

Article

Efficiency Comparison of Pro-Growth Poverty Reduction Spending before and during the COVID-19 Pandemic: A Study of Regional Governments in Indonesia

Roosemarina Anggraini Rambe , Purmini Purmini, Armelly Armelly, Lizar Alfansi and Ratu Eva Febriani 

Department of Economics, Faculty of Economics and Business, University of Bengkulu, Bengkulu 38371, Indonesia; purmini@unib.ac.id (P.P.); armelly@unib.ac.id (A.A.); lizar_alfansi@unib.ac.id (L.A.); ratuevafebriani@unib.ac.id (R.E.F.)

* Correspondence: roosemarina.rambe@unib.ac.id

Abstract: During the COVID-19 pandemic, all regions in Indonesia have had negative economic growth. It also increased the poverty rate in the country. The government must allocate pro-growth and poverty reduction programs to maintain economic growth and simultaneously reduce poverty. This study aims to measure the relative efficiency of pro-growth poverty reduction spending of local governments in seven regions in Indonesia. This study compares the efficiency scores before and during the COVID-19 pandemic from 2015 to 2019 and 2020. The inputs are five types of government spending: education, health, economic, social protection, and infrastructure. The outputs are economic growth and poverty reduction. Data envelopment analysis with an output-oriented model and a return to scale variable approach is applied. The results show that the highest average local government efficiency score was in Kalimantan, with the lowest being in Sulawesi. The efficiency scores of local governments in the COVID-19 pandemic differ between regions: it remained stable in Kalimantan, increased in Java-Bali, Sumatra, and Sulawesi, and experienced a decline in Nusa Tenggara, Maluku, and Papua. The study concludes that economic growth and poverty reduction can simultaneously measure government efficiency. To be relatively efficient, local governments need to consider allocating pro-growth poverty reduction spending to improve the conditions of both outputs.

Keywords: efficiency; spending on pro-growth poverty reduction; economic growth; poverty reduction; DEA; COVID-19



Citation: Rambe, Roosemarina Anggraini, Purmini Purmini, Armelly Armelly, Lizar Alfansi, and Ratu Eva Febriani. 2022. Efficiency Comparison of Pro-Growth Poverty Reduction Spending before and during the COVID-19 Pandemic: A Study of Regional Governments in Indonesia. *Economies* 10: 150.

<https://doi.org/10.3390/economies10060150>

Academic Editor: Ștefan Cristian Gherghina

Received: 6 May 2022

Accepted: 15 June 2022

Published: 18 June 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The efficiency of government spending is a crucial topic in the public economy. The government has the authority to regulate policies and execute programs by using government spending. As the public fund's government activities, it is pertinent that the government spend efficiently.

In measuring the efficiency of government spending, socio-economic indicators are often used as outputs, such as economic growth (Albassam 2020; Sharif et al. 2021). This is because government policies and programs reflected in these expenditures also determine whether the government can encourage economic growth. Thus, it is necessary to evaluate whether government spending is used efficiently in promoting economic growth.

Poverty is another socio-economic indicator used as an output in measuring the efficiency of government spending. The government is expected to be able to create pro-poor policies, regulations, and programs, which are reflected in pro-poor spending. A pro-poor program is a government program that sides with the interests of the poor; a pro-poor program aims to alleviate poverty. Several studies have raised the topic of measuring the efficiency of government spending for poverty alleviation, such as whether pro-poor spending has been efficient in reducing poverty (Ambarkhane et al. 2020; Fonayet et al. 2020).

Previous research has focused only on either economic growth or poverty. However, the simultaneous use of both outputs (economic growth and poverty reduction) in measuring spending efficiency needs to be considered because there is a link between the two. The relationship between economic growth and poverty reduction is still debated. A few prior studies have found that economic growth influences poverty (Ebunoluwa and Yusuf 2018; Kouadio and Gakpa 2021), while other studies have found that economic growth cannot reduce poverty (Loría 2020; Škare and Družeta 2016).

The opposite also exists in that poverty has been found to affect economic growth (Thorbecke and Ouyang 2022). Their research explains that the faster the poverty rate declines, the faster the economy grows, and vice versa. However, there is no certainty on whether economic growth will always encourage poverty reduction. For this reason, this study aims to reveal the need to implement a pro-growth poverty reduction strategy: a strategy devised to encourage economic growth while reducing poverty.

The government can play a role in carrying out this strategy if it is supported by spending supporting economic growth and poverty reduction. This condition is achievable as government spending plays a vital role in driving economic growth (Abdieva et al. 2017; Olaoye et al. 2020; Sedrakyan and Varela-Candamio 2019).

Likewise, government spending can reduce poverty. Previous research revealed that several types of government spending could reduce poverty, such as infrastructure (Sasmal and Sasmal 2016), education (Hidalgo-Hidalgo and Iturbe-Ormaetxe 2018), and social (Celikay and Gumus 2017; Mackett 2020). Another study by Kiendrebeogo et al. (2017) reported that poverty alleviation requires not only one type of spending but a combination of three (social spending, education, and health).

To conclude, the government needs to allocate spending that supports pro-growth poverty reduction, which combines pro-growth spending with pro-poor spending. Spending bolstering pro-growth poverty reduction is essential in the current times, especially in developing countries with high poverty rates. The COVID-19 pandemic in 2020 has exacerbated poverty in various countries. Negative economic growth and increases in poverty still occur due to the COVID-19 pandemic in most countries, including Indonesia. Before the COVID-19 pandemic, the poverty rate in Indonesia was 6.69% (in 2019). The poverty rate increased to 7.38% in 2020 and 7.89% in 2021 (<https://www.bps.go.id>, accessed on 1 February 2022).

With negative economic growth, poverty can worsen if the government cannot efficiently allocate pro-growth poverty reduction spending. It is necessary to measure the efficiency of government spending that supports pro-growth poverty reduction.

Unfortunately, studies on the efficiency of pro-growth poverty reduction spending are rarely conducted. This is because economic growth is no longer the development target in developed countries. However, economic growth remains a target in developing countries, as economic growth is still the primary way to increase income. Moreover, developing countries' economies are still fluctuating, so more effort is needed to encourage economic growth.

The role of government is necessary for developing the economy in developing countries. Coupled with the COVID-19 pandemic in 2020, most countries have implemented lockdown policies. This policy resulted in negative economic growth and increased poverty. Therefore, a study on this topic is needed to assist local governments so that their spending can encourage economic growth and reduce poverty in Indonesia.

