Do incidence and duration of child labour matter on schooling in Indonesia?

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Abstract: This study attempts to investigate the effect of incidence and duration of child labour on schooling using the 2016 Indonesia's National Labour Force Survey (SAKERNAS). The study uses instrumental variable (IV) technique where access to clean water, good sanitation and access to electricity serve as instruments. The finding suggests that the incidence of child labour is negatively and significantly correlated with enrolment, while there is no effect of duration on schooling. In addition, schooling is significantly influenced by sex, some income and household characteristics and area.

Keywords: child labour; incidence; duration; schooling; Indonesia.

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1 Introduction

Child labour has been well-known as a violation of children's rights and it could potentially detrimental to the national development in the long-term. According to the International Labour Organization (ILO, 2013), the prevalence of child labour was estimated around 168 million, in which 46% is in Asia and The Pacific, 35% in the Sub-Saharan Africa and 8% in Latin America and the Caribbean. Such information requires good policy to address in order to diminish the potential effect on human capital development and future economic growth of developing countries.

In general, child labour phenomenon as the regular participation of school-aged children in the labour force in order to add income of the household or to earn a living for themselves [Basu, (1999), p.1085]. This terminology is totally different with the concept of child work which is more unharmful than the previous one and is not strictly intended to generate income. Here, children might involve in housekeeping activities and household chores such as cleaning, cooking and washing that may intensively be conducted after school hours or on holidays.

Although there is a limited information on the number of child labour in Indonesia increasing over time, the attention should be directed to the incidence of child labour. Priyambada et al. (2002) estimated that the incidence of child labour in Indonesia was 7% (based on the 1998 National Labour Force Survey data) and 10% (based on 100 Village Survey 1999 data). However, 16 years later, the 2015 Indonesia's National Labour Force Survey (SAKERNAS) recorded that there were around 1.65 million child labour (75% of total labour force aged 15–17 years old) in Indonesia working in several types of business sectors, including high-risk or dangerous work such as agriculture, mining and fishing.

From a policy perspective, such issue needs to be answered so that if working during school has a detrimental effect on schooling, it might be reasonable to reinforce law that mitigates child labour practice. However, this argument is debatable due to the fact that there are many factors that contribute to the low enrolment rate such as distance and cost to schooling as well as quality of schooling. In addition, imposing restrictions on child labour would contribute little to suppress such practice or even to increase participation. This is due to the proposition in Indonesia culture that parents might either send their least motivated children to work without considering the gender or they only might send male children to school given the capacity and capability that they have.

Since there is no development in the current literature, our paper will provide novelty in the child labour – enrolment nexus in Indonesia. Specifically, we try to estimate the effect of incidence and duration of child labour on schooling simultaneously using the 2016 SAKERNAS dataset. Since child labour and schooling are categorised as endogenous variables, we use instrumental variable (IV) technique as a research methodology.

The following parts of this paper are organised as follows: Section 2 based on literature review, discusses the relationship between child labour and schooling. Section 3 describes the data and methodology used in this study. Section 4 explores and analyses the result. Finally, Section 5 provides the conclusion and limitation of the study.

2 Literature review

The reasons for children participating in the labour market are mostly related to household economic instability. Consequently, the income generated from labour market can be used either to support their families in maintaining consumption level or to pay their tuition fee. However, as working hours increase, schooling becomes less and less important.

Edmonds and Turk (2002) argued that being in class is a necessary but not sufficient condition for learning. The argument is that being enrolled in school does not guarantee the time spent in class. Moreover, working could reduce the children's concentration to study properly. Apart from schooling and working hours framework, Edmonds (2008) later established a simple model of children time allocation. The contribution of the model is that the parents make joint decisions on the schooling, leisure and labour of their child. In other words, decisions on such choices depend on how these three items interact with each other.

Departing from the motivation of child labour, many studies analyse the connection between the number of hours worked by children and their schooling that focus on causes. For example, Kambhampati and Rajan (2005) proposed the determinants of child work and schooling in rural India using a bivariate probit analysis. They conclude that mother's education could be the single most determinant factors in reducing the likelihood of a child work. Meanwhile, Akabayashi and Psacharopoulos (1999) showed that, in addition to school attainment, children's reading competence decreases with child labour hours. Finally, Heady (2003) used direct measures of reading and mathematics ability and found that there was a negative relationship between child labour and educational attainment in Ghana.

