HOW DOES PARENTAL INCOME AFFECT CHILD LABOR SUPPLY? EVIDENCE FROM THE INDONESIA FAMILY LIFE SURVEY

Elan Satriawan
Alif Timur Ghifari

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Abstract

Drawing on the substitution axiom formulated by Basu and Van (1998) this study examines the nature of relationship between parental income and child labor supply in Indonesia. To estimate such relationship, we are benefited by panel data from the last two waves of Indonesia Family Life Survey (2007 and 2014). We tackle the potential endogeneity in parental income by controlling for parental fixed-effect. Results shows that parental income matter to child labor supply. The effect of father's income looks more significant to all sample particularly to girls. In rural areas, both parental income matter to girls, and not to boys. The relationship between a father's income (and mother's in rural) with children's labor hours are complementary at low level of income, and as income rises, the increments in child labor hours decreases and at high levels of income, the relationship transforms into a substitute relationship –resembling an inverted-U shape.

Keywords: Child Labor, Parental Income, IFLS, Indonesia

JEL Classification: J13, O15, J22

[♦] National Team for Acceleration of Poverty Reduction (TNP2K), Office of Vice President-Republic of Indonesia (email: elan.satriawan@tnp2.go.id)
[♣] Fakultas Ekonomi & Bisnis, Universitas Gadjah Mada, Jl Sosio-Humaniora No. 1, Bulaksumur Sleman, Yogyakarta 55283, INDONESIA (email: esatriawan@ugm.ac.id)
[♠] Department of Economics, The University of Melbourne, Victoria 3010 (email: atghifari@gmail.com).

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1. Introduction

In recent years, the phenomenon of child labor is almost exclusively associated with developing countries (Ray, 2000). ILO estimates show that 78 million child laborers -the biggest amount of child laborers in the world- are located in Asia and the Pacific (ILO, 2013). In Indonesia, a 2012 report by Understanding Children's Work estimated that about 2.3 million Indonesians aged 7-14 years, or about 7 percent of total children in this age group were classified as child laborers. When the age group is relaxed, over four million children aged 5-17 were working as child laborers in Indonesia.

These numbers are disturbingly high in light of the negative educational and human capital implications associated with child labor. Psacharopoulos (1997) and Beegle et al. (2008) found that child labor engagement leads to less schooling on average as well as decreased labor productivity, while Beegle et al. (2004) and Boozer and Suri (2001) found negative correlation between child labor and educational outcomes in Vietnam and Ghana respectively. It is also reported that around 87 percent of child laborers in Indonesia are still enrolled in school and those who mix school with work tend to trail behind those who do not in terms of school attendance rate by as much as nine percentage points (Understanding Children's Work, 2012). Child labor engagement were also found to hamper the development of children's mathematical and reading skills (Akabayashi and Psacharopoulos, 1999; Heady, 2003; Sim et al., 2012). Perhaps the worst of all are the findings by Emerson and Souza (2003) which suggested that intergenerational persistence in child labor exists, meaning that children of former child laborers have a higher risk of engaging in child labor activities themselves.

Literatures on child labor frequently delve into the determinants of child labor, which ranged from poverty (Basu and Van, 1998; Swinnerton and Rogers, 1999), credit market imperfections (Baland and Robinson, 2000), labor market imperfections (Bhalotra and Heady, 2003), poor institutions (Edmonds and Pavcnik, 2005), household size and composition (Grootaert and Kanbur, 1995; Emerson and Souza, 2007) as well as social norms and dynasties (Wahba, 2005; Behrman, 1997). However, there is an understanding that present empirical literature on child labor determinants is relatively young (Basu and Tzannatos, 2003) and leaves much room for further discussions.

Against this backdrop, studies done by Ray (2000a, 2000b, 2003) and Amin et al. (2006) –based on the substitution axiom posited by Basu and Van (1998)[1]—shows that with regards to child labor, parental income plays a significant role in the household labor supply decision. The nature of the relationship between parental income and child labor supply is deemed complementary when child labor hours increases in response to an increase in parental income. However, an inverse relationship implies that parental income and child labor supply are substitutes. Understanding the nature of the relationship between parental income and child labor contains important policy implications. As Amin et al. (2006) notes: "*if children work because a parent cannot work and the family is thus in a state of poverty then policies to lessen child labor must recognize the need for economic assistance. If children engage in market work because they accompany a parent to work based on social and cultural mores, then policies to lessen children's market work and increase children's schooling must accommodate the cultural climate*".

