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Article

The Impact of School Attendance on Child Working: Case from Indonesian School Operational Assistance

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Abstract

Educational subsidies are increasing school attendance, but the impact on the child's working participation is vague. After running for five years, the government of Indonesia changed the regulation of Bantuan Operasional Sekolah (the BOS program or school operational assistance) to eliminate school fees for all elementary and junior secondary schools in 2009. This study intends to estimate the impact of hours of school attendance on children working using the 2009 regulation BOS program as an instrument. The estimation uses data from the fourth and fifth Indonesia Family Life Survey (IFLS) with Fuzzy Regression Discontinuity Design (FRDD) as methodology. The result presents that the children who benefited from the 2009 regulation BOS program spent more hours attending school than non-beneficiaries. However, the increase in school attendance is increasing the time allocation for income-generating and household work, supporting the idea that working and schooling are not perfectly substitutable.

Keywords: education policy; Bantuan Operasional Sekolah (BOS); school operational assistance; fuzzy regression discontinuity; Indonesia.

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1. Introduction

Child labor is a serious phenomenon in developing nations, including Indonesia. The Ministry of Manpower's (2014) "Roadmap towards Indonesia Child Labor Free in 2022" provides evidence of the Indonesian government's commitment to ending child labor. However, to be completely free of child labor in 2022 is challenging; as reported in 2021, 2.63% of children aged 10 to 17 are working (Statistics Indonesia, 2021). Moreover, children's participation in working is concerning because one out of three working children aged 12 to 14 is not attending school (International Labour Office & UNICEF, 2021). This condition potentially impacts the children's future welfare because school drop-out is associated with unskilled workers, difficulty finding a decent occupation, lower wages, and an increased probability of a poverty trap (Thévenon & Edmonds, 2019). As stated in Orrnert (2018), four policy areas have been generally believed to be essential in alleviating working children: regulation, social safety net, labor markets, and education. This study focuses on the impact of education policy on child working.

Several countries have applied educational policies to alleviate child participation in work by increasing school participation. However, the impact of educational policies, such as subsidies, varies. First, school subsidy reduces the incidence of child labor (Edmonds & Schady, 2012; Kozhaya & Flores, 2022; Ravallion & Wodon, 2000; Skoufias & Parker, 2001). Secondly, the impact of school subsidies might increase children's time allocation in income-generating work (Attanasio et al., 2010; de Hoop & Rosati, 2014; de Hoop et al., 2019). Lastly, educational subsidies might increase children's school participation but are not always linked to child labor (Amarante, Ferrando, & Vigorito, 2011; Opoku & Boahen, 2021). Most of the programs above give cash transfers to beneficiaries and increase household income, but the school subsidy in this study is nationwide, with the schools as beneficiaries. Due to varying outcomes and different subsidy mechanisms, it is necessary to study the impact of educational policy on children working participation in Indonesia.

In Indonesia, there are educational programs aimed at increasing educational attainment. One of the programs is *Batuan Operasional Sekolah* (BOS or school operational assistance). This program was established in 2005 to succeed a 9-year (now twelve) compulsory study by freeing school fees for poor students and reducing school fees for non-poor students at primary and junior secondary school levels. With the regulation change in 2009, the BOS program freed school fees for all primary and junior secondary students. Implementing the BOS program has reduced school drop-out (Kharisma, 2016) and raised the transition rate from elementary to junior secondary school (Kharisma, Remi, & Maharani, 2021). However, the impact of the BOS program after the regulation change in 2009 on child working participation through school attendance has not been explored yet.

This study intends to understand the impact of school attendance on working children in Indonesia by utilizing the change in BOS program regulation in 2009 to analyze the causal relationship between school attendance and child work. This study uses two waves of the Indonesia Family Life Survey (IFLS) and applies the fuzzy regression discontinuity design with the BOS program as an instrument. The primary objective is to answer the question: is the 2009-regulation BOS program affect school attendance and significantly reduce child working? The result illustrates that the 2009 regulation BOS program significantly increase school attendance, subsequently increasing the incidence of children working (both income-generating and household work). The result states that providing

school subsidies increases children's school attendance but increases the time allocation for children working, in line with research done by de Hoop and Rosati (2014)and Attanasio et al. (2010).

The remaining of this study is established as follows. Section 2 provides the theoretical foundation, the background of Indonesia's working and education conditions of Indonesia, and the BOS program used as the instrumental variable. Section 3 presents the data and the methodology. Section 4 offers the result and discussion. Finally, section 5 provides the conclusion of the result and policy recommendations.

2. Literature Review

2.1. Theoretical Foundation

In this part, the research follows a model by Opoku and Boahen (2021), which developed from a model by de Hoop and Rosati (2014) to accommodate the basic information about the linkage between the household decision on working and schooling; and education costs in terms of monetary and time. A household decision considers a unitary function, with parents maximizing household utility by defining household consumption and children's time allocation for leisure and education.

There are several assumptions in this model. The first is the rigidity of time to attend school, so the budget constraint is constant, not strictly convex. Secondly, fertility is treated as exogenous. The number of children in the family is predetermined and equal to one. Thirdly, the labor supply for the parents is assumed to be fixed. Lastly, the household is assumed to be a credit constraint. Household model to maximize utility function:

$$\max_{C,L,S} U(C, L, S) \tag{1}$$

$$\text{subject to } S = S^p + S^c \tag{2}$$

$$C = Y_o + wH - eS^c \tag{3}$$

$$H + L + S^c = 1 \tag{4}$$

$$0 \leq H, S^c, L \leq 1 \tag{5}$$

Where C denotes the consumption of the household, L denotes the children's leisure activities, and S denotes the children's educational attainment level – a summation between the total number of years that children have attended school in the past (S^p) and the number of years that they are currently enrolled in school (S^c). A household's consumption (C) is calculated by adding the exogenous income of the parents by (Y_o) to the child contribution, which is calculated by multiplying the child's wage rate (w) multiplied by the number of hours of working (H) and then deducting the educational expense (e). Then, time allocation for the children for working (H), leisure (L), and school attendance at the current time (S^c) is normalized to 1. Substituting the constraints into the household utility function:

$$\max_{H,S^c} U(Y_o + w(1 - L - S^c) - eS^c, 1 - L - S^c, S^p + S^c \quad (6)$$

A household's utility can be maximized when the household chooses the amount of consumption and the children's time allocation for working and schooling. Children's working hours (H) are specified by comparing the marginal rate of substitution between consumption and leisure (U_L'/U_C') and the wage rate (w).