All of studies presented above measure correlation, rather than the causal relationship between child labour and schooling. To address this issue, Ray and Lancaster (2004) instrumented child labour with household measures of income, assets and infrastructure, to analyse its effect on several school outcome variables in seven countries and found that a negative impact of child labour on school outcomes. Meanwhile, Beegle et al. (2009) used community-level economic factors (e.g., community-level rice price and community disasters) as instruments for working hours and found a negative relationship between predicted child labour and school attendance. Working the average number of hours in paid or unpaid economic work is associated with a 30% decline in the likelihood of attending school.

Moving to our unit of analysis, clearly empirical studies that explain child labour and schooling in Indonesia are relatively scarce. Priyambada et al. (2002) focussed on the determinants of child labour in Indonesia by using the 1998 and 1999 National Labour Force Survey and confirmed that there is a strong link between child labour and poverty where the profile of child labour largely mirrors the profile of poverty and poverty is found to be an important determinant of child labour. In addition, this study found that working does not completely eliminate the children's opportunity to obtain a formal education, as only a half the number of child labour are not enrolled at the school.

Meanwhile, Pitriyan (2006) used the 2002 National Labour Force Survey to investigate the impact of child labour on their education and found that the negative and

significant coefficient of 'working' on schooling regression. This indicates that there is a trade-off between working and schooling where child engaged in the labour market has less opportunity involved in schooling activities. In another study, Chang (2005) used the 1997 and 2000 Indonesian Family Life Survey to examine the relationships between family affluence, parents' bargaining power and education on their children's likelihood to be in school and at work. She found that higher bargaining power of mother is significant in mitigating a child's work likelihood. Mother's years of schooling are also more influential in determining the likelihoods of child labour, relative to father's educational attainment. In addition, a hump-shaped pattern between expenditure and boys' schooling as well as a U-shaped relationship between per capita expenditure and boys' likelihood to work do exist.

In summing up, the impact of child labour on schooling has been discussed extensively in the context of developing countries, including Indonesia. However, the previous studies have tended to focus on the incidence of child labour. Our study examines simultaneously factors that affect the participation of children to school, among others, the duration of child labour, gender, area, income and several household characteristics.

3 Data and methodology

According to the Indonesian Labour Legislation No. 20/1999, the minimum age of workers is 15 years old. In this study, child labour is defined as children aged 12 to 15 years who participate in the labour market since Manpower Act No. 13 (2003) allowed children within this age category to perform 'light' work (e.g., no work longer than three hours per day). The dataset contains 73,282 observations with several characteristics (see Table 1) such as:

- 1 child (age, dummy female, working hours and dummy enrolment)
- 2 household (dummy female head of household, household size, dummy floor and house and per capita expenditure)
- 3 community (access to sanitation, access to water and access to electricity)
- 4 parent (dummy agriculture as main source of income, dummy unemployment of head of household and education level of household)
- 5 location (dummy rural)
- 6 regional (region).

Overall, Table 1 provides an overview of our data. Of 73,282 children aged 12 and 15 in our sample, 6,415 worked. The average work intensity is about 2.4 hours per week, but among children who work, it is about 28 hours per week. The gender distribution in our full sample is slightly balanced, but male children take the work more often when they enter the labour market. Both head of household education attainment and the per capita expenditure are lower when children work.

