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Research Paper

Spatial Spillover Impact of Sectoral Government Expenditure on Poverty Alleviation in South Kalimantan Province

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Abstract

Poverty is still one of the forefront issues in developing countries. It could hamper the achievement of sustainable development goals, thereby triggering a recurring call on the government's role in mitigating poverty. This paper contributed to the debate on the role of sectoral government spending under the fiscal decentralization policy to combat poverty. Using a case study in South Kalimantan Province, we employed a spatial panel data analysis covering 13 districts from 2010-2020. This study investigated the presence of spatial dependency on poverty and the spatial spillover impact of government expenditure—education, health, housing, public facilities, and social protection—on poverty. The research found the existence of spatial autocorrelation on poverty and the significant high-cluster poverty in the agriculture-based region. The direct estimation from the Spatial Durbin Model uncovered that government expenditure on education, health, and social protection significantly alleviated poverty, while housing and public facilities expenditure remained insignificant in reducing the poverty rate. Besides, education spending also has a significant indirect effect on poverty, indicating the spatial spillover impact of education spending by the neighbors on poverty in a region.

Keywords: poverty; sectoral government expenditure; spatial dependency; spatial spillover impact; Spatial Durbin Model (SDM)

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1. Introduction

Indonesia is a developing country that constantly fights against poverty, one of its major development challenges (Gibson & Olivia, 2020; Puspita, 2015; Suryahadi et al., 2020). Poverty eradication has become a concern of some policymakers and researchers as it can cause a number of problems in society, such as an increase in homicide rate (Dong B et al., 2020; Messner, 1982; Rogers & Pridemore, 2013) and malnutrition (Adeyeye et al., 2017; Siddiqui et al., 2020). Indonesia, which has implemented fiscal decentralization since 2001, was able to reduce the poverty rate from 19.14 percent in 2000 to 9.68 percent in 2020 (BPS, 2021). Some studies believed that fiscal decentralization was the primary factor behind this decrease (Abdillah & Mursanto, 2016; Nursini & Tawakkal, 2019; Syamsul, 2020). The theoretical literature on the role of fiscal decentralization in poverty reduction was originally proposed by Oates (1999), who argued that fiscal decentralization through the role of subnational public expenditure can improve the population's welfare. Subnational governments are considered to have a broader understanding of the potential and problems in their area; thus, they are believed to produce more effective and efficient policies. Recent research is now concentrated more on increasing sectoral government expenditure that benefits the poor, such as basic education and health, due to fiscal decentralization (Granado et al., 2005). Moreover, Martinez-Vazquez (2001) revealed that fiscal decentralization affects the increasing expenditure on education and health services that eventually improve the human development and welfare of poor families.

Several studies and empirical evidence showed that some sectoral government spending has an impact on poverty though the results are still inconclusive. Using a general equilibrium approach, Jung and Thorbecke (2003) uncovered that education expenditure targeting the poor household significantly reduces poverty. Employing the same approach, Balma et al. (2012) also found that public expenditure on education leads to a decrease in household poverty. Meanwhile, a study by Komarudin and Oak (2020) discovered the negative effect of health expenditure on poverty by employing a random effect model on panel data. Arma et al. (2018) revealed that education and health spending significantly reduce the poor while road infrastructure spending remains insignificant, as the government expenditure on road construction might benefit the rich more than the poor. Analyzing poverty in developing countries, the study by Slater (2011) and Kiendrebeoho et al. (2017) provided the same conclusion that social protection works better in alleviating poverty in a region. On the contrary, Anderson et al. (2018) studied the effect of government spending on poverty in low and middle-income countries using meta-regression analysis and found unclear conclusions. Government spending on social welfare has a better impact on lowering the poverty rate than education and health spending, though only through limited evidence. Government spending is more effective in lowering the poverty rate in Eastern Europe and Central Asia than in Sub-Saharan Africa. This result is in line with Omodero (2019), who discovered that government expenditure on education and health does not significantly combat poverty.

Apart from research conducted abroad, there is also some research related to the influence of government expenditure on poverty in Indonesia. Some found a negative effect on particular government spending on poverty alleviation (Mardiana et al., 2018; Nugroho, 2017; Suwardi, 2011), while others discovered an insignificant impact (Alamanda, 2020; Khairunnisa et al., 2021). However, almost all of the studies were conducted without spatial consideration. Some further studies on poverty in Indonesia attempted to explore the role of spatial analysis, even though it was still limited. Aklilu (2015) performed Spatial Lag Model (SLM) to investigate poverty and its determining factors in Java. Meanwhile, considering the spatial dependency on the independent and dependent variables, Alvitiani et al. (2019) performed Spatial Durbin Model (SDM) to analyze poverty in Central Java. In contrast, in analyzing farmers' poverty in Jambi, Nashwari et al. (2017) utilized Geographically Weighted Regression (GWR) that considers the spatial deference among observations. However, very few studies utilized government spending as one of the determinant factors in poverty.

