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Measuring The Efficiency of Public Spending In Combating Poverty in Indonesia: Data Envelopment Analysis and Panel Data Regression Analysis

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Abstract

Poverty is a complex issue faced by various countries, including Indonesia. One fiscal instrument in poverty alleviation efforts is through the allocation of government public spending. Based on this policy, this research aims to analyze the efficiency of government expenditure in alleviating poverty. This study employs two methods, namely data envelopment analysis and panel data regression analysis. Government expenditure is proxied by education and health expenditure relative to total government spending. The estimation results of this research indicate that efficiency of education expenditure has a significant negative effect on poverty. Meanwhile, efficiency of health expenditure has a positive, albeit insignificant, effect on poverty. The contributions of this research include policy recommendations that should be undertaken by the government within its fiscal capacity to address social issues such as poverty.

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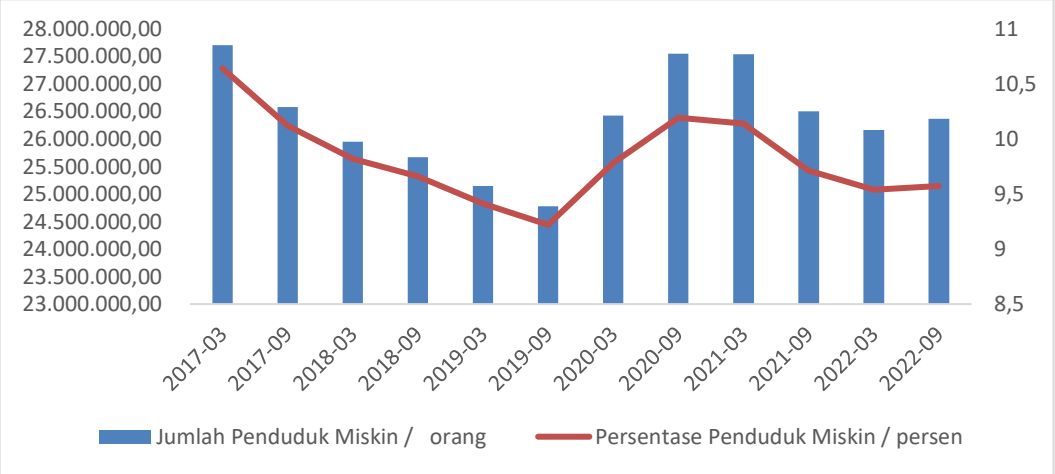
INTRODUCTION

Poverty is a complex social issue and a serious concern in many countries, including Indonesia. According to data from the Central Bureau of Statistics /(BPS), in the second semester of 2022, the poverty rate in Indonesia reachd 26.36 million people, with the highest poverty percentage recorded on the island of Java at 19.59% (Figure 1). Poverty is a multidisciplinary issue and is influenced by various factors, including socio-political aspects, education and skills, as well as welfare aspects (Arsyad, 1992). Despite the government's implementation of various policies, these efforts have not yet been fully effective in addressing the issue.



Sumber: Central Bureau of Statistics, processed

Figure 1. Poverty Rate in Indonesia

There are several policies that have been implemented by the government related to poverty alleviation. One important instrument that can function well for poverty alleviation is through government spending or government expenditure. The existence of government spending is assumed to be able to reduce income inequality and poverty (Akhmad et al, 2022; Anderson et al, 2017). In addition, in implementing this policy, strong institutional control is needed to ensure the effectiveness of government spending. Research conducted by Omgba (2023) revealed that weak corruption control will distort government spending on public goods, resulting in the ineffectiveness of the policy.

Government intervention in the economy through fiscal instruments plays an important role in maintaining the social welfare of its people. Referring to Keynes' view regarding the role of government in the economy in order to achieve equilibrium between consumption, savings, and investment. According to Keynes (1936) when savings are greater than investment, aggregate demand will not be able to maintain full employment conditions. Thus, according to Keynes, the role of government is expected to be able to re-stabilize consumption, savings, and investment in society. Some of these policies can be implemented through public spending, policy subsidies, and other social security programs (Stack, 1978).