A 0P	Description	Full sample	Children working	Children not working
1,150	Age within the range 12 and 15	13.45 (1.14)	14.02 (1.04)	13.39 (1.14)
Agesq A	Age squared	182.15 (30.78)	197.61 (28.36)	180.67 (30.60)
Female F	$\hat{\tau}$ emale = 1; male = 0	0.48(0.50)	0.35 (0.48)	0.49(0.50)
Work V	Nork = 1; no = 0	0.09(0.28)	1 (-)	
Whrs E	Hours worked in past week	2.44 (9.22)	27.82 (16.26)	
Enrol E	\exists nrolment = 1; no enrolment = 0	0.85(0.35)	0.34(0.47)	0.90(0.30)
Femaleh F	\tilde{r} emale head of household = 1; 0 = otherwise	0.08(0.28)	0.16(0.34)	0.08 (0.27)
Hhsize S	size of household	5.41 (1.68)	5.45 (1.80)	5.40(1.66)
Floor F	Ploor made out of earth = 1; $0 =$ otherwise	0.14(0.34)	0.20(0.40)	0.13(0.33)
House F	fouse made out of bamboo = 1 ; $0 =$ otherwise	0.09(0.29)	0.16(0.37)	0.08(0.28)
Pcexp F	² er capita expenditure	182,681.8 (127,826.2)	151,379.8 (109,171.7)	185,684.8 (129,076.9)
Sewer 1	= closed sewer; 0 = otherwise	0.38(0.48)	0.20(0.40)	0.39(0.49)
Water 1	= access to drink clean water, $0 =$ otherwise	0.30(0.46)	0.18 (0.39)	0.31(0.46)
Elec 1	= access to electricity; $0 =$ otherwise	0.82(0.38)	0.66(0.47)	0.84(0.37)
Aggr 1	= agriculture as main source of income; $0 =$ otherwise	0.48(0.50)	0.72 (0.45)	0.46(0.50)
Hhu 1	= head of household unemployed; $0 =$ otherwise	0.04(0.19)	0.04 (0.19)	0.04(0.19)
Atth E 0 0 1 1 4 4	<pre>Education attainment of head of household) = head of household has no education completed; = primary; 2 = junior secondary; 3 = senior secondary; t = higher</pre>	1.33 (1.20)	0.77 (0.97)	1.38 (1.21)
Rural 1	= rural area; 0 = urban area	0.62(0.49)	0.84 (0.37)	0.60(0.49)
Region 1 1	= Java and Bali; 0 = otherwise	0.36(0.48)	0.25 (0.43)	0.37(0.48)
Region 2 1	= Sumatra; 0 = otherwise	0.31(0.46)	0.28(0.45)	0.31(0.46)
Region 3 1	= Sulawesi, 0 = otherwise	0.16(0.34)	0.19 (0.39)	0.13(0.34)
Region 4 1	= Kalimantan; 0 = otherwise	0.11(0.31)	0.11(0.32)	0.11 (0.31)
Region 5 1	= other islands; 0 = otherwise	0.09(0.29)	0.16(0.37)	0.08(0.28)

Table 1 Data description and summary of statistic

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In addition, most child labour practice takes place in rural area and when head of household relies upon agriculture sector as a main source of income. Also, children who are working have a lower level of sanitation, access to drink clean water and electricity, than those who are not working. In line with per capita expenditure argument, children who are working have resided more in the floor made out of earth and house made out of bamboo than those who are not working. Moreover, child labour practice often takes place when mother is head of household.

Characteristics	Child labour incidence	Distribution of child labour
Gender		
Male	10.87	64.66
Female	6.45	35.34
Total	8.75	100
Location		
Urban	3.7	16.10
Rural	11.86	83.90
Total	8.75	100
Enrolment		
Drop out/no	39.44	66.00
Enrol	3.49	34.00
Total	8.75	100
Head of household		
Male	8.26	86.45
Female	14.19	13.55
Total	8.75	100
Education level head of household		
No completed primary education	14.72	49.56
Completed primary education	8.35	33.33
Completed junior secondary education	5.70	9.12
Completed senior secondary education	3.30	6.22
Completed higher education	3.04	1.78
Total	8.75	100
Quintile of per capita expenditure		
1	13.86	37.77
2	10.19	25.63
3	7.27	17.18
4	5.57	11.78
5	4.48	7.64
Total	8.75	100

Table 2The incidence of child labour aged 12–15 in Indonesia (%)

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Moving to Table 2, the incidence of child labour in rural areas is almost three times higher than urban areas. As a result, the rural area makes up around 84% of all child labour and the remaining goes to urban. Pradhan et al. (2000) showed that poverty in Indonesia is largely a rural and agricultural phenomenon, as well as very much determined by the education levels of household heads.

Meanwhile, the incidence of child labour among boys is around 11% while female constitutes around 6%, as a result, boys make up around 65% of all child labour and the remaining goes to girl. This pattern of the incidence of child labour by gender shows that the higher tendency for boys to work compared with girls. Also, the incidence of child labour in case for drop out/no enrolment is 11 times more than enrolment case. As a result, the proportion of drop out accounts for around 66% of all child labour and the remaining goes to enrol.