Poverty in Indonesia has declined since 2000; however, the gap between provinces is still high, indicating a high regional imbalance (BPS, 2021). According to BPS (2021), Kalimantan island has the smallest percentage of poor people in Indonesia (6.16 percent), with the population below the poverty line reaching 1.02 million people. South Kalimantan, in particular, has the lowest poverty rate in the Kalimantan region, with 4.38 percent in 2020. The economy of South Kalimantan is also unique, where the mining sector dominates the economic structure. The share of the mining sector in 2010 reached 27.76 percent and gradually fell to 18.29 percent in 2020. Therefore, empirical evidence is needed to

analyze whether government policies, economic structure, and other macroeconomic variables have a role in reducing poverty in South Kalimantan Province.

Considering that Indonesia, including South Kalimantan Province, consists of some districts with unique geographical characteristics, it will be beneficial if the poverty analysis in Indonesia considers the spatial approach. As Myrdal (1957) argued that development in a growth center might result in a spillover effect and backwash effect in their neighbors; thus, the spatial dependency on some development indicators, including poverty, is unavoidable. Some studies found that poverty in a region might be affected by poverty in their neighboring areas (endogenous) or other poverty determinants of their neighbors (Adebanji et al., 2008; Miranti, 2021; Alvitiani et al., 2019; Qin & Zhang, 2022). Hence, this study attempted to fill the gap on two fronts. First, it uncovered the impacts of some sectoral government expenditure on poverty alleviation, especially on education, health, housing, and public facilities, and social protection. Second, this study employed spatial econometric analysis that considers the spatial spillover effect of poverty and some determinant variables in the neighboring regions.

2. Methodology

This study used balanced panel data covering 13 regencies in South Kalimantan Province from 2010 to 2020. The data used in this study were secondary data downloaded from the Directorate General of Finance, Ministry of Finance, and BPS-*Statistics Indonesia* website.

2.1 Variables

This study used the data on poverty rates published by BPS-*Statistics Indonesia* as the main dependent variable. This indicator is known as the Headcount index (*Po*). BPS calculates poverty using the basic need approach from *SUSENAS* (National Socio-Economic Survey) Consumption Module. The main independent variable in this study was the share of local government expenditure—education, health, housing, public facilities, and social protection—on the regional gross domestic product, following a study by Clifton et al. (2020). These data were obtained from the Directorate General of Fiscal Balance, Ministry of Finance Indonesia. This study also utilized some control variables, including economic growth, the human development index, and the share of agriculture in the economy. The detailed summary statistics of the data are described in Table 1.

Table 1: The Summary Statistics

Variable	Obs.	Mean	S.D.	Min.	Max.
Poverty Rate/The percentage of the Poor (%)	143	5.173427	1.164037	2.55	7.76
Local Government Expenditure:					
- Education Expenditure (% of GRDP)	143	3.930632	2.161055	0.5292268	9.924615
- Health Expenditure (% of GRDP)	143	1.967689	1.243929	0.293569	6.072569
- Housing and Public Facilities Expenditure (% of GRDP)	143	2.339943	1.369269	0.4019527	7.985943
- Social Protection Expenditure (% of GRDP)	143	0.2051695	0.1205996	0.0311213	0.5923171
Economic Growth (%)	143	4.630839	2.331955	-2.49	8.84
Human Development Index	143	67.78916	4.484352	58.5	79.22
Share of Agriculture Sector on Economy (%)	143	17.06279	8.263294	1.917293	32.96371

Source: Author Analysis (2022)

2.2 Analysis

In this study, the method used to analyze the role of sectoral government expenditure on poverty in South Kalimantan was the spatial panel model. Elhorst (2014) argued that spatial analysis can reduce the estimation bias caused by the exclusion of spatial dependency on the fixed effect model. The use of spatial models can also control the spatial-specific effects caused by observations in spatial units. Myrdal (1957), with his Cumulative Causation theory, also argued that the development of a region, especially a growth center, can cause spillover impacts and backwash impacts to the neighboring areas. It was supported by Tobler's statement that adjacent areas are more strongly interconnected than far-apart areas due to the ease of population migration, technology diffusion, and sharing endowments. Thus, by considering the spatial autocorrelation among observations, it may have more plausible and accurate estimates. Specifically, Elhorst (2014) found that spatial autocorrelation in the spatial econometrics model can occur through three channels: endogenous factor (spatial dependency on dependent variables), exogenous factor (spatial dependency on explanatory variables), and spatial dependency on error terms (some unobserved variables). The four most common spatial econometric models are the Spatial Lag Model (SLM), which considers spatial dependency on dependent variables; Spatial Error Model (SEM), which considers spatial dependency on error terms; Spatial Autoregressive Combine (SAC), which considers spatial dependency on dependent variables and error terms; and Spatial Durbin Model (SDM), which considers spatial dependency on dependent variables and explanatory variables. Nevertheless, this study applied the Spatial Durbin Model following LeSage and Pace's (2009) strategy in the spatial econometric model. Considering the presence of spatial lag on both dependent and explanatory variables is plausible, the Spatial Durbin Model we developed as follows:

$$POV_{it} = \rho \sum_{j=1}^{n} w_{ij} POV_{jt} + EXP_{it}\alpha + X_{it}\beta + \gamma \sum_{j=1}^{n} w_{ij} EXP_{jt} + \theta \sum_{j=1}^{n} w_{ij} X_{jt} + \eta_i + \varepsilon_{it}$$

where:

POV_{it} is the poverty in region i and year t
EXP_{it} is local government sectoral expenditure in region i and year t
X_{it} is the vector of control variables
$\gamma \sum_{j=1}^{n} w_{ij} EXP_{jt}$ and $\theta \sum_{j=1}^{n} w_{ij} X_{jt}$ are the spatial lag of the exploratory variables
w_{ij} is the element of spatial weight matrix W that describes the degree of spatial linkage between two observations i and j
η_i is region-specific effects
$\varepsilon_{i,t}$ is the error terms

To choose the best spatial econometric model to investigate the relationship between explanatory variables and dependent variables, LeSage & Pace (2009) developed a Wald test to check the assumption. There are two Wald's tests:

1. The test of the hypothesis $H_0: \theta = 0$ to see whether the model can be simplified to the spatial autoregressive model (SAR)

2. The test of the hypothesis $H_0: \theta = -\beta\rho$ to check whether the model can be reduced to the spatial error model (SEM)

If the two Wald tests are rejected Ho (significance level is less than α=5%), we can conclude that Spatial Durbin Model is the most appropriate spatial panel model.

As seen in the model above, it is necessary to identify the weight matrix in the spatial econometric model because it is the fundamental element of spatial analysis (Florax & Folmer, 1992). This study used an inverse distance matrix following some studies on spatial econometrics in Indonesia (Vidyattama, 2014; Miranti, 2021; Santos-Marquez et al., 2021). The centroid is defined based on the pure physical distance based on the coordinates data of the centroid of each region.

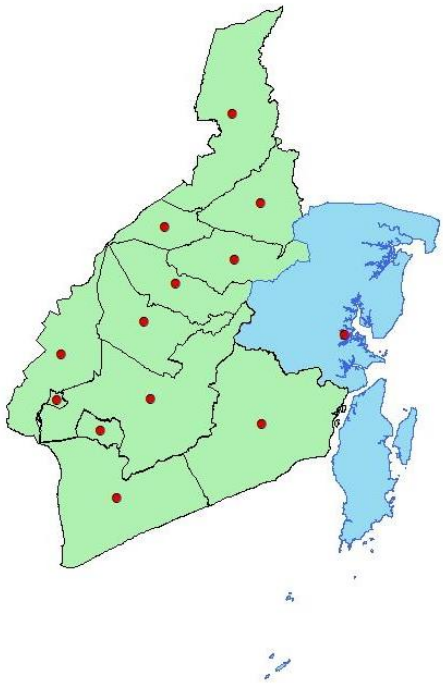

Figure 1. Location of the Centroid of Each District South Kalimantan Province

Source: Author's analysis

This study also employed Exploratory Spatial Data Analysis (ESDA) to identify whether clustering occurred and in which areas the clustering occurred in the spread of poverty in South Kalimantan. ESDA is the spatial analysis to measure global spatial autocorrelation and local spatial autocorrelation (Anselin, 1994, 1995; Anselin et al., 2007). Global Moran's I statistics and Local Indicator of Spatial Autocorrelation are indexes developed by Anselin (1995) to answer these questions. The formulas are as follows:

1. Global Moran's I

$$I = \frac{n}{\sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij}} \frac{n \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij}(x_i - \underline{x})(x_j - \underline{x})}{\sum_{i=1}^{n} (x_i - \underline{x})^2}$$

Where:
n is the number of regions
x_i is the value of variable x taken in region i
x_j is the value of variable x taken in region j
$\underline{x}$ is the average value of variable x
w_{ij} is the ijth element of the row-standardized spatial weight matrix W^{std}
I is the global spatial autocorrelation across areas

