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Does Fiscal Decentralization Encourage Corruption in Local Governments? Evidence from Indonesia

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Abstract: This study examines the effects of fiscal decentralization on corruption by analyzing whether the degree of fiscal decentralization facilitates or mitigates the number of corruption cases in Indonesia's local governments. The research utilizes a panel data model and a system Generalized Method of Moments (GMM) estimator to assess the degree of fiscal decentralization on corruption in 19 provinces for the period between 2004 and 2014. The estimation results reveal that the degree of fiscal decentralization, both expenditure and tax revenue sides, drives a growing number of corruption cases in local governments. A lack of human capital capacity, low transparency and accountability, and a higher dependency on intergovernmental grants from the central government may worsen the adverse effects of corruption. Our results suggest that a more heterogeneous population and higher political stability mitigate the adverse effects of corruption. Furthermore, this is the first corruption study in Indonesia to create corruption measures from the number of corruption cases investigated by the Indonesia Corruption Eradication Commission as well as extensive, provincial-level government financial data. As a result of using these different datasets, this research advances existing empirical studies and makes policy recommendations for the local governments in Indonesia.

Keywords: corruption; fiscal decentralization; Indonesia

1. Introduction

Corruption has been severe in Indonesia since the era of former President Suharto during the period 1967–1998 (Vial and Hanoteau 2010). In fact, Indonesia consistently scores low in the Corruption Perceptions Index (CPI), Transparency International's annual ranking of a country's level of corruption from zero (meaning very corrupt) to 100 (meaning corruption free). In the CPIs published between 1995 and 2003, Indonesia scored below 25, and the rankings have not improved significantly since 2003, with Indonesia scoring between 25 and 37, which is below the world average corruption index (Banuri and Eckel 2015). These numbers indicate that Indonesia has a serious corruption problem. Even though the government established the anticorruption organization Komisi Pemberantasan Korupsi (KPK) in 2003, the corruption problem in Indonesia is improving more slowly than expected.

Interestingly, the suspects of corruption cases tend to be regional government leaders such as governors, mayors, regents, and local parliament members. The increasing number of corruption cases in regional governments has generated a national discourse concerning why corruption continues to grow at a subnational level. To address this issue, this study relates the increasing number of corruption cases to the transition of Indonesia's financial system from fully centralized to decentralized in 2001. Decentralization was the country's first successful attempt at addressing the problem of Korupsi, Kolusi, and Nepotisme (KKN), meaning corruption, collusion, and nepotism. Concerns about the efficient delivery of public services across provinces and demands to give citizens more power in governmental and political affairs motivated structural change. Another motivation for the transition was to maintain national unity when the country was at risk of separatism or an ethnic conflict (Bahl

and Wallace 2005; Shah et al. 2004). Therefore, the effects of fiscal decentralization on corruption at a subnational level in Indonesia is worth consideration.

The implementation of fiscal decentralization is expected to mitigate corruption because of an increase in local accountability and authority; however, several unsettled challenges to decentralization have emerged that cannot be solved easily. Lack of local apparatus capacity and lack of local government leader motivation are two main problems that hamper decentralization goals. In decentralization, government apparatuses are transferred to local governments. Intergovernmental grants from the central government, which are supposed to be spent on productive sectors such as education, health, infrastructure, and public goods, are instead used to pay salaries. The allocation of intergovernmental grants to salary expenditures typically reaches more than 50% of the total revenue from intergovernmental grants. The misconception of the purpose of intergovernmental grants at the local level is that they are thought to breed corruption in most local governments. Another problem that hinders the goals of decentralization is the lack of monitoring and auditing of institutions at the regional level. These limitations create an opportunity for government officials to exploit the government's budget for private gains.

The adverse effects of corruption on local government administrators may threaten the decentralization process. Corruption breeds in all tiers of government, from the provinces to the municipalities, but the media often publishes about corrupt regional leaders caught red-handed due to the operations of KPK. Indonesia established KPK in 2003, a fact which indicates how serious the corruption problem had become. However, KPK's performance as an independent institution created to eradicate corruption in Indonesia is suboptimal, and one of the reasons is the lack of personnel to cover all corruption cases across the provinces.

Unlike other studies about corruption in Indonesia, which have focused on particular corruption cases in infrastructure projects (Olken 2007, 2009) or employed survey corruption analyses (Kuncoro 2002), this study utilizes different datasets from the provincial level that are rarely used in existing empirical studies. The data uses the number of corruption cases investigated by KPK and measures fiscal decentralization by using the provincial budget realization dataset obtained from the Indonesia Ministry of Finance. We take advantage of the corruption data available from KPK and the financial realization data from the provincial level in order to examine the extent of corruption across provinces and to contribute to the existing work in corruption studies.

In addition, the availability of extensive datasets allows this study to answer two research questions: (1) whether the degree of fiscal decentralization facilitates an increasing number of corruption cases and (2) whether financial independence from tax revenue can encourage regional governments to be more responsible and accountable, mitigating corruption. Furthermore, this study performs an empirical analysis using 19 provinces for the period between 2004 and 2014 using a panel data analysis and system Generalized Method of Moments (GMM) estimator. From the estimation results, this study concludes two points: (1) the degree of fiscal decentralization measured by total expenditure is revealed to promote the number of corruption cases, and (2) an increase in the degree of tax revenue decentralization appears to facilitate an increase of corruption cases in local governments.

