

The Impact of School Operational Assistance (BOS) on Student Expenditure and Scores

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Abstract

This study aims to analyze the impact of the provision of BOS on student expenditures and scores. Using the Indonesia Family Life Survey (IFLS) waves 4 and 5 data, the results of the analysis with the Difference-in-Difference (DID) method find that the provision of BOS has an impact on increasing student scores. A one percent increase of BOS funds, on average, will increase 2.4 points of student scores. Meanwhile, there is no evidence of the effect of BOS funds on student spending on education. The results of this study encourage the need for the government to evaluate the allocation of BOS funds in schools to reduce the burden of student spending on education.

Keywords: BOS; Difference-in-Difference; education

JEL Classification: I22; I28

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1. Introduction

Education, as human capital, increases the earning potential of an individual. Investment in education promotes an increase in an individual's standard of living. Mankiw et al. (1992) empirically demonstrated that the augmented Solow Model that includes education as a factor of production explains the variation in per capita real income. The vital role of education in the economy encourages every country to provide education services for its citizens.

The government plays an essential role because market mechanisms only cannot provide education services accessible to the whole community. Allowing education to be regulated by the market aims to increase the competitiveness of human resources. On the other hand, according to the Law No. 20 of 2003 concerning the National Education System Article 11 Paragraph 2, the Indonesian government is obliged to guarantee the availability of funds for the implementation of education for every citizen aged seven to 15 years. However, some factors cause the low achievement of primary education compulsory education, such as poverty and low motivation to go to school. According to Berlian VA (2011), one of the strategies for completing the compulsory program is through a subsidy pattern to eliminate or reduce the cost of education.

Some developing countries implement subsidy programs to increase the accessibility to educational services. Mexico has Programa de Educacion, Salud y Aliimentacion (PROGRESA). Honduras has Programa de Asignacion Familiar (PRAF). In Brazil, government has Programa de Erradicacao do Trabalho Infantil (PETI) as the educational subsidy program. The others are Familias en Accion (FA) in Colombia, and School Operational Assistance (BOS) in Indonesia.

Many countries position education budget allocation as a priority. Indonesia is one of those countries. At least 20 percent of the state budget is allocated to the education budget (Article 31 paragraph 4 of the 1945 Constitution of the 4th Amendment). This is confirmed by the decision of the Constitutional Court Number: 013/PUU-VI/2008 which states that the Government must provide an education budget of at least 20 percent of the State Revenue and Expenditure Budget (APBN) and Regional Revenue and Expenditure Budget (APBD). The government allocates the education budget through several channels, namely ministries/institutions, transfers to regions and village funds, and financing expenditures, including salaries. In 2018, the government allocated IDR444.1 trillion (20 percent of the total state expenditure) as the education budget. Compared to the Gross Domestic Product (GDP), the proportion of the education budget is 3.5 percent.

The Indonesian government reduced subsidy fuel in 2001 then allocated more to infrastructure, health, and education. In the education sector, there are two subsidy programs, namely Special Student Assistance (BKM) and School Special Assistance (BKS). BKM is given in the form of cash transfers to elementary, middle, and high school students, while BKS is a grant for schools. Both the BKS and BKM lasted for four years until 2004.

In 2005, the BKM and BKS were transformed into School Operational Assistance (BOS). Students categorized as poor are eligible to receive BOS funds. They do not need to pay school fees. The others still have to pay school fees, but lower than the fees before BOS implemented. In 2009, the government changed the policy and made the BOS funds accessible to all students. In terms of distribution, BOS is given to schools proportionally based on the student number. The government also increased the number of funds to improve the quality of primary education.

The impact of the BOS program has not been analyzed using data after IFLS 4 (the year 2007). Sulistyaningrum (2016) evaluates the impact of the BOS program using the IFLS 4 (2007) data. Other studies on the BOS program impact use data panels from IFLS 3 (2000) and IFLS 4 (2007). They are Kharisma (2018), Fatah (2016), and Handoyo (2012).

This study has two contributions. First, this study looked at the impact of BOS after a policy change in 2009, in which all students benefited from BOS funds. Second, this research uses two-period data with the Difference-in-Differences method to eliminate bias in coefficient estimation due to the unobserved heterogeneity that is constant over time. This study uses data from IFLS 4 (2007) and IFLS 5 (2014) to measure the impact of the BOS program on student expenditure and final exam scores. To improve robustness, this study analyses some models.

There are many previous study assessing the impact of education subsidy on education outcome. Ganimian & Murnane (2014) evaluate educational program in 33 low to middle income countries. They give four conclusions. First, education programs can reduce school fees and provide alternative options for going to public schools, increasing student attendance and achievements, even if they do not improve performance. Second, providing information about school quality and the benefits of going to school, in general, can improve student achievement. Third, better resources cannot improve performance if there is no effort to change students learning experience. Fourth, student achievement could be improved by improving teacher performance through good incentives.