Previous discussions indicate that studies on the efficiency of pro-growth poverty reduction are relatively rare. It is even rarer in the context of emerging countries such as Indonesia. Most studies on government efficiency measured outputs (either growth or poverty) separately. This research was conducted to cover the existing research gap. This research aims to measure the relative efficiency of pro-growth poverty reduction spending by local governments in districts/cities in Indonesia and compare the efficiency scores before and during the COVID-19 pandemic. Data Envelopment Analysis (DEA) was applied to the dataset to measure the government spending efficiency. The study

contributes two ways to the existing literature review on government spending efficiency. First, applying two outputs simultaneously would contribute to the body of knowledge of government efficiency literature. Second, measuring the impact of COVID-19 on government efficiency would be the study's originality. The result of the study would add to the body of knowledge on how a pandemic such as COVID-19 influences the efficiency of local governments.

Efficiency measurements are carried out on district and city governments because Indonesia adheres to a decentralized government system. The central government gives autonomy to local governments to administer the government; Act No. 23 of 2014 stated which government affairs are under the local government's jurisdiction and the central government. The affairs under the authority of the central government (whole affairs) consist of foreign policy, defense, security, judicial, monetary and fiscal affairs, and religion. However, the central government still has a national program to maintain and support development in the regions so that welfare is evenly distributed throughout Indonesia. Some of these national programs include education, health, and social assistance.

Meanwhile, the affairs under the authority of the local governments (concurrent affairs) consist of 24 affairs, including education, health, public works, public housing, social affairs, small and medium enterprises, and manpower. Based on this, it is inferred that local governments have broad authority to innovate and create programs in their regions to encourage economic development and improve the welfare of the people in their regions. Local governments play an essential role in regional development. For this reason, it is necessary to measure the efficiency of local government spending.

This paper is described in the following order. It starts with the background and reasons why measuring the efficiency of government spending is necessary (Section 1), followed by a literature review that underlies the selection of inputs and outputs in measuring efficiency (Section 2). The following section elaborates the research method (Section 3). Then, the research and discussion results are described (Section 4). This paper closes with conclusions, research implications, and recommendations (Section 5).

2. Theoretical Background

2.1. Output Used in Efficiency Measurement

The government plays a vital role in improving the economy and the welfare of the people in the region. How the government works and allocates spending will determine the success of this role. The government needs the ability to manage spending efficiently to improve the economy. Therefore, discussing the efficiency of government spending is always a concern.

Socio-economic indicators often used as outputs in measuring government efficiency are indicators in education (Dufrechou 2016; Gavurova et al. 2017; Rambe 2020) and health (Guo et al. 2021; Olanubi and Osode 2017). Education and health indicators are used as outputs because these two are the essential government services for the community. For this reason, the government must spend efficiently to achieve quality education and health, producing good-quality human resources. The efficiency measurement of government spending should not be limited to the output of education and health.

Ouertani et al. (2018) carried out a more comprehensive use of output, whose study measured the relative efficiency of Saudi Arabia's government spending from 1988 to 2013. This study measured the efficiency of government spending in producing seven outputs: primary school, secondary school enrollment, infant mortality, life expectancy, electricity transmission power, energy consumption per capita, and telephone per 100 inhabitants. Likewise, Brini and Jemmali (2016) also measured spending efficiency with multiple outputs: the level of corruption, quality of regulations, government effectiveness, infant mortality rate, life expectancy at birth, secondary school enrollment, adult literacy rate, electric power transmission, and standard telephone lines per 100 inhabitants. These two previous studies used a more comprehensive output to examine the efficiency of government spending, but these studies did not use outputs that described economic

development and people's welfare. The lack of the two outputs is curious, considering that economic development and welfare improvement of a community in an area shows that the local community also enjoys development results.

Other studies have used outputs related to economic development. [Halaskova et al. \(2018\)](#) measured the efficiency of government spending in generating GDP per capita and employment in public services. The study showed which governments could spend efficiently to promote economic development in 27 EU countries in 2009 and 2016.

Another study was conducted in Indonesia ([Tirtosuharto 2022](#)). In this study, the output used was district/city GRDP growth. Based on the DEA calculation using the input-oriented method, this study revealed that the efficiency level of district/city governments is very low on average. In other words, there are differences in the ability of local governments to allocate spending to promote economic growth.

Another empirical study was conducted by [Afonso et al. \(2021\)](#), which measured the efficiency of government spending in 18 OECD countries from 2006 to 2017. In their research, the output used was public sector performance (PSP), defined as the average of opportunity and Musgravian indicators. The opportunity indicator describes the government's performance in the administration, education, health, and infrastructure sectors. Meanwhile, the Musgravian indicators reflect distribution, stability, and economic performance. The economic performance measured by this second indicator is GDP, GDP per capita, and unemployment rate. The efficiency measurement is performed by the data envelopment analysis method.

Studies conducted in provinces in China in 2000 and 2017 ([Ou et al. 2020](#)) used a similar approach. They measured government efficiency by using per capita government spending as an input. The output was GDP per capita, education, health, and infrastructure.

Meanwhile, [Antonelli and De Bonis \(2018\)](#) measured the efficiency of the governments in 22 EU countries, with social protection spending as the input. The output was the social protection performance index (SPPI), which consists of maternal employment in a family, health, labor market, old age, unemployment, disability, income inequality, and poverty.

Previous studies have used economic development as one of the outputs in measuring government efficiency. These studies have measured government spending in driving economic growth; however, they have not included the increase in welfare, reflected by poverty reduction, as one of their outputs in measuring efficiency. The lack of a precedent for an increase in welfare as the output is curious, as the occurrence of economic growth does not guarantee an increase in welfare. Even if a government works efficiently in promoting economic growth in an area, poverty does not necessarily decrease. Economic growth is closely tied with poverty, but whether economic growth has a negative impact on poverty is still up to debate. [Eburnoluwa and Yusuf \(2018\)](#) and [Kouadio and Gakpa \(2021\)](#) have found that economic growth can reduce poverty. [Loría \(2020\)](#) and [Škare and Družeta \(2016\)](#) stated the opposite, in that economic growth cannot reduce poverty.

On the other hand, studies have used poverty reduction as the output to measure government efficiency. [Ambarkhane et al. \(2020\)](#) measured the efficiency of government spending in increasing the percentage of non-poor people in India in 2006, 2010, and 2014 by using the DEA method. Likewise, [Fonayet et al. \(2020\)](#) used the DEA method to measure the efficiency of government spending in reducing poverty in EU-28 countries from 2007 to 2015.

These last two studies focused on the efficiency of government spending in reducing poverty. However, they did not consider the economic growth variable as the output. A government efficient in reducing poverty cannot necessarily encourage economic growth. Previous studies have found that poverty hinders economic growth ([Nakabashi 2018](#)).