The paper is organized into the four following sections: Section 2 describes the literature review, providing a range of existing research in a similar area; Section 3 explains the data and methodology utilized in the estimation; Section 4 elaborates the empirical results and discussion; and finally, Section 5 offers some recommendations and remarks for future research.

2. Literature Review

Issues of decentralization have gained interest among many researchers; however, there is still debate about the effects of fiscal decentralization on corruption. Tiebout (1956) conducted the first study that expressed a fundamental rationale of devolving powers of revenue collection and expenditure from central to local authorities. Prud'homme (1995) and Tanzi (1996) revealed that a decentralized government system is highly motivated to bring officials into close contact with citizens in the regions, promote better services, and empower local governments with a higher degree of discretion; on the

other hand, a decentralized government system also leads to the weakening of monitoring, controls, and audits by central agencies, thereby creating opportunities for corruption. Using data from the United States (USA), [Fisman and Gatti \(2002b\)](#) found a positive relationship between corruption and a state's spending derived from federal transfers. Conversely, [Huther and Shah \(1998\)](#) found that fiscal decentralization in government expenditure is negatively associated with corruption. Finally, [Treisman \(2000\)](#) provided evidence which showed that, by creating many levels of government, decentralization is likely to reduce accountability and further encourage corruption.

Despite debates about the effects of fiscal decentralization on corruption, many prominent studies argue that decentralization is one solution to improve government structure and to limit corruption from growing. [Weingast \(1995\)](#) and [Arikan \(2004\)](#) revealed that decentralization offers the potential for enhanced accountability, reduced corruption, and increased competition among local governments. [Wildasin \(1995\)](#) and [Carbonara \(1999\)](#) argued that the decentralized government is more likely to lower expected gains from corruption but has a higher probability of detection and punishment at the local level. [Ahlin \(2001\)](#) found that greater transparency in local government creates a limit for corruption and increases monitoring levels by the central government. [Crook and Manor \(2000\)](#) assessed the process of political decentralization in India, Bangladesh, Cote d'Ivoire, and Ghana, finding that decentralization leads to enhanced transparency and reduces the incidence of corruption. Taking a sample case in Indonesia, [Kuncoro \(2002\)](#) argued that administrative decentralization leads to lower corruption, as firms relocated to areas with lower bribes.

Considering tax revenue, [De Mello \(2000\)](#), using cross-country data, concluded that tax revenue decentralization is positively associated with improved quality of government. Tax revenue is an appropriate allocation mechanism between central and local governments and stimulates local governments to empower tax officers, maintain good administration, and improve their services to citizens. A study by [Gurgur and Shah \(2005\)](#) identified significant corruption drivers to isolate the effect of decentralization, including a lack of service orientation in the public sector, weak democratic institutions, and centralized decision-making. They concluded that decentralization supports greater accountability in the public sector and reduces corruption.

The existing studies discussed above suggest that the inconclusive findings depend on the context, geographical setting, choice of measurements, methodology, and sample period. Some studies have tried to address these unsettled relations by introducing other channels to explain the effects of fiscal decentralization on corruption; for example, [Enikolopov and Zhuravskaya \(2007\)](#) included political institutions and political competition, arguing that political aspects affect corruption in a decentralized system ([Albornoz and Cables 2013](#)). The choice of corruption measure directly affects empirical results. Most cross-country studies use corruption perception indices to define corruption levels; yet, [Fan et al. \(2009\)](#) argued that the mixed findings of empirical studies are affected by the choice of corruption measures that mainly utilized the corruption perception indices rather than objective measures. Since these objective measures are difficult to find across countries, they are more appropriate in a specific country analysis. The prominent study by [Fisman and Gatti \(2002b\)](#), using U.S. corruption conviction data, found that the proportion of a state's expenditure from federal transfers has a positive relationship with corruption. [Goel and Nelson \(2011\)](#) used average federal public corruption convictions in the U.S. as the corruption measure to argue that government decentralization does not necessarily reduce corruption and is dependent on the type of decentralization. In a recent study, [Shon and Cho \(2019\)](#) confirmed that corruption in U.S. state governments tends to increase in more decentralized structures. In this research, we examine the effects of the degree of fiscal decentralization in Indonesia at the provincial level and advance the existing empirical studies using an objective corruption measure: the number of corruption cases investigated by KPK. To our knowledge, the number of corruption cases is the only available corruption data at the provincial level; therefore, this study serves the original contribution in examining fiscal decentralization and the corruption nexus in Indonesia.

