FISCAL DECENTRALIZATION, REGIONAL INCOME INEQUALITY, AND THE PROVISION OF LOCAL PUBLIC GOODS: EVIDENCE FROM INDONESIA

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The objective of this paper is to clarify the potential joint determination between fiscal decentralization, regional inequality, and the provision of local public goods in Indonesia. Using provincial-level data over the period 2001-2014, we estimate the simultaneous equation model (SEM) to circumvent the possibility of interdependence between the interest variables. The result reveals that fiscal decentralization is associated with lower regional income disparity but not vice versa. The result confirms that regional income inequality and the provision of public goods are simultaneously determined. The result provides no evidence of interdependence between fiscal decentralization and the provision of local public goods.

Keywords: Fiscal Decentralization, Local Public Goods, Simultaneous Equation Model, Regional Inequality, Indonesia
JEL Classification: H10, H77, H70

1. INTRODUCTION

In recent years, several theoretical and empirical studies have analyzed the relationship between fiscal decentralization, regional income inequality, and the provision of local public goods. Some empirical studies reveal that fiscal decentralization, by enabling the local government of the impoverished region to stimulate a pro-growth policy, decreases regional inequality. However, scholars propose that the degree of fiscal decentralization may depend on the existing regional income inequalities. This is because the government may shift to centralize or decentralize its resources depending on its consideration of the contribution of fiscal centralization or fiscal decentralization toward regional convergence. Moreover, scholars provide evidence that local governments are more capable of providing efficient local public

goods compared to central governments, which can motivate a country to fiscally decentralize. Alternatively, researchers have reported that fiscal decentralization enables the local government to deliver a more substantial diversity of public goods to accommodate varying preferences toward the provision of local public goods. Finally, empirical evidence has also emerged indicating that a society within a large regional income inequality scenario often demands the government to deliver a greater redistribution policy, especially in providing public goods to reduce the income gap. However, several studies proposed that the provision of public goods can have a bearing on regional income disparity. This study indicates that any of these variables (to a certain degree) can be influenced by the other two.

The main objective of this paper is to clarify the potential joint determination between fiscal decentralization, regional inequality, and the provision of local public goods in the case of Indonesia. Most existing studies consider the possibility of interdependence by employing instrumental variables (IVs) techniques such as two-stage least squares (2-SLS). The difficulty of finding appropriate instruments for the endogenous variables and the chance of persistence over time of the interest variables may compromise this estimation method (Lessmann, 2012; Kyriacou, Muinello-Gallo and Roca-Sogales, 2017). To address this limitation, this paper accommodates the probability of interdependence between fiscal decentralization, regional inequality, and the provision of local public goods by applying a simultaneous equation model (SEM). SEM can provide consistent estimates and produce a more efficient estimation than the single equation approach and also help to identify the potential interdependence between the key variables. Indonesia provides an ideal case to examine the topic. First, after decades of being a heavily centralized country, Indonesia experienced a 'big bang' decentralization in 2001 that authorized the local government to deliver local public goods and design a pro-growth development program to accommodate local needs. Second, the size of Indonesia and its economic and social diversity has resulted in a significant difference in regional economic development and the income inequalities for a long period of time (Statistics Indonesia, 2016). Also, public goods in Indonesia are in a state of under-fulfillment. Indonesia ranks 60th in infrastructure development and 100th in health and primary education progress out of 138 countries, which damages its global competitiveness (World Economic Forum, 2017). This study offers several new insights. First, it fills the gap of limited analysis on this topic. This study addresses the probability of joint determination among the provision of public goods, regional income inequality, and fiscal decentralization by applying SEM, which directly addresses interdependence between the key variables. To conclude, this study proposes policy implications based on estimation results to assist the Indonesian central and local governments in dealing with the interaction between the variables of interest.

The paper is organized as follows. Section 2 reviews the literature findings that explain the comprehensive relationship of the examined variables. Section 3 describes the data, key variables, and empirical methodology. Section 4 reports on the results and a sensitivity check and then discusses the findings. Section 5 concludes the study and

presents policy implications.

2.   LITERATURE REVIEW

The channel links fiscal decentralization, regional inequality, and the provision of local public goods as described in Figure 1, which is explained in the sub-chapters below.
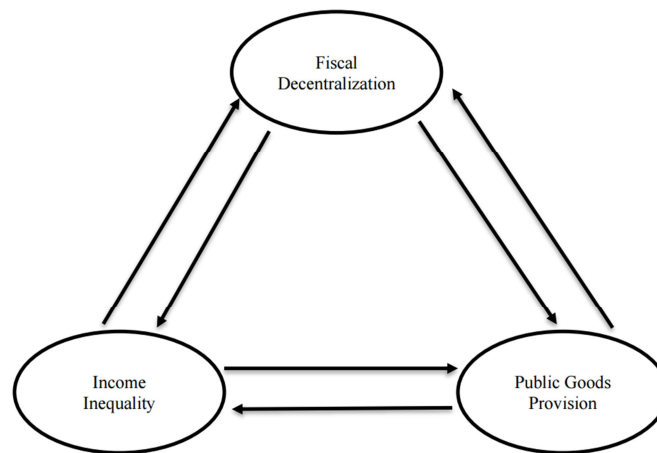