Equation 2 reveals that attending school will almost surely increase children's level of education. However, attending school affects working hours in two opposing ways. For children who are enrolled in school, a rise in school attendance due to cheaper educational costs (e), leads to an increase in the marginal utility of leisure while simultaneously leading to a fall in the marginal utility of consumption and a reduction in child labor. Children who start attending school due to a reduction in educational costs have a higher marginal utility of consumption (and child labor) because households must pay for schooling (e). However, attending school frequently tends to improve the marginal utility of leisure, decreasing the time children spend working. The school attendance on effect working child participation for a newly enrolled student depends on these two effects but cannot be determined a priori. In conclusion, improving school attendance reduces child participation in work for children who attend school, although the effect on newly enrolled students is undetermined. The relative changes in direction and labor for newly enrolled and current students determine the aggregate changes in child participation in work.

Educational subsidies such as the BOS program reduced the financial expense of education (e). As a direct consequence, parents are encouraged to invest in their children's future by enrolling them in school and enhancing their level of attendance, as their educational expenses are reduced (e). The educational subsidies have an apparent positive effect in raising children's time allocation in school. The overall school attendance is increasing because newly enrolled and existing children will keep attending school. However, the effect of school attendance, encouraged by educational subsidies, on the children's time allocation for working is difficult to theoretically predict, as it can either reduce participation, increase participation, or have no effect.

2.2. Impact of Educational Policy on Child Labor

Several countries have applied educational policies to alleviate child working and increase school attendance by lowering schooling expenses via educational subsidies. Some programs successfully reduced child participation in work, for example, *Progresa* in Mexico (Skoufias & Parker, 2001), *Bono de Desarollo Humano* in Ecuador (Edmonds & Schady, 2012), and Full-time school program in Mexico (Kozhaya & Flores, 2022). However, it is hard to say that schooling displaces working. Evidence from Food-for-Education (FFE) in Bangladesh (Ravallion & Wodon, 2000) and *Familias en Acción* in Columbia (Attanasio et al., 2010) mention that even though school subsidy increases the rate of school attendance and reduces child working participation rate. However, the displacement effect on child labor is smaller than the gain in school attendance. Then, it can be concluded that children's time allocation for schooling and working is not a perfect substitute, and the parents are substituting other use of children's time allocation to maintain their eligibility for the program and modify children working hours (Ravallion & Wodon, 2000).

School subsidy programs might not have associated with child participation in work. The research undertaken by Amarante, Ferrando, & Vigorito (2011) on *Ingreso Ciudano*, the cash transfer component of *Plan Nacional de Atenció a la Emergencia Social* (PANES) in Uruguay, reveals a distinct outcome. The findings show that the program does not affect child labor; this is unrelated to the substitution effect in labor market participation, individual labor income, or family labor income; the transfer scheme should be redesigned, for example, by increasing the transfer amount (Amarante, Ferrando, & Vigorito, 2011). The result is in line with a study by Datt and Uhe (2018) about the effect of scholarship-based transfers on child labor in Nepal. The outcome indicates that the size or quantity of the scholarship matter to discourage children from participating in economic activities.

In addition, a study on the capitation grants in Ghana by Opoku and Boahen (2021) illustrates that any significant changes might not follow the increase in school attendance in child's work participation. The policy to increase school attendance might not work well to eliminate children's participation in working activities automatically; additional complementary policies, such as law abolishing child workers or any policies to improve household welfare, are needed (Opoku & Boahen, 2021).

Lastly, school subsidies might increase the incidence of the child participating in economic activities. Research done by de Hoop et al. (2019) on the *Pantawid* program in the Philippines and de Hoop and Rosati (2014) on the Bright project in Burkina Faso illustrates that school subsidies increase school attendance and increase participation in economic activities and domestic chores. Due to partial subsidies, children tend to work to pay for school costs that the subsidies do not cover. The result supports the evidence of the importance of the size of the subsidies (de Hoop et al., 2019). However, if the purpose of education subsidies is to accomplish both an increase in the number of hours children spend in school and a decrease in the number of hours children spend working. In that case, the government may need to combine the programs with other policies that lessen children's participation in child labor, or they may need to be customized to include more apparent incentives and punishments for child workers (de Hoop & Rosati, 2014).

In line with the theory, the effects of educational subsidies on children going to school and working are not apparent. They could have a negative effect, a positive effect, or no effect at all. In addition, the size of subsidies is essential. Educational subsidies must be sufficient to effectively alleviate working child participation (Datt & Uhe, 2018). Inadequate subsidies force children to engage in economic activities to cover their educational costs (de Hoop & Rosati, 2014). Moreover, children's time allocation on schooling and working is not a perfect substitute; parents could reduce other time allocations so the children can keep working while attending school (Ravallion & Wodon, 2000). Suppose the school subsidies must handle both school participation and child labor issues. In that case, the program needs to be combined with more specific policies, such as penalties for the parents if they do not enroll their children in school (de Hoop & Rosati, 2014).

2.3. Child Schooling and Working in Indonesia

Child labor is a sign of poverty, and Indonesia, as a developing country, faces poverty and child labor issues. Based on Statistics Indonesia (2021), the total population of Indonesia in mid-2021 is around 272,68 million, and approximately 26,53 million people are living under the poverty line (Statistics Indonesia, 2021). In addition, 2.63% of children aged 10 to 17 are working (Statistics Indonesia, 2021). The existence of child participation in economic

activities is concerning because one out of three working children aged 12 to 14 is not attending school (International Labour Office & UNICEF, 2021), which could harm the children's welfare in the future (Thévenon & Edmonds, 2019).