3. Data and Methodology

3.1. Data Construction

This study covers 19 out of 34 provinces in Indonesia from 2004 to 2014. The provinces included in the dataset are Bali, Bengkulu, DKI Jakarta, West Java, Central Java, East Java, South Kalimantan, East Kalimantan, Lampung, Nanggroe Aceh Darussalam, West Nusa Tenggara, East Nusa Tenggara, Papua, Riau, South Sulawesi, Central Sulawesi, North Sulawesi, South Sumatra, and North Sumatra. We focused on 19 provinces because of limited data availability, particularly the corruption data from KPK, which has only reported on 19 provinces since its establishment in 2003. Additionally, we used audited financial reports to compute the fiscal decentralization data available from the Indonesia Ministry of Finance because the financial data in an audited version are accountable, and the report cannot be edited after it is published. However, there were only 25 provinces that published full-disclosure financial reports from 2004 to 2014, and only a few provinces released the audited reports after 2014. Therefore, this study focused on 19 provinces in Indonesia. These provinces accounted for 65% of total regional gross domestic product (regional GDP) and 80% of total population in Indonesia for the sample period.

The dependent variable, the number of corruption cases, was obtained from the Indonesia Corruption Eradication Commission (KPK), beginning in the first year of its establishment in 2003. This information constitutes the only available data at the provincial level. The corruption data were constructed as the number of corruption cases investigated by KPK, normalized by province population in millions. The number of corruption cases represents the level of corruption in each province. KPK is a single, independent institution operating under State Law, and its jurisdiction covers all provinces. Therefore, corruption data collected by KPK may reflect an objective measurement of institutional efficiency and accountability and reduces any biases occurring from the differences in political condition, demographics, human resources, or any variation across provinces.

Moreover, many corruption studies have employed corruption perception indices from Transparency International, World Bank, and International Country Risk Guide, among others, as corruption measures. They usually examine cross-country analyses or a specific region. On the other hand, a few studies of specific countries, such as the United States and India, employ objective measures such as the number of corruption cases or the number of convictions for violations of federal corruption law. These corruption measures suggest a general perception of corruption (Glaeser and Saks 2006). To get a better analysis, the number of corruption cases was deflated by the province's population to account for the authority area and monitoring function by the citizens. We hypothesize that a larger population is more likely to deal with a higher number of corruption cases compared with a smaller population. Despite mixed findings regarding the relationship between fiscal decentralization and debates regarding the choice of corruption measure, this research acknowledges that the number of corruption cases is the best-suited corruption measure available at the provincial level.

To examine the relationship between the degree of fiscal decentralization and corruption, fiscal decentralization was proxied by two datasets: expenditure and revenue sides. Most studies argue that fiscal decentralization measurements using expenditure or revenue shares cannot fully capture the degree of fiscal decentralization (Devarajan et al. 1996). On the other hand, the recent study by Shon and Cho (2019) determined that an accounting approach can explain the relationship between the degree of fiscal decentralization and corruption in the United States at sublevels of government. Some studies applied a similar approach, such as Fisman and Gatti (2002b) and Goel and Nelson (2011), among others. Following the latter approach, this study used two datasets as the proxies of fiscal decentralization. The first dataset was expenditure decentralization, which exposes the degree of total regional government expenditure over total government expenditure (central and regional levels). This variable has been widely used as a core component to measure the degree of fiscal decentralization. For example, the greater the expenditure managed by a province, the higher the degree of fiscal decentralization of the province. The second dataset was tax revenue decentralization. The variable

is constructed as the share of total regional tax revenue collected by the province itself over total government tax revenue (central and regional levels). The construction of these two components of fiscal decentralization aimed to determine whether or not one component affected corruption more than the other component, due to the varying degrees of authority devolved to them. Central government shares a greater extent in expenditure side to the regional government; on the other hand, the central government may give a limited authority to the regional government to collect revenue from tax and natural resources.

Differentiating the effects of fiscal decentralization from both expenditure and revenue sides controls for a political decision regarding the degree of autonomy local governments practice in expenditure and revenue sides. Governments move a higher degree of expenditure to local governments in order to practice better discretion in the management of their regions. A pressing issue, however, is whether local governments can set accountability levels high enough to mitigate corruption. Some studies emphasize that the lack of accountability in a decentralized government system may encourage corruption (Prud'homme 1995; Bardhan and Mookherjee 2006). On the other hand, a limited degree of autonomy in the revenue side may be problematic for local governments because they cannot collect revenue from taxes and natural resources. This limited degree of autonomy creates a heavy dependency on intergovernmental grants from the central government to finance a local government's fiscal capacity. These intergovernmental grants are determined and authorized by the central government; then the shares of intergovernmental grants on the revenue side cannot capture the degree of fiscal decentralization and are excluded as a measure on the revenue side (Wang and Hou 2012). A similar view is proposed by Oates (1999). From a competitive point of view, in a decentralized system, citizens are more likely to monitor the elected leaders in a way that causes them to be more responsive to their electorates (Anderson 2010). Citizens may compare their province's economic achievement with the affluence of their neighbor's province, creating competition across jurisdictions. Accordingly, a higher demand to promote economic development by collecting revenues reduces the opportunity for bureaucrats to extract rent (Fisman and Gatti 2002a). Regarding the mixed effects of fiscal decentralization described above, we examined the degree of fiscal decentralization on both expenditure and tax revenue sides.