In improving people's welfare, one of the government's efforts is to invest in improving the quality of human resources through children's education and health programs (Kousar et al., 2023). High-quality education and affordable health services can increase worker productivity and subsequently increase income (Asefa & Huang, 2015). The government's treatment in managing its funds is often associated with the effectiveness of poverty alleviation. Cyrek (2019) studied countries in Europe in 2007-2016. His research measured the efficiency that could be generated from government spending in the education and health sectors. Afonso et al., (2021), also through

their research tried to find out the efficiency of government spending in the education and health sectors of 18 OECD countries. Other studies have also explored the efficiency of government spending by measuring based on the Education and Health sectors (Ouertani et al., 2018; Shin et al., 2020). However, the relationship between government spending and poverty is still a matter of debate. Several studies have found that government spending has helped reduce poverty (Liu et al., 2020; Noja et al., 2021; Prasetyo & Thomas, 2021) and other studies have stated that the relationship is unclear (Anderson et al., 2018).

The government allocates funds from the State Budget, one of which is to achieve development targets, namely poverty reduction. In terms of education, the Indonesian government has a mandatory spending of 20% of the total APBN. The allocation of education funds is basically aimed at strengthening the quality of human resources of the Indonesian people. Previous research conducted by Liu et al., (2023) and Herianingrum et al (2020) analyzed the importance of the role of education in poverty reduction. The results of the study stated that education significantly reduces the poverty rate, where the higher the education of the community, the greater the impact on reducing the poverty rate. In line with these facts, strengthening education through government education spending needs to be done (Sayyidina et al., 2023). Government spending can reduce poverty by improving the quality of human resources in terms of knowledge and skills, so that it will make it easier for people to be absorbed in the labor market (Febriani et al., 2023; Adegboyo, 2020; Singh & Shastri, 2020).

Health spending is an important component in improving the quality of human resources. According to the World Health Organization, in order to achieve inclusive health insurance, the government needs to allocate resources efficiently to provide effective health services to the community (World Health Organization, 2010). Indonesia's health budget now takes 25% of the total APBN funds and is used optimally to ensure that the community gets decent health services. Previous studies have analyzed the influence of government health spending as an instrument to reduce poverty levels. Sirag & Nor (2021) analyzed the influence of health spending from several countries with different income classifications. It was found that there was a significant influence of public health spending on poverty in high-income countries. There are differences in influence in high-income and lower-middle-income countries. This also takes into account the relevance of the standard of living in a country. Other studies conducted by Banik et al., (2023) and Onofrei et al., (2021) added that there is an important influence of institutional quality so that health sector spending can run effectively.

Various studies have explored the relationship between government spending and poverty reduction. However, most previous studies have focused more on the effectiveness of poverty alleviation without considering the efficiency aspect in managing public spending. This study aims to analyze the efficiency of government public spending in the education and health sectors on poverty levels in 34 provinces in Indonesia in 2017-2022. In this context, public sector spending is measured by the ratio of spending in one sector to total government spending. First, this study tries to identify the efficiency score of health and education spending from 34 provinces. Furthermore, this study analyzes the effect of public sector spending efficiency on poverty reduction. In addition, this study uses control variables such as the Unemployment rate and Gross Regional Domestic Product (GRDP) referring to research conducted by Rodliyah (2023) and Sinaga (2020). Thus, this study can be expected to provide theoretical contributions that can complement the literature and appropriate policy recommendations in terms of poverty alleviation in Indonesia.

RESEARCH METHODOLOGY

Data

This study aims to assess the efficiency of public spending, especially health and education spending, on poverty in 34 provinces in Indonesia from 2017-2022. Meanwhile, the data used in this study includes secondary data obtained from the Directorate General of Fiscal Balance of the Ministry of Finance of the Republic of Indonesia and the Central Statistics Agency. This study uses the following variables:

Table 1. Data Sources

Variable	Source
Output Variable	
Average Years of Schooling	Central Statistics Agency
School Participation Rate	Central Statistics Agency
Life Expectancy	Central Statistics Agency
Input Variable	
Education Expenditure	Ministry of Finance
Health Expenditure	Ministry of Finance
Other Variables	
Poverty Rate	Central Statistics Agency
Unemployment Rate	Central Statistics Agency
GDRP	Central Statistics Agency
Inflation	Central Statistics Agency

Source: Author, 2024

Data Envelopment Analysis

This study evaluates the efficiency of public sector spending using Data Envelopment Analysis (DEA). The DEA method assesses a group of entities called Decision Making Units (DMU) in converting various inputs into various outputs (Cooper, 2011). The level of efficiency measured by DEA produces a score ranging from 0 to 1. The closer the score is to 1, the more efficient a DMU is in a given year. This study estimates efficiency based on the assumption of variable returns to scale (VRS). This assumption extends the assumption of constant returns to scale (CRS) by stating that changes in input will result in constant changes in output (Charnes et al., 1978). Meanwhile, VRS assumes that changes in input do not result in similar changes in output. The VRS assumption provides a measure of pure technical efficiency, so it can provide broader insight into public sector spending.). The model used in this study is as follows:

Objective Functions

$$MaxE = \mu_1 y_1 + \mu_2 y_2 + \mu_0 \quad (1)$$

Considering

$$\sigma_1 x_1 = 1 \quad (2)$$

$$\mu_1 y_1 + \mu_2 y_2 + \mu_0 - (\sigma_1 x_1) \leq 0 \quad (3)$$

$$\mu_1, \mu_2, \sigma_1 \geq 0 \quad (4)$$

To measure the efficiency of education spending, y_1 is the Average Length of Schooling; y_2 is the School Participation Rate and x_1 is Education Sector Spending. Meanwhile, to measure the efficiency of health spending, the following equation is used:

Objective Functions

$$MaxE = \mu_1 y_1 + \mu_0$$

Considering

$$\sigma_1 x_1 = 1$$

$$\mu_1 y_1 + \mu_0 - (\sigma_1 x_1) \leq 0$$

$$\mu_1, \sigma_1 \geq 0$$

y_1 is Life Expectancy and x_1 is health expenditure

Data Panel Regression

This study attempts to analyze the influence of public sector spending efficiency using panel data regression. In general, panel data is a combination of time series and cross section data, where in general, the panel data regression equation can be written as follows:

$$Y_{i,t} = \alpha_{i,t} + \beta x_{i,t} + u_{i,t}$$

Where Y and x have i= 1,2,..,N cross sections and t= 1,2,…,T time periods. Panel data estimation starts from the assumption that individual relationships have the same parameters (pooled). The advantages of using panel data estimation, such as significantly increasing sample size and avoiding bias in its estimation (Asteriou, 2021). There are three approaches used in panel data estimation, namely common effect (CEM), fixed effect (FEM), and random effect (REM). Common Effect estimation assumes that there is no difference in the cross-sectional dimension (N) (Asteriou, 2021). If this CEM model is selected, the possible implication is that inter-unit variability will be ignored, thus creating a high risk of bias due to strict homogeneity. The equation of the CEM model is:

$$Y_{i,t} = \alpha + \mu_i + \gamma_t + \beta x_{i,t} + u_{i,t}$$

Where μ_i is the intercept of the i-th cross section and γ_t is the t-th time intercept (Greene, 1951). Unlike CEM, the FEM model can tolerate different constants from each group (section). In this approach, each entity does not vary over time (Gujarati & Porter, 2009). In general, the equation of FEM is as follows:

$$Y_{i,t} = \alpha_i + \beta x_{1it} + \cdots + \beta_k x_{kit} + u_{it}$$

Can be rewritten as:

$$Y = D\alpha + X\beta' + u$$

Furthermore, an alternative method to estimate panel data is to use REM. This model assumes that the individual effect on cross-sequence and time series is a random variable that is

included in the model as an error. REM is an efficient method, especially when there is a short time period. If the REM model is selected, it can provide a broader analysis and can be used for inference on a larger population. However, in the REM model, it is assumed that the individual effect is not correlated with the independent variable. Referring to Hausman (1978), if this assumption is not met, the estimation will be biased and inconsistent. The general equation used is as follows:

$$Y_{i,t} = \alpha_{i,t} + \beta X_{i,t} + w_{it}$$

With $\alpha_{i,t}$ is the group effect of cross section i and period t. Meanwhile, w_{it} is the unit error component of cross section i and time t. Furthermore, the regression model selection will be carried out using the Chow test and the Hausman test. The Chow test is used to select the best model between CEM and FEM. The Chow test is written in the following equation (Asteriou & Hall, 2021)

$$F = \frac{[(SSR_1 - (SSR_{n1} + SSR_{n2})]/k)}{(SSR_{n1} + SSR_{n2})/(n1+n2+k)}$$

With k being a parameter of the equation to be estimated. The Chow test is basically done by splitting the sample into two structures and comparing the Sum Square Residual of the equation to the entire sample (Asteriou & Hall, 2021). The decision on the results of the Chow test is based on the hypothesis used as follows:

$$H_0: \alpha_1 = \alpha_2 = \cdots \alpha_n = 0\,, \quad then\ CEM\ is\ preferred$$
$$H_1: \alpha_i \neq 0; i = 1,2,\ldots,n \quad then, FEM\ is\ preferred$$