In Indonesia, protection against child labor is also included in Indonesia law number 13 of 2003 about the workforce (2013). This law regulates the minimum age for child labor, the maximum duration of a working hour per day, and prohibited sectors for child labor. In addition, through the ministry of labor, the government constructed a plan to alleviate child labor called "Roadmap towards Indonesia Child Labor Free in 2022". This plan includes policies, strategies, and guiding principles to eliminate child labor (Ministry of Labor of the Republic of Indonesia, 2014).

Indonesia has implemented a 9-year compulsory study since 1994 and changed the regulation into a 12-year compulsory study in 2015. The school participation level in Indonesia is high enough. In 2021 the participation rate for age groups 7-12, 13-15, and 16-18 were 99.19%, 95.99%, and 73.09%, respectively (Statistics Indonesia, 2021). However, implementing compulsory study does not automatically eliminate out-of-school children. In 2021, even though the number of children out-of-school at a primary level is almost zero, there are 6.77% of children out-of-school at the junior secondary level and 21.47% at the senior secondary level, with a more considerable proportion at rural than urban areas (Statistics Indonesia, 2021). Therefore, eliminating child participation in working through educational attainment is essential in developing countries. The government of Indonesia has several programs to increase educational attainment, *Bantuan Operasional Sekolah* (BOS) is one of the programs.

2.4. Bantuan Operasional Sekolah (BOS or school operational assistance)

Bantuan Operasional Sekolah (BOS), also known as the school operational assistance program, is one of the compensation programs established by the government of the Republic of Indonesia in response to the reduction of fuel subsidies in 2004. The BOS program aims to guarantee that every student has access to excellent-quality education to successfully finish the nine-year compulsory education program mandated by Indonesia law number 20 of 2003 about the education system (2003).

When the BOS program was initiated in 2005, the program abolished school fees for poor primary and junior secondary school students and lowered fees for non-poor students. Since 2009, however, BOS funding has eliminated tuition for all primary and junior high school students (both poor and non-poor). The BOS program provides supplemental transportation and a uniform allowance for poor students. The number of students attending a school determines how much of a grant a school will receive. According to SMERU (2006), when the BOS program was initiated, the central government budget allotted Rp235,000 per primary student per year and Rp324,500 per junior secondary student per year.

As described by the World Bank (2014), the BOS program is expected to improve educational outcomes through three fundamental approaches. First, support with a primary school operating expense. This strategy can minimize parental educational expenditures and increase enrolment among low-income families. Second, the BOS program provides financial aid for low-income students to pay for transportation, stationery, uniform, and other educational expenses. Furthermore, improved school-based administration so that the school has the autonomy to manage its budget to improve the quality of education.

3. Data and Analytical Method

This study used data from the Indonesia Family Life Survey to explore how the modification to the BOS regulation change in 2009 affected the relationship between children's participation in the labor force and their school attendance (IFLS). RAND's Institute for Family Life Studies (IFLS) is a socio-demographic and economic household survey. IFLS is a longitudinal survey conducted in five waves: IFLS 1, IFLS 2, IFLS 2+, IFLS 3, and IFLS 4 were carried out in 1993, 1997, 1998, 2000, and 2007, respectively. The most recent wave, IFLS 5, was conducted in 2014.

IFLS has several distinct features. First, when it started in 1998, the IFLS 1 sample included around 83 percent of Indonesia's total population across 13 major regions. Second, the IFLS data collection provides detailed information on individuals, households, and communities. This information includes the demographics of households, the economic characteristics of households, consumer behavior, health history, access to community services, and the social safety net. In addition, IFLS has a lower attrition rate (less than 10% per wave) due to the follow-up survey also tracking the respondents who migrate to different areas (Dartanto, Moeis, & Otsubo, 2020).

3.1. Sample and Variable Definition

As this study aims to understand the effect of the BOS regulation change in 2009, the data used for this study is the waves fourth (2007) and fifth (2014) of IFLS. In Indonesia, children can enroll in primary school starting at six years old, but the school year spans two years. In this study, children are assumed to begin primary school at the age of seven to accommodate delays in enrolment, based on The World Bank (2022). Then children would complete a 9-year compulsory study at the age of 15. However, the IFLS module for children is targeted at children below 15 years old, then the maximum period for this sample is restricted to 14 years old. Therefore, the sample constraint is for each wave's children aged seven to fourteen.

For the IFLS 4 (2007) survey, the sample includes children who were born from 1992 to 1999. Similarly, IFLS 5 (2014) uses children born between 2000 and 2007 as samples. This study used a sample from IFLS4 as the control group and a sample from IFLS 5 as the treatment group. The number of children born in 2000 is used to differentiate between groups. Pooling two waves of IFLS and restricting the age between seven and 14 give a total sample size of 9273.

The outcome variable of interest is children working participation. In this study, working participation is divided into two: income-generating work (including working for pay, working in a family business (both farm and non-farm business), and household work (Attanasio et al., 2010). Working is a continuous variable defined by the total working hours (income-generating and household work) in the last week. The treatment variable is school attendance, represented by the total hours of the school attended by the children in the previous week. This variable is an instrument variable consisting of variable treatment (a binary variable, whether the child benefits from the BOS program), a running variable subtracted by the cut-off (year of birth minus the cut-off), and an interaction variable.

Children's characteristics, such as gender, religion, ethnicity, and region, are included as the control variable. Gender is a binary variable, whether the children are male or female. Due to the plentiful categories of religion, ethnicity, and region, these variables are

constructed into binary variables. The variable Muslim (Islam) was used to explain the religion because 90.97% of the sample is Muslim. For ethnicity, the majority of the sample is Javanese, so it was used as a variable. Several household characteristics are also included, such as the head of the household's gender, the binary variable whether the child's father lives in the household, the binary variable whether the child's mother lives in the household, and the total number of children living in the same household.

3.2. Empirical Analysis

This study exploits the change in the BOS program regulation in 2009 to determine the impact of attending school on child participation in working activities. The methodology mainly adopted the econometric model by Opoku and Boahen (2021) with modifications to suit different outcome interests. The BOS program is a good fit for a regression discontinuity design, which allows for identifying the cause-and-effect relationship between child schooling and working because of the exogenous implementation. The birth year divides the control and treatment groups (not affected and affected by BOS). In other words, children who were born earlier and enrolled in primary or junior secondary school before implementing the change in the BOS program in 2009 are the control group since they are not benefited from the program, whereas children who were born later work as the treatment group.