Moreover, this research focused on particular control variables that have been widely used to capture political, socioeconomic, and demographic conditions in existing corruption and fiscal decentralization studies. First, we controlled for government size. This variable assessed the extent of government in the economy and was constructed by total government revenue as a share of regional gross domestic product (regional GDP). We expect that, the bigger the size of government, the larger the government's role in increasing economic growth, and further mitigate corruption. The data sources were the Indonesia Ministry of Finance for government revenue and Statistics Indonesia for regional GDP. Next, real, natural log regional GDP per capita ($\ln \text{rgdp percapita}$) controlled for structural income differences across provinces. A rich province typically possesses more revenue sources than tax revenue such as natural resources, like oil and mining, and tourism. Citizens from these wealthy provinces tend to lead better lives and are, therefore, more reluctant to engage in corruption practices. The data source for this control was Statistics Indonesia. Additionally, we controlled for education levels because a province with a higher level of education is expected to have a better economy and better knowledge of corruption. Mean years of schooling (education) ranged between 0 and 100, indicating investment in human capital. Education was defined as the average number of years of education received by people aged 25 years and older, and these data were taken from Statistics Indonesia. Finally, the productive age population, which included people between the ages of 15 and 64 years, was a variable that controlled for the productive human resources available in a province. It was measured by the total productive age population over the number of the labor force and was obtained from Statistics Indonesia. It is important to control for this because, in some literature, there is contradictory evidence of whether population affects increased or decreased corruption levels.

In addition to demographic and economic variables, socioeconomic indicators were considered such as an ethnolinguistic fractionalization index (ethnolinguistic) and a political index. Lederman et al. (2005)

found that a more heterogeneous society leads to increased corruption; therefore, ethnolinguistic controls for the heterogeneity of the population and for cultural aspects. The ethnolinguistic index was derived from Arifin et al. (2015), who constructed an ethnolinguistic fractionalization index for provinces in Indonesia. The index score ranged from zero to one. Another control variable was a political index, or a control for the political stability of a province. The index ranged between 0 and 100, with a higher score indicating more political stability. The data source for this variable was Statistics Indonesia.

Table 1 shows the descriptive statistics of the variables. To test for correlation between the variables, Table 2 shows the result of the correlation matrix and found no severe multicollinearity problem, except for the expenditure decentralization and tax revenue decentralization variables. However, in the estimation application, those variables were estimated separately; therefore, the multicollinearity would not be a problem in our estimations.

Table 1. Descriptive Statistics.

Variable	Observation	Mean	Std. Dev.	Min	Max
corruption	209	0.43	0.82	0	4.97
expenditure decentralization	154	0.46	0.47	0.07	2.62
tax revenue decentralization	169	0.10	0.26	0	1.44
government size	142	3.25	2.19	0.60	12.14
ln rgdp percapita	209	9.86	0.96	2.75	12.07
productive age population	209	135.42	11.70	114.92	157.71
education	209	64.71	5.15	51.39	77.76
ethnolinguistic index	209	0.63	0.24	0.04	0.91
political index	209	45.37	42.43	0	98.51

Table 2. Simple Correlation Matrix.

Variable	Corruption	Expenditure Decentralisation	Tax Revenue Decentralisation	Government Size	ln Rgdp per Capita	Productive Age Population	Education	Ethnolin Guistic Index	Political Index
corruption	1.00								
expenditure decentralization	0.14	1.00							
tax revenue decentralization	−0.01	0.81	1.00						
government size	−0.08	−0.04	−0.08	1.00					
ln rgdp percapita	0.41	0.50	0.39	−0.07	1.00				
productive age population	0.31	0.36	0.32	−0.19	0.36	1.00			
education	0.19	0.29	0.26	0.12	0.38	0.31	1.00		
ethnolinguistic index	0.25	−0.05	0.10	0.22	0.16	0.21	−0.05	1.00	
political index	0.12	0.09	−0.07	−0.07	0.25	−0.08	0.19	0.01	1.00

3.2. Baseline Model

We conducted an empirical analysis to test the relationship between the degree of fiscal decentralization and corruption. A set of panel data was estimated by following a general baseline estimation:

$$\text{corruption}_{it} = \beta_1 + \beta_2 \text{fiscal decentralization}_{it} + \beta_3 x_{it} + \alpha_t + \mu_i + e_{it} \quad (1)$$

where corruption denotes the number of corruption cases normalized by population in millions; fiscal decentralization as the main explanatory variable is proxied by two measures, expenditure decentralization and tax revenue decentralization; and x_{it} is a set of control variables that directly affects corruption. The subscripts denote country i at time t . α_t and μ_i are termed as year dummies, or time-fixed effects and province-fixed effects, to account for common shocks affecting all provinces in all sample periods, and e_{it} is the error term.

In this study, the estimation strategy included two models. In the first model, we utilized a well-known panel data model and allowed for specific, time-invariant characteristics to be exploited. A random effects model for panel data was preferable over a fixed effects model because the fixed effects

model was more likely to omit time-invariant variables, such as political index and ethnolinguistic fractionalization index. Those two variables have been found to be correlated with corruption (Mauro 1995; Ugur 2014). Another way to choose the best model for our specification is by employing a Hausman test. We tested our specification to select the best model between fixed effects and random effects models. The coefficient result of the Hausman test showed that the p-value was 0.09 (higher than 0.05, the significance level). The coefficient indicated that the null hypothesis of the random effects model was the preferred model; therefore, the random effects model was utilized in our estimation strategy. Moreover, the random effects model may be subject to a variety of biases if there is a causality direction assumed in the model or the presence of the omitted variable bias.