2. Local Indicators of Spatial Autocorrelation (LISA)

$$I_i = \frac{(x_i - \underline{x})}{m_2} \sum_{j=1}^{n} w_{ij}(x_j - \underline{x})$$

$$m_2 = \sum_{i=1}^{n} n^{-1}(x_i - \underline{x})^2$$

Where:

I_i is the similarity between the deviation of its value from the mean and the deviation from the mean of the observed neighbor's values

3. Results and Discussions

3.1 Poverty in South Kalimantan

South Kalimantan, whose economic share reached 14.03 percent in 2020, had the lowest poverty rate in the Kalimantan region (BPS, 2021). Figure 1 shows the poverty rate in 2020 declined, although it increased slightly in 2019. The poor population in South Kalimantan in 2020 was 4.38 percent, which decreased significantly compared to 2010 at 5.21 percent. The number of poor people in 2020 was approximately 187,000 people, decreasing by around 4600 people compared to 2019. This poverty rate reduction in 2020 was the best achievement in the last ten years. This is an encouraging achievement during the slowing economy of South Kalimantan's economy due to the COVID-19 pandemic.

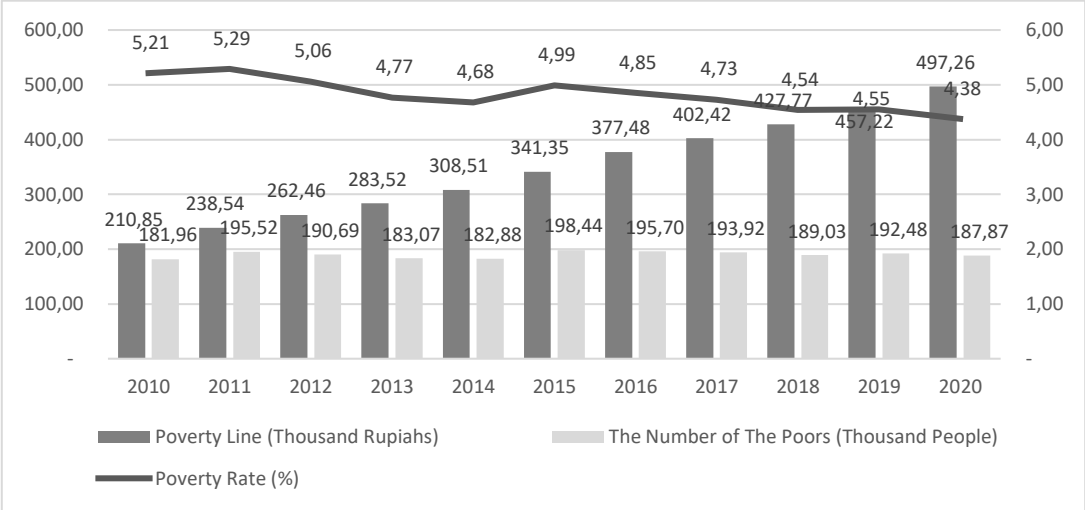

Figure 2. Poverty Indicators of South Kalimantan Province, 2010—2020

Source: BPS-Statistics Indonesia (Author edited)

In addition to investigating the development, it is important to identify where the concentration of poverty occurred, which would allow the local governments to take more apparent actions to overcome the poverty problems. Figure 2 below slightly indicates that the distribution of poverty in the South Kalimantan Province district shows a clustering. Districts with high poverty are located near other districts with high poverty, and vice versa. Overall, the poverty distribution of South Kalimantan districts from 2010, 2016, and 2020 does not show a significant difference. The district in the north has the highest poverty rate compared to other areas. The region is an area whose economy is based on agriculture. For example, in 2020, the highest poverty occurred in Hulu Sungai Utara (6.14 percent), whose economy was dominated by agriculture at 16.87 percent. In contrast, Banjar—one of the most urbanized regions in South Kalimantan—became a district with the lowest poverty in 2020 at 2.55 percent. In addition, the areas which have the highest poverty problem in South Kalimantan are also located farthest from the capital, Banjarbaru. Meanwhile, the coastal areas in South Kalimantan—Tanah Laut, Tanah Bumbu, and Kota Baru—have a moderate poverty rate.