Fuzzy regression discontinuity design (FRDD) was selected based on birth year to identify cohorts affected by the change in the BOS program regulation in 2009. Since the running variable in this study is the year of birth rather than the year of initial enrolment in primary school, and there is the possibility of early or late enrolment, the treatment status is not a deterministic function of the running variable. In other words, the birth year only marks the probability of receiving the treatment but does not work as a deterministic function of being treated (Imbens & Lemieux, 2008).

Suppose Y_i is working child participation, $X_i$is the running variable (birth year), c is the cut-off point (birth of the year 2000), and S_i represents the total number of effective hours of school attendance in the last week. Observation for the children who are expected to be benefited from the BOS program (the 2009 regulation) is placed on the right side of the cut-off point of the running variable. The FRDD is expressed as:

$$Y_i = \beta_i S_i + f(X_i) + \beta_z Z_i + U_i \tag{7}$$

$$S_i = \pi_i Z_i + \ g(X_i) + V_i \tag{8}$$

$$Z_i = 1(X_i \geq c) \tag{9}$$

Other factors that affect Y_i are denoted by U_i, and other factors that affect S_i are denoted by V_i. $Z_i$is a binary of treatment status. A value of 1 indicates the possibility of receiving treatment (benefited from the 2009 regulation BOS program), and a value of 0 indicates otherwise. Combining equations (7), (8), and (9), U_i and V_i are continuous at the cut-off, ensuring the first stage is not zero; monotonicity, independence, and exclusion restriction assumption ($\beta_z = 0$); and Z_i affect Y_i through S_i; the FRDD estimand is identified as $\mathbb{E}[\beta_i | X_i = c, \pi_i = 1\ ]$. Due to cross-over (the probability of children in the

control group receiving the treatment), the estimand of FRDD identifies the local average treatment effect (LATE), which is represented as follows:

$$\mathbb{E}[\beta_i|X_i = c, \pi_i = 1\ ] = \frac{\mathbb{E}[Y_i|X_i = c] - \lim_{X_i \uparrow c} \mathbb{E}[Y_i|X_i = x]}{\mathbb{E}[D_i|X_i = c] - \lim_{x \uparrow c} \mathbb{E}[Y_i|X_i = x]} \quad (10)$$

π_i=1 is the compliers (Lee & Lemieux, 2010 as cited in Opoku & Boahen, 2021). It should be noted that the FRDD estimand in equation (10) is the same thing as the estimation of the two-stage least square (2SLS) (Imbens & Lemieux, 2008; Lee & Lemieux, 2010; Opoku & Boahen, 2021). During the estimation process using the 2SLS, gender, religious affiliation, and ethnicity are utilized as the preset factors that impact Y_i and S_i.

Table 1. Summary statistics

Variable	Control cohort (Observation: 3883)		Treatment cohort (Observation: 5390)	
	Mean	Std.Dev.	Mean	Std.Dev.
Hours of the school attended	21.59	12.24	24.66	10.79
The child receives benefits from BOS	0	0	1.00	0
Child's year of birth	1,995.94	1.96	2,003.31	2.23
Child's year of birth centered at the cut-off	- 4.00	1.96	3.31	2.23
Hours of income-generating work	0.18	2.14	0.23	2.41
Hours of household work	0.62	2.40	0.45	2.60
Child is male	0.51	0.50	0.51	0.50
Child is Muslim	0.91	0.29	0.91	0.29
Child is Javanese	0.41	0.49	0.43	0.50
The child lives in Java	0.57	0.50	0.49	0.50
The head of household is male	0.86	0.35	0.87	0.34
The child's father lives in the household	0.76	0.43	0.78	0.41
The child's mother lives in the household	0.87	0.34	0.89	0.32
Number of children live in the household	2.30	1.06	2.14	0.95

Source: IFLS 4 and IFLS 5

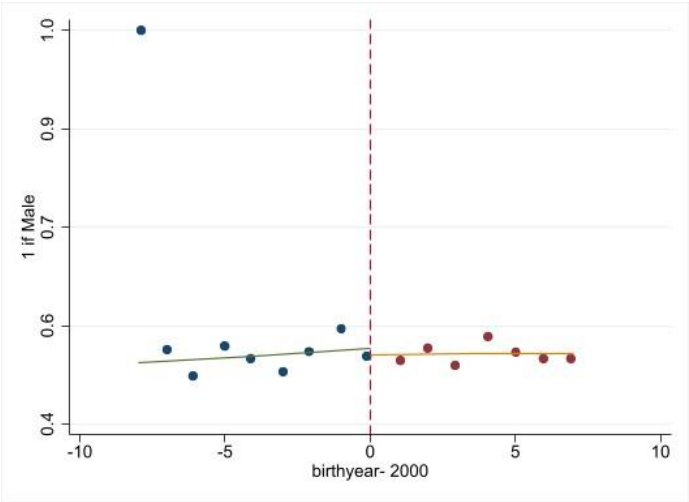
The bandwidth used for the estimation is determined by applying the methods devised by Calonico et al. (2017). Two primary considerations should be taken into account while selecting the optimal bandwidth. The first criterion is that the point estimate should have a mean square error that is as small as possible. The second criterion is to ensure that the asymptotic coverage error of the confidence intervals linked with the point estimate must be lowered to the maximum extent possible. It is necessary to apply the optimal bandwidth

because, within the bandwidths, the distribution of persons between treatment and control groups is "as good as random" (Cattaneo et al., 2020, as cited in Lewis & Nguyen, 2020).

3.3. Identification and Internal Validity Check

Two critical assumptions are required to use the BOS program (after the regulatory modification in 2009), which will serve as an instrument for this investigation. The first assumption is that there is no reliance and a restriction on exclusion. The amount of the BOS program depends on the number of students enrolled in the schools, so the BOS program is not dependent on school children's attendance and working participation. The second assumption is that there is a strong correlation between the 2009 regulation BOS program and student school attendance.