With the rejection criteria, reject H_0 if F count > F table. Furthermore, this study uses the Hausman test. The purpose of using the Hausman test from this model selection is to find out the choice used between FEM and REM. In addition, the Hausman test is carried out to determine the existence of model bias between FEM and REM. The equation of the Hausman test in this study is as follows:

$$W = \hat{q}'[var\,(\hat{q}')]^{-1}\hat{q}'$$

$$W = \left(\hat{\beta}_{FEM} - \hat{\beta}_{REM}\right)'[var(\hat{\beta}_{FEM} - \hat{\beta}_{REM})]^{-1}(\hat{\beta}_{FEM} - \hat{\beta}_{REM})$$

Where $\hat{\beta}_{FEM}$ is an estimation of FEM and $\hat{\beta}_{REM}$ is an estimation of REM. Based on the results of the Hausman test, conclusions will be obtained based on the hypothesis used as follows:

$$H_0 = REM\ model\ is\ preferred$$
$$H_1 = FEM\ model\ is\ preferred$$

With H_0 rejection criteria if $W > x^2_{(\alpha,K)}$

If there are heteroscedasticity and autocorrelation problems in the model, this study uses the cluster-robust standard error model (Colin Cameron & Miller, 2015). Simply put, the equation of this method is as follows:

$$V_{het}[\hat{\beta}] = (\sum_i \quad x_i^2[\hat{u}_i^2])/(\sum_i \quad x_i^2)^2$$

Where $\hat{u}_i = y_i - \hat{\beta}_{x_i}$ and $\hat{\beta}$ is a robust standard error. By using this method, a more accurate and consistent standard error estimate can be obtained, regardless of the heterogeneity in the data.

RESULTS AND DISCUSSION

Data Envelopment Analysis Estimation

Table 2. Efficiency Score Based on Provinces

Province	Educational Efficiency	Ranking	Health Efficiency	Ranking
Aceh	0.9499	7	0.9307	20
Bali	0.9344	8	0.9592	7
Banten	0.8519	19	0.9320	17
Bengkulu	0.9010	14	0.9213	24
DI Yogyakarta	0.9911	2	0.9991	1
DKI Jakarta	0.9893	3	0.9708	5
Gorontalo	0.8065	29	0.9045	29
Jambi	0.8502	20	0.9473	11
West Java	0.8283	23	0.9727	4
Central Java	0.7920	32	0.9900	3
East Java	0.8146	28	0.9486	10
West Kalimantan	0.7725	34	0.9399	14
South Kalimantan	0.8229	26	0.9129	26
Central Kalimantan	0.8260	25	0.9293	21
East Kalimantan	0.9675	5	0.9901	2
North Kalimantan	0.9026	13	0.9659	6
Bangka Belitung Islands	0.8015	31	0.9392	15
Riau Islands	0.9831	4	0.9318	18
Lampung	0.8179	27	0.9407	13
Maluku	0.9539	6	0.8785	33
North Maluku	0.9118	11	0.9088	28
West Nusa Tenggara	0.8589	18	0.8832	31
East Nusa Tenggara	0.8372	22	0.8901	30
Papua	0.7750	33	0.8806	32
West Papua	0.9947	1	0.9283	22
Riau	0.9008	15	0.9530	9
West Sulawesi Barat	0.8041	30	0.8653	34
South Sulawesi Selatan	0.8373	21	0.9384	16
Central Sulawesi Tengah	0.8711	17	0.9099	27
Southeast Sulawesi Tenggara	0.8839	16	0.9472	12
North Sulawesi Utara	0.9061	12	0.9538	8
Sumatera Barat	0.9302	9	0.9240	23

Sumatera Selatan	0.8278	24	0.9311	19
Sumatera Utara	0.9291	10	0.9202	25

Source: Author, 2024

Table 2 provides a comprehensive overview of education and health efficiency in various provinces in Indonesia from the results of Data Envelopment Analysis (DEA) estimation. From the analysis results, it can be seen that the provinces of West Papua and DI Yogyakarta stand out as leaders in education efficiency, ranking first and second nationally respectively. Meanwhile, West Kalimantan shows the lowest education performance among other provinces. In terms of health efficiency, DI Yogyakarta is in the highest position followed by East Kalimantan. Both show high efficient performance in the provision of health services. However, West Sulawesi stands out as the province with the lowest health efficiency indicating that there are challenges faced in the health sector in the region. Provinces such as DI Yogyakarta show consistency in efficient performance in both sectors. Other provinces have disparities in efficiency between education and health. Provinces such as DI Yogyakarta, DKI Jakarta, and East Kalimantan rank highest in both aspects of efficiency. Meanwhile, West Sulawesi and Papua rank lowest. In essence, the provincial rankings provide additional insight into the relative position of each region in education and health efficiency. The efficiency value remains a reference for observing policy optimization in both sectors. Low efficiency values prove that local governments produce suboptimal achievements (output) by utilizing the available budget (input) for the education and health sectors. Thus, the efficiency value is able to show the performance of local governments in providing education and health services.