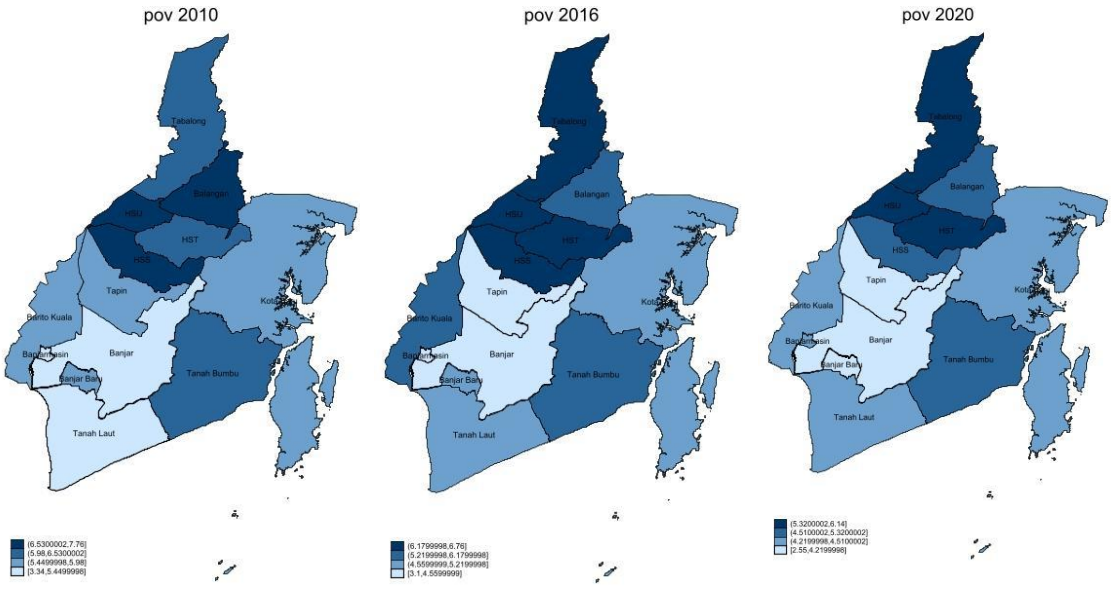

Figure 3. Poverty in South Kalimantan Province, 2010, 2015, 2020

Source: BPS-*Statistics Indonesia* (Author edited)

Table 2: The Global Spatial Autocorrelation on Poverty in South Kalimantan, 2010—2020

Year	Moran's I	sd (I)
2020	0.087***	0.055
2019	0.106***	0.055
2018	0.131***	0.055
2017	0.086***	0.056
2016	0.086***	0.057
2015	0.067***	0.056
2014	0.102***	0.057
2013	0.084***	0.056
2012	0.091***	0.054
2011	0.069***	0.054
2010	0.07***	0.054

Note : * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Author's Analysis (2022)

Table 2 shows that the spatial autocorrelation of poverty in South Kalimantan was positive and significant at a 1 percent significance level in all analysis periods. Since the null hypothesis of spatial autocorrelation was rejected, the results indicated that there was a significant spatial autocorrelation for poverty across districts in South Kalimantan. The positive estimation of Moran's I statistics shows that similar poverty values tended to be clustered. Districts with high poverty are located near other districts with high poverty, and vice versa. However, Global Moran's I can only show the overall similarity regardless of the districts in which the clustering occurred in. The districts significantly performing spatial clusters or spatial outliers can be seen from the results of Local Indicators of Spatial Analysis in Figure 4 below.