In the context of parental income as child labor determinants, the existing body of literature in various countries report mixed results between countries, and even within countries, studies have found that the gender of parents also influences whether parental income (or other household wealth measures) and child labor are substitutes or complements [Ray (2000a, 2000b, 2003); Amin et al (2006); Basu et al (2010)]. This emphasizes the fact that while child labor might be an international issue, there are characteristics of child labor unique to each country. In light of the relatively significant amount of child laborers in Indonesia as well as the negative impacts of child labor, understanding the relationship between child labor and parental income in Indonesia becomes crucial. Literatures on child labor using Indonesian data is rather limited when compared to Latin American data or African data and, to the best of the authors' knowledge, no research have ever been undertaken to see whether parental income and child labor supply are substitutes or complements in Indonesia.

To that aim, this study benefits from the use of panel data from the last two waves (2007 and 2014) of the Indonesian Family Life Survey (IFLS), a longitudinal data set containing rich socioeconomic information on both individuals and households in Indonesia.

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[1] Basu and Van (1998) presented a framework of child labor containing two fundamental axioms, the luxury axiom and substitution axiom. The luxury axiom states that household will send children to work only if the household income from non-child labor activities is very low. The substitution axiom states that child labor and adult labor are substitutes.

We exploit the data's panel characteristics to handle potential endogeneity of parental income due to presence of unobserved heterogeneity. Particularly, we include in the empirical model parental fixed-effects to control for time-invariant unobserved parental preference that may lead to biased parameters.

This study found that in Indonesia, father and child labor are complementary at lower level of wages particularly for girls and for rural sample. However, at higher level of wages, the relationship transforms into a substitute relationship. This implies two things: first, when fathers are working for low wages, the household faces capital constraint. Children are then forced to work to help the household meet their subsequent needs, in line with Basu and Van's luxury axiom. Second, when a father's wage is relatively high enough, the household is then assumed to have enough financial security and thus the children do not have to work. This shows that the relationship between child labor hours and father's income resembles an inverted U-shape.

The structure of this paper is as follows. Next section surveys child labor literature including both theory and empirical work. After that, in section 3, we set up the empirical strategy in which we specify our empirical model to estimate how parental income affects child labor and discuss the estimation issues. Then, in section 4, we discuss the data and variable measurement. The results and discussion of the findings are presented in section 5. Finally, section 6 concludes and provides policy recommendations.

2. Literature Survey

Economic Theory on Child Labor

When analyzing the phenomenon of child labor, it is imperative to recognize child labor engagement as part of the household labor decision. The seminal work of Becker (1965) on the allocation of time and its many extensions on household behavior helps explain how households allocate their labor hours and provides the theoretical foundation on child labor decisions. In Becker's model, households jointly make decisions on a myriad of issues to satisfy a "common set" of family preferences, including the number of children in a household as well as how to allocate the time of household members between work, schooling, leisure, and household production.

Recognizing that the decision to engage in child labor is made by the household, it is therefore important to analyze child labor engagement in the context of the relationship

between parent and child. Basu and Van (1998) posits two crucial assumptions, or axioms, that underlie the theory as well as much of the existing literature on child labor. The first assumption suggests that when adults work full time, children are sent to work only if income levels of the household are less than subsistence consumption.[2] This assumption is known as the luxury axiom.

The second assumption, also known as the substitution axiom suggests that child and adult labor are interchangeable from a firm's perspective, subject to an equivalency correction. This means that from a technical point of view, adult labor can be substituted with child labor, that is, children can do some, if not all jobs that are usually thought to be reserved for adults. Both axioms implicitly support the notion that households are altruistic in a sense that they prefer children not to engage in labor activities unless forced to by circumstances.