The incidence of child labour among male-headed households is around 8%, while the female ones contribute significantly higher at around 14%. Nevertheless, since households headed by females make up only a small minority of the population, child labourers from male-headed households still make up more than 86% of total child labour. Also, the incidence of child labour quickly diminishes with higher education levels of household heads. This implies that households headed by persons with higher levels of education are less likely to send their children to work than households headed by persons with low levels of education. In fact, around 83% of all child labour comes from households headed by persons who have at most primary school education. It can be intuitively explained that household heads with higher levels of education are more likely to be able to generate higher income for their families, and thus there is less need for them to send their children to work.

In addition, the higher the per capita expenditure quintile (which means the better off the households), the lower the incidence of child labour. While the incidence of child labour in the two poorest quintiles is around 10%–14%, the incidence of child labour in the richest quintile is around 4%. Furthermore, around 63% of all child labour comes from households in the two poorest quintiles.

Moving to the empirical framework, our model start with binary outcome one where we assume that the indicated child enrolment or drop out are $Enrol_i$. The structural equation of $Enrol_i$ where i = 1, ..., N; Work_i and Whrs_i are endogenous regressor of incidence and duration in child labour; and X_1 is $K_{1\times 1}$ vector of exogenous regressor, is written as follows:

$$Enrol_{i} = \beta_{0} + \beta_{1}Work_{i} + \beta_{2}Whrs_{i} + \beta_{3}X_{1i} + \mu_{i}$$
(1)

Enrol_i is binary variable where takes value = 1 if child enrol and 0 if otherwise and μ_i are independently distributed random variable with zero mean. Here, E (Enrol_i) = β_0 + β_1 Work_i + β_2 Whrs_i + β_3 X_{1i}. Now, let P_i = Pr (Enrol_i = 1), hence E (Enrol_i) = 1.P_i + 0.(1 - P_i) = P_i. In this case, we assume that in linear probability model (LPM), P_i = β_0 + β_1 Work_i + β_2 Whrs_i + β_3 X_{1i}.

The independent variables of X_1 to be considered in the model are based on several literatures (see Ray and Lancaster, 2004; Chang, 2005; Pitriyan, 2006; Watson, 2008; Beegle et al., 2009). First, we include age of child, square of age, dummy for location (rural or urban), child gender and dummy for region. Interaction variable between mother as head of household and child gender is also incorporated in the model since it increases women's bargaining power in the household decision on investment in male and female child differently.

In addition, we insert interaction variable between education attainment and employment status on head of household and child gender where they may affect investments in male and female child differently. Log per capita expenditure is also intercalated in the model since the higher the per capita household expenditure (i.e., the better off the household), the more likely the children in the household will enrol in school.

Furthermore, the size of household in interaction with child gender is considered important as the larger the size of household, the more likely the children in that household will become drop out. In order to capture the cultural phenomenon in Indonesia, we take the interaction of dummy location and child gender in the model as there is still social stigma in the rural area that female would be fully responsible for household chores.

Last, household income is important in equation but it might not always reflect household welfare in developing countries like Indonesia where subsistence agriculture is common and households consume what they produce. To avoid this, we include agriculture as a main source of income, the availability of floor and the building structure of house to proxy wealth.

As we mentioned earlier in the empirical framework, both duration of child labour and child work are determined by enrolment and vice versa, where the duration and incidence of child labour affect its enrolment. Consequently, the estimates in the regression of the child's schooling variables on her labour market status are likely to be inconsistent. Few studies have tried to correct the issue of endogeneity, mainly due to the lack of valid instruments in the data.

Child wage is one of the best candidates but, unfortunately, it is only available for some working children. Bhalotra (2007) attempts to overcome the problem by proxying child wages in community-level agricultural wages. However, she provides no justification for this strong and arbitrary assumption. Meanwhile, Beegle et al. (2009) used community-level economic factors (e.g., community-level rice price and community disasters) as instruments. However, these should be viewed with caution, since community-level instruments cannot capture household-level differences and the relationship is contemporaneous.

In another study, Watson (2008) used five instruments such as whether children in a household who has suffered a death of a household member in the last four years, whether household owned any cows (modern variety), whether the household has been a victim of various forms of theft in the last four years, whether the household has experienced pests or diseases that affected crops before they were harvested in the last four years. However, she insisted on the strong assumption that all of these instruments are valid for child labour, which in the end, she admitted as weak instruments.