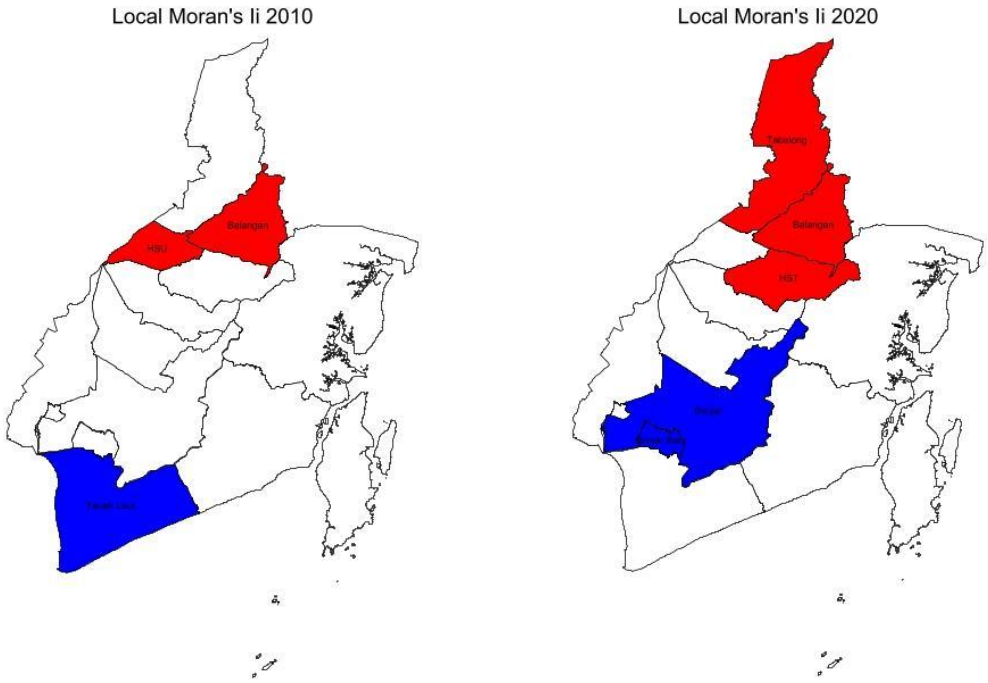

Figure 3. LISA on Poverty in South Kalimantan Province, 2010 and 2020

Source: Author's Anaysis (2022)

Figure 3 shows that in 2010 Hulu Sungai Utara and Balangan performed hotspot clustered, while the coldspot cluster was located in Tanah Laut. Slightly different, in 2020, 3 (three) districts—Hulu Sungai Tengah, Balangan, and Tabalong—were the hotspot areas of poverty, while coldspot ones were located in Banjarbaru and Banjar. The result revealed that the hotspot cluster – the cluster with high poverty – was located in a district far from the capital. Meanwhile, clusters of districts with low poverty—coldspots—were in areas close to the capital city. Thus, it indicates that most poverty problems occur in areas quite far from urban centers.

The LISA results can provide an overview of the local government in dealing with the problems of poverty in South Kalimantan Province. By knowing the locations where high poverty occurs, the government is expected to be able to produce more targeted policies. The government can carry out spatial action planning by considering the areas with the highest poverty clusters. The provision of special assistance for poverty alleviation programs can be focused on these areas, such as sanitation and agricultural assistance for low-income families in Hulu Sungai Utara.

3.2 Spatial Panel Analysis of Poverty in South Kalimantan

We employed Spatial Durbin Model to analyze the impacts of some sectoral government expenditures on poverty. Our model controlled the region and time-specific effect to accommodate the influence of region-specific effects, such as distance from the capital or district type, and time-specific effects, such as the COVID-19 shock, that can affect the estimation results. The detailed result is presented in Table 3 below.

Table 3: The Spatial Durbin Model (SDM) Regression on Poverty in South Kalimantan

Variables	**Poverty (1)**	**Poverty (2)**	**Poverty (3)**	**Poverty (4)**
Local government expenditure on:				
- Education	0.013			
	(0.0379)			
- Health		-0.177***		
		(0.0589)		
- Housing and Public Facilities			-0.0307	
			(0.0375)	
- Social Protection				-1.544***
				(0.513)
Economic Growth	0.0164	0.0232	0.0295	0.0238
	(0.0215)	(0.0214)	(0.0224)	(0.0211)
Human Development Index	-0.0196	-0.0153	-0.0564	-0.0978**
	(0.0471)	(0.0509)	(0.0478)	(0.049)
The Share of Agriculture in the Economy	0.0929**	0.0647**	0.109***	0.117***
	(0.0362)	(0.0317)	(0.0305)	(0.0288)
w. education	0.743***			
	(0.266)			
w.health		-0.644		
		(0.421)		
w.housing			0.003	
			(0.241)	
w.social				-3.941
				(2.978)
Observations	143	143	143	143
Spatial Rho (ρ)	-2.199***	-2.296***	-2.205***	-2.206***
	(0.257)	(0.256)	(0.261)	(0.259)
Year dummies	Yes	Yes	Yes	Yes
Wald test (Ho : θ = 0)	0.0000	0.0000	0.0000	0.0000
Wald test (Ho : θ = - βρ)	0.0000	0.0011	0.0000	0.0000

Notes: standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

Source: Author's Analysis (2022)

Table 3 shows that the Wald test is significant in all four sectoral government expenditures at a 1 percent significance level. Thus, we can conclude that our Spatial Durbin Model (SDM) is the best model to describe the influence of the four functions of government expenditure to reduce poverty in South Kalimantan rather than using the Spatial Lag Model (SLM) or Spatial Error Model (SEM).

The sign in our estimation indicates that almost all four sectoral government expenditures have significant performance in reducing poverty in South Kalimantan. Our model also applied a set of control variables, including economic growth, the human development index, and the share of agriculture sectors in the economy. Among the three, the agriculture sector's share of the economy seems to worsen poverty significantly. These results confirmed our first LISA finding that poverty is higher in the agriculture-based regions. However, the interpretation of the Spatial Durbin Model cannot be analyzed directly by looking at the coefficients on the model. It needs to derive direct effect, indirect effect, and total effect following LeSage and Pace's (2009) arguments. The detailed effect is described in Table 4 below.