Government subsidy educational programs can be divided into two approaches: (1) supply and (2) demand. Building schools, increasing teacher salaries, providing training, reducing class sizes (including improvement in the teacher-pupil ratio) are the supply approaches. The demand approach provides subsidies targeted administratively for the poor in the community. It is expected to reduce the gap in school participation between the poor and non-poor. According to Schultz (2004), the supply approach can increase school participation in some cases. Unfortunately, it cannot increase the poor's school participation and cannot reduce the poor and the rich's educational attainment gap. A study in Kenya by Deolalikar (1996) found that the improvement in the teacher-pupil ratio increases the enrollment rate of children in the top quintiles. However, it reduces the enrollment of children in the poor quintiles. It might be because the improvements in the teacher-pupil ratio reduce other schooling inputs such as scholarships which help poor students. Another reason may be that an increase in the teacher-

student ratio often increases the costs to students and thus adversely affects the participation rates of poor children. Based on a study in Honduras, the supply approach of the PRAF program did not increase school participation, while the demand approach of that program increased school participation (Glewwe & Olinto, 2004).

Schultz (2004) shows that the demand approach reduces inequality in education and income in Mexico and other Latin American countries. Fiszbein & Schady (2009) provide a resume of impact evaluation of Conditional Cash Transfer (CCT) conducted by the World Bank. Almost all programs show that CCT has a positive effect on school participation. However, the effect is sometimes only found in certain age groups.

Based on Bangladesh's national time-series data, the level of secondary school participation in female students is lower than that in male students. In the early 1990s, subsidies for female students were introduced. As an impact, the subsidies reduce inequality in school participation between male and female students. Khandker et al. (2010) find that the subsidy program significantly impacts the high school participation of female students. They use the fixed effect conditional logistic model to reduce bias coming from heterogeneity in the village level.

In Columbia, the government has a subsidy program named *Familias en Accion* (FA) that covers health, nutrition, and education aspects. This program started in 2001. Attanasio et al. (2005) analyze the program impact, especially the education program. The FA program gives monthly subsidies to mothers whose welfare is below a certain threshold and the children are between 7–17 years old. The program impact is examined by comparing the level of school participation between individuals in the program area and non-program areas. The evaluation results show that the FA program effectively increases the level of school participation in groups of students aged 14–17 years.

Maluccio & Flores (2004) analyze the impact of a subsidy program in Nicaragua named the RPS program. That subsidy program gives cash transfers to eligible households. It is designed to increase food expenditure, cut drop-out rates in elementary school, and increase health conditions and nutrition care for children below five years old. Maluccio & Flores (2004) take household and individual characteristic data before and also after the RPS program was implemented. This makes it possible to calculate the average effects with the double-difference method. Before the RPS program, the level of school participation between the program group and non-program group almost had the same number. It is around 70 percent. At the 2001 and 2002 follow-ups, school participation in the program group reached 90 percent while in the non-program group was 75.1 percent and 79.2 percent.

Schultz (2004) examines the impact of PROGRESA in Mexico. The impact is measured on school participation using the randomization method. The success of the randomization can be seen from the insignificant differences in school participation levels between the program group and non-program group before the program starts. Analysis using the difference-in-difference method shows

that the PROGRESA program increased school participation by 0.66 years at the baseline level of schools aged 6.80 years.

1.1. School Operational Assistance (BOS) in Indonesia

Some studies evaluate the impact of the BOS program based on student scores, final exam participation rate, and household expenditures on education. Sulistyaningrum (2016) evaluates the impact of the BOS program using the IFLS 4 data. She uses test scores of elementary school students as the outcome. Using the Propensity Score Matching (PSM) technique, she concludes that the BOS fund can increase student grades.

Other studies on the BOS program impact use data panels from IFLS 3 and IFLS 4. Kharisma (2018) uses the dropout rate as the outcome variable. Difference-in-Difference (DID) method shows that students aged 7–15 years who receive BOS funds have a lower drop-out rate than those who did not receive the fund. However, the result is not statistically significant. Fatah (2016) estimates the impact of the BOS program on household expenditure on education using regression. Unfortunately, household expenditures on education are not become lesser after receiving the BOS fund. The fourth study is an impact evaluation using DID (Handoyo, 2012). He concludes that the BOS program has a positive impact on student scores only in the sample of junior high school level. In contrast, student whereas students at the elementary school level do not get significant influence.

It can be concluded that the impact of the BOS program has not been analyzed using data after IFLS 4 (2007). After 2007, precisely in 2009, the allocation of BOS funds was not only given to poor students. BOS funds are given to all students since 2009.