Furthermore, in the second model, we acknowledge that the random effects model does not consider the dynamic panel data regression, as the corruption incidence in the past year is most likely correlated with corruption in the current year. Introducing one-year lagged corruption as an independent variable correlates with the error term, and this creates an endogeneity issue. Additionally, the causality relationship between fiscal decentralization and corruption may pose an endogeneity problem because an increase in the degree of fiscal decentralization may affect corruption and vice versa. To overcome these issues, Arellano and Bover (1995) and Blundell and Bond (1998) provided a system GMM panel data estimator. System GMM allows the lags in the endogenous variables to serve as instrumental variables. Therefore, in the second model estimation, a system GMM estimator was applied by following the baseline model:

$$\text{corruption}_{it} = \beta_1 + \beta_2 \text{corruption}_{it-1} + \beta_3 \text{fiscal decentralization}_{it} + \beta_3 x_{it} + \alpha_t + \mu_i + e_{it} \quad (2)$$

where corruption, fiscal decentralization, x_{it} , α_t , μ_i , and e_{it} are the same as Equation (1), and corruption_{it-1} denotes one-year lagged corruption. The system GMM estimator employs instruments in levels, as well as first differences, to improve efficiency. The estimator efficiently uses previous realizations of the regressors as the instrument variables for the current values in the first differences and the lagged differences for the regression levels. The limitation of the system GMM estimator is that operation of this model is complicated, and beginners may generate invalid estimates. The estimator easily generates numerous instruments, but a large instrument will overfit endogenous variables and weaken the Hansen test of the instrument's validity (Roodman 2006). To get a suitable number of instruments, we set the instruments to the minimum number: two-year lagged for first-difference specifications and one-year lagged for regression levels. One-year lagged corruption and fiscal decentralization were treated as endogenous variables.

The panel data analysis and system GMM model are favorable for a country that has limited corruption data at the subnational level. The advantage of using a panel data analysis is that it can capture the change in provinces over time, and a system GMM estimator is an efficient method for a large number of observations and short period samples. Additionally, because the system GMM estimator accounts for dynamics in a model, we utilized it to solve the endogeneity issue resulting from causality between corruption and fiscal decentralization.

4. Estimation Results and Discussion

The estimation results for the random effects model are displayed in Table 3, and the results from the system GMM model are in Table 4. The model specifications in columns (1) through (6) of Tables 3 and 4 are similar. The two proxies of fiscal decentralization, which served as the main independent variables, are divided into columns (1) through (3), using expenditure decentralization, and columns (4) through (6) capture tax revenue decentralization. In more detail, in columns (1) and (4), the baseline specification, we included government size, ln rgdp per capita, and education as control variables. Columns (2) and (5) consist of the baseline specification and two socioeconomic indicators: the ethnolinguistic and political indices. Lastly, columns (3) and (6) examine the baseline specification and a demographic variable (productive age population).

4.1. Random Effects Model—Discussion

Table 3 presents the estimation results using a random effects model. From the results, the degree of fiscal decentralization represented by the expenditure decentralization was revealed to facilitate an increase of corruption cases in columns (1) through (3). A higher degree of authority in the fiscal sector from the central government to local governments appeared to decrease the incidence of corruption, and the result showed a five percent significance level. In an economic scale, a one percent greater degree of expenditure shares of local governments was more likely to increase corruption incidence by 0.91, corresponding to population size. The findings confirmed the hypothesis that a higher degree of expenditure authority may likely facilitate an increase in corruption cases. Our estimation results confirm the findings of Treisman (2000) and Alfano et al. (2019).

Table 3. Random Effects Model.

Dependent Variable: Corruption	(1)	(2)	(3)	(4)	(5)	(6)
expenditure decentralization	0.912 ** (0.397)	1.095 *** (0.382)	0.884 ** (0.401)			
tax revenue decentralization				−0.570 (0.579)	−0.749 (0.561)	−0.748 (0.602)
government size	−0.223 *** (0.083)	−0.236 *** (0.079)	−0.218 *** (0.084)	−0.114 * (0.067)	−0.118 * (0.065)	−0.106 (0.068)
ln rgdp percapita	0.048 (0.086)	0.049 (0.082)	0.045 (0.087)	0.065 (0.085)	0.068 (0.082)	0.062 (0.085)
education	−0.082 * (0.049)	−0.086 * (0.046)	−0.087 * (0.050)	−0.069 (0.047)	−0.064 (0.045)	−0.075 (0.047)
ethnolinguistic		−1.006 (0.817)			0.018 (0.684)	
political index		−0.001 *** (0.00075)			−0.001 *** (0.0003)	
productive age population			0.009 (0.016)			0.017 (0.016)
constant	5.522 * (3.256)	6.071 ** (3.082)	4.909 (3.458)	4.244 (3.130)	3.909 (2.985)	2.714 (3.436)
Year fixed effects	yes	yes	yes	yes	yes	yes
Province fixed effects	yes	yes	yes	yes	yes	yes
Number of observations	209	209	209	209	209	209
R-squared	0.502	0.552	0.504	0.466	0.509	0.472

Note: The dependent variables are the number of corruption cases normalized by total population in millions. All regressions include year and province dummies (results not reported). Fiscal decentralization variables are represented by expenditure decentralization and tax revenue decentralization. Hausman test confirms to use Random Effects model. The asterisk represents the p-value significance levels (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$). Standard errors in parentheses are based on robust-consistent standard errors.