Another study by [Yang et al. \(2021\)](#) also measured the efficiency of anti-poverty policies in 28 provinces in China in 2013 and 2017. The output consisted of the number of poor people (an unfavorable outcome for the government), the number of middle school graduates, and the participation rate in rural media schemes. The method used was meta frontier.

A slightly different case is a study by [Cyrek \(2019\)](#), which measured the efficiency of government spending in reducing poverty and income inequality in European Union countries. Thus, the output was the poverty rate and income inequality measured by the DEA method. Similarly, [Shin et al. \(2020\)](#) measured the efficiency of government spending between Korea and OECD countries. The outputs were the income distribution index (Gini ratio and poverty rate after taxes), employment index, and public health index.

In the last three studies, the focus of output was not only on poverty. Income inequality, education, health, and employment were also outputs. However, economic growth has not been used as an output in measuring government efficiency.

Based on previous research findings, it can be inferred that economic growth and poverty are not yet taken as outputs simultaneously in measuring the efficiency of government spending. Even in multi-output studies, economic growth, education, and health indicators are used as outputs. A similar case occurs with the poverty variable; in multi-output studies, poverty and income inequality are used together as the output in measuring efficiency. Thus far, no study has used economic growth and poverty as the outputs, even though the two influence each other. For governments to maintain efficiency in spending in the long term, the use of both outputs (economic growth and poverty reduction) needs to be considered. The government needs to allocate spending in a direction that encourages economic growth and reduces poverty. Such expenditure allocation is called pro-growth poverty reduction spending. Therefore, this paper uses economic growth and poverty levels as outputs to measure the efficiency of government spending, which is pro-growth poverty reduction.

2.2. Inputs Used in Efficiency Measurement

This paper describes the type of spending used in previous studies to determine the correct type to promote economic growth and reduce poverty. As one of the outputs is economic growth, the types of government spending often used to measure efficiency are education, health, and infrastructure ([Afonso et al. 2021](#); [Ouertani et al. 2018](#)). Meanwhile, [Halaskova et al. \(2018\)](#) measured government efficiency using health, recreation, culture and religion, education, and social protection spending.

Based on the empirical study above, it can be seen that expenditures commonly used as inputs in measuring efficiency are spending on education, health, social protection, and infrastructure. The usage of these types of expenditure as input is in accordance with previous studies, which revealed that economic growth is influenced by spending on education, health, and social protection ([Alper and Demiral 2016](#)). Infrastructure spending also influences economic growth ([Babatunde 2018](#); [Ojede et al. 2018](#); [Thanh et al. 2020](#)).

Unfortunately, the measurement of efficiency using economic spending has not been widely used. [Lee et al. \(2019\)](#) revealed that in addition to spending on education, health, social protection, general public services, culture, and the environment, economic spending also influences economic growth. Economic spending is allocated to develop small and medium enterprises, and developing SMEs generates positive economic growth. For this reason, economic spending needs to be included as an input in measuring government efficiency in promoting economic growth (pro-growth spending).

[Cyrek \(2019\)](#) used spending on social protection, education, and health to measure government efficiency in reducing poverty. [Shin et al. \(2020\)](#) used health expenditure, welfare expenditure, and social overhead capital expenditure. Meanwhile, [Antonelli and De Bonis \(2018\)](#) used social protection expenditure.

The previous studies above have shown that spending on education, health, social protection, and infrastructure is used to measure government efficiency in reducing poverty (pro-poor spending). [Purmini and Rambe \(2021\)](#) revealed the role of spending on education, health, economy, and social protection in reducing poverty. Economic spending also plays a role in reducing poverty. Through capital assistance to MSMEs, poor households can possess household businesses to increase their family income. Thus, the poverty rate can be reduced.

Based on the above explanation of pro-growth and pro-poor spending, pro-growth poverty reduction spending is a combination of the two. The five types of spending used as inputs are education, health, economic, social protection, and infrastructure.

3. Materials and Method

3.1. Dataset

This study's first objective is to measure local governments' relative efficiency in using pro-growth poverty reduction spending in every region in Indonesia. The second goal is to compare the efficiency scores before and during the COVID-19 pandemic. In Indonesia, there are seven regions, namely (1) Java-Bali, (2) Sumatra, (3) Kalimantan, (4) Sulawesi, (5) Nusa Tenggara, (6) Maluku, and (7) Papua. Within each area, there are districts and cities with varying numbers. Thus the number of local governments as decision-making units (DMUs) in each region is different. The number of DMUs in Java-Bali is 123; in Sumatra, 154; in Kalimantan, 56; in Sulawesi, 81; in Nusa Tenggara, 41; in Maluku, 20; and in Papua, 42 local governments (districts and cities). Efficiency measurements are carried out in each area using data from the Indonesian National Development Planning Agency (called BAPPENAS), which monitors economic progress in the regions by region. Indonesia's regional economic development is analyzed to see which region is the most successful in developing the economy.

The measurement of government efficiency is carried out by region because poverty levels differ between regions. For example, in the Papua region, the poverty rate of districts and cities is always high on average. In contrast, all districts and cities in the Kalimantan region experience low poverty rates. Likewise, economic growth varies between regions. This signifies the varying abilities of local governments in each region to allocate pro-growth and poverty reduction spending. Therefore, the measurement of government efficiency is carried out in each region, revealing the efficient governments of each region. The efficiency measurement in each area will strengthen the economic development analysis carried out by BAPPENAS.

Research data are in the form of secondary data. Data on economic growth and poverty are obtained from Statistics Indonesia. Data for the five types of per capita spending are obtained from the Ministry of Finance of the Republic of Indonesia.

3.2. Data Envelopment Analysis

This study uses a quantitative descriptive method. The relative efficiency of pro-growth poverty reduction spending is measured using Data Envelopment Analysis (DEA). DEA is used because it has several advantages (Cooper et al. 2002; Coelli et al. 2005; Bogetoft and Otto 2011). First, DEA can measure multiple outputs' relative efficiency against multiple inputs. Second, DEA does not require a functional relationship between outputs and inputs. Third, DEA performs benchmarking between DMUs. In addition, DEA can identify sources of inefficiency and the number of inputs that should be reduced or outputs that should be increased to achieve efficient levels. Based on these reasons, the use of DEA to measure the efficiency of pro-growth poverty reduction spending by local governments in this study is considered appropriate.

The measurement of efficiency with DEA measures the ratio of output/input. There are two outputs in measuring relative efficiency: economic growth and poverty rate. With DEA, a higher value indicates a better value. As the assumption in DEA is positivity, the value must be positive, so the output measurement needs to be adjusted. Each region experienced negative economic growth in 2020. Adjustments are made to the economic growth and poverty rates data to meet the DEA assumptions.