A fundamental issue for consideration is the likelihood that additional child working and schooling-related policies may be adopted during the year of the cut-off. If other policies were in place during the cut-off year, the projected findings would determine the combined causal influence of the BOS program and the different policies. Throughout the research that has been done, no policies, at the cut-off year of 2000, caused a gap between the working hours of children and the time allocation spent in school. In addition, the pre-treatment covariates in figure 1 do not disclose a significant statistical difference at the cut-off, which suggests a low likelihood of additional policies that generated a discontinuity in the year 2000.



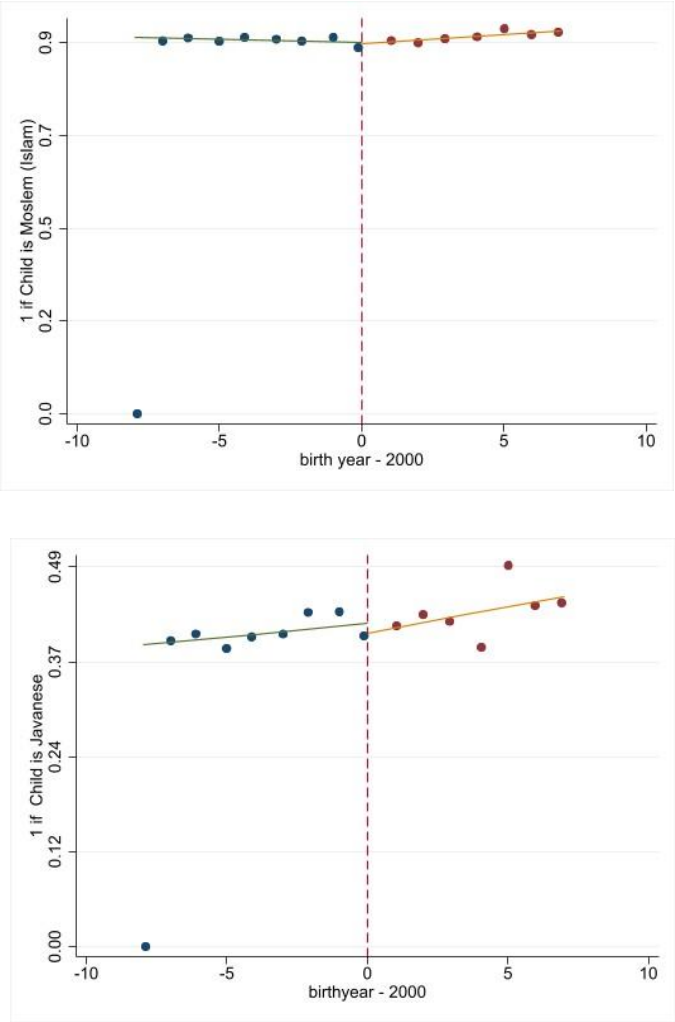


Figure 1. Impact of the BOS program (2009 regulation) on pre-treatment covariates gender, religion, and ethnicity

4. Result and Discussion

In this study, the decision on primary school enrolment starts at age seven (The World Bank, 2022). In this regard, the 2009 regulation change BOS program affects children born in 2000 or after. The cut-off of policy exposure is estimated to be around the year of birth in 2000. The first step in assessing the impact of school participation on children working using the 2009 regulation BOS program is to estimate the optimum bandwidth. The optimum bandwidth estimation is determined by applying the methods devised by Calonico et al. (2017). Table 1 presents the optimum bandwidth for both interest outcomes (hour of income-generating work and domestic work), approximately between two years.

Table 2. Optimum Bandwidth

	Optimum bandwidth	
	Left of the cut-off	Right of the cut-off
Income-generating work	2.302	2.302
Household work	2.454	2.454
Observation	3,883	5,390

4.1. First Stage Regression

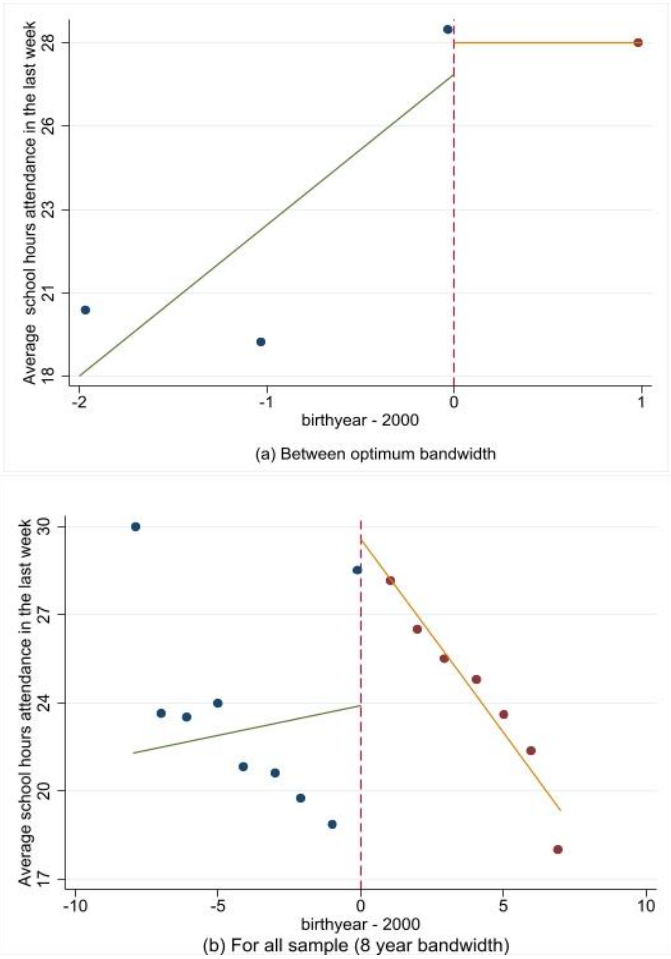


Figure 2. Regression discontinuity plot on the BOS program policy implemented in 2009

The discontinuation in total school hours attended by the child is shown from the different intercepts and slopes of the two fitted values before and after the cut-off. A noticeable spike in student enrolment can be seen in figure2. A discontinuity graph on all

the samples (figure 2 (b)) is included because the optimum bandwidth is between two years and seems too close to the bandwidth to give a better illustration figure 2 (a)). The discontinuity at the cut-off is crucial because it is an identification strategy using the regression discontinuity analysis (Opoku & Boahen, 2021).