Empirical Studies on the Substitution Axiom

Substantial researches have contributed findings to support the luxury axiom, most notably Basu and Tzannatos (2003), Delap (2001), Grootaert (1999), Ravallion and Woodon (2000), and Ray (2000a, 2000b). However, contemporary empirical researches testing the substitution axioms were relatively scarcer, with mixed results.

Ray (2000a, 2000b) was the first to econometrically test the substitution axioms, using data on child labor from Pakistan and Peru to do so. He found that parental income and child labor were negatively correlated in Peru, indicating that parents and children were substitutes, while in Pakistan, mother's wages and child labor were positively correlated, indicating a complementary relationship. The difference in relationship between parental income and child labor in Peru and Pakistan led Ray (2003) to test the relationship once again in Ghana. The paper found that in Ghanaian rural areas, at low level of wages male and female labor were complementary with child labor while at high level of wages child labor and female labor were substitutes. The study notes that the results between rural and urban areas differ greatly, suggesting that child labor in rural and urban areas were affected by different factors.

Basu et al (2010), using household surveys in two mid-Himalayan regions in India (Himachal Pradesh and Uttaranchal), test the inverted-U relationship hypotheses between inherited land owned by household and child labor. Controlling for both child and household

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[2] The minimum tolerable level of household consumption.

characteristics and including village fixed effects they find size of inherited land correlates positively with child labor but with decreasing return supporting the inverted-U hypotheses.

In Bangladesh, Amin et al. (2006) estimated the relationship between parental income and child labor in eight different demographic groups. The paper reported mixed results. Father and children were substitutes in the household labor supply decision for younger rural boys and girls as well as younger urban boys, but father and older rural boys were complements. Meanwhile, mother and children were found to be complements in seven out of the eight demographic groups. This can be attributed to the social customs in Bangladesh that encourages boys to be kept busy in order to stay out of trouble and that pressures girls to not be left home alone if her mother is working outside the house. They also found that parental income had little effect on children's household work.

Using data from Egypt, Diamond and Fayed (1998) simulated employment effects on child labor. Their findings reported that adult males tend to be complements of child labor, while adult females were substitutes. This finding reinforces the result of the study carried out by Grant and Hamermesh (1981) which found that white women and youths were substitutes in production in the USA.

Child Labor Phenomenon in Indonesia

The Government of Indonesia has tried to combat child labor through a series of policy regulations such as Law No. 20/1999 on the Ratification of ILO Convention 138 as well as Law No. 13/2003 (also known as the Manpower Act) that limits the age of workers and the types of jobs allowed for children. However, as Grootaert and Kanbur (1995) notes, simply restricting some forms of child labor, or even banning it entirely might be ineffective and in some cases, counterproductive. Knight (1980) suggests that a child labor ban might be detrimental in a sense that when child labor is prohibited by law, the law is then powerless to introduce measures to protect child laborers since they are not recognized by the law. Moehling (1999) also found that the minimum age limit on child work has had relatively little effect on the long run decline of child labor. Therefore, instead of a straightforward ban on child labor more effective policies are needed to address child labor issues. To be effective, these policies must take into account the determinants and nature of child labor. To help contextualize the issue, below we provide a brief discussion on the nature of child labor in Indonesia.

As of 2009, over 2.3 million children aged 7-14 worked as child laborers in Indonesia, with 2 million located in rural areas while the rest originated from urban areas (Understanding Children Work, 2012). Children working in urban areas can be found in the streets selling newspaper, candies, and drinks or singing and begging for money at traffic lights or buses (Priyambada et al. 2005) while in rural areas children were found working in the fields or tending to livestock. When disaggregated by sectors, the agricultural sector accounts for the largest share of child labor in Indonesia, with 58 percent of working children aged 7-14 employed there. The services sector, which employs 27 percent of all child laborers, is second while manufacturing with 7 percent comes a distant third (Understanding Children's Work, 2012). The report goes on to highlight the fact that one third of the children in the services sector work in domestic services, which is a particular policy concern as their work is then not observable and they might therefore be vulnerable to overexploitation.

Gender was found to influence the type of work that children does. Boys tend to work in the agriculture sector, while girls were more likely to work in services and manufacturing. Age, unsurprisingly, also affects the type of jobs children engages in, as younger children were more likely to work in agriculture and older children were more likely to be found working in the manufacturing and services sector. Finally, geographical location also plays a part. Children in rural areas tend to work in agriculture, and their urban counterpart were more likely to work in the manufacturing and services sector.