Table 3. Efficiency Based on Lowest Average Score Each Year

Efficiency	2017	2018	2019	2020	2021	2022
Education						
Average	0.8607	0.8657	0.8757	0.8822	0.8867	0.8923
Lowest	0.7530	0.7605	0.7627	0.7733	0.7822	0.7885
Health						
Average	0.9302	0.9299	0.9330	0.9346	0.9348	0.9384
Lowest	0.8574	0.8603	0.8637	0.8669	0.8693	0.8744

Source: Author, 2024

Table 3 shows the efficiency trend in the education and health sectors in Indonesia from 2017 to 2022. From the education side, it can be seen that the average efficiency increased from 0.8607 in 2017 to 0.8923 in 2022. This indicates an improvement in the utilization of resources in providing education across the country during the period. In addition, the lowest efficiency in education has shown improvement, starting from 0.7530 in 2017 to 0.7885 in 2022. This indicates that the challenges faced by each province in Indonesia are being addressed to improve the performance of education services. In the health sector, efficiency also shows a positive upward trend from year to year. The average health efficiency increased from 0.9302 in 2017 to 0.9384 in 2022. This reflects efforts made to improve efficiency in providing health services across the country. The lowest efficiency in the health sector also improved, rising from 0.8574 in 2017 to 0.8744 in 2022. This shows that there is still room for improvement in some areas to ensure efficient use of resources in providing health services to the community.

Compared to government spending on health, this study found that the average efficiency level in the education sector tends to be lower than projected in the health sector. Similar results were

also found by (Jafarov & Gunnarsson, 2008) in the Republic of Croatia and (Ouertani et al., 2018) in Saudi Arabia. This finding can explain that the use of the government budget for education is not optimal, thus limiting community participation in enjoying education services in Indonesia. However, the increasing trend of efficiency in education and health is a positive indication of the efforts made to improve the quality of life and access to basic services in Indonesia. This study will conduct further analysis to understand the factors underlying these changes and to design more effective strategies to improve efficiency in both sectors in the future.

Panel Data Regression Estimation

Tabel 4. Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Poverty Rate	204	10.5546	5.4608	3.4200	27.7600
Education Efficiency	204	0.8772	0.0677	0.7530	1.0000
Health Efficiency	204	0.9335	0.0330	0.8574	1.0000
Unemployment Rate	204	5.1849	1.7999	1.4000	10.9500
GDRP	204	64081	49923	17165	298326
Inflation	204	2.9750	0.9290	1.5600	4.2100

Source: author, 2024

Table 4 presents statistics of each research variable. The poverty rate has an average value of 10.5546. The large difference between the lowest and highest poverty rates shows the variation in poverty conditions of provinces in Indonesia. The unemployment rate, which has an average of 4.18, also has a large distance between the lowest and highest values. The efficiency of education and health shows average values of 0.8772 and 0.9335, respectively. The difference between the maximum and average values of GDRP shows significant variation in regional economic activity, with the difference being 234245, illustrating the inequality in the level of economic development in the region. Inflation has an average of 2.9750.

Tabel 5. Model Selection

Test	*P-Value*
Chow	0.0000
Hausman	0.0000

Source: Author, 2024

The study used the chow test and the hausman test to determine the best model that can be used. Table 5 shows that the p-value is less than 0.5 for both model selection tests. Therefore, the best model to use is the fixed effect model. The FEM model can provide more accurate estimates for each unit, given that this model controls for individual fixed effects. Thus, FEM can provide more robust estimates of individual heterogeneity given that the FEM model can overcome bias due to unobserved variables that remain within the unit, so that the results can be relied upon if the heterogeneity between units is quite high (Baltagi, 2021). If there is significant variation between units that cannot be explained by the independent variables in the model, FEM can provide more reliable estimates than CEM or REM.