Table 3 presents a linear regression using optimal bandwidth (between 2 years). Overall, the 2009 regulation BOS program is significantly increasing school attendance hours for children born in 2000 and later (attending primary and junior secondary level when the program started). Children who benefit from the BOS program (2009 regulation version) are more likely to participate in school for 10 hours longer than children who do not benefit from the program.

Table 3. First Stage Regression

	Hours of School Attendance
Treated	10.067
	(1.132)***
Birth-year centered at cut-off	-0.914
	(0.684)
Treated x Birth-year centered at the cut-off	0.517
	(0.903)
Male	-0.584
	(0.447)
Muslim	0.803
	(0.735)
Javanese	0.997*
	(0.552)
Sumatera	1.252*
	(0.658)
Bali & Nusa Tenggara	4.121***
	(0.697)
Kalimantan	2.463***
	(0.848)
Sulawesi & Papua	0.530
	(1.023)
Constant	16.868***
	(1.632)
Prob > F	0.000
Observation	2469

Note: samples are limited to children born between 1998 and 2001. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the year of birth are reported in parentheses. Control variables include dummies for gender, religion, and ethnicity, as well as the island fixed effects (Java as based).

Nevertheless, there is no proof that the year of birth or the interaction variable between policy treatment and the year of birth affects the number of school hours. Child characteristics such as gender and religion appear to have no impact on hours of schooling attendance. However, the student's ethnicity substantially impacts the amount of time spent in school; Javanese children are more likely to spend more time in school than other ethnicities. As for the island of living fixed effect, it is partially significant. Regional characteristics of each island (for example, culture, public facilities, and quality of local government) appear to cause the difference (Joewono, Handayani, & Dartanto, 2021)

4.2. Second Stage Regression

The results of the second stage of the regression are presented in table 4 to estimate the primary variable of interest, whether or not hours of school attendance significantly reduce hours of work with the 2009 regulation of the BOS program as an instrument. The findings indicate that an increase in the number of hours spent in school due to the BOS program leads to a considerable increase in the number of hours spent working, including income-generating and household work. In the second regression stage, there are additional control variables about household attributes, such as the household head's gender, the domicile place for the child's father and mother, and the number of children in the household. Other pre-determined covariates such as child gender, religion, ethnicity, and island fixed effect are still included.

Table 4. Second stage Regression

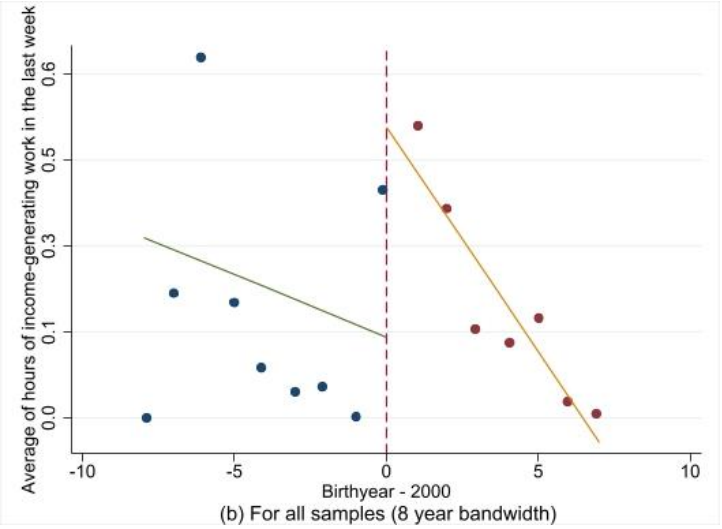
	Hours of Participation	
	Income-generating work	Household work (chores)
Hours of school attendance	0.047***	0.047***
	(0.010)	(0.132)
Male	-0.154	-0.485***
	(0.113)	(0.124)
Muslim	0.026	-0.524*
	(0.179)	(0.273)
Javanese	0.229*	0.197
	(0.127)	(0.132)
The male head of the household	0.102	-0.569
	(0.202)	(0.190)
Father lives in the household	0.126	-0.058
	(0.183)	(0.188)
Mother lives in the household	-0.048	0.201
	(0.140)	(0.199)
Number of children living in the household	0.224	-0.241
	(0.081)	(0.390)
Sumatera	0.425**	0.332**
	(0.210)	(0.163)
Bali & Nusa Tenggara	0.349*	0.051
	(0.208)	(0.233)
Kalimantan	0.131	0.021
	(0.185)	(0.204)
Sulawesi & Papua	0.341	-0.077
	(0.258)	(0.189)
Constant	-1.278***	-0.241
	(0.419)	(0.390)
Observation	2469	2469

Note: samples are limited to children born between 1998 and 2001. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the year of birth are reported in parentheses. Control variables include dummies for gender, religion, and ethnicity, as well as island fixed effects (Java as based).

4.2.1 Effect of School Attendance in Income-generating Work

The discontinuation of children's average time allocation for income-generating work in the last week is shown from different intercepts and slopes before and after the cut-off. For the same reason, the graph of all the samples is still included to give a better illustration. The graph shows the clear jump in the cut-off. Table 4 presents the second stage regression. It can be seen that the interest variable, the hours of attending school from the first regression, significantly impacts the increasing time allocation of income-generating work. Any additional hours of attending school will increase by 0.047 hours of income-generating work. The first stage shows that the 2009 regulation BOS program beneficiaries are more likely to attend school 10 hours longer in a week. Furthermore, the income-generating work also increases by 0.47 hours or around 28 minutes a week.

In this part, the household characteristic, such as the gender of the household, whether or not the child's father and mother live in the same household, and the number of children in the household has no significant impact on hours of income-generating work. However, Javanese children significantly work 0.22 hours more than children of other ethnicities. In addition, the regional effect is partially significant. Children living in Sumatra and Bali – Nusa Tenggara work 0.42 and 0.35 more hours than those living in Java.