While prevalence of child labor in Indonesia is relatively lower than other developing countries, in absolute terms it continues to be a significant concern (Understanding Children Work, 2012). Notwithstanding the recent influx of literature on child labor in Indonesia as studies endeavored to find the determinants of child labor (Chang, 2006; Kis-Katos and Schulze, 2011), it must be noted that studies on the relationship between parental income and child labor in Indonesia are conspicuous by its absence. Chang (2006), which estimated the roles of family affluence, bargaining power, and parental educational attainments on child labor status using IFLS2 and IFLS3 did control for the effect of family income on child labor status. However, the study used per capita expenditure to proxy for household income rather than parental income and disregarded the difference in nature between a father's income and a mother's income with respect to child labor status. We argue that the difference between the effect of father's income and mother's income on child labor is vital for policy formulation. By understanding how they differ, the government is then able todirectly target the income of

specific individuals (fathers or mothers) in order to decrease child labor, for instance by holding job training programs for individuals with children in order to increase their income. More generally, the government will then be able to optimally formulate new policies, or reform existing policies, on child labor.

In the reminder of this analysis, we will therefore focus on the difference between father's income and a mother's income in determining the level of child labor engagement in the household.

3. Empirical Strategy

We formulate empirical specification to examine the relationship between parental income and child labor. Particularly we test whether the relationship support substitution axiom. To do so, we borrow empirical models by Ray (2000a, 2000b, 2003) and Amin et al. (2006). We start with basic empirical model as follows:

$$cl_{iht} = \alpha + \beta_1 finc_{ht} + \beta_2 minc_{ht} + X'_{it}\gamma + HH'_{ht}\theta + \varepsilon_{it}$$

where cl_{iht} measures child labor, $finc_{iht}$ and $minc_{iht}$ are respectively father's and mother's income, X'_{it} and HH'_{ht} are respectively vector of individual child and household characteristics, and ε_{it} denotes error term. Subscripts *iht* are respectively denote for child labor *i* in household *h* and period *t*.

The parental income of child *i* are differentiated into father's income and mother's income in the regression function to account for the difference in nature between father and mother's income towards child labor engagement. The practice of differentiating parental income by gender has been used before, notably by both Ray (2000a, 2000b, 2003) as well as Amin et al. (2006) and can be traced back to Grant and Hamermesh (1981).

Estimating effect of parental income on child labor supply with Ordinary Least Squares – ignoring correlation between parental income and error term—will lead to biased parameters. We thus control for parental fixed effect to eliminate potential bias, as households engaging in child labor may systematically differ from household that do not. For instance, households/parents might have a fixed preference or motivation in sending children to work. As an added measure, reflecting on the fact that some of the children in the sample are members of the same household, the standard errors of the coefficients have also been corrected for clustering.

Motivating by the relation between child labor supply and parental income as depicted in Figures 1 and 2, we include quadratic form of parental income ($finc_{ht}^2$ and $minc_{ht}^2$) to capture the decreasing or increasing marginal effects of parental income. A year dummy ($yr14$) and district dummy are included to control for difference in 'child labor market' across observation periods and districts respectively. Our expanded empirical model is then:

$$cl_{iht} = \beta_0 + \delta_0 yr14_t + \beta_1 finc_{ht} + \beta_2 finc_{ht}^2 + \beta_3 minc_{ht} + \beta_4 minc_{ht}^2 + X'_{it}\gamma + HH'_{ht}\theta$$
$$+ \mu_h + \pi_d + \varepsilon_{it}$$