Table 4. The Estimated Effect of Sectoral Government Expenditure on Poverty in South Kalimantan

Variables	Direct Effect	Indirect /Spillover Effect	Total Effect
Local government expenditure on:			
- Education	-0.0850*	0.330***	0.245***
	(0.046)	(0.109)	(0.095)
- Health	-0.138*	-0.115	-0.253*
	(0.0726)	(0.165)	(0.138)
- Housing and Public Facilities	-0.0394	0.0334	-0.00596
	(0.0365)	(0.0909)	(0.0882)
- Social Protection	-1.461***	-0.208	-1.669
	(0.417)	(1.007)	(1.117)

Notes: standard errors in parentheses. All the estimations include a full set of control variables.
* p < 0.1, ** p < 0.05, *** p < 0.01

Source: Author's Analysis (2022)

Table 4 reports that the effects of the government expenditure on four sectors—education, health, housing and public facilities, and social protection—were different. Local government expenditure on social protection significantly alleviated poverty in its region at a 5 percent significant level, while that on education and health sector significantly reduced poverty in its region at a 10 percent confidence level. In stark contrast, expenditure on housing and public facilities remained insignificant in reducing its own region's poverty. The precise direct effect estimation on education indicates that when the local government in a region increases its expenditure on education by 1 percent to regional GDP, the poverty level in its region can reduce by 0.085 percent point; while a one percentage point increase in the share of health expenditure to regional GDP is followed by the 0.138 reductions of poverty in its region. Meanwhile, the direct effect of social protection on poverty reduction seemed to be more pronoun than the other sectors. The estimation of -1.461 percent shows that a 1 percent increase in local government spending on social protection significantly ameliorated poverty in its region by 1.461 percent at a 1 percent significance level. However, the means of social protection expenditure's share of regional GDP in South Kalimantan only reached 0.2 percent. Thus, if the local government wants to reduce poverty by 1.461 percent, it needs to increase its social protection spending fivefold. However, it is difficult to achieve this considering the limitation of the local government's budget.

Moreover, the coefficient of spatial lags on explanatory variables, as presented in Table 3, was only significant on education expenditure. It means that only local government expenditure on education had a spatial spillover impact, implying that poverty in a region was not only affected by government expenditure on the education sector in its region but also in neighboring regions. The magnitude of the effect was presented in indirect or spillover impact in Table 4. The positive and significant indirect effect of education expenditure implies that a 1 percent increase in the local government's expenditure on the education sector to regional GDP in a region leads to a 0.33 percent increase in the poverty level in its neighbors. Nevertheless, the indirect or spillover effect was found to be higher than the direct effect. We considered this finding as one of the limitations of the study using a spatial approach, and we left it for further studies to analyze why and how this outcome happened.

3.3 Discussion

The influence of each government's spending on poverty varies. However, looking at the details, we can see that health expenditure had a significant influence on poverty reduction in South Kalimantan. Compared to the average poverty rate in South Kalimantan over the last ten years, which reached 5.17 percent, the increase in the share of health expenditure had an economic significance of 2.6 percent in reducing poverty in its region. This effect was significantly higher than the other expenditures, considering the average share of health expenditure on regional GDP was 1.96 percent. This result confirmed the

negative impact of health expenditure on poverty (Arma et al., 2018; Komarudin & Oak, 2020). Moreover, according to the financial report in South Kalimantan (2022), more than half of the local government's health expenditure was allocated for direct spending to improve health quality, for example, local health insurance (Jamkesda). This innovation was believed to improve the quality of life of the poor, which could eventually improve their welfare. This finding supported Grossman's (1972) argument that the government's spending on health is associated with increased human capital accumulation, eventually improving productivity. Moreover, a study by Martínez-Vázquez et al. (2012) revealed that when government spending can directly affect the poor, it could contribute to enriching the poor's welfare and lifting them from endemic poverty. Therefore, the government must continue to strive to increase the coverage of Jamkesda because BPS (2021) noted that only 52.81 percent of the 40 percent bottom society (the poor) utilized health insurance for treatment, while nearly 60 percent of the rich already took advantage of health insurance.