Tabel 6. Multicolinearity Test

Variabel	VIF
Education Efficiency	1.28
Health Efficiency	1.28
Unemployment Rate	1.31
GDRP	1.26
Inflation	1.03

Source: Author, 2024

Table 6 shows that each independent variable has a VIF value < 10. With these results, it can be concluded that no multicollinearity problems were found in all independent variables.

Tabel 7. Heteroskedasticity Test and Autocorrelation Test

Classical Assumptions	*P-Value*
Heteroskedasticity	0.0000
Autocorrelation	0.0000

Source: Author, 2024

Based on the data in Table 7, the p-value shows a value that is smaller than 0.05 for both classical assumption tests. This indicates problems related to heteroscedasticity and autocorrelation in the model. In overcoming this problem, the recommended estimation method is to use clustered-robust standard error on the best model that has been selected (Colin Cameron & Miller, 2015). CSRE can calculate the residual variance consistently for each cluster, so it can produce a more reliable standard error estimate. CRSE can provide more accurate estimates in panel models that have correlated residual patterns.

Table 8. Fixed Effect Model Clustered-Robust Standard Error Estimation

Variable	(1)	(2)	(3)	(4)
Education Efficiency	-14.1152*	-14.0029**	-18.3958***	-18.0257**
Health Efficiency	6.2437	4.0920	3.2836	3.1033
Unemployment Rate		0.2442***	0.26076***	0.2671***
GDRP	0.0000		8.408e-06*	8.107e-06*
Inflation	-0.0543*	0.0280		0.0146
C	17.1092*	17.6688**	21.7355**	21.5221**

*Note: Saignificancy Ratei: * p<0.05; ** p<0.01; *** p<0.001*

Source: Author, 2024

The results of the fixed effect estimation of the clustered-robust standard error model are presented in Table 8, which shows the relationship between the independent variables and the dependent variable, namely the poverty level. It was found that educational efficiency has a significant effect on the poverty level with a negative coefficient. This effect is also consistent in all models. The significant educational efficiency that affects the poverty level provides an understanding that optimal management of the education budget to produce more inclusive education services can reduce poverty. Increasing the provision of education services needs to be carried out by all provincial governments to improve the standard of living of their people. This result is also in line with the findings that state that access to higher education can reduce poverty (Yusriana et al., 2021). There is a positive relationship between the level of education and a

person's ability to earn income (Majumder & Chowdhury, 2017). Therefore, the government's attention to the management of the education budget is the most important part of increasing community productivity so as to prevent them from poverty. On the other hand, the health efficiency variable actually has a positive effect on the poverty level. When efficiency in managing the health sector increases, the poverty rate tends to decrease. However, the effect is not significant in all models, indicating that the relationship is not strong enough to be considered a statistically significant factor in predicting poverty levels.

In the control variables, the unemployment rate has a significant effect on the poverty rate with a positive coefficient. These results are consistent with the p-value below 0.001. This means that a high unemployment rate can have an impact on increasing the poverty rate. The high unemployment rate indicates limited economic activities that can absorb workers. This condition causes people to lose income and create poverty. The relationship between the unemployment rate and the poverty rate found in this study supports the previous findings of Dahliah (2023) GDRP and inflation also have a significant effect on the poverty rate, but the impact is not consistent in all models. A significant GDRP with a positive coefficient has shown that high economic activity actually gives rise to poverty. This influence can be caused by non-inclusive economic growth. Economic growth is only enjoyed by a small segment of the population, while the majority remains poor or marginalized. Meanwhile, inflation has an influence with a different coefficient in the model used. The inflation found to be significant has a negative impact on the poverty rate. This phenomenon can be explained by the fact that high public demand often causes inflation, but also encourages greater economic activity. This market stimulation creates wider employment opportunities and increases overall community income. However, it should be noted that inconsistent results indicate complexity in the relationships between these variables.

CONCLUSIONS

Conclusion

Poverty is one of the social problems that has become a concern for the Indonesian government. Government intervention in dealing with poverty has been carried out through fiscal instruments handed over to local governments. As a provider of social services, local governments allocate part of their regional expenditures for education funds and health funds. . The efficiency of public spending in this study refers to the extent to which the use of the public budget can produce optimal achievements with available inputs. Thus, the purpose of this study is to analyze the efficiency of government public spending in the education and health sectors and measure its effect on poverty levels. This study observed 34 provinces in Indonesia in 2017-2022. The methods used are Data Envelopment Analysis (DEA) and Panel Data Regression.