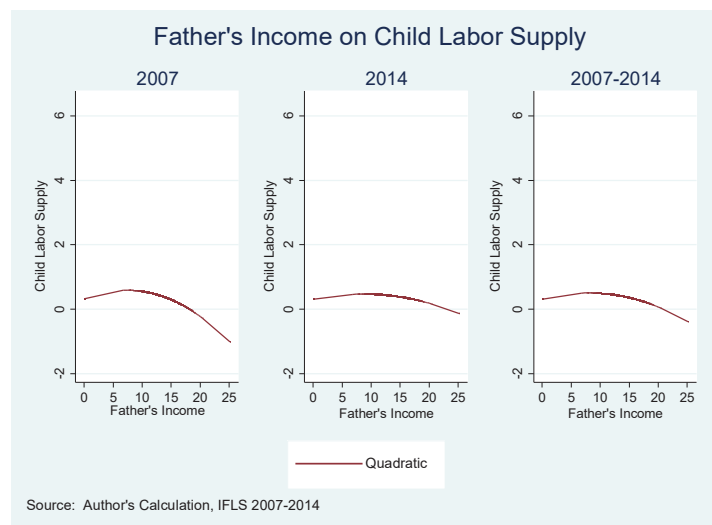**Figure 1. Father's Income and Child Labor Supply**

Figure 2. Mother's Income and Child Labor Supply

Our main parameters of interest are thus β_1, β_2, β_3 and β_1. After controlling for both observed covariates and time-invariant unobserved heterogeneity, we argue that the parameters of interest are unbiased. If both β_1 and β_2 (β_3 and β_4) are significant, father's (mother's income) should affect child labor supply in quadratic relationship –either exhibiting positive or negative effects with diminishing return. Some conditions however may invalidate our identification assumption. For example, if parental preference or motivation are not fixed across observation period perhaps due to economic shock, our parameters of interest may accordingly not unbiased.

We run the model on three samples; the full sample and two disaggregated sample: by residential location as well as by gender type. The reasoning behind this is that location of residence and gender type is an important determinant of child labor in Indonesia (Understanding Children's Work, 2012), thus, samples are disaggregated to help better understand child labor phenomenon in Indonesia and isolate area-specific or gender-specific characteristics of child labor.

4. Data and Principal Features

This study uses data from the Indonesian Family Life Survey.[3] The Indonesian Family Life Survey is a continuing longitudinal socioeconomic and health survey based on a sample of households representing about 83% of the Indonesian population. The IFLS collects a wealth of data on individual respondents, their families and households, the communities in which they live, as well as the health and education facilities they use. The IFLS has been administered 5 times, from 1993 to 2015. The first wave (IFLS1) was carried out in 1993 and covered individuals living in 7,224 households. The second wave (IFLS2) covered the same individuals in 1997 while IFLS2+ measured the impact of the Indonesian crisis in 1998. The third wave (IFLS3) was administered in 2000 with the same respondents, and the fourth wave (IFLS4) was fielded in late 2007-early 2008. Meanwhile, the fifth wave (IFLS5) consisted of the 1993 households and their split-offs and was fielded in late 2014 and early 2015, which covered 50,148 individuals living in 16,204 households.

Due to the structure and evolving nature of the IFLS questionnaires, questions on child labor incidence are only present from the third wave of the study. As this study is interested in analyzing the recent trend of child labor engagement, this paper only focuses on data from

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[3] For a more complete discussion on the IFLS, see Strauss et al. (2016)

the last two waves. Data on child labor incidence can be retrieved from Book 5, where IFLS4 contains information on 8,505 children while the IFLS5 data set covered 10,381 children aged 5-14. However, this study limits itself to analyzing data of children aged 10-14. The reason for this limitation is that the incidence of child labor in the IFLS data is concentrated on children aged 10-14. As this paper is interested in analyzing the relationship between the phenomenon of child labor and parental income, the focus of the analysis is on the age group where children are more likely to work. The final dataset consists of 8,475 individuals from 5,327 households across the two waves.

This study uses child labor hours as the dependent variable rather than a dummy variable indicating whether child i is engaged in child labor activities or not. The reason for this is because child labor hours is deemed as a crucial measure of child welfare, and more importantly, it is also an essential component in evaluating the cost of work in terms of health and human capital accumulation (Rosati and Rossi, 2003)

Child labor hours is determined by looking at answers to two questions. The first question inquired as to whether the child worked last week. If the child (or her parents) confirms that she has been working last week, the respondents are then asked about the number of hours she spent working last week. If the child confirms that she did not work last week, then her labor hours is set to zero. Monthly child labor hours is then estimated by multiplying weekly labor hours by 4.