To solve endogeneity problem of Work_i and Whrs_i in $Enrol_i$, we obtain several instruments used in Ray and Lancaster (2004) study such as access to clean water, good sanitation and access to electricity. The argument that we build is lack of infrastructure especially for water and sanitation will provide some health constraints of household production activities and thus, will increase participation of children in labour market to compensate the loss of income in the family. In addition, Nankhuni and Findeis (2003) observed that in Malawi, lack of access to electricity may contribute to a larger work

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burden for children. In turn, children spend more hours on resource collection work. The suitability of those instruments is examined through overidentifying test.

4 Results

In Table 3, the analysis is started with very simple model where schooling is determined by child characteristics such as age, square of age, child gender, location, regional dummy in model I. In model II, we start to add more variables in the previous equation such as female as head of household, size of household, unemployment of head of household, education attainment of household head. While in the model III, following the model II, we add the variable of income effect such as log per capita expenditure.

The coefficient of child labour hour becomes negative and insignificant on enrolment but child work becomes negative and insignificant to enrolment, suggesting that working will decrease the probability of child schooling. Also, age within child labour framework has U-shaped relationship with schooling, though it is insignificant. The variable of household size becomes insignificant and the coefficient becomes even smaller. In addition, female is negatively and significantly correlated with enrolment. Although the size and magnitude gradually decreased in model III, Samiadji (2001, cited in Digdowiseiso, 2010) believed that social and cultural preferences might hamper female to obtain a formal education.

Meanwhile the variable of rural, though it is significant, its estimated coefficient becomes smaller in model III. According to Suwignyo (2004, cited in Digdowiseiso, 2010) both local and provincial governments have spent a larger percentage of their budget on improving the quality of education to boost the demand of education in rural area. Thus, there was a tendency that rural area grew much faster than urban area in terms of enrolment.

Now to the degree of bargaining power and education attainment, we find that our results are somewhat consistent with Chang's (2005) findings where female as a head of household and educational level on head of household do matter in increasing the chance of children to school.

The sign of several coefficients looks promising. However, the overidentifying test from model I to model III indicates that such restrictions are not valid and we should cast a doubt on the suitability of instruments set. Based on this condition, we insert the interaction effect of female with respect to household size, mother as head of household, unemployment condition on head of household, education attainment of household head and rural, as stated in model IV. Here, we want to argue whether such indirect effect will contribute significantly on schooling.

In general, the incidence and duration of child labour has no impact on schooling. Also, variable of age and its square are still insignificant. Such findings are similar with Ray and Lancaster' study (2004) in which they found that both coefficients were statistically insignificant in Namibia, Panama, the Philippines, Portugal and Sri Lanka. Meanwhile, female stills maintain negative and significant coefficient but the standard error increases. Surprisingly, the household characteristic variables such as education attainment of household head are now losing their magnitude in model IV. The only household characteristics that slightly maintain the magnitude is female as household head where if one more female household head is estimated to reduce the probability to enrol by about 0.04, holding other variables fixed.

		:	***			***	
Variables	Ι	11	111	II	~	Ν	IIA
Age	0.06(0.13)	0.04~(0.12)	-0.15(0.10)	-0.15 (0.10)	-0.07(0.11)	-0.07(0.11)	-0.10(0.07)
Age^{2}	-0.002(0.01)	-0.01 (0.004)	0.006(0.004)	0.006 (0.004)	0.003(0.004)	0.003 (0.004)	0.004 (0.003)
Female	$-0.09^{***}(0.01)$	-0.08^{***} (0.01)	$-0.06^{***}(0.01)$	-0.07*** (0.02)	$-0.08^{***}(0.01)$	-0.08^{***} (0.02)	-0.09^{***} (0.01)
Work	-3.88^{**} (1.23)	-3.26^{***} (1.13)	-0.81 (1.05)	-0.86 (1.06)	-2.17* (1.22)	-2.23* (1.25)	-1.12^{***} (0.45)
Work hours	0.05(0.04)	0.04 (0.04)	-0.03(0.03)	-0.03(0.03)	0.0007(0.04)	0.002 (0.04)	-0.02 (0.02)
Female as head of household		0.07^{***} (0.01)	$0.05^{***}(0.01)$	$0.04^{***}(0.01)$	$0.073^{***}(0.02)$	0.06*** (0.02)	
Household size		-0.005^{**} (0.001)	-0.0004 (0.002)	0.0001 (0.002)	-0.004^{***} (0.001)	-0.004* (0.002)	
Household unemployed		-0.004(0.01)	0.002(0.01)	-0.01(0.01)	-0.002(0.01)	-0.02 (0.02)	
Education attainment head of household		$0.01^{***}(0.003)$	0.01^{***} (0.003)	-0.006 (0.004)	0.02*** (0.003)	-0.004(0.005)	
Floor					0.005 (0.008)	0.005 (0.008)	
House					$-0.02^{*}(0.01)$	-0.02* (0.01)	
Log per capita expenditure			$0.05^{***}(0.01)$	$0.05^{***}(0.01)$			
Agriculture as source of income					$0.04^{**}(0.02)$	0.05** (0.02)	
Rural	$0.11^{***}(0.03)$	$0.09^{***} (0.03)$	0.04*(0.02)	$0.08^{***} (0.03)$	$0.05^{**}(0.03)$	$0.10^{***} (0.03)$	
Notes: Number of parentheses are ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.	robust standard erro	2					