2. Methodology

This study uses the Indonesia Family Life Survey (IFLS). The IFLS is a longitudinal survey that was first held in 1993 and was carried out consecutively in 1997, 2000, 2007, and 2014. The initial sample of the IFLS represents 83 percent of Indonesia's population, living in 13 provinces of 26 provinces (Strauss et al., 2016). The data used in this study focus on the BOS fund received by schools, as well as the average scores and education-related spending of the student. Although students do not directly receive the BOS fund, the availability of the BOS fund in school hopefully can decrease the student's school-related spending. In this context, school-related spending includes school fees, school supplies (books, uniforms), transportation, and pocket money. For example, the students do not need to pay for textbooks because the school has already prepared them. Fortunately, IFLS provides the code of school facilities in the household data, so that we combine school information (BOS fund variable) from the facility book with individual information (school-related spending and average score of students) from the individual book.

We also only concentrate on elementary and junior high school education because these levels of education are critical in relation to Indonesia's 9-year compulsory education program. The IFLS data, especially in the facility questionnaire, contains information about whether the school received BOS assistance or not, how much the BOS assistance was, and how much the BOS funds were used. Besides, the IFLS was also asked about the average National Final Examination/EBTANAS and the average student expenditure for school fees. This study also uses information on school characteristics and regional characteristics.

This study used two-period panel data from IFLS 4 (2007) and IFLS 5 (2014). With the difference-in-difference method, unobserved heterogeneity that is constant over time can be eliminated. Based on the DID standard framework, we should define two categorical variables, namely participation or treatment status and before/after program status, and then we interact them. However, almost all schools have received BOS, so we can not proceed with the standard DID model. Alternatively, we use the Generalized DID approach for continuous treatment (Callaway et al., 2021). We use the size of the BOS fund received by the school as the treatment variable. In addition, because we use several waves of IFLS data, 2007 and 2014, then we create a categorical year dummy variable that represents before and after the program.

The impact of the BOS program with DID model can be estimated in the regression framework as shown in equation below.

$$Y_{it} = \alpha + \beta T_{it}t + \rho T_{it} + \gamma t + \varepsilon_{it}$$

The coefficient, the interaction between the treatment variable (T) and time (t) gives an estimate of the impact of the BOS program. The important assumption in DID is that the error variable must not correlate with other variables in the equation.

$$\begin{aligned} Cov(\varepsilon_{it}, T_{it}) &= 0 \\ Cov(\varepsilon_{it}, t) &= 0 \\ Cov(\varepsilon_{it}, T_{it}t) &= 0 \end{aligned}$$

This study uses empirical models with two outcomes, namely student spending (Model 1a) and student scores (Model 2a).

$$lexpendtot_{it} = \alpha + \beta lbos_total_{it} * yearid + \rho lbos_total_{it} + \gamma yearid + \varepsilon_{it} \quad (1a)$$

$$lexpendtot_{it} = \alpha + \beta lbos_total_{it} * yearid + \rho lbos_total_{it} + \gamma yearid + X'_{it}\delta + \varepsilon_{it} \quad (1b)$$

$$skorGPA_{it} = \alpha + \beta lbos_total_{it} * yearid + \rho lbos_total_{it} + \gamma yearid + \varepsilon_{it} \quad (2a)$$

$$skorGPA_{it} = \alpha + \beta lbos_total_{it} * yearid + \rho lbos_total_{it} + \gamma yearid + X'_{it}\delta + Z'_{it}\delta + \varepsilon_{it} \quad (2b)$$

Besides Model (1a) and (2a), there is Model (1b), which is Model (1a) with

additional control variables in the form of school characteristics; and Model (2b), which is Model (2a) with additional control variables in the form of the characteristics of schools and communities. Community characteristics are not included in model (1a) because the school fee component only covers administrative costs in schools that are allegedly not affected by community variables, such as public transportation and electricity.

Table 1: Variable Definitions

Variable	Operational Definition
lbos_total	log BOS funds that received from the school
lbos_totalyr	interaction variable between lbos_total with dummy year
stskorGPA	average final exam score
lexpendtot	log average student expenditure
yearid	dummy year 2014
stschool	dummy school accredited
public	dummy public school
avgroom	average number of students per room
urban	dummy urban
textbook	dummy textbook
electric	percentage of houses using electricity in the community
pubtrans	dummy public transportation in the community

3. Result and Discussion

The number of observations after dropping missing values are 1,232 schools, consisting of 293 elementary schools and 321 junior high schools observed for two years. Based on the statistical description in Table 2, most schools are public (public) schools and not nationally or internationally certified. It is indicated by the average value of the stschool variable of 0.19; the use of textbooks is quite comprehensive in all schools (87%); the composition of the urban-rural is balanced with the average urban variable of 0.62; almost all houses have access to electricity (93.12%); public transportation is not covering all regions (72%).