(b) For all samples (8 year bandwidth)

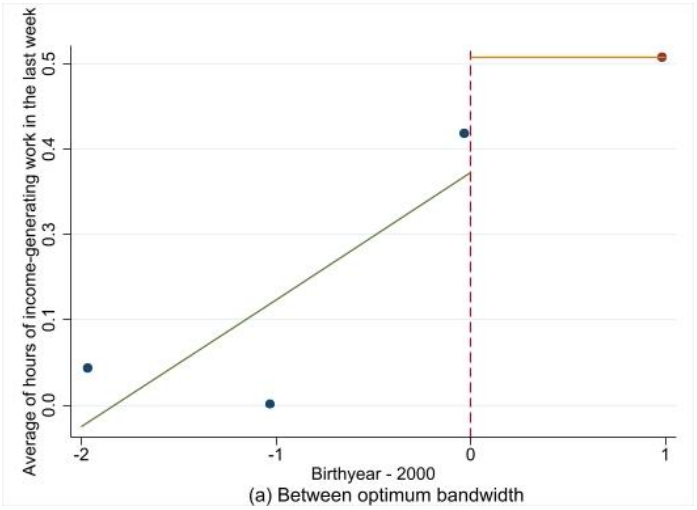


Figure 3. Impact of the birth-year instrument on the hours of income-generating work

4.2.2 Effect of School Attendance on Household Work

The graphs in figure 4 present a clear jump in average hours of household work in the last week on the cut-off. It is a sign that regression discontinuity can be applied to the analysis. Figure 4 presents the impact on average hours of household work in the last week for both optimum bandwidth and all samples for better illustration since the optimum bandwidth is too close to the cut-off. However, a jump at the cut-off can be seen clearly in both graphs.

Household work, also known as domestic chores, is not included as working (Attanasio et al., 2010). Based on that reason, this study differs between income-generating work and household work. As presented in table 4, the second stage regression on hours of household work and hours of attending school due to the 2009 regulation of the BOS program significantly increased hours of household work. There will be a 0.047-hour increase in household work for every hour added to school attendance. Since the first stage presents additional 10 hours of school attendance per week for the 2009 regulation BOS beneficiaries, the hours of household work will increase by 0.47 hours or around 28 minutes per week.

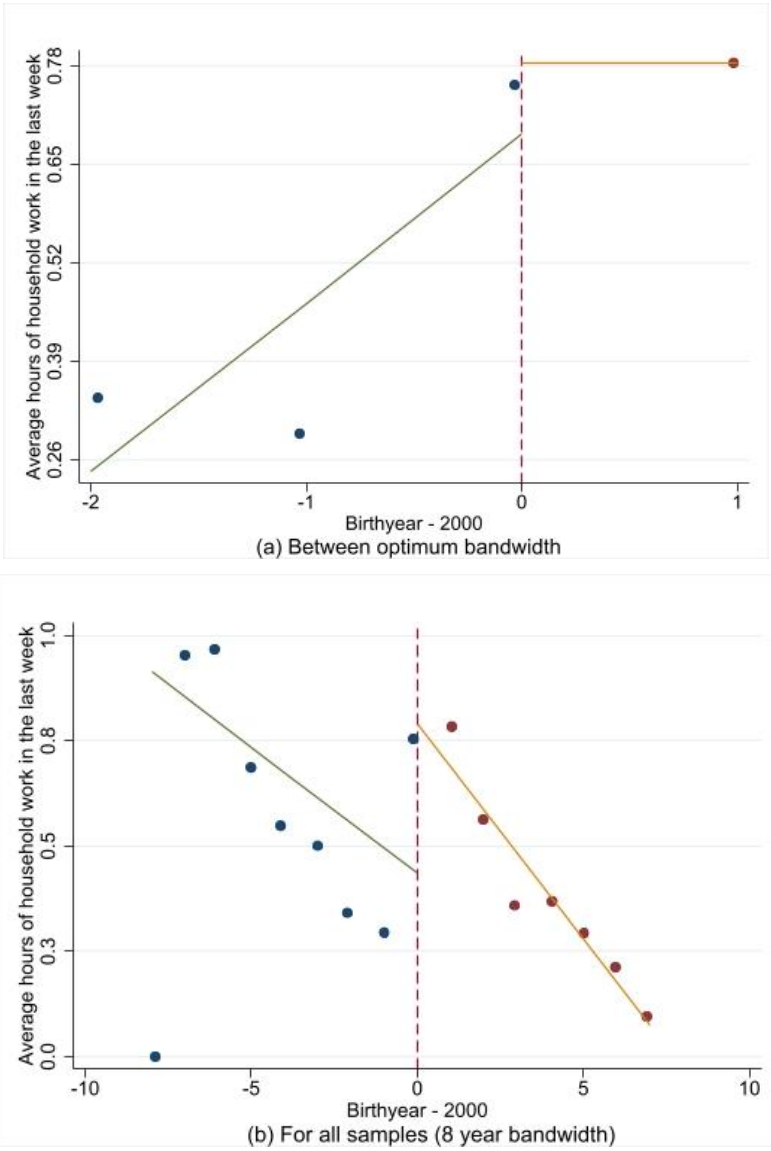


Figure 4. Impact of the birth-year instrument on the hours of household work

The result presents that the gender of the child has a significant impact on household work. Boys are more likely to have fewer hours doing household work than girls by half an hour. The following variable that significantly affects hours of household work is religion. Muslim (Islam) children tend to work shorter hours on household work than children with other beliefs by half an hour. The last significant variable is the regional fixed effect; children living in Sumatra are likelier to work more extended hours in households than in Java. Same as the regression result on hours of income-generating work, the household characteristic such as the gender of the household, whether or not the child's father and mother live in the same household, and the number of children in the household has no significant impact on hours of household work.