Figure 1.   The Relationship between Fiscal Decentralization, Regional Income Inequality and the Provision of Local Public Goods

2.1.   Fiscal Decentralization and Income Inequality

Regarding the influence of fiscal decentralization on regional income inequality, fiscal decentralization is applauded for empowering local governments to reduce the income gap because it is assumed that local governments are more well-informed than central governments on how to address regional inequality. Empirical works by Ezcurra and Pascual (2008), Sepulveda and Martinez-Vazquez (2011), Ametoglo, Guo and Wonyra (2018) support this hypothesis. Alternatively, fiscal decentralization may broaden regional inequality because it triggers regional competition in absorbing economic resources (Prud'homme, 1995; Martinez-Vazquez and McNab, 2003; Zhang, 2006) and confines the interregional and intraregional positive externalities created by a centralized redistribution policy (Rodriguez-Pose and Gill, 2004; Liu, Martinez-Vazquez, and Wu, 2016). Several empirical studies support this argument such as Silva (2005), Bonet (2006), Sacchi and Salotti (2011), and Liu Liu, Martinez- Vazquez, and

Wu (2016).

Regional income inequality may affect the level of fiscal decentralization (Bolton and Roland, 1997; Beramendi, 2007; Lessmann, 2012). Dissatisfaction regarding the central government's failure to reduce poverty and income disparity and also the expectation that larger local government authority in a fiscally decentralized system can address these issues, has triggered stronger demand to decentralize the country (Sepulveda and Martinez-Vazquez, 2011). However, wide regional income inequality may trigger support for centralization because the central government has the authority to allocate resources across regions and this narrows the income gap between regions (Oates, 1972; Lessmann, 2009; Stegarescu, 2009; Sacchi and Salotti, 2014).

2.2.   Fiscal Decentralization and Public Goods

Several studies propose that efficiency in providing local public goods is one of the primary considerations for a country to decentralize (Oates, 1972; Ahmad and Brosio, 2009). Fiscal decentralization lowers the transaction cost for the delivery of public goods by removing bureaucracy layers, shortening the decision-making process, and reducing the information cost associated with diseconomies of scale because the local government is assumed to be more responsive to local needs than the central government (Shah, 1998).

Decentralization accommodates the diverse preferences across regions toward the provision of public goods which increases the provision of the local public goods (Musgrave, 1969; Oates, 1972). In contrast, several studies argue that local government has better information regarding local preferences, but this may not always be the case. This is because gathering information is not only expensive but also a time-consuming process, which involves experienced human resources, reliable information, and a technology system. These factors are rarely available at the local government level, especially in a developing economy. Therefore, there may be a reduction in the supply of public goods (Prud'homme, 1995; Rodriguez-Pose and Gill, 2004).

2.3.   Income Inequality and Public Goods

Regarding the impact of income inequality on the provision public goods, the classical public choice model proposed by Romer (1975), Roberts (1977) and Meltzer and Richard (1981) suggests that broadening income inequality leads to a larger demand of public goods because it imposes political pressure on the government to redistribute income. Large regional income inequality results in a demand of public goods on education, health, childcare, and infrastructure sectors to close the income gap (Alesina and Perotti, 1993; Alesina and Rodrik, 1994).

The results of the literature on the effect of the provision of public goods on income inequality is inconclusive. It has been argued that spending on public goods in the health and education sector reduces the income gap by generating an equal distribution of

human capital (Tiongson, Davoodi and Asawanuchit, 2003). Alternatively, Ferreira (1995) and Brakman, Garretsen and van Marrewijk (2002) argue that spending on public goods and regional inequality is positively related. A within-country analysis by Banerjee (2004), Banerjee and Somanathan (2007), and Bajaar and Rajeev (2015) for India revealed that spending on public goods is associated with large income inequality. In their study in Bangladesh, Khandker and Koolwal (2007) found the same result.

3.   KEY VARIABLES AND EMPIRICAL ANALYSIS

3.1.   Key variables

This study applies province-level data from 2001 to 2014 for 33 provinces in Indonesia (the Kalimantan Utara Province is excluded since it was established in 2013). The data is originated from Indonesia Ministry of Finance and Statistics Indonesia. Table 1 presents the summary statistics of the variables in this paper.

Table 1.   Summary Statistics

Variable	Observation	Mean	Std. Deviation
Fiscal decentralization (FD)	462	0.019	0.016
Regional inequality (RI)	462	0.151	0.118
Public goods (PG)	462	29.293	1.063
Ethnic fractionalization index	462	0.538	0.189
Regional income per capita, log	462	16.105	0.899
Population, log	462	15.151	1.018
Share of trade to total regional GDP (%)	462	0.380	0.301
Area, log kilometer squared	462	10.472	1.197
Population density	462	667.307	2,345.391
Intragovernmental transfer per capita, log	462	13.900	1.028
Unemployment	462	7.369	3.448
Years of schooling	462	7.561	1.506
Share of urban population (%)	462	43.490	18.246
Dependency ratio (%)	462	49.500	22.609

Source: Statistics Indonesia, Indonesia Ministry of Finance.

Several critical variables are employed in this analysis such as the measure of the local provision of public goods, regional inequality, and fiscal decentralization. Regional capital expenditure is used as a proxy for the provision of local public goods following

Lewis (2013). Capital expenditure is defined as an expenditure that was used to obtain capital stock in terms of physical assets, which covers land, buildings, roads, irrigation, and others that belong to the local government (Indonesian Ministry of Finance, 2016).