Table 3 shows the results of estimating the impact of BOS using DID for two outcome variables. Model (1a) and (2a) are simple models, while Model (1b) and (2b) control covariates in the form of school and community characteristics. In addition, the estimation uses robust cluster standard error for overcoming the heteroscedasticity problem.

With or without school and community characteristic variables, the magnitude of the coefficient of the time dummy variable, the participants, and their interactions shows similar values. Furthermore, there are no significant control variables in these estimation results. It shows that the variation of each control variable cannot explain the dependent variable. However, the F statistic shows a significant result for the exam score model (model (2a) and (2b)), while it is not significant for the school expenditure model (model (1a) and (1b)). It is consistent

Table 2: Statistic Descriptives

Variables	Mean/Proportion	Std Dev	Min	Max
lbos_total	18.70	1.86	0	27.63
bos_total (IDR million)	7541.113	85172.656	0	1000000
skorGPA	19.87	19.86	4.25	99.99
lexpendtot	4.59	6.09	0	20.72
expendtot (IDR million)	2.714	49.338	0	1000
stschool	0.19	0.39	0	1
public	0.81	0.39	0	1
avgroom	34.10	17.29	0.43	237
urban	0.62	0.49	0	1
textbook	0.87	0.34	0	1
electric	93.12	13.99	4	100
pubtrans	0.72	0.45	0	1

Source: IFLS Data

Table 3: Regression Result

	Student Expenditure		Exam Score	
	1a	1b	2a	2b
dummy year	9.749* (5.718)	10.02* (5.684)	-22.67* (13.36)	-23.26* (13.71)
lbos'total	0.308 (0.277)	0.310 (0.274)	-1.097** (0.487)	-1.041** (0.476)
lbos'totalyr	-0.494 (0.306)	-0.499 (0.304)	2.381*** (0.707)	2.392*** (0.718)
stschool		-0.130 (0.716)		-0.958 (1.915)
public		-0.705* (0.414)		11.33 (8.853)
avgroom		-0.00251 (0.0140)		-0.0653 (0.0506)
urban		-1.088 (1.214)		1.668 (3.058)
textbook		-0.618 (0.694)		1.901 (2.264)
electric				-0.00127 (0.0502)
pubtrans				2.458 (1.620)
constant	-1.294 (5.034)	0.483 (5.020)	28.80*** (8.865)	16.78 (11.88)
Observations	1232	1232	1232	1232
Adjusted r2	0.010	0.009	0.489	0.492
p-value F-Stat	0.144	0.146	0.000	0.000

Note: Robust Standard errors in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

with the goodness of fit result, where the exam score model has a higher adjusted R-squared than the expenditure model.

The results of the analysis in Table 3 show that BOS has a positive impact

on student test scores. Every additional 1% of BOS funds received by schools, on average, will increase student scores by 2.4 points. Because the observation consists of elementary and junior high school, then this result represents both the level of education. This finding supports the results of a previous study by Sulistyaningrum (2016) that BOS increases student scores. Furthermore, Handoyo (2012) found that the BOS program has no impact on the improvement of final exam scores for elementary schools, but it has an impact on the improvement of final exam scores for junior high school.

The positive effect of the BOS fund on exam scores might be related to the availability of education facilities and teacher quality in the school. Before the BOS program was implemented, the government gave greater authority to school-based management. With greater autonomy and new funding source, the education quality in schools is expected to be improved. Several studies showed that school-based management led to better decisions at the school level which in turn improved student learning outcomes (World Bank, 2014)

Meanwhile, there is no evidence that BOS funds affect decreasing student spending. Although the coefficient of BOS is not statistically significant, the sign shows a negative result. This indicates that the BOS effect is still limited to decreasing student expenditure. This is in line with Fatah (2016) that household expenditure for education is not lesser after receiving the BOS fund. Finding from World Bank (2014) also confirmed that the BOS program only had a temporary and minor impact on the costs faced by households. Furthermore, the effect was greatest among the poorest households and those who sent their children to public schools.

The lesser impact of the BOS fund on reducing education expenses might depend on the focus of spending allocation by the school. When the spending priority of the school is not related to programs that decrease student spending, then it is generally if the BOS program has no or little impact on reducing spending. Further research can address the detailed allocation of funds in the school and its consequence on households' education spending.

4. Conclusion

The analysis result shows that the higher the amount of BOS funds will increase the average score of students in schools. However, there is no evidence that BOS funds can reduce students' school-related spending. By controlling the characteristics of schools and communities, the coefficient is almost like the model without the control variable. One of the purposes of BOS funds is to reduce students' school-related spending. However, the findings of this study did not find evidence of a decrease in students' school-related spending as BOS funds increased. Therefore, the allocation of BOS funds in schools needs to be evaluated to reduce students' school-related expenses and enforce students' learning outcomes.

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