4.3. Sensitivity Check

Table 5. Sensitivity in various bandwidth

			Bandwidth							
			2		4		6		8	
Income -generating work	First -stage	***	10.41	***	10.53	***	10.53	***	10.48	***
			(1.13)		(0.82)		(0.61)		(0.52)	
	Second-stage	**	0.04*	**	0.05*	**	0.05*	**	0.05*	**
			(0.01)		(0.01)		(0.01)		(0.01)	
House hold work	First -stage	***	10.43	***	10.53	***	10.53	***	10.48	***
			(1.13)		(0.82)		(0.61)		(0.52)	
	Second-stage	*	0.05*	*	0.06*	**	0.06*	**	0.06*	**
			(0.02)		(0.01)		(0.01)		(0.01)	

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors are reported in parentheses.

A method by Calonico et al. (2017) is applied to check the robustness of the estimation. The first and second stages are significant for income-generating work, with 1% statistical significance. The significance between stages means that the treatment effect is statistically significant and estimated with robust bias–corrected confidence intervals and inference procedures. Another test to check the robustness is the sensitivity at different bandwidths. Here, the optimum bandwidth (between two years), twice the optimum bandwidth, three times, and for all samples were applied to test the sensitivity. The result from Table 5 shows that all the bandwidths listed are significant. It can be concluded that the estimation is not sensitive to the number of observations and is credible enough.

The same method is applied to estimate the robustness of household work. The first- and second-stage are significant, with statistical significance of 1% and 10%, respectively, which means that the treatment effect is statistically significant and estimated with robust bias–corrected confidence intervals and inference procedures. The sensitivity between different bandwidths in Table 5 shows that all the bandwidth is significant. However, the statistical significance is different, but it can still be concluded that the estimation is not too sensitive and credible enough.

4.4. Discussion

The first-stage regression states that the 2009 regulation changed the BOS program significantly and increased the elementary and junior secondary student hours of school attendance. This estimation is in line with the theory that a school subsidy will increase school attendance because of the reduction in the financial cost of education (Opoku & Boahen, 2021). The BOS program increases overall school attendance, for children already enrolled in primary and junior secondary school will remain attending. Children starting to register for school due to free fees will keep attending school.

The theoretical foundation explains that the unitary household model divides time between working, leisure, and going to school to maximize the utility function (de Hoop &

Rosati, 2014; Opoku & Boahen, 2021). The first stage regression shows that the BOS program increases school time allocation. Meanwhile, the second stage illustrates that time allocation for school also increases the probability of working for income-generating and household work. It can be concluded that parents reduce children's time allocation to leisure so the children can improve their time proportion on schooling and working. Then, the household will receive the benefit of free schooling without deducting children's participation in the working activity (Ravallion & Wodon, 2000).

The result of this study is in line with research done by de Hoop and Rosati (2014) and Attanasio et al. (2010). The 2009 regulation change BOS program has significantly impacted increasing hours of school attendance but rising, instead of reducing, children's time allocation to working. This result supports Ravallion and Wodon (2000) that working is not displacing attending school for children. In other words, children's time allocation for schooling and working is not perfectly substitutable (Attanasio et al., 2010). Even though the 2009 BOS program has eliminated school fees and given an additional allowance for transport and uniforms for students from low-income families, there are still some costs levied in primary and junior secondary schools (The World Bank, 2014). The increase in participation in economic activity is possibly due to the children trying to finance themselves to cover educational expenses (de Hoop et al., 2019).

5. Conclusion and Policy Recommendation

5.1 Conclusion

Child working is a common problem in developing countries, including Indonesia. The primary issue with child working is that a third of working children between 12 and 14 are out of school (International Labor Office & UNICEF 2021). School subsidies have been introduced in several countries to alleviate children's time allocation in working. Increasing school attendance will reduce children's time allocation on working participation. Nevertheless, the previous literature studies the impact of educational subsidies on children working in state variety of results. Because the result differs from the case by case and cannot be generalized, it considers necessary to see the impact of school attendance on children working due to the 2009 regulation BOS program.

Unlike previous literature that the majority give school subsidies in cash transfers for low-income families or students, the 2009 regulation BOS program is implemented nationwide for all primary and junior secondary schools (now until senior secondary school). Giving cash transfer generates an income effect for the beneficiaries, which increase the household income, but the BOS program beneficiaries are schools to eliminate the cost of operation. However, the BOS program removes the cost of education; education is more affordable for poor parents.

FRDD is used to estimate the impact of school attendance on children working with the BOS program as an instrument. The first regression result indicates the significant positive effect of benefits from the BOS program and hours of school attendance. In other words, children who benefit from the BOS program are more likely to attend school for 10 hours longer a week. However, the impact of school attendance is not reducing, increasing to be exact. Every hour, in addition to school attendance, is raising income-generating and household work by around 0.047 hours. Then the 2009 regulation BOS beneficiaries tend to

work 0.47 hours or 28 minutes longer than non-beneficiaries per week. This result is in line with de Hoop and Rosati (2014) and Attanasio et al. (2010), supporting the idea that working and schooling are not perfectly substitutable. Parents are more likely to reduce other time allocations, such as doing homework or attending tutorial classes for education, rather than the time allocation for working (Ravallion & Wodon, 2000). However, due to the limitation of the data, the impact of school attendance on other time allocations cannot be identified. In addition, this study uses the data from IFLS as IFLS illustrates 85% of Indonesia's population. The surveys do not cover all of Indonesia's provinces (now 37), especially the eastern part of Indonesia.

5.2 Policy Recommendation

Increasing school attendance does not automatically alleviate child working. Refers to de Hoop and Rosati (2014), if the educational subsidy has two purposes, increasing school attendance and eliminating child workers, it needs to be combined with other interventions which successfully reduce the incidence of the child working. The BOS program aims to reduce inequality in education by eliminating school fees; reducing child working is not the program's purpose. So, it needs to be combined with other policies to reduce child working. A cash transfer or anti-poverty program probably works by giving additional income to the family works as the income effect stops children from working.

Indonesia has several programs to push children to attend school and reduce working time allocation. However, the regulation that administrated the responsibility of the parents to allocate children's time wisely has not been implemented. No fines or penalties are given to parents if the children do not finish a compulsory study or not attending school because they have to work. Indonesian law number 13 of 2003 about the workforce regulates that firms do not employ child workers below 13 years old and a maximum of 3 hours per day for children 13 years old and above. However, this regulation does not regulate the informal sector, such as working on a family farm under the parents' supervision.

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