Adjustments for economic growth are made as follows. For example, regional A's economic growth is lowest, at -5.05% . To measure efficiency using positive economic growth, regional A's economic growth is assigned a value of 0.01. Then, the economic growth of other regions is added by 5.06% . For example, if area B is at 3.81% , regional B's

economic growth will be 8.87%. This adjustment is made for all DMUs. Thus, the DEA positivity assumption can be met.

Meanwhile, for the poverty rate, adjustment of the figure is carried out using the formula: $100\% - \text{poverty level} = \text{percentage of the population who are not poor}$. The higher the percentage of the nonpoor population, the better the condition. By adjusting this output value, the DEA assumption is fulfilled.

The next is the inputs for measuring efficiency. Five types of government spending reflect pro-growth poverty reduction spending. The five types of spending are education, health, economic, social protection, and infrastructure. Each region has a varying population; some areas are densely populated and have significant government spending, while others are sparsely populated and have smaller government spending. Local governments with significant expenditures do so because they care for a large population. Therefore, this study uses per capita spending for five types of spending.

Based on this explanation, efficiency measurement is carried out with multiple outputs against multiple inputs. An output-oriented model carries out the measurement with a variable return to scale approach.

The model of the relative efficiency of pro-growth poverty reduction spending for this study is:

Objective function

$$\text{Max } E = \mu_1 Y_1 + \mu_2 Y_2 + \mu_0 \quad (1)$$

Subject to

$$\sigma_1 X_1 + \sigma_2 X_2 + \sigma_3 X_3 + \sigma_4 X_4 + \sigma_5 X_5 = 1 \quad (2)$$

$$\mu_1 Y_1 + \mu_2 Y_2 + \mu_0 - (\sigma_1 X_1 + \sigma_2 X_2 + \sigma_3 X_3 + \sigma_4 X_4 + \sigma_5 X_5) \leq 0 \quad (3)$$

$$\mu_1, 2, \sigma_1, 2, 3, 4, 5 \geq 0 \quad (4)$$

Description: Y_1 is economic growth; Y_2 is the percentage of people who are not poor; X_1 is education spending per capita; X_2 is health spending per capita; X_3 is economic spending per capita; X_4 is social protection spending per capita; X_5 is infrastructure spending per capita; E is the efficiency score; μ_1 indicates the weight of the output (Y); μ_0 indicates the weight of the input X ; μ_0 is the intercept, which can be positive or negative.

This efficiency model is applied to seven regions in Indonesia to reveal which local governments are relatively efficient in each region in Indonesia. The observation period is 2015 to 2020, comparing the efficiency scores before (2015–2019) and during the COVID-19 pandemic (2020). This application determines which local governments are good at managing pro-growth poverty reduction spending and can maintain a relative efficiency position from year to year, both during normal conditions (before the COVID-19 pandemic) and conditions during the COVID-19 pandemic.

4. Research Results and Discussion

The measurement of relative efficiency was carried out in seven regions in Indonesia. Based on the output-oriented model with the Variable Return to Scale approach, local governments' spending efficiency scores are pro-growth poverty reduction in seven regions. Table 1 shows the number of local governments that have achieved relative efficiency, and their percentage of total local governments, in each region before the COVID-19 pandemic (2015–2019) and during the COVID-19 pandemic (2020).

The number of efficient local governments fluctuated annually in all regions from 2015 to 2019. However, in 2020, efficient local governments increased in all regions. Compared to the other six regions, the number of efficient local governments is highest in the Java-Bali region, both in terms of the actual number and the percentage of the total local government. This increase in the number of efficient local governments shows an increase in the relative ability of these governments to promote economic growth and reduce poverty in each region.

Table 1. Development of Efficiency Scores of Local Government Spending in Each Region.

Region	Item	City/District Government					
		2015	2016	2017	2018	2019	2020
Java-Bali	No. of efficient local government	19	16	19	25	20	40
	The ratio of efficient government	15%	13%	15%	20%	16%	32%
	Mean of Efficiency	0.94	0.93	0.93	0.95	0.95	0.97
	Lowest Efficiency	0.76	0.78	0.78	0.83	0.83	0.84
Sumatra	No. of efficient local government	16	13	17	21	16	27
	The ratio of efficient government	10%	8%	11%	14%	10%	17%
	Mean of Efficiency	0.94	0.92	0.92	0.94	0.98	0.94
	Lowest Efficiency	0.83	0.71	0.73	0.79	0.75	0.83
Kalimantan	No. of efficient local government	12	9	14	13	13	15
	The ratio of efficient government	21%	16%	25%	23%	23%	27%
	Mean of Efficiency	0.97	0.97	0.97	0.97	0.97	0.97
	Lowest Efficiency	0.90	0.90	0.90	0.90	0.89	0.90
Sulawesi	No. of efficient local government	5	11	12	8	9	14
	The ratio of efficient government	6%	14%	15%	10%	11%	17%
	Mean of Efficiency	0.64	0.65	0.65	0.65	0.65	0.71
	Lowest Efficiency	0.56	0.57	0.57	0.58	0.59	0.60
Nusa Tenggara	No. of efficient local government	7	9	11	9	10	13
	The ratio of efficient government	17%	21%	27%	21%	24%	32%
	Mean of Efficiency	0.89	0.90	0.95	0.98	0.95	0.94
	Lowest Efficiency	0.71	0.70	0.88	0.82	0.86	0.73
Maluku	No. of efficient local government	4	7	5	5	4	5
	The ratio of efficient government	20%	35%	25%	25%	20%	25%
	Mean of Efficiency	0.88	0.90	0.89	0.89	0.92	0.89
	Lowest Efficiency	0.70	0.72	0.72	0.72	0.79	0.73
Papua	No. of efficient local government	9	9	9	8	7	9
	The ratio of efficient government	21%	21%	21%	19%	17%	21%
	Mean of Efficiency	0.86	0.83	0.88	0.85	0.96	0.87
	Lowest Efficiency	0.68	0.66	0.67	0.63	0.88	0.66

Next, the average efficiency score between regions is discussed. From 2015 to 2019, of the seven regions, the highest and most stable average efficiency score for local government spending was in the Kalimantan region. Kalimantan being the highest shows that the relative ability among local governments is most evenly distributed in the Kalimantan region in allocating spending to encourage economic growth while reducing poverty. Similar conditions occur in local governments in the Java-Bali region. The ability of local governments to allocate spending in these two areas is also better than in the other five regions.

In contrast, the lowest average efficiency score for local government spending is in the Sulawesi region. This discrepancy means that the capabilities of local governments in this region are different. Some local governments can be relatively efficient, but others remain with a very high inefficiency score.