Table 3IV result on enrolment

Variables	Ι	Ш	III	AI	A	И	IIA
Female \times Female as head of household				0.02 (0.02)		0.03 (0.02)	0.06^{***} (0.01)
Female \times Household size				-0.001 (0.002)		-0.001 (0.003)	-0.005*** (0.002)
Female \times Household unemployed				0.03 (0.02)		0.04*(0.02)	0.01 (0.01)
Female \times Education attainment head of household				0.04^{***} (0.004)		$0.04^{***}(0.005)$	0.04*** (0.002)
Female \times Rural				$-0.07^{***}(0.01)$		$-0.10^{***}(0.01)$	-0.003(0.01)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Testing for endogeneity	$677.20 \ (p = 0.00)$	309.90 (p = 0.00)	236.80 (p = 0.00)	238.07 (p = 0.00)	210.85 (p = 0.00)	212.57 (p = 0.00)	701.44 (p = 0.00)
Testing for overidentification	16.90 (p = 0.00)	13.67 (p = 0.00)	11.4391 (p = 0.00)	10.77 (p = 0.00)	25.92 (p = 0.00)	24.43 (p = 0.13)	1.11 (p = 0.29)
Testing for weak instrument	351.76 (work) and 266.59 (Whrs)	279.69 (work) and 205.61 (Whrs)	262.19 (work) and 193.60 (Whrs)	206.77 (work) and 155.41 (Whrs)	238.61 (work) and 174.90 (Whrs)	193.10 (work) and 144.44 (Whrs)	238.67 (work) and 189.13 (Whrs)
Testing for joint significant	Work 190.89 (0.00) and Whrs 187.51 (0.00)	Work 105.82 (0.00) and Whrs 109.19 (0.00)	Work 94.92 (0.00) and Whrs 103.73 (0.00)	Work 93.34 (0.00) and Whrs 102.24 (0.00)	Work 64.89 (0.00) and Whrs 75.36 (0.00)	Work 63.66 (0.00) and Whrs 74.07 (0.00)	Work 368.04 (0.00) and Whrs 287.97 (0.00)
Ν	73,282	73,282	73,282	73,282	73,282	73,282	73,282
\mathbb{R}^2	0.11	0.14	0.14	0.14	0.14	0.14	0.12
Notes: Number of parentheses are	e robust standard erro	r.					

Table 3 IV result on enrolment (continued)

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***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

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The connection between female and rural area, also between female and education attainment of household are the only two interaction variables in model IV producing a stronger significant result. However, the net effect (the direct effect + the indirect effect) of female on schooling is negative, confirming the result from previous models that social and cultural preferences in Indonesia do matter. Also in model IV, per capita expenditure still maintains its sign, size and magnitude, similar as in model III. Though model IV reveals that child work and child labour hours are endogenous and all instruments are strong and jointly significant, overidentifying test suggests that at least some of IVs are not exogenous, raising further doubt on the suitability of instruments set.

Moving to models V and VI, our endogeneity assumption is based on per capita expenditure. In this case, schooling may affect household earning and hence its expenditure. In line with this argument, Priyambada et al. (2002) used household ownership of assets as proxy variables, which in these cases are floor that made out of earth and house that made out of bamboo. In addition, agriculture as employment sector of household head can be used to proxy wealth.