In contrast, if we use tax revenue collected by the province as the fiscal decentralization proxy, the results in columns (4) through (6) revealed negative effects of tax revenue decentralization on corruption, yet these were statistically insignificant. The results contradict the findings of Shon and Cho (2019), who found a positive and statistically significant relationship between revenue decentralization and corruption conviction in U.S. local governments. One possible reason for the discrepancy is that the capacity of local governments in Indonesia to collect tax revenue remains low because of the lack of capable human resources, limited discretion from central government on revenue collection, and a higher dependency on intergovernmental grants as their revenue sources.

Regarding government size, economic scale, and education effects on corruption, a greater portion of total government revenue relative to regional GDP is expected to reduce corruption. This hypothesis particularly applies to developing countries, where the government's dominant role is to provide basic services in the development process such as education, health, infrastructure, military, protection of human rights, and housing (Mauro 1998). The economic scale represents the wealth of the provinces

denoted by regional GDP per capita. We expect that a rich province will tend to maintain efficient governance and be less corrupt; in contrast, a poor province is more likely to suffer from high corruption incidence, which might hinder its regional development. Many studies control for human resource development because a province with a higher education level typically manages itself efficiently and practices good governance and accountability compared with a province with a lower education level. From the estimation results, government size had a negative effect on corruption in all specifications, yet the result in column (6) was statistically insignificant. The findings confirm the economic benefits of attempting to reduce corruption incidence in government. However, the economic scale cannot capture the impact of the wealth of the province on corruption, indicated by the statistically insignificant results in all specifications. Furthermore, education appeared to reduce corruption incidence, and the results were statistically significant at 10% in columns (1) through (3). This finding agrees with the hypothesis that provinces with higher education levels are less likely to engage in corrupt practices because they understand the consequences and risks.

Introducing socioeconomic indicators to control for corruption, the ethnolinguistic fractionalization index attempts to answer whether a province with a heterogeneous population, reflected by a higher index, may discourage corruption, while a homogeneous province encourages corruption. Mauro (1995) argued that, in cross-country analyses, a country with a heterogeneous population is found to have lower corruption. Another socioeconomic indicator that we accounted for is political stability, to control for the varying degrees of stability across provinces. From the estimation results, ethnolinguistic variables were statistically insignificant in all specifications. Political stability was found to limit corruption incidence in columns (2) and (5). Moreover, a demographic indicator was represented by the productive age population of those between the ages of 15 and 64 years, yet the results in columns (3) and (6) were statistically insignificant.

4.2. System Generalized Method of Moments (GMM) Model—Discussion

We now turn to the second model, dealing with the dynamic effects of corruption by using the system GMM model. Corruption in the past year is believed to influence current corruption incidence. Bureaucrats learn the circumstances of corruption over time, but a slow judiciary process and a low number of corruption convictions are two indicators of low quality in a judicial institution. In contrast, a higher number of corruption cases may strongly discourage bureaucrats from getting involved in corrupt practices because of effective anticorruption efforts. In the empirical analysis, a dynamic effect can be a threat and a severe endogeneity problem if the lagged value of the dependent variable is placed as the independent variable. We used a system GMM model to solve this issue by following equation (2). The estimation results of the system GMM model are displayed in Table 4, and the model specifications are similar to the one employed in the random effects model.

Before discussing the results, it is essential to check the validity of the instruments and the absence of serial correlation of second-order in the first-differences error term. We checked the validity of the instruments using the Hansen test for overidentifying restrictions. All coefficients of the p -value (Hansen test) in columns (1) through (6) indicate high values; therefore, we cannot reject the null hypothesis that the instruments are valid. Another test is for second-order autocorrelation in the first-differences error term, and all coefficients of the p -value (AR-2) show high values. These findings generally indicate that we cannot reject the null hypothesis of the absence of second-order serial correlation in the first-differences error. The test results support the consistency of the system GMM estimator in our model.

Table 4. System Generalized Method of Moments (GMM) Model.