During the COVID-19 pandemic in 2020, the spending on the economy and infrastructure experienced a decline. The decrease in the two types of expenditure was diverted to health spending. Overall, the total local government spending on these five types decreased in 2020. However, even though spending allocations decreased, some local governments could still produce better output than others, so they became relatively efficient during the COVID-19 pandemic. This is true in the Kalimantan region, where the average efficiency score was stable and unchanged ($E = 0.97$). This illustrates the ability of the majority of local governments in Kalimantan to be stable in managing spending. With good spending management skills, this region's average spending inefficiency score is low, around 3% in 2020.

The increase in local governments' capability to work better during the COVID-19 pandemic also occurred in several regions. The average efficiency score of local governments increased in the Java-Bali region. Although negative economic growth occurred during the COVID-19 pandemic, causing an increase in poverty, all areas in the Java-Bali region experienced an increase in the average efficiency score. Improvements in efficiency scores also occurred in Sumatra and Sulawesi. As the region with the lowest efficiency score, Sulawesi could slightly increase the average efficiency score during the COVID-19 pandemic, from 0.65 in 2019 to 0.71 in 2020.

The opposite occurred in the Nusa Tenggara, Maluku, and Papua regions. The average efficiency score of local governments in these three regions decreased during the COVID-19 pandemic. Some local governments in these three regions were slower to adapt to the

COVID-19 pandemic, so they could not allocate their spending better. An overview of the efficiency scores of local governments in seven regions during the COVID-19 pandemic is presented in an efficiency map in Figure 1.

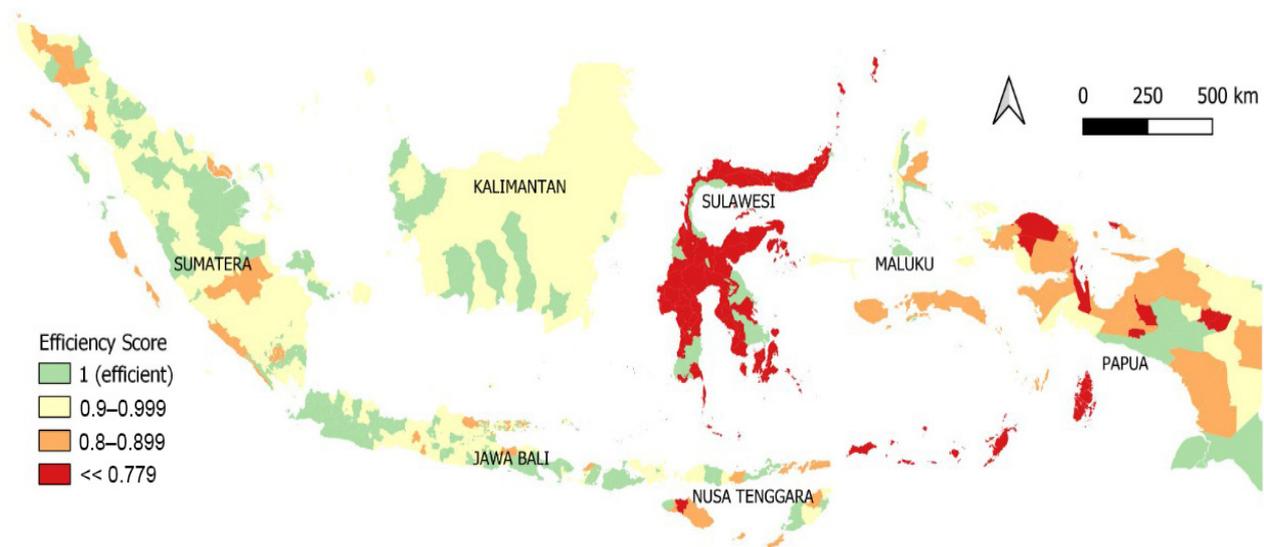


Figure 1. Map of local government spending efficiency in seven regions in Indonesia in 2020.

From Figure 1, during the COVID-19 pandemic, it can be seen that the efficiency score was highest in Java-Bali and Kalimantan, with Kalimantan being the only region with an average efficiency score not lower than 0.899. The ability of local governments to manage expenditure is relatively stable in these two regions. The opposite condition occurs in Sulawesi, where most local governments achieve an efficiency score of <0.80. This score shows relatively very high inefficiency in Sulawesi.

The poverty rate and economic growth conditions in efficient local governments vary, as in Table 2. Based on Table 2, the relatively efficient local governments with the best output are in the Kalimantan region, followed by the Java-Bali region. Kalimantan is a region rich in abundant natural resources such as oil, coal, bauxite, iron, gold, wood, and rattan. This encourages the growth of the processing industry in this area, thereby increasing employment opportunities for the community and thus resulting in a low level of poverty. Kalimantan has the lowest average poverty rate of all regions.

Java-Bali occupies the second position on the lowest-to-highest scale of the average poverty rate. Java-Bali is the most densely populated area in Indonesia, so on average, local government spending per capita in this area is smaller than in other regions. The relatively efficient local governments in this region can allocate less per capita spending than other regions to encourage economic growth while keeping the poverty rate low. The opposite situation occurs in the Papua region. A relatively efficient local government in Papua, namely Merauke, faces the worst efficiency condition among the seven regions. Merauke is a region with high poverty, moderate economic growth, and a very high spending per capita (average of the five types) compared to other regions. This condition explains that the poverty rate and local government spending in Papua are, on average, very high. Unfavorable conditions also occur in relatively efficient local governments in the Nusa Tenggara region, where per capita spending in the efficient regions is relatively low, but the poverty rate remains very high.

Table 2. Government spending per capita, economic growth, and poverty levels in regional governments that are always efficient in seven regions in 2015–2020.

Region	Five Types of Spending/Capita (000IDR)		Economic Growth (in %)		Poverty Rate (in %)	
	2015–2019	2020	2015–2019	2020	2015–2019	2020
Java-Bali	162–410	210–474	4.94–7.37	(1.01)–(9.42)	2.27–10.44	2.14–9.31
Sumatra	215–1171	195–987	5.57–6.87	(1.27)–(4.38)	2.22–5.08	2.16–4.75
Kalimantan	253–635	332–498	4.07–5.02	(0.69)–(1.96)	2.68–4.27	2.55–4.39
Sulawesi	286–235	221–338	7.01–9.53	(0.25)–(1.27)	4.28–10.88	4.54–10.68
Nusa Tenggara	336–531	413–721	5.05–7.11	(2.05)–(6.68)	9.59–17.93	8.47–15.24
Maluku	338–511	287–547	4.88–8.13	(0.02)–(1.95)	2.94–4.70	3.46–4.51
Papua	1012	1135	6.38	(0.77)	10.68	10.03

Note: parentheses () indicate negative values.