In general, the duration of child labour becomes positive and insignificant. Moreover, the incidence of child labour becomes negative and significant. Such result supports Pitriyan's (2006) findings where there is a trade-off between working and schooling. Similar to the previous models, mother has a more bargaining power when she acts as a household head. In addition, the magnitude of occupation of household head and of rural becomes strongly positive and significant on child enrolment.

Interestingly, the interaction effect between female and the unemployed head of household is positive and significant on schooling. However, the net effect is relatively the same as the previous models where boys seem to have a greater chance of attending school than girls. Also, both child work and child labour hours are endogenous and all instruments are strong and jointly significant, but in model VI, we pass the overidentifying restriction test.

In model VII, the main variables of household characteristics, income and rural on equation are dropped. However, we maintain all interactive variables. In this case, we want to know whether dropping main variables produce different results than model VI. In general, the results are mixed where our variable of interest, the incidence of child labour, is still negative and significant but it decreases on size and magnitude. In addition, the interaction variable between female and unemployment level on household head, as well as between female and rural become insignificant. But, the net effect of coefficient of female, produced through coefficients of female \times female as a head of household and of female $\times x$ education attainment on head of household, are still negative. Also, similar to model VI, the instruments in model VII are exogenous.

5 Conclusions

The study examines the effect of incidence and duration of child labour on schooling using the Indonesia's National Labour Force Survey in 2016. Based on the result, it can be concluded that incidence of child labour has negative and significant effect on schooling, while the duration has no effect on schooling. In addition, enrolment is significantly influenced by sex, some income and household characteristics and area.

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There are some limitations of this study. By using IV on the basis of LPM, the variance of error μ_i depends on X_i through P_i . Also, LPM assumes a constant marginal effect of X_i for all values of X_i , but the marginal effect of X_i almost always varies with respect to X_i . In addition to LPM disadvantage, its fitted values are not constrained to lie in the unit interval, in which Enrol_i lies between 0 and 1. Thus, predicted probabilities below zero or above one are commonly encountered. Any regressor that can take on a large range of values will inevitably cause the LPM's predictions to breach these bounds.

The need to implement other econometric techniques that capture both continuous and discrete endogenous explanatory variable simultaneously in equation is very essential for the development of this study. IV-probit for example is valid only for continuous endogenous explanatory variable.

Suppose the observed value of the indicated child enrolment or drop out is determined by an underlying unobserved variable of $Enrol_i^*$. Given this latent variable, the outcomes equal either 0 or 1. The structural equation of $Enrol_i^*$ where i = 1, ..., N; Work_i and Whrs_i are continuous endogenous regressor of incidence and duration in child labour is written as equations (2)–(4):

$$Enrol_{i}^{*} = \beta_{0} + \beta_{1}Work_{i} + \beta_{2}Whrs_{i} + \beta_{3}X_{1i} + \mu_{i}$$
⁽²⁾

$$Work_i = \delta_0 + \delta_1 X_{1i} + \delta_2 X_{2i} + v_i$$
(3)

$$Whrs_i = \gamma_0 + \gamma_1 X_{1i} + \gamma_2 X_{3i} + e_i$$
(4)

The variable of Enrol_i^* is latent and hence is not directly observed. Instead, the binary outcome of Enrol_i is observed, with $\text{Enrol}_i = 1$ if $\text{Enrol}_i^* > 0$ and $\text{Enrol}_i = 0$ if $\text{Enrol}_i^* \le 0$. It is assumed that (μ_i , v_i and e_i) are jointly normally distributed and thus Work_i and Whrs_i, given X_{1i} , X_{2i} and X_{1i} , X_{3i} , respectively must feature normal random variable and that rules out discrete endogenous regressor (Wooldridge, 2012).

Given such limitations, the Government of Indonesia should take a cautious approach in formulating the policies related to incidence and duration of child labour and their effects on enrolment. It is plausible that children engaging in child labour practices may benefit from the work experience. For example, by taking a part-time work in a safer conditions, they can afford their schooling costs. At the same time, it can raise a sense of responsibility and develop some useful skills (Edmonds and Turk, 2002). Thus, prohibiting children from working may force them to drop out of school.

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