This paper applies a population-weighted coefficient of variation as a measure of regional income inequality. The population-weighted coefficient of variation offers several characteristics that may not be found in other inequality measures such as independent scale, population size, number of regions and satisfaction of the Pigou-Dalton transfer principle (Cowell, 1995; Firebaugh, 2011). The population weighted coefficient of variation is defined as:

$$PWCV = \frac{1}{\bar{y}} \left[\sum_{i=1}^{n} p_i \left(y_i - \bar{y} \right)^2 \right]^{1/2}, \tag{1}$$

where $\bar{y} = \sum_{i=1}^{n} p_i y_i$; y_i and p_i are the GDP per capita and population share of the province, respectively, and n is the number of provinces.

This paper estimates fiscal decentralization by employing an expenditure-based decentralization measure, which is more suitable in the case of Indonesia since Indonesian decentralization introduced a significant change in the allocation of expenditure but not in revenue collection. The Indonesian fiscal decentralization law authorizes a substantial expenditure discretion to the local government in prioritizing expenditures, but the main taxing right remains with the central government (Ahmad and Mansoor, 2002; Nasution, 2016). Therefore, we consider the expenditure based fiscal decentralization measures that are appropriate for the Indonesian context. The expenditure-based fiscal decentralization measure is defined as the ratio of local government spending to total government spending. This index has been widely used in previous research (Bonet, 2006; Lessmann, 2009; Rodriguez-Pose and Ezcurra, 2010; Sacchi and Salotti, 2011; Liu, Martinez- Vazquez and Wu, 2016).

3.2. Empirical Analysis

This study applies a simultaneous equation model (SEM) to circumvent the potential joint determination among the key variables. The model takes the following form:

$$FD_{kt} = \alpha_0 + \alpha_1 PG_{kt} + \alpha_2 RI_{kt} + \alpha_3 X_{1,kt} + \mu_{1,kt}, \tag{2}$$

$$RI_{kt} = \beta_0 + \beta_1 PG_{kt} + \beta_2 FD_{kt} + \beta_3 Y_{2,kt} + \mu_{2,kt}, \tag{3}$$

$$PG_{kt} = \gamma_0 + \gamma_1 FD_{kt} + \gamma_2 RI_{kt} + \gamma_3 Z_{3,kt} + \mu_{3,kt}, \tag{4}$$

where subscript k and t refer to province and year, respectively; FD_{kt}, RI_{kt}, and PG_{kt} refer to the dependent variables of fiscal decentralization, regional inequality and the provision of public goods, respectively; $(\alpha_0, \beta_0, \gamma_0)$ are the constant terms; $(\alpha_1, \beta_1, \gamma_1)$ and $(\alpha_2, \beta_2, \gamma_2)$ are the parameters associated with endogenous

variables; $(\alpha_3, \beta_3, \gamma_3)$ are the parameters associated with the control variables $X_{1,kt}$, $Y_{2,kt}$ and $Z_{3,kt,}$, respectively; and $(\mu_{1,kt}, \mu_{2,kt}, \mu_{3,kt})$ are the error terms for equations (3), (4) and (5), respectively.

Previous studies using the instrumental variables method to deal with simultaneity offered possible but often insufficient solutions (Martinez-Vazquez, Lago-Penas, and Sacchi, 2017). This paper deals explicitly with the potential simultaneity between the critical variables using SEM, which generates a consistent and more efficient estimate than a single-equation approach and eventually assists in the identification of joint determination between the three key variables (Wooldridge, 2010). The existence of persistence and endogeneity in the estimation also biases the estimated impact of the critical variables. The full set of three equations is jointly estimated using the system instrumental variables (SIV) method which constructed on the principle of a generalized method of moment (GMM) to obtain a consistent and more efficient estimator (Baltagi, 2013; Greene, 2017). GMM with heteroskedasticity and autocorrelation (GMM-HAC) is employed to account for the heteroskedasticity and contemporaneous correlation of the disturbances across equations that contain endogenous variables by using the default Newey-West (Bartlett kernel function) specifications of heteroskedasticity and autocorrelation (HAC) estimators of the covariance matrix (Baum, 2006; Baum, Schaffer and Stillman, 2007). In all of the equations, the number of exclusions is sufficient to satisfy the order condition of the identification. The system is identified since each equation has at least two nonzero variables of the excluded exogenous variables from the other two (Wooldridge, 2010).

