmaz, S., Beris, Y., Serrano-Berthet, R., 2010. Linking local government discretion and accountability in decentralisation. Dev. Policy Rev. 28 (3), 259–293.