Education is also the most important dimension in improving the welfare of a region. Although the human capital theory by Becker (1962) proposed that education and training can increase the productivity of each worker, many experts stated that the effect of education on the welfare of the population at reducing poverty and inequality cannot be felt directly (Balma et al., 2012 ; Jung & Thorbecke, 2003). This argument is also reflected in our result, where the effect of education expenditure on poverty remained lower than the other expenditures. However, our result also confirmed that education expenditure in a region had a spillover impact on the worsening poverty of its neighbors. This shows that when a local government increases education spending, it worsens poverty in neighboring areas. This result slightly confirmed that there is a backwash effect greater than the positive spillover effect from the development of a region conveyed by Myrdal (1957) with his Cumulative Causation Theory. Education expenditure in an area can improve the quality of education in that area, but when people have already had a better quality of education, they tend to migrate to the neighboring areas to improve their lives. However, when they cannot compete with other residents, they worsen the poverty conditions in the area. Therefore, the government must pay close attention to the quality of education, especially in border areas that tend to have the opportunity to get a spillover impact from their neighbors. According to BPS (2021), the percentage of poor people aged 15 years and over in South Kalimantan in 2020 whose education below elementary school was still 30.38 percent. It shows that the quality of education for the poor was still relatively low. Thus, it would be beneficial if the government could allocate its education expenditure on education for the poor so that the poor could compete with other residents in finding jobs.

Social protection expenditure seems to have a significant impact on alleviating poverty in South Kalimantan. This result is in line with the main objective of social protection expenditure which naturally targets the poor to increase their welfare (Danziger et al., 1981). This result also corroborates studies by Slater (2011) and Kiendrebeoho et al. (2017), who found the significant and efficient impact of social protection on poverty reduction. However, the average social protection expenditure on regional GDP was quite small and only around 0.2 percent; thus, if the local government can increase the share of social protection on expenditure by 0.2 percent, poverty in its region can reduce by 0.29 percentage points. However, the local government will have difficulty if they have to increase the spending in the social protection field twofold because of their budget limitation. Therefore, what the local government can do is to innovate and evaluate the provision of government program assistance for the poor in the South Kalimantan region. According to BPS (2021), only 31.40 percent of poor households in South Kalimantan received Program Benefits in 2020. Indeed, if viewed based on the distribution by district/city, there were still districts where only one-tenth of the poor households became Program Beneficiaries, namely Hulu Sungai Utara.

Finally, with respect to housing and public facility expenditure, we found an insignificant effect of this expenditure on reducing poverty in South Kalimantan. This might be due to less than a fifth of this expenditure being allocated for improving the quality of poor's housing, while more than 80 percent of the remainder was allocated for big infrastructures, such as bridges, roads, irrigation, dams, and others. These arguments align with Arma et al.'s (2018) finding, which revealed that government expenditure on road construction has no significant impact on poverty reduction since it might benefit the rich more than the poor. Moreover, Chatterjee and Turnovsky (2012) found that when infrastructure spending is allocated for large infrastructure spending, which is expected to increase access, the rich enjoy it more than the poor. This finding was quite unfortunate, considering that only 53.59 percent of poor households in South Kalimantan province had access to safe water, and 11.04 percent of poor households still did not

have latrines/toilet facilities alone or with other households BPS (2021). Therefore, it is highly expected that the government's allocation of housing and public facilities can be maximized and provide decent housing for the poor. Thus, the government is expected not only to concentrate on how much money is spent but also to whom the money is spent and utilized.

Conclusions

This paper's main objective was to analyze and evaluate the spatial spillover impact of sectoral government expenditure to reduce poverty in 13 districts in South Kalimantan Province from 2010-2020 using spatial panel econometrics. The Exploratory Spatial Data Analysis (ESDA) revealed that the global Moran's I statistics were positive and significant at a 1 percent significant level in all periods, indicating there was a spatial clustering on the percentage of the poor in South Kalimantan province. The Local Indicators of Spatial Autocorrelation (LISA) confirmed that high cluster poverty was located in the district far from the capital, characterized by agriculture sectors such as Hulu Sungai Utara, Hulu Sungai Tengah, and Balangan. The sign of the Spatial Durbin Model (SDM) estimation result for each expenditure was generally corroborated with the theoretical prediction. As the share of local government expenditure on education, health, and social protection increased, there was a reduction in the percentage of the poor in South Kalimantan. However, the local government expenditure on housing and public facilities could not perform well in alleviating poverty in South Kalimantan. The results also found that education expenditure by a region significantly worsened poverty in its neighbor due to spatial spillover impact and backwash effect of the development in a region.

This study had policy implications concerning the implementation of fiscal decentralization policy. The government should increase its budget to improve the poor's welfare and lift them from endemic poverty. However, the government should not only focus on increasing its budget but also on choosing the most effective and efficient public spending that specifically targets the poor. The existence of a spatial spillover impact from local government expenditure, especially on education, encourages local governments to improve coordination and collaboration by exchanging information and technology. The result of this study also suggested that the local government should boost the provision of proper infrastructure for poor households, such as drinking water facilities and latrines for the poor.

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