This study includes several control variables for each estimation based on the existing studies. The estimations always control for ethnic heterogeneity, regional income per capita, population, and openness to international trade. An ethnically diverse society calls for greater autonomy and thereby increases support for fiscal decentralization (Panizza, 1999; Alesina and Spolaore, 2003). Moreover, a socially plural society has different preferences over what to provide and where and how to provide public goods (Benabou, 2000; Chandra, 2001). Finally, several researchers suggest that a more diverse society is associated with a larger income gap due to a lack of trust (Easterly, 1999) and the judgment of the policy-maker in a diverse society in allocating resources (Franck and Rainer, 2012). The income level may affect the provision of public goods (Kuijs 2000; Akitoby, Clements and Gupta, 2006). A rich region is more proficient in reducing the income disparity compared to poor regions (Lessmann, 2009; Liu, Martinez- Vazquez, and Wu., 2016; Kyriacou, Muinello-Gallo and Roca-Sogales, 2017). Several researchers suggest that decentralization is positively associated with regional income (Panizza, 1999; Latelier, 2005; Bodman and Hodge, 2010). Demographic factors, such as population, affects the number of public goods provided by the government (Alesina, Baqir and Easterly, 1999; Shonchoy, 2010). The regional population is applied to control the effect of the demographic factor on fiscal decentralization (Wallis and Oates, 1988; Panizza, 1999) and regional disparity (Sylwester, 2003; Lesmann, 2009). The provision of public goods is one of the many

ways that the government protects society against external risk in an open economy (Rodrik, 1998; Shelton, 2007). Furthermore, increasing trade may influence regional disparities (Rodriguez-Pose, 2012; Dabla-Norris, Kochar, Suphaphiphat, Ricka and Sounta, 2015). This study employs an ethnic fractionalization index, the log of regional GDP per capita, the log of regional population, and the share of regional trade (total export and import) to regional GDP to measure ethnic diversity, regional income, population, and openness to international trade, respectively.

Population density, the geographic size of the region (area), and intra-governmental transfer per capita are controlled when estimating the fiscal decentralization equation. A small region is more likely to be easier to govern and logistically cheaper to manage. Hence, it calls for a lower demand for decentralization (Panizza, 1999; Arzhagi and Henderson, 2005). The surface area (in square kilometers) of the regions is applied to measure the geographic region size. The intra-governmental transfer also contributes to a determination of the autonomy of the local government. The intra-governmental fund is a substitute for local revenue to support the local government so that it can perform its functions (Latelier 2005; Bodman and Hodge, 2010; Lewis, 2014). The log of intra-governmental per capita is used in this study to represent intra-governmental transfer.

In estimating the regional income inequality equation, this study applies a human capital variable and unemployment. The contribution of human capital is vital for economic outcomes including income distribution (Mankiw, Romer and Weil, 1992; Barro and Lee, 2001). Years of schooling is also applied as a proxy for human capital.

The estimation of public goods controls for the share of the urban population and the dependency ratio. A greater share of the urban population and the dependency ratio triggers a larger demand for public goods from the local government (Gisselquist, 2015; Coady and Dizioli, 2017). The dependency ratio is measured as the number of the population that is under 15 and over 65 years old against the number of people between 15 and 64 years old.

4.   ESTIMATION RESULTS AND ROBUSTNESS CHECK

4.1.   Estimation Results

Table 2 presents the estimation results. For all of the estimations, the p-value of the Kleibergen-Paap rk LM statistic, which is an LM test of whether the excluded instruments are relevant or correlated with endogenous regressors, are below the significance level of 0.01 and this rejects the null hypothesis (i.e., the IVs are irrelevant). Hence, the model is identifiable. The p-values of the Kleibergen-Paap rk Wald statistic, which tests the correlation of the instruments with the regressor but weakly, are below a 0.01 significance level. These results indicate that no weak IVs exist. The p-value of the Hansen J statistics in all of the estimations fails to reject the null hypothesis, which

indicates that the overidentifying restrictions are valid (Baum Schaffer and Stillman, 2007; Roodman, 2009; Cameron and Trivedi, 2010).

For the second finding, we focused on the economic significance of the result. Figure 2 describe the estimation result.

Beginning with the relationship between the fiscal decentralization and the provision of local public goods, the results indicate no evidence of joint determination between these two variables of interest. For the interaction between fiscal decentralization and regional income inequality, the result reveals that fiscal decentralization is associated with lower regional income inequality but does not support the argument that regional income inequalities have an influence on the degree of decentralization. This result indicates that fiscal decentralization is associated with lower regional inequality. When the fiscal decentralization index increases by 1 point, the regional inequality decreases by 0.044 points.

Table 2.   Estimation Results

	FD	RI	PG
Fiscal decentralization (FD)		-0.044**	-0.409
Regional inequality (RI)	-0.096		0.050**
Public goods (PG)	-0.004	0.027***	
Ethnic fractionalization index	0.017	0.146*	0.049
Income per capita	0.079***	-0.046	0.632**
Population	0.02	-0.042	0.569***
Share of trade	0.143**	0.133**	0.012
Area	0.03*		
Population density	0.00002**		
Intragovernmental transfer per capita	-0.038		
Unemployment		0.018**	
Years of schooling		-0.068**	
Urban population			-0.005
Dependency ratio			0.001
N	462	462	462
Kleibergen-Paap rk LM p-value	0.000	0.000	0.000
Kleibergen-Paap rk Wald p-value	0.000	0.000	0.000
Hansen J test p-value	0.331	0.378	0.403