In the IFLS questionnaires, child laborers are divided into two types, those working for wages and those working for family business. Nonetheless, based on the findings of Sim et al. (2012), the negative effect of child labor in Indonesia affects those who work within the family as well as those who works outside it. This might be explained by the fact that hazardous work conditions were common for both children engaged in family business or working for wages (Understanding Children's Work, 2012). Therefore, this study does not differentiate between those two types of work in defining child labor.

On the subject of parental characteristics, namely parental education and income, one particular caveat should be noted. As some missing data were observed in the data set, imputations were made to correct for missing values and data imperfection. Appendix 1 summarizes and explains the treatment given to selected variables.

5. Findings and Discussions

Table 1 presents child labor participation rates in Indonesia as well as the breakdown of child labor incidence based on types and genders. In general, child labor is more prevalent in rural areas than in urban areas for all age group, while higher age is associated with an increase in child labor incidence. The increase in child labor engagement with age might be explained by rising productivity, which in turn leads to rising opportunity cost of keeping children in school. There is also suggestion that the lack of access to post-primary schooling, especially in rural areas decreases the opportunity cost of child labor (Understanding Children's Work, 2012). The data shows that the amount of child laborers in rural areas is a cause for concern, with more than one quarter of 14-year-old boys found working as child laborers.

Table 1. Child Labor Participation Rates in Indonesia

Age	Market Work (%)				Family Business (%)				Child Labor (%)			
	Rural		Urban		Rural		Urban		Rural		Urban	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
10	0.48	1.20	0.43	1.31	9.44	5.29	3.02	5.45	9.93	6.49	3.45	6.54
11	1.58	1.16	1.85	0.84	9.73	8.58	5.13	5.22	11.09	9.74	6.78	6.05
12	1.32	1.86	0.65	1.12	15.61	8.51	6.25	7.61	15.87	9.84	6.68	8.50
13	2.60	1.38	2.81	2.75	17.63	13.26	8.64	9.02	19.65	14.36	10.80	10.78
14	6.80	3.87	2.95	3.23	22.57	12.98	10.88	9.68	27.43	16.57	13.38	28.57

Source: Author's analyses based on IFLS4 (2007) and IFLS5 (2014)

Popular illustrations on child labor usually paints a picture of children working in dimly lit factories or forced into slavery or prostitution. However, Edmonds (2008) argues that those cases represents extreme examples of child labor and are not widespread. In truth most child laborers around the world work within the household and only a few work outside the household for pay (Edmonds and Pavcnik, 2005). The IFLS data reflects this fact, as the majority of child laborers are found to be working for family business.

Table 2 displays the mean and standard deviation of parental income and other control variables. For parental income, it shows that fathers have a higher average income than mothers implying that in Indonesia households still rely on fathers to act as the main breadwinner. This could also point to the fact that women in households with children are less

likely to work full-time than men. In our sample, number of boys and girls were almost balanced, most children were still in school (95.7%), and average age was almost 12 years old.

Table 2. Descriptive Statistics

	Mean	Std. Dev.
Dependent variable		
Natural log of children's monthly workhour	0.379	1.133
Independent variables		
Parental Income		
Father's monthly income (natural log)	12.762	4.325
Mother's monthly income (natural log)	7.465	6.745
Child & Household Characteristics		
Child is still in school (Yes=1)	0.957	0.202
Sex (Boy=1)	0.509	0.499
Age of child (Years)	11.944	1.416
Father's education (Years)	8.073	4.509
Mother's education (Years)	7.725	4.295
Number of male adults in HH	1.356	0.838
Number of female adults in HH	1.484	0.775
Number of older children in HH	0.158	0.392
Number of younger children in HH	1.032	0.978

Source: Authors' calculation based on IFLS4 (2007) and IFLS5 (2014). N=8,475

We also control for household characteristics including parental education, number of adult female and male in the household, number of older and younger children in the household. Mean and standard deviation for each household characteristics can be seen in table 2.