Dependent Variable: Corruption	(1)	(2)	(3)	(4)	(5)	(6)
corruption ($t - 1$)	0.322 * (0.165)	0.141 (0.244)	−0.252 (0.163)	−0.118 (0.199)	−0.056 (0.296)	0.207 * (0.116)
expenditure decentralization	2.421 *** (0.827)	−0.607 (1.485)	1.675 ** (0.853)			
tax revenue decentralization				4.578 ** (2.267)	−3.334 (3.521)	1.008 (1.350)
government size	0.088 ** (0.037)	0.253 * (0.137)	0.198 *** (0.055)	0.158 ** (0.067)	0.385 ** (0.169)	0.082 ** (0.037)
ln rgdp percapita	0.192 (0.131)	0.866 ** (0.361)	−0.120 (0.174)	1.140 *** (0.220)	1.651 *** (0.551)	0.316 *** (0.088)
education	−0.258 *** (0.057)	−0.524 ** (0.215)	−0.228 *** (0.056)	−0.186 *** (0.039)	−0.692 *** (0.256)	−0.279 *** (0.052)
ethnolinguistic		8.589 (5.759)			−1.316 *** (0.562)	
political index		−0.001 * (0.001)			−0.011 (0.009)	
productive age population			0.144 *** (0.054)			0.055 * (0.031)
Year fixed effects	yes	yes	yes	yes	yes	yes
Province fixed effects	yes	yes	yes	yes	yes	yes
Number of observations	209	209	209	209	209	209
Number of instruments	12	14	14	12	14	13
Hansen test (p -value)	0.229	0.425	0.51	0.865	0.689	0.448
AR (2) p -value	0.508	0.751	0.592	0.602	0.562	0.593

Note: The dependent variables are the number of corruption cases normalized by total population in millions. All regressions include year and province dummies (results not reported). Fiscal decentralization variables are represented by expenditure decentralization and tax revenue decentralization and are treated as endogenous. They are instrumented with lags of exogenous regressors. The asterisk represents the p -value significance levels (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$). Standard errors in parentheses are based on robust-consistent standard errors.

From the estimation results in Table 4, the effect of the one-year lagged corruption appeared positive and was statistically significant at 10% in columns (1) and (6). The corruption cases in the previous year were more likely to facilitate corruption cases in the following year, only in the baseline model in column (1) and after controlling for the productive age population in column (6). The lagged corruption seemed to have no effect on current corruption cases, and it was statistically insignificant in columns (2) through (5). After controlling the dynamic of corruption, the effect of the degree of expenditure decentralization revealed a positive impact on corruption in columns (1) and (3). Similarly, tax revenue decentralization demonstrated a corruption-increasing impact in column (4). This result correlates with the finding of [Shon and Cho \(2019\)](#). Both expenditure and revenue decentralization confirmed that an increase in the degree of fiscal decentralization was likely to promote corruption incidence. Regarding the economic scale indicator, the results improved and were statistically significant in most specifications. The findings confirm the arguments of [Prud'homme \(1995\)](#) and [Goel and Nelson \(2011\)](#) that corruption incidence is more likely to grow in a decentralized government system. Moreover, an increase in regional GDP per capita was found to increase corruption incidence. This finding suggests that a rich province has more financial resources that motivate bureaucrats to extract rent for private gains. Different from the random effects model, the productive age population revealed a positive effect on corruption in columns (3) and (6). The probability of an increase in corruption in the productive age population was based on the data that the largest demographic in Indonesia consisted of people between 15 and 64 years of age; therefore, people in the productive age range were more likely to actively engage in production and economic activities.

Robustness Checks

In this section, we need to check whether our main estimation results remain consistent with the other fiscal decentralization variable form. An alternative estimation strategy utilizes a percentage change to measure the degree of fiscal decentralization. This functional form is intended to analyze how much the percentage change of the degree of fiscal decentralization, both expenditure and revenue sides, affects corruption, rather than measuring the fiscal decentralization in level units. For a robustness check, we estimated the degree of fiscal decentralization measured in the percentage change using a system GMM estimator. Understanding the impact of a percentage increase or decrease of the degree of fiscal decentralization on corruption can help us to provide better analyses for local governments when allocating budgets. To differentiate the fiscal decentralization unit measurement used in the percentage change and in level units utilized in the previous system GMM model, the expenditure decentralization is abbreviated as expenditure dec growth rate, and tax revenue decentralization is tax revenue dec growth rate. Corruption and the control variables are the same as the previous system GMM model. The baseline equation and model estimations are the same as the ones used in the previous discussion of system GMM estimations. The estimation results are presented in Table 5.

Table 5. The System Generalized Method of Moments (GMM) Model. (Fiscal Decentralization is Measured as Percentage Change).