Notes: *, **, *** measures statistical significance at the 10, 5, and 1 percent level, respectively.
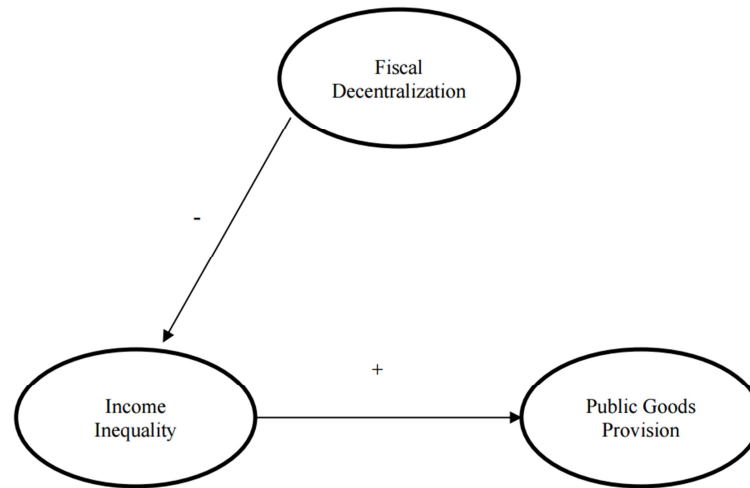
Source: Author's estimation.

Figure 2. Estimation Results

Fiscal decentralization authorizes local governments with substantial political and economic power to govern their regions in accommodating local preferences. Indonesian local governments enjoy almost full discretion in designing local economic development programs within their region. They can design and implement a set of locally customized pro-growth policy programs which is not possible during the centralization period. Due to different situations and preferences across the regions, each local government has a different pro-growth program. The intra governmental transfer fund from the central government becomes a primary source of most local governments to level the development gap between regions by introducing local pro-growth programs that can counterbalance the detrimental effect of fiscal decentralization on income distribution. The design of Indonesian intra-governmental transfer has reduced the regional inequality and inter-region rivalry triggered by decentralization (Hoffman and Guerra, 2007).

Regarding the relationship between regional income inequality and the provision of local public goods, the result confirms that these two variables are simultaneously determined. When the measure of regional inequality increases by 1 point, the provision of public goods increases by 0.050 points. Since decentralization, the financial and political powers of the local governments significantly increased along with the responsibility. Large regional income inequalities in Indonesia have forced the local government to provide more local public goods. It is widely accepted that improving the provision of local public goods (i.e., especially in the education, health, and infrastructure sectors) to offer equal opportunity for all provides opportunities for a good start in life (World Bank, 2007). To address large income inequality, the Indonesian government has made a clear commitment to provide local public goods, especially in the education and health sectors. The local government is obligated to allocate at least

twenty percent and ten percent of the local budget for the education (Indonesia Law 20/2003) and health (Indonesia Law 36/2009) sectors, respectively. Since then, to ensure equal access for local constituents, each local government has provided a greater mix of local public goods.

Simultaneously, when the provision of public goods increases by 1 point, the regional income inequality increases by 0.027 points. One possible explanation is the different state of initial economic development, and the uneven distribution of resources among regions may influence the impact of the provision of local public goods, which worsens regional income inequality. Intra-governmental transfer enables local Indonesian governments to deliver local public goods to their constituents without intervention from the central government. Initially rich regions had sufficient resources to provide more advanced public goods and the ability to attract skilled workers. In addition, rich regions that had more advanced public goods (e.g., modern public clinics, well-equipped public schools, and more electricity, bridges, and roads) that enabled them to concentrate on generating more value-added goods/services with skilled workers who are more productive compared to rest of the country. However, poor regions must struggle to provide basic public goods using workers with limited skills and attempt to catch up with developed regions. Without any intervention from the central government to manage resource allocation between rich and poor regions, the provision of local public goods will exacerbate regional income disparity.

Finally, we address the results regarding the control variables. In the fiscal decentralization equation, the variables of regional income per capita, trade, population density, and geographic area present positive and significant signs. The estimation of regional income inequality showed that ethnic diversity, trade, and unemployment positively correlated with income inequality, while the years of schooling contributed negatively to the distribution of income. Regional income per capita and population were associated with a larger provision of public goods.

4.2. Robustness check

The robustness of the results can be evaluated by employing an alternative measure of fiscal decentralization, regional income inequality, and the provision of public goods. This paper employs a revenue decentralization measure, i.e., the Gini index, and a log of regional infrastructure expenditures as a substitute to measure fiscal decentralization, regional income inequality, and the provision of public goods. The revenue decentralization measure defines as the ratio of local government revenue to total government revenue.

Table 3 summarizes the results of the sensitivity check with an alternative measure of the key variables. Overall, the result is robust for the changes of important variables.

Table 3.   Robustness Check

	FD	RI	PG
Fiscal decentralization (FD)		-0.044**	-0.409
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Kleibergen-Paap rk Wald p-value	0.000	0.000	0.000
Hansen J test p-value	0.331	0.378	0.403

Source: Author's estimation.

5.   CONCLUSION

Literature studies on the determinants of fiscal decentralization, regional income disparities and the provision of public goods indicate a possibility that these variables are interdependent. To address the limitation of previous studies on this topic, this study applies the SEM approach, which directly addresses the potential interdependencies among the key variables.

The result reveals that fiscal decentralization is associated with lower regional income disparity but does not support the idea that income inequalities have an influence on fiscal decentralization. The result confirms that regional income inequality and the provision of public goods are simultaneously determined. The result provides no evidence of a significant dependence between fiscal decentralization and the provision of local public goods.