Findings

Table 3 presents the results of the regression on the full sample. While this study uses a quadratic model, a model that assumes linear relationship between parental income and child labor hours is also displayed in Table 2. This is done to show the contrast in results between differing models and assumptions. The difference between the first and the second regression is that the second regression uses household fixed effect to correct for potential biases. Results from the linear functional relationship between the two (columns 1 and 2) suggest that the relationship between a mother and her child in the household labor supply is complementary, with child labor hours increasing as wages increases.

Table 3. Effects of Parental Income on Child Labor Hours (Full Sample)

VARIABLES *Total hours worked per month (log)*	(1)	(2)	(3)	(4)
Father's monthly income (ln)	0.004	-0.004	0.026**	0.060*
	(0.003)	(0.011)	(0.012)	(0.036)
Father's monthly income (ln) – squared			-0.001*	-0.004*
			(0.001)	(0.002)
Mother's monthly income (ln)	0.010***	0.010	0.023*	0.067
	(0.002)	(0.007)	(0.012)	(0.041)
Mother's monthly income (ln) – squared			-0.001	-0.004
			(0.001)	(0.003)
Constant	2.049**	0.862	1.992**	0.510
	(1.008)	(1.784)	(1.006)	(1.793)
Parental fixed-effects	NO	YES	NO	YES
Districts fixed-effects	NO	YES	NO	YES
Observations	8,475	8,475	8,475	8,475
R-squared	0.054	0.076	0.055	0.080
Number of parents		6,357		6,357

Source: Authors' calculation based on IFLS4 (2007) and IFLS5 (2014)

Note: ***, **, and * denotes significance at the 1, 5, and 10 percent level respectively. Regression were done with a full set of control variables that includes age, age squared, school enrollment, number of younger and older children in the household, years of schooling parent, the number of male and female adults in the household, and a year dummy. A complete table can be found in the appendix. Robust-heteroskedasticity and household level-clustered standard errors in parentheses.

In the third and fourth columns, following Ray (2003) and Basu et al (2010) the relationship between parental incomes and child labor hours is modeled as a quadratic model, therefore the squared natural log of both parents' income are included in the regression model. The results from the quadratic model paints a different light. First, the magnitude of the impact of an increase in mother's income towards child labor hours is markedly higher and significant, but its square form is not significant indicating that mother's income complements linearly with working hours of children. Second, modelling the relationship as quadratic causes the father's income to become significant. Particularly, at low level of wages, the relationship between a father and working hours of children is complementary. However, as wages increases, the increments in child labor hours decreases, and at high level of wages, father's income and child labor are substitutes. When controlling for parental and districts fixed-effect, however, the effect of mother's income disappears. On the contrary, effect of father's income on child's working hours becomes significant supporting inverted-U form: as income increases, child working hours increase with decreasing return.

This result would appear to be consistent with the idea of parental altruism in the substitution hypothesis, in a sense that child labor is deemed undesirable and fathers will decrease their children's labor hours as their own income increases. This finding is also in line with Ray (2003) which reported that parents in Ghana behaved similarly when income increases.

Tables 4 and 5 presents the regression results when samples are disaggregated by gender and region types respectively. Results in Table 4 show that the quadratic relationship between parental income and child's working hours in full sample in Table 3 is explained mainly by the quadratic relationship between father's income and girl's working hours –the effect to boy's working hours become shrink and insignificant. This is notable, as Parish and Willis (1993) suggest that compared to their male counterpart, girls were more likely to help the household by working or by bringing other resources into the household. This result implies that when households are facing capital constraints, girls are first in line to work and help ease family finances.

Table 4. Effects of Parental Income on Child Labor Hours: Boys vs Girls

VARIABLES	(1)	(2)	(3)	(4)
Total hours worked per month (log)	Boys		Girls	
Father's monthly income (ln)	0.046**	-0.001	0.007	0.139*
	(0.020)	(0.070)	(0.015)	(0.072)
Father's monthly income (ln) – squared	-0.003*	0.001	-0.000	-0.009**
	(0.001)	(0.004)	(0.001)	(0.004)
Mother's monthly income (ln)	0.007	0.094	0.037**	0.056
	(0.018)	(0.070)	(0.016)	(0.072)
Mother's monthly income (ln) – squared	-0.000	-0.006	-0.002	-0.003
	(0.001)	(0.005)	(0.001)	(0.005)
Constant	2.175	0.580	1.513	-2.492
	(1.439)	(3.449)	(1.403)	(2.845)
Parental fixed-effects	NO	YES	NO	YES
Districts fixed-effects	NO	YES	NO	YES
Observations	4,310	4,310	4,165	4,165
R-squared	0.074	0.130	0.041	0.096
Number of parents		3,697		3,579