Dependent Variable: Corruption	(1)	(2)	(3)	(4)	(5)	(6)
corruption ($t - 1$)	0.9917 *** (0.0719)	1.0546 *** (0.2254)	1.0142 *** (0.0764)	0.8643 ** (0.3440)	0.8400 ** (0.4019)	0.8850 *** (0.2763)
expenditure dec growth rate	0.7669 * (0.4292)	0.6370 (0.5570)	0.8573 * (0.4774)			
tax revenue dec growth rate				2.7931 *** (3.0039)	2.5518 * (3.7174)	2.2015 (2.3692)
government size	0.0717 *** (0.0151)	0.0037 (0.0723)	0.0141 (0.0181)	0.0360 ** (0.0151)	0.0271 (0.0372)	0.0353 (0.0352)
ln rgdp percapita	0.0154 (0.0214)	0.166 *** (0.0270)	−0.0142 (0.0249)	1.3017 *** (0.3451)	0.2929 *** (0.0393)	0.2253 (0.2244)
education	0.0025 (0.0026)	0.0074 (0.0095)	0.0091 (0.0085)	−0.0480 (0.0546)	−0.0460 (0.0593)	−0.0465 (0.0513)
ethnolinguistic		−0.7035 (1.2405)			−0.999 *** (0.4057)	
political index		−0.0067 (0.0042)			−0.0020 (0.0032)	
productive age population			0.0032 (0.0039)			0.0048 (0.0080)
Year fixed effects	yes	yes	yes	yes	yes	yes
Province fixed effects	yes	yes	yes	yes	yes	yes
Number of observations	190	190	190	190	190	190
Number of instruments	12	14	14	12	14	13
Hansen test (p -value)	0.421	0.388	0.475	0.323	0.833	0.850
AR (2) p -value	0.416	0.381	0.419	0.326	0.448	0.335

Note: The dependent variables are the number of corruption cases normalized by total population in millions. All regressions include year and province dummies (results not reported). Fiscal decentralization variables are represented by expenditure decentralization and tax revenue decentralization percentage changes, and are treated as endogenous. They are instrumented with lags of exogenous regressors. The asterisk represents the p -value significance levels (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$). Standard errors in parentheses are based on robust-consistent standard errors.

In Table 5, the main estimation results still hold. The one-year corruption revealed a positive effect on current corruption, and it was statistically significant at one percent in columns (1) through (6). The magnitudes of expenditure decentralization and tax revenue decentralization are consistent with our previous findings. Expenditure decentralization was found to positively affect corruption,

and it was statistically significant at 10% in columns (1) and (3). An increase in the degree of tax revenue decentralization revealed an increase in the number of corruption cases in columns (4) and (5). At the economic scale, an increase of one percent change in the degree of expenditure decentralization revealed the number of corruption cases (at the 0.6–0.8 level), and the economic scale was higher on tax revenue decentralization (at the 2.2–2.8 level). A consistent finding between the estimation results, using a percentage change form in the robustness check section and the main results, influences our conclusion of these findings.

5. Conclusions

Existing studies have made inconclusive findings on the relationship between the degree of fiscal decentralization and corruption. The main difference in these studies is the choice of corruption measures such as corruption perception index and objective measures (the number of corruption cases and the number of corruption convictions). Using a specific-country study in Indonesia, this study utilizes unique corruption data: the number of corruption cases investigated by KPK (an independent body under state law), as well as extensive financial data from the provincial level, obtained from the Indonesia Ministry of Finance. Employing those corruption and financial data, this research contributes an original analysis on the degree of fiscal decentralization and corruption in Indonesia at the provincial level.

The findings confirm the argument that corruption incidence is more likely to grow in a decentralized government system (Prud'homme 1995; Goel and Nelson 2011). A higher degree of expenditure decentralization revealed a positive, robust, and statistically significant effect on corruption. Based on data from KPK, the number of corruption cases at the provincial level rose over the sample period of 2004 to 2014. Similarly, tax revenue decentralization was found to facilitate an increase in corruption cases in local governments. This finding contradicts the hypothesis that a higher degree of tax revenue decentralization may hinder bureaucrats from extracting rent and getting involved in corrupt practices. The empirical findings of our study suggest that the degree of fiscal decentralization, from both expenditure and revenue sides, suffer from issues of corruption.

There are three ways to improve the corruption problem in local governments. The first opportunity to decrease corruption is by improving monitoring and auditing functions from central to regional governments (Prud'homme 1995). The second opportunity to decrease corruption is by increasing political contestability and encouraging local leaders from outside the province to take part in the local leaders' elections. Our empirical findings suggest that a more heterogeneous province can mitigate corruption, and a province with higher political stability tends to be less corrupt. Finally, the third opportunity to decrease corruption is to fix the lack of transparency and accountability in local governments. The motivation of fiscal autonomy is to shift governing control in order to administer to a particular region and to bring the government closer to the people when providing basic services. However, the central government needs to assure that the level of accountability managed by local governments reaches a significant standard degree.

Despite the empirical evidence confirming that the degree of fiscal decentralization promotes the incidence of corruption, the implementation of fiscal decentralization has been successful in solving ethnic or regional conflicts in several provinces in Indonesia such as Papua, Aceh, and Sulawesi. A prominent study by Tiebout (1956) discussed how fiscal decentralization brings improvements in better public services and the procurement of goods. Moreover, decentralization shifts not only financial resources from central to local governments but also political and institutional arrangements (Shon and Cho 2019). However, this study exclusively focuses on financial aspects of decentralization in spite of other influential aspects such as politics. Limited data availability impedes this study from examining all 34 provinces and from extending the sample period to a more recent year. For further research, it will be important to elaborate on other, more comprehensive issues such as political and institutional efficiency aspects. In conclusion, this research not only enriches corruption studies in Indonesia but also serves as empirically based policy recommendations. Local governments should take serious

actions to improve accountability and eradicate corruption after receiving greater autonomy to manage their regions through decentralization.

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