Fiscal decentralization enables each local government to design and implement a local pro-growth development program to level the development gap between regions and may counterbalance the detrimental effect of fiscal decentralization on income inequality. To address the broad income gap, Indonesian local governments provide a significant amount of local public goods to their constituents, especially in the productive sectors such as education and health. At the same time, the provision of local public goods seems to worsen regional disparity. The different state of initial economic

development and the uneven distribution of resources among regions may affect the impact of the provision of public goods on regional inequality.

Since regional income and the provision of local public goods are simultaneously determined, there must be an intervention from the central government to avoid public goods' adverse impact on regional income inequality. To mitigate the adverse effect of local public goods provision on regional income inequality, the central government must measure the impact of local public goods provision on the regional and national levels. Joint coordination between the central government and local governments as well as between all local governments, may be able to do so. Based on the impact assessment, the central government proposes a set of public goods provided by the local government, which has the lowest impact on regional income distribution. The recommendation may vary across regions depends on the local need and its impact on regional income distribution. More evenly regional income distribution may lead to income convergence in the national level

To ensure the participation of the local government, a stick and carrot approach may be implemented. An additional (reduced) amount of intergovernmental transfer may work as an incentive (punishment) to confirm the local government's involvement in the long-term.

APPENDIX

Table A1.   List of Provinces

No	Provinces	No	Provinces	No	Provinces
1	Nanggroe Aceh Darussalam	12	Jawa Barat	23	Gorontalo
2	Sumatera Utara	13	Banten	24	Sulawesi Tengah
3	Sumatera Barat	14	Jawa Tengah	25	Sulawesi Selatan
4	Riau	15	D.I. Yogyakarta	26	Sulawesi Tenggara
5	Kepulauan Riau	16	Jawa Timur	27	Sulawesi Barat
6	Jambi	17	Bali	28	Nusa Tenggara Barat
7	Sumatera Selatan	18	Kalimantan Barat	29	Nusa Tenggara Timur
8	Bangka Belitung	19	Kalimantan Tengah	30	Maluku Utara
9	Bengkulu	20	Kalimantan Selatan	31	Maluku
10	Lampung	21	Kalimantan Timur	32	Papua
11	Dki Jakarta	22	Sulawesi Utara	33	Papua Barat

REFERENCES

Ahmad, E. and A. Mansoor. A (2002), "Indonesia: Managing Decentralization," International Monetary Fund (IMF) Working Paper No.136.

Ahmad. E. and G. Brosio (2009), *Does Decentralization Enhance Service Delivery and Poverty Reduction,* UK: Edward Elgar.

Akitoby, B., B. Clements, S. Gupta, and G. Inchauste (2006), "Public Spending, Voracity, And Wagner's Law in Developing Countries," *European Journal of Political Economy,* 22(4), 908-924.

Alesina, A. and R. Perotti (1996), "Income Distribution, Political Instability, and Investment," *European Economics Review,* 40, 1203-1228.

Alesina, A. and D. Rodrik (1994), "Distributive Politics and Economic Growth," *Quarterly Journal of Economics,* 109, 465-490.

Alesina, A., R. Baqir and W. Easterly (1999), "Public Goods and Ethnic Divisions," *Quarterly Journal of Economics,* 114(4)*,* 1243-1284.

Alesina, A. and E. Spolaore (2003), *The Size of Nations*, London: MIT Press.

Ametoglo, M.E.S., P. Guo and K.O. Wonyra (2018), "Regional Integration and Income Inequality in ECOWAS Zone," *Journal of Economic Integration*, 33(3), 604-628.

Arzhagi, M. and V. Henderson (2005), "Why Countries are Fiscally Decentralizing," *Journal of Public Economics*, 89, 1157-1189.

Bajaar, S. and M. Rajeev (2016), "The Impact of Infrastructure Provisioning on Inequality in India: Does the Level of Development Matter?" *Journal of Comparative Asian Development,* 5(1), 122-155.

Baltagi, B.H. (2013), *Econometric Analysis for Panel Data (5thed),* New York: Wiley and Sons.

Banerjee, A. (2004), "Who is Getting the Public Goods in India? Some Evidence and Some Speculation," in Basu, K. (Eds), *India's Emerging Economy: Performance and Prospects in the 1990's and beyond,* Cambridge: MIT Press.

Banerjee, A. and R. Somanathan (2007), "The Political Economy of Public Goods: Some Evidence from India," *Journal of Development Economics,* 82, 287-314.

Barro, R. and J. Lee (2001), "International Data on Educational Attainment: Updates and Implications," *Oxford Economic Paper,* 53, 541-563.

Baum, C.F. (2006), *An Introduction to Modern Econometrics Using Stata*, Texas: Stata Press.

Baum, C.F., M. Schaffer and S. Stillman (2007), "Enhanced Routines for Instrumental Variables Generalized Method of Moments Estimation and Testing," *Stata Journal*, 7(4), 465-506.

Benabou, R. (2000), "Unequal Societies: Income Distribution and the Social Contract," *American Economic Review,* 90*,* 96-129.

Beramendi, P. (2007), "Inequality and the Territorial Fragmentation of Solidarity," *International Organization*, 61, 783-820.

Bodman, P. and A. Hodge (2010), "What Drives Fiscal Decentralisation? Further

Assessing the Role of Income," *Fiscal Studies,* 31, 373-404.