The findings from DEA show that there are provinces that occupy the highest ranking in education and health efficiency, such as DI Yogyakarta, DKI Jakarta, and East Kalimantan. Other provinces obtained unequal results in efficiency between education and health. Meanwhile, West Sulawesi and Papua occupy the lowest ranking in both efficiency sectors measured. Overall, education and health efficiency show an increasing trend from year to year. Based on the results of Panel Data Regression using the fixed effect model clustered-robust standard error, it was found that education efficiency has a significant negative impact on poverty levels. Health efficiency does not have a significant effect on poverty levels. In the control variables, the unemployment rate has a positive effect on poverty levels. GDRP and inflation also have a significant effect on poverty levels, but their effects are not consistent across all models.

This study uses public spending efficiency to then measure its impact on poverty in Indonesia. Poverty itself is a topic or problem that can be studied more deeply, considering that this problem is a common problem faced by the government, from the

National line, to the Regency/City line. This study leaves room for future research development around public spending efficiency and poverty in Indonesia. Further research can further deepen the spatial analysis in examining the spillover effect from one province to another in poverty alleviation. Another alternative in this case is to consider the role of institutions and governance by integrating the quality of government variables in each province

Recommendation

The context of efficiency here refers to the ability of the government at the regional level to allocate funds to achieve improvements in the quality of services with limited resources. This study found that the level of efficiency varies in each region, so the focus in the future is on certain regions to improve budget management in the Education and Health sectors. This can be supported by encouraging transparency and accountability in the management of funds in the primary sector, such as education and health, so that its implementation will be more effective. From the research results, there are recommendations that are formed. First, the development of inclusive education services. It is important to direct education funds towards the provision of inclusive education services so that all levels of society have equal opportunities to access quality education. This can include investment in education infrastructure, providing financial assistance to underprivileged families, and increasing accessibility to education for vulnerable groups. This can be done through evaluating areas where funds are not used efficiently and increasing transparency in budget use. Thus, it is expected that there will be an increase in the efficiency of education budget management which can ensure that the funds allocated actually provide optimal results in reducing poverty levels. Second, evaluation and improvement of health management efficiency. Although the effect is not statistically significant, improving efficiency in the management of the health sector is still important to improve the welfare of society as a whole. The government can conduct a comprehensive evaluation of the health system to identify areas where efficiency can be improved, such as fund management, administrative processes, and resource distribution.

REFERENCES

Adegboyo, O. S. (2020). *Does government spending reduce poverty in Nigeria? Evidence from Auto-Regressive Distributed Lag Specification*.

Afonso, A., Jalles, J. T., & Venâncio, A. (2021). Structural Tax Reforms and Public Spending Efficiency. *Open Economies Review*, *32*(5), 1017–1061. https://doi.org/10.1007/s11079-021-09644-4

Anderson, E., d'Orey, M. A. J., Duvendack, M., & Esposito, L. (2018). Does Government Spending Affect Income Poverty? A Meta-regression Analysis. *World Development*, *103*, 60–71. https://doi.org/10.1016/j.worlddev.2017.10.006

Asefa, S., & Huang, W.-C. (2015). Governance challenges in education and health care in developing countries. *The Political Economy of Good Governance*, 93–110. https://doi.org/10.17848/9780880994989.ch5

Asteriou, D., & Hall, S. G. (2021). *APPLIED ECONOMETRICS FOURTH EDITION*.

Banik, B., Roy, C. K., & Hossain, R. (2023). Healthcare expenditure, good governance and human development. *EconomiA*, *24*(1), 1–23. https://doi.org/10.1108/econ-06-2022-0072

Charnes, A., Cooper, W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. In *Company European Journal of Operational Research* (Vol. 2).

Colin Cameron, A., & Miller, D. L. (2015). A practitioner's guide to cluster- robust inference. *Journal of Human Resources*, *50*(2), 317–372. https://doi.org/10.3368/jhr.50.2.317

Cooper, 2011 (Handbook on Data Envelopment Analysis). (n.d.).

Cyrek, M. (2019). Government social spending in the eu countries: Efficiency in poverty and income inequality reduction. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *14*(3), 405–424. https://doi.org/10.24136/eq.2019.019

Greene, W. H. (1951). *ECONOMETRIC ANALYSIS*.

Gujarati, D., & Porter, D. C. (2009). *Basic Econometrics*.

Herianingrum, S., Ernayani, R., Seto, H., & Rayandono, M. (2020). The Impact Of Zakat, Education Expenditure, And Health Expenditure Towards Poverty Reduction. *Systematic Reviews In Pharmacy*, *11*(12).