Source: Author's analyses based on IFLS4 (2007) and IFLS5 (2014)

Note: ***, **, and * denotes significance at the 1, 5, and 10 percent level respectively. Regression were done with a full set of control variables that includes age, age squared, school enrollment, number of younger and older children in the household, years of schooling parent, the number of male and female adults in the household, and a year dummy. A complete table can be found in the appendix. Robust-heteroskedasticity and household level-clustered standard errors in parentheses.

Table 5. Effects of Parental Income on Child Labor Hours: Urban vs Rural

VARIABLES	(1)	(2)	(3)	(4)
Total hours worked per month (log)	Urban		Rural	
Father's monthly income (ln)	-0.005	0.010	0.051**	0.119**
	(0.014)	(0.052)	(0.021)	(0.047)
Father's monthly income (ln) – squared	0.000	-0.000	-0.003**	-0.008***
	(0.001)	(0.003)	(0.001)	(0.003)
Mother's monthly income (ln)	0.051***	0.037	-0.001	0.177**
	(0.015)	(0.046)	(0.020)	(0.073)
Mother's monthly income (ln) – squared	-0.003***	-0.002	0.001	-0.012**
	(0.001)	(0.003)	(0.001)	(0.005)
Constant	1.081	1.058	2.757*	-0.340
	(1.223)	(2.212)	(1.638)	(2.949)
Parental fixed-effects	NO	YES	NO	YES
Districts fixed-effects	NO	YES	NO	YES
Observations	4,537	4,537	3,938	3,938
R-squared	0.040	0.062	0.068	0.110
Number of parents		3,458		3,004

Source: Author's analyses based on IFLS4 (2007) and IFLS5 (2014)

Note: ***, **, and * denotes significance at the 1, 5, and 10 percent level respectively. Regression were done with a full set of control variables that includes age, age squared, school enrollment, number of younger and older children in the household, years of schooling parent, the number of male and female adults in the household, and a year dummy. A complete table can be found in the appendix. Robust-heteroskedasticity and household level-clustered standard errors in parentheses.

Results from Table 5 suggests that quadratic relationship between father's income and child's working hours persists strong and significant in rural areas. This result complements the findings of Amin et al. (2006), which found a substitute relationship between the father and children in a rural setting. In addition, when disaggregating by urban-rural, we find also such relationship between mother's income and child's working hours. Interestingly, the magnitude of mother's income effects is greater than those of father's income. This finding is consistent with the findings of Ray (2003), and suggest that when mothers are forced to work for low wages in rural areas, this might be an indication that the household is facing severe financial constraints and therefore requires additional income in the form of child work.

From the remaining control variables on individual and household characteristics, there are a couple of points to note. First, unlike previous studies, age is not found to be significant, both in the full sample and in the disaggregated ones. This suggest that parental income, rather than age, plays a significant role in determining child labor outcomes in Indonesia.

Second, being enrolled in school also has a large negative effect on estimated child labor hours. This suggests that across all samples, a child who is enrolled in school is less likely to engage in child labor activities compared to a child who dropped out of school. Understanding Children's Work (2012) highlighted the fact that almost two thirds of children in Indonesia not currently engaged in schooling were found to be working, while Ravallion and Woodon (2000) also noted some substitutability between child labor and school enrollment. This implies that one of the most straightforward methods on decreasing child labor incidence in Indonesia is through policies that ensures all children are enrolled in school.

Third, parental education initially appears to be important determinant that lower child labor. However, after controlling for household/parental fixed-effects, the significant effects disappear. There are a couple of reasons for this. This might imply that there are other unobserved household/parental heterogeneity matter more in reducing child labor. It might however also be the case that because parental education rarely changes between waves, when using FE method this means that we rarely see significant coefficients.

Fourth, we also find that having a sibling in the household decreases estimated child labor hours, which may indicate that