Bolton, P. and G. Roland (1997) "The Breakup of Nations: A Political Economy Analysis," *Quarterly Journal of Economics*, 12, 1057-1090.

Bonet, J. (2006), "Fiscal Decentralization and Regional Income Disparities: Evidence from Colombian Experience," *Annals of Regional Science*, 40, 661-667.

Brakman, S., H. Garretsen, and C. van Marrewijk (2002), "Agglomeration: The Role of Government Spending," CESIFO Working Paper, 775.

Cameron, A.C. and P.K. Trivedi (2010), *Microeconometrics Using Stata.* Texas: Stata Press.

Chandra, K. (2001), "Ethnic Bargains, Group Instability, and Social Choice Theory," *Politics and Society,* 29, 337–362.

Coady, D. and A. Dizioli (2017), "Income Inequality and Education Revisited: Persistence, Endogeneity and Heterogeneity," *Applied Economics,* 50(2), 1-15.

Cowell, F. (2001), *Measuring Inequality,* England: Oxford University Press.

Dabla-Norris, E., K. Kochar, N. Suphaphiphat, F. Ricka, F and E. Tsounta (2015), "Causes and Consequences of Income Inequality: A Global Perspective," *International Monetary Fund Working Paper*, SDN/15/13.

Easterly, W. (1999), "The Middle-Class Consensus and Economic Development," *World Bank Working Paper*.

Ezcurra, R. and P. Pascual (2008). "Fiscal Decentralization and Regional Disparities: Evidence from Several European Union Countries," *Environment and Planning A,* 40, 1185-1201.

Ferreira, F.H. (1995), "Roads to Equality – Wealth Distribution Dynamics with Public Private Capital Complementarity," London School of Economics and Political Science Discussion Paper.

Firebaugh, G. (2003), *The New Geography of Global Income Inequality,* England: Harvard University Press.

Franck, R. and I. Rainer (2012), "Does the Leader's Ethnicity Matter? Ethnic Favouritism, Education, and Health in Sub-Saharan Africa," *American Political Science Review,* 106, 294-325.

Gisselquist, R., S. Leiderer and M. Nino-Zaruza. M. (2014), "Ethnic Heterogeneity and Public Goods Provision in Zambia: Further Evidence of Subnational Diversity Dividend," *World Development,* 78, 308-323.

Greene, W.H. (2017), *Econometric Analysis (8ᵗʰ ed.)*, Upper Saddle River: Prentice Hall.

Hoffman, B. and S.C. Guerra (2007), "Ensuring Inter-Regional Equity and Poverty Reduction," in J. Martinez-Vazquez, J., and Searle, B. (eds.), *Fiscal Equalization: Challenges in the Design of Intergovernmental Transfer,* 31-59, New York: Springer.

Indonesia Law 20/2003 (2003), National Education System. Retrieved from: https://kelembagaan .ristekdikti.go.id/wpcontent/uploads/2016/08/UU_no_20_th_20 03.pdf.

Indonesia Law 36/2009 (2003), National Health. Retrieved from: http://www.depkes.

go.id/resources/download/general/UU%20Nomor%2036%20Tahun2%20009%20ten
    tang%20Kesehatan.pdf.

Indonesia Ministry of Finance. (2016), *Indonesia Government Accounting Standard,*
    Ministry of Finance Regulation Number 114, Retrieved from: https://jdih.
    kemenkeu.go.id/fullText/2015/114~PMK.05~2015Per.pdf.

Khandker, S. and G. Koolwal (2007), "Are Pro-Growth Policy Pro-Poor? Evidence from
    Bangladesh," World Bank.

Kuijs, L. (2000), "The Impact of Ethnic Heterogeneity on the Quantity and Quality of
    Public Spending," International Monetary Fund Working Paper 00/49.

Kyriacou, A., L. Muinello-Gallo and O. Roca-Sogales (2017), "Regional Inequalities,
    Fiscal Decentralization and Government Quality," *Regional Studies*, 51(6), 945-957.

Latelier, L. (2005), "Explaining Fiscal Decentralization," *Public Finance*, 33, 155-183.

Lessmann, C. (2009), "Fiscal Decentralization and Regional Disparity: Evidence from
    Cross-Section and Panel Data," *Environment and Planning A*, 41, 2455-2473.

Lessmann, C. (2012), "Regional Inequality and Decentralization: An Empirical
    Analysis," *Environment and Planning A*, 44, 1363-1388.

Lewis, B. (2013), "Local Government Capital Spending in Indonesia: Impact of
    Intergovernmental Fiscal Transfers," *Public Budgeting and Finance,* 33(1), 76-94.

Lewis, B. D. (2014), "Twelve Years of Fiscal Decentralization: A Balance Sheet,". in H.
    Hill (eds.), *Regional Dynamics in a Decentralized Indonesia*, Singapore: ISEAS.

Liu, Y., J. Martinez-Vazquez and A.M. Wu (2016), "Fiscal Decentralization,
    Equalization, and Intra-Provincial Inequality in China," *International Tax and Public
    Finance*, 24(4), 248-281.

Mankiw, G., D. Romer and D. Weil (1992), "A Contribution to the Empirics of
    Economic Growth," *Quarterly Journal of Economics*, 107, 407-437.

Martinez-Vazquez, J. and R. McNab (2003), "Fiscal Decentralization and Economic
    Growth," *World Development*, 31(9), 1597-1616.