Kesehatan dan Belanja Bantuan Sosial terhadap Kemiskinan di Provinsi, B., Febriani, I., Wahyunadi, W., & Agustiani, E. (2023). The Effect of Education Expenditure, Health Expenditure, and Social Assistance Expenditure on Poverty in NTB Province 2013-2022. *Socio-Economic and Humanistic Aspects for Township and Industry* , *1*(3), 340–347. https://doi.org/10.59535/sehati.v1i3.160

Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money*.

Kousar, S., Ahmed, F., Afzal, M., & Segovia, J. E. T. (2023). Is government spending in the education and health sector necessary for human capital development? *Humanities and Social Sciences Communications*, *10*(1). https://doi.org/10.1057/s41599-023-01514-3

Liu, W., Li, J., & Zhao, R. (2020). Rural Public Expenditure and Poverty Alleviation in China: A Spatial Econometric Analysis. *Journal of Agricultural Science*, *12*(6), 46. https://doi.org/10.5539/jas.v12n6p46

Liu, W., Li, J., & Zhao, R. (2023). The effects of rural education on poverty in China: a spatial econometric perspective. *Journal of the Asia Pacific Economy*, *28*(1), 176–198. https://doi.org/10.1080/13547860.2021.1877240

Noja, G. G., Cristea, M., Thalassinos, E., & Kadłubek, M. (2021). Interlinkages between government resources management, environmental support, and good public governance. Advanced insights from the European union. *Resources*, *10*(5). https://doi.org/10.3390/resources10050041

Onofrei, M., Vatamanu, A. F., Vintilă, G., & Cigu, E. (2021). Government health expenditure and public health outcomes: A comparative study among eu developing countries. *International Journal of Environmental Research and Public Health*, *18*(20). https://doi.org/10.3390/ijerph182010725

Ouertani, M. N., Naifar, N., & Ben Haddad, H. (2018). Assessing government spending efficiency and explaining inefficiency scores: DEA-bootstrap analysis in the case of Saudi Arabia. *Cogent Economics and Finance*, *6*(1), 1–16. https://doi.org/10.1080/23322039.2018.1493666

Prasetyo, P. E., & Thomas, P. (2021). A Simple Mitigation Model of Poverty Reduction in Indonesia. *Open Journal of Business and Management*, *09*(06), 2742–2758. https://doi.org/10.4236/ojbm.2021.96152

Rodliyah, D. (2023). The Effect of HDI, Unemployment, and Investment on GRDP and Poverty. *Efficient: Indonesian Journal of Development Economics*, *6*(2), 199–209. https://doi.org/10.15294/efficient.v6i2.59000

Sayyidina, N. A., Iranto, D., & Suparno, S. (2023). The Effect of Government Expenditure in the Education Sector, Human Development Index, and Economic Growth on Poverty Rate in Eastern Indonesia. *Journal of Business and Economics Research (JBE)*, *4*(2), 186–193. https://doi.org/10.47065/jbe.v4i2.3559

Shin, D. J., Cha, B. S., & Kim, B. H. S. (2020). Efficient expenditure allocation for sustainable public services?—comparative cases of korea and oecd countries. *Sustainability (Switzerland)*, *12*(22), 1–19. https://doi.org/10.3390/su12229501

Sinaga, M. (2020). Analysis of Effect of GRDP (Gross Regional Domestic Product) Per Capita, Inequality Distribution Income, Unemployment and HDI (Human Development Index) on Poverty. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, *3*(3), 2309–2317. https://doi.org/10.33258/birci.v3i3.1177

Singh, D., & Shastri, S. (2020). Public expenditure on education, educational attainment and unemployment nexus in India: an empirical investigation. *International Journal of Social Economics*, *47*(5), 663–674. https://doi.org/10.1108/IJSE-06-2019-0396

Sirag, A., & Nor, N. M. (2021). Out-of-pocket health expenditure and poverty: Evidence from a dynamic panel threshold analysis. *Healthcare (Switzerland)*, *9*(5). https://doi.org/10.3390/healthcare9050536

Stack, S. (1978). The Effect of Direct Government Involvement in the Economy on the Degree of Income Inequality: A Cross-National Study. *American Sociological Review*, *43*(6), 880. https://doi.org/10.2307/2094627

World Health Organization., Etienne, Carissa., Asamoa-Baah, Anarfi., & Evans, D. B. (2010). *The World health report : health systems financing: the path to universal coverage.* World Health Organization.