Some local governments can allocate spending well; some cannot. Twenty local governments are always in a good position and always relatively efficient from year to year, as depicted in Figure 2a,b. The following figures show bubble charts explaining the condition of 20 local governments that have always been relatively efficient during 2015–2019 and 2020 in seven regions. The figures explain in more detail and confirm the relatively efficient condition of economic growth, poverty, and per capita spending of each local government in the seven regions presented in Table 2.

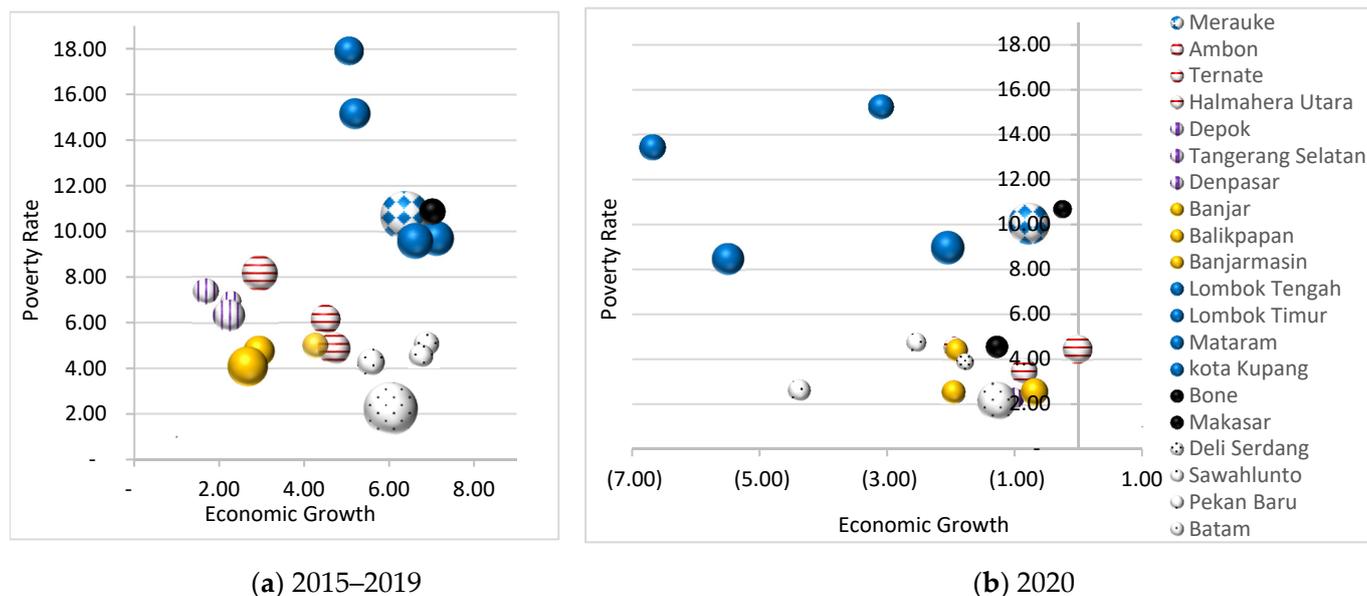


Figure 2. Bubble chart of average poverty rate, economic growth, and per capita spending in 20 relatively efficient local governments in 2015–2019 and 2020. Notes: Local governments in one area have the same colors and patterns. Bubbles with blue boxes are local governments in Papua. Bubbles with red horizontal stripes are local governments in Maluku. Bubbles with purple vertical stripes are local governments in the Java-Bali. Yellow bubbles are local governments in the Kalimantan. Blue bubbles are local governments in the Nusa Tenggara. Black bubbles are local governments in the Sulawesi. White bubbles with black spots are local governments in Sumatra. The bubble size indicates the total size of the five types of spending per capita. The larger the per capita spending, the larger the bubble size.

Out of the 20 local governments that have always been relatively efficient, not all have become peers (benchmarking). Only 11 relatively efficient local governments have always been peers for relatively inefficient local governments. These 11 local governments are located in 5 regions. No single local government has been a peer in the Sumatra and Sulawesi regions in all consecutive years of 2015–2019 and 2020. Information on local

governments that are always relatively efficient and become peers in the five regions is presented in Table 3.

Table 3. Local governments that are always peers in each region in 2015–2019 and 2020.

Regions	Local Governments	2015–2019			2020		
		EG	PR	Spending/Cap (000IDR)	EG	PR	Spending/Cap (000IDR)
Papua Maluku	Merauke	6.38	10.68	1012.73	−0.77	10.03	1135.62
	Ambon	6.13	4.50	338.59	−1.95	4.51	287.55
	Ternate	8.13	2.94	511.78	−0.85	3.46	470.97
Jawa-Bali	Depok	6.94	2.27	170.30	−1.92	2.45	212.93
	Tangerang Selatan	7.37	1.69	267.69	−1.01	2.29	294.27
	Denpasar	6.32	2.23	410.37	−9.42	2.14	474.68
Kalimantan Nusa tenggara	Balikpapan	4.07	2.68	635.24	−0.69	2.57	498.46
	Lombok Tengah	5.19	15.15	376.29	−6.68	13.44	446.93
	Lombok Timur	5.05	17.93	336.78	−3.10	15.24	413.11
	Mataram	7.11	9.70	501.30	−5.50	8.47	687.13
	Kota Kupang	6.61	9.59	531.56	−2.05	8.96	721.66

Notes: PR = poverty rate; EG = economic growth; S/cap = spending/capita.

These eleven local governments can allocate spending well to promote economic growth and reduce poverty in Indonesia during the study period. Furthermore, local governments that are relatively inefficient in Kalimantan can use Balikpapan as a benchmark to improve their relative efficiency in the future. This is similar to the Nusa Tenggara region; the relatively inefficient local governments can benchmark their respective peers: Lombok Tengah, Lombok Timur, Mataram, and Kupang City. This solution also applies to other areas: by increasing economic growth and reducing poverty as its peers achieve, a relatively inefficient local government can improve its efficiency score.

From this analysis, it can be inferred that measuring pro-growth poverty reduction spending efficiency is beneficial for the government; it ensures that their spending allocation does not only focus on economic growth or poverty reduction. Both are equally important and should be output for local governments. By taking into account economic growth and poverty reduction simultaneously, economic progress will be achieved evenly in each region.

Previous studies have employed economic variables as outputs in measuring government efficiency. Variables such as GDP (Halaskova et al. 2018; Ou et al. 2020) and GRDP growth (Tirtosuharto 2022; Afonso et al. 2021) have been employed to measure government efficiency. Yet, they ignored the importance of poverty reduction as an essential output indicator in measuring government efficiency. On the other hand, studies applying poverty reduction as an output variable have been well documented (Ambarkhane et al. 2020; Fonayet et al. 2020; Yang et al. 2021; and Cyrek 2019). However, they did not acknowledge the role of economic growth in measuring government efficiency. While the economic growth may not be an essential goal in some developed countries, it is not the case in developing and emerging economies, as it is the primary way to increase income and reduce poverty.

The study's result indicates that both economic growth and poverty variables can be implemented simultaneously to measure government efficiency. Therefore, the result of the study could fill the gap in the body of knowledge of government efficiency literature. Secondly, the context of the study is also important as the data taken in 2020 reflect the government's efficiency during the COVID-19 pandemic. Examining government efficiency during the pandemic is a significant contribution to the literature.

5. Conclusions

The study concludes that economic growth and poverty reduction can simultaneously be applied in measuring government efficiency. By using output in the form of economic growth and poverty reduction, local governments must be more careful in allocating

spending. To be relatively efficient, local governments need to consider allocating pro-growth poverty reduction spending to improve the conditions of both outputs.

Of the seven regions in Indonesia, the average efficiency score of pro-growth poverty reduction spending varies. In 2015–2019, the area with the highest number of relatively efficient local governments was Kalimantan, followed by Java-Bali.

During the COVID-19 pandemic in 2020, local governments were on average able to perform well in four regions: Kalimantan, Java-Bali, Sumatra, and Sulawesi, indicated by an increase in the number of efficient local governments and the average efficiency score in these four regions in 2020. All regions experienced negative economic growth, making it difficult to reduce poverty in such conditions. The relatively inefficient governments lacked the capability and resources to adapt to environmental changes during the COVID-19 pandemic; this resulted in their inability to increase their efficiency score.

This study's results indicate local governments' ability to differ across regions in dealing with the COVID-19 pandemic. This research implies that the central government needs to provide financial management training for local governments to hone their employees' skills in creating effective and efficient programs for the community. Local governments need to focus more on making programs to help micro business owners (some of which are poor) and small business owners to return to production in their businesses. With the proper allocation of spending to focus on helping business owners, the regional economy can grow while simultaneously reducing poverty so that the regional government can increase its efficiency.

The study had several limitations. The impact of COVID-19 on local government efficiency was measured only in one year, while the pandemic lasted more than two years. The study did not compare the local government efficiency among regions in the Indonesia archipelago, so the resource difference could not be measured. Further research should examine the efficiency rates of local governments by considering various resources in each region. Employing geographical-weighted regression to examine efficiency rates among the Indonesian regions might be more appropriate.

Author Contributions: All authors contributed to the study conception and design. Material preparation and data collection were performed by P.P. Descriptive data was performed by A.A. Analysis was performed by R.A.R. and R.E.F. The first draft of the manuscript was written by R.A.R. and all authors commented on previous versions of the manuscript. The final of the manuscript was edited by L.A. All authors have read and agreed to the published version of the manuscript.

Funding: Directorate of Research, Technology and Community Service, Directorate General of Higher Education, Research, and Technology, The Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia, with the number SP DIPA-023.17.1.690523/2022. Number of contract: 105/E5/PG.02.00.PT/2022

Acknowledgments: The authors would like to acknowledge the financial support of the Directorate of Research, Technology and Community Service, Directorate General of Higher Education, Research, and Technology, The Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia for a fundamental research grant.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Abdieva, Raziakhan, Damira Baigonushova, and Junus Ganiev. 2017. Relationship between government expenditure and economic growth in transition Countries: Case of Kyrgyzstan and Tajikistan. *Bilig* 83: 241–58. Available online: <http://bilig.yesevi.edu.tr/yonetim/icerik/makaleler/2083-published.pdf> (accessed on 11 June 2021).
- Afonso, Antonio, João Tovar Jalles, and Ana Venâncio. 2021. Structural Tax Reforms and Public Spending Efficiency. *Open Economies Review* 32: 1017–61. [CrossRef]
- Albassam, Bassam A. 2020. A model for assessing the efficiency of government expenditure. *Cogent Economics and Finance* 8: 1823065. [CrossRef]
- Alper, F. Ozlem, and Mehmet Demiral. 2016. Public Social Expenditures and Economic Growth: Evidence from Selected OECD Countries. *Research in World Economy* 7: 44–51. [CrossRef]

- Ambarkhane, Dilip, Ardhendu Shekhar Singh, and Bhama Venkataramani. 2020. Measuring efficiency of Indian states for reducing poverty using data envelopment analysis. *Poverty and Public Policy* 12: 357–85. [CrossRef]
- Antonelli, Maria Alessandra, and Valeria De Bonis. 2018. The efficiency of social public expenditure in European countries: A two-stage analysis. *Applied of Economics* 51: 47–60. [CrossRef]
- Babatunde, Shakirat Adepeju. 2018. Government spending on infrastructure and economic growth in Nigeria. *Economic Research-Ekonomiska Istrazivanja* 31: 997–1014. [CrossRef]
- Bogetoft, Peter, and Lars Otto. 2011. *Benchmarking with DEA, SFA, and R*. New York: Springer.
- Brini, Riadh, and Hatem Jemmali. 2016. Public spending efficiency, governance, political and economic policies: Is there a substantial causal relation? Evidence from selected MENA countries. *International Journal of Economics and Financial Management* 1: 24–34. Available online: <https://www.researchgate.net/publication/311320727> (accessed on 20 March 2020).
- Celikay, Ferdi, and Erdal Gumus. 2017. The effect of social spending on reducing poverty. *International Journal of Social Economics* 44: 620–32. [CrossRef]
- Coelli, Timothy J., Dodla Sai Prasada Rao, Christopher J. O'Donnell, and George Edward Battese. 2005. *An Introduction to Efficiency and Productivity Analysis*, 2nd ed. New York: Springer.
- Cooper, William W., Lawrence M. Seiford, and Kaoru Tone. 2002. *Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References, and DEA Solver Software*. New York: Kluwer Academic Publishers.
- Cyrek, Magdalena. 2019. Government social spending in the EU countries: Efficiency in poverty and income inequality reduction. Equilibrium. *Quarterly Journal of Economics and Economic Policy* 14: 405–24. [CrossRef]
- Dufrechou, Paola Azar. 2016. The efficiency of public education spending in Latin America: A comparison to high income countries. *International Journal of Educational Development* 49: 188–203. [CrossRef]
- Ebunoluwa, Oyegoke O., and Wasiu A. Yusuf. 2018. Effects of Economic Growth on Poverty Reduction In Nigeria. *IOSR Journal of Economics and Finance (IOSR-JEF)* 9: 25–29. [CrossRef]
- Fonayet, Fransesc Valls, Ángel Belzunegui Eraso, and Jorge De Andrés Sánchez. 2020. Efficiency of Social Expenditure Levels in Reducing Poverty Risk in the EU-28. *Poverty and Public Policy* 12: 43–62. [CrossRef]
- Gavurova, Betata, Kristina Kocisova, Lubomir Belas, and Vladimir Krajcik. 2017. Relative efficiency of government expenditure on secondary education. *Journal of International Studies* 10: 329–43. [CrossRef] [PubMed]
- Guo, Xuesong, Jun Zhang, Zhiwei Xu, Xin Cong, and Zhenli Zhu. 2021. The efficiency of provincial government health care expenditure after China's new health care reform. *PLoS ONE* 16: e0258274. [CrossRef] [PubMed]
- Halaskova, Martina, Renata Halaskova, and Viktor Prokop. 2018. Evaluation of efficiency in selected areas of public services in European Union Countries. *Sustainability* 10: 4592. [CrossRef]
- Hidalgo-Hidalgo, Maria, and Inigo Iturbe-Ormaetxe. 2018. Long-run effects of public expenditure on poverty. *Journal of Economic Inequality* 16: 1–22. [CrossRef]
- Kiendrebeogo, Youssouf, Kossi Assimaidou, and Abdoulaye Tall. 2017. Social protection for poverty reduction in times of crisis. *Journal of Policy Modeling* 39: 1163–83. [CrossRef]
- Kouadio, Hugues Kouassi, and Lewis-Landry Gakpa. 2021. Do economic growth and institutional quality reduce poverty and inequality in West Africa? *Journal of Policy Modeling* 44: 41–63. [CrossRef]
- Lee, Jong Chan, Yi Joong Won, and Sang Young Jei. 2019. Study of the relationship between government expenditures and economic growth for China and Korea. *Sustainability* 11: 6344. [CrossRef]
- Loría, Eduardo. 2020. Poverty trap in Mexico, 1992–2016. *International Journal of Development Issues* 19: 277–301. [CrossRef]
- Mackett, Odille. 2020. Social grants as a tool for poverty reduction in South Africa? A longitudinal analysis using the NIDS survey. *African Studies Quarterly* 19: 41–64. Available online: <https://sites.clas.ufl.edu/africanquarterly/files/V19I1a3.pdf> (accessed on 18 November 2021).
- Nakabashi, Luciano. 2018. Poverty and economic development: Evidence for the Brazilian states. *Economia* 19: 445–58. [CrossRef]
- Ojede, Andrew, Bebonchu Atems, and Steven Yamarik. 2018. The Direct and Indirect (Spillover) Effects of Productive Government Spending on State Economic Growth. *Growth and Change* 49: 122–41. [CrossRef]
- Olanubi, Sijuola Orioye, and Oluwanbepelumi Esther Osode. 2017. The efficiency of government spending on health: A comparison of different administrations in Nigeria. *Journal of Policy Modeling* 39: 79–98. [CrossRef]
- Olaoye, Olumide O., Oluwatosin O. Eluwole, Aziz Ayesha, and Olugbenga O. Afolabi. 2020. Government spending and economic growth in ECOWAS: An asymmetric analysis. *Journal of Economic Asymmetries* 22: e00180. [CrossRef]
- Ou, Zhirong, Fuwen Zeng, and Xinyu Zhan. 2020. Does Public Spending Structure Affect the Efficiency of Spending? Evidence from a Panel Tobit Model for Chinese Provinces. *International Journal of Management, Economics and Social Sciences* 9: 206–23. [CrossRef]
- Ouertani, Mohamed Nejib, Nader Naifar, and Hedi Ben Haddad. 2018. Assessing government spending efficiency and explaining inefficiency scores: DEA-bootstrap analysis in the case of Saudi Arabia. *Cogent Economics and Finance* 6: 1493666. [CrossRef]
- Purmini, Purmini, and Roosemarina Anggraini Rambe. 2021. Labor and Government Policies on Poverty Reduction in Sumatera Island, Indonesia. *Jurnal Ekonomi Pembangunan* 19: 61–74. [CrossRef]
- Rambe, Roosemarina Anggraini. 2020. Implications of Regional Split in Local Government Efficiency: Evidence from North Sumatra, Indonesia. *Jurnal Ekonomi Dan Studi Pembangunan* 12: 159–75. Available online: <http://journal2.um.ac.id/index.php/JESP/article/view/12789> (accessed on 13 March 2021).

- Sasmal, Ritwik, and Joydeb Sasmal. 2016. Public Expenditure, Economic Growth and Poverty Alleviation. *International Journal of Social Economics* 43: 604–18. [[CrossRef](#)]
- Sedrakyan, Gohar Samvel, and Laura Varela-Candamio. 2019. Wagner's law vs. Keynes' hypothesis in very different countries (Armenia and Spain). *Journal of Policy Modeling* 41: 747–62. [[CrossRef](#)]
- Sharif, Naubahar, Kevin Chandra, Athar Mansoor, and Kirti Bhasin Sinha. 2021. A comparative analysis of research and development spending and total factor productivity growth in Hong Kong, Shenzhen, Singapore. *Structural Change and Economic Dynamics* 57: 108–20. [[CrossRef](#)]
- Shin, Dong Jin, Byung Sub Cha, and Brian H. S. Kim. 2020. Efficient expenditure allocation for sustainable public services?—Comparative cases of Korea and OECD countries. *Sustainability* 12: 9501. [[CrossRef](#)]
- Škare, Marinko, and Romina Prziklas Družeta. 2016. Poverty and economic growth: A review. *Technological and Economic Development of Economy* 22: 156–75. [[CrossRef](#)]
- Thanh, Su Dinh, Neil Hart, and Nguyen Phuc Canh. 2020. Public spending, public governance and economic growth at the Vietnamese provincial level: A disaggregate analysis. *Economic Systems* 44: 100780. [[CrossRef](#)]
- Thorbecke, Erik, and Yusi Ouyang. 2022. Towards A Virtuous Spiral Between Poverty Reduction And Growth: Comparing Sub Saharan Africa With The Developing World. *World Development* 152: 105776. [[CrossRef](#)]
- Tirtosuharto, Darius. 2022. The impact of fiscal efficiency on poverty reduction in Indonesia: Institutional factor and geographical differences. *Journal of Geographical Systems* 24: 67–93. [[CrossRef](#)]
- Yang, Guotao, Yue Wang, Huibin Chang, and Qinghua Chen. 2021. Evaluating anti-poverty policy efficiencies in China: Meta-frontier analysis using the two-stage data envelopment analysis model. *China Agricultural Economic Review* 14: 416–42. [[CrossRef](#)]