Martinez-Vazquez, J., S. Lago-Penas and A. Sacchi (2017), "The Impact of Fiscal
    Decentralization: A Survey," *Journal of Economic Surveys,* 31(4), 1095-1129.

Meltzer, A. and S. Richard (1981), "A Rational Theory of the Size of Government,"
    Journal of Political Economics, 89(5), 914-927.

Musgrave, R (1969), *Fiscal Systems,* New Haven: Yale University Press.

Nasution, A. (2016), "Government Decentralization Program in Indonesia," Asian
    Development Bank Institute Working Paper No.601.

Oates, W. E. (1972), *Fiscal Federalism*, New York: Harcourt Brace Jovanovich.

Panizza, U. (1999), "On the Determinants of Fiscal Centralization: Theory and
    Evidence," *Journal of Public Economics*, 74, 97-139.

Prud'homme, R. (1995), "The Dangers of Decentralization," *World Bank Research
    Observer*, 10, 201-220.

Roberts, K. (1977), "Voting Over Income Tax Schedules," *Journal of Public Economics,*
    8(3), 329–-340.

Rodriguez-Pose, A. (2012), "Trade and Regional Inequality," *Economic Geography*,

88(2), 109-136.

Rodriguez-Pose, A. and N. Gill (2004), "Is There a Global Link between Regional Disparities and Devolution?" *Environment and Planning A,* 36, 2097-2117.

Rodriguez-Pose, A. and R. Ezcurra (2010), "Does Decentralization Matter for Regional Disparities? A Cross-Country Analysis," *Journal of Economic Geography*, 10, 619-644.

Rodrik, D. (1998), "Why Do More Open Economies Have Bigger Governments?" *Journal of Political Economy,* 106, 997-1032.

Romer, T. (1975), "Individual Welfare, Majority Voting, and the Properties of a Linear Income Tax," *Journal of Public Economics,* 4(2)*,* 163-185.

Roodman, D. (2009), "How to Do Xtabond2: An Introduction to Difference And System GMM in Stata," *Stata Journal,* 9(1), 86-136.

Sacchi, A. and S. Salotti (2011), "Income Inequality, Regional Disparities, and Fiscal Decentralization in Industrialized Countries," Paper presented at Workshop on Regional and Urban Economics: Inequality and Regional Growth Cohesion, 24-25 November 2011. Barcelona, Spain.

Sacchi, A. and S. Salotti (2014), "How Regional Inequality Affects Fiscal Decentralisation: Accounting for The Autonomy of Sub-central Governments," *Environmental and Planning C*, 32, 144-162.

Sepulveda, C. and J. Martinez-Vazquez (2011), "The Consequences of Fiscal Decentralization on Poverty and Income Equality," *Environmental and Planning C: Government and Policy*, 29, 32-343.

Shah, A. (1998), "Fiscal Decentralization - An Elusive Goal? A Case Study of Indonesia and Pakistan Experiences," in Bird, R. and F. Vaillencourt (eds.), *Fiscal Decentralization in Developing Countries*, London: Cambridge University Press.

Shelton, C. (2007), "The Size and Composition of Government Expenditure," *Journal of Public Economics,* 91, 2230-2260.

Shonchoy, A.S. (2010), "What Is Happening with the Government Expenditure of Developing Countries? A Panel Data Study," Retrieved from: https://www.econstor. eu/bitstream/10419/39964/1/251_shonchoy.pdf

Silva, J. A. (2005), "Devolution and Regional Disparities in the Philippines: Is There a Connection?" *Environmental and Planning C: Government and Policy*, 23, 399-417.

Statistics Indonesia (2016), *Financial Statistics of Regency/Municipality Government 2015-2016*, Jakarta: Statistics Indonesia Publishing.

Stegarescu, D. (2009), "The Effect of Economic Integration and Political Integration on Fiscal Decentralization: Evidence Form OECD Countries," *Canadian Journal of Economics*, 42, 694-718.

Sylwester, K. (2003), "Income Inequality and Population Density 1500 AD: A Connection," *Journal of Economic Development,* 28(2), 61-82.

Tiongson, E.H and H.R. Davoodi and S.S. Asawanuchit (2003), "How Useful Are Benefit Incidence Analyses of Public Education and Health Spending," International Monetary Fund (IMF) Working Paper No. 227.

Wallis, J.J and W. Oates (1988), "Decentralization in the Public Sector: An Empirical Study of State and Local Government," in Rosen, H.S. (ed.), *Studies in Fiscal Federalism*, Chicago: University of Chicago Press.

Wooldridge, J.M. (2010), *Econometric Analysis of Cross Section and Panel Data (2nd ed.)*, Cambridge: MIT Press.

World Bank. (2007), "Spending for Development: Making the Most of Indonesia's New Opportunities," Jakarta: World Bank.

World Economic Forum. (2017), "The Global Competitiveness Report 2016-2017," Retrieved from: http://www3.weforum.org/docs/GCR20162017/05FullReport/The GlobalCompetitivenessReport2016-2017_FINAL.pdf.

Zhang, X. (2006), "Fiscal Decentralization and Political Centralization in China: Implications for Growth and Inequality," *Journal of Comparative Economic*, 34(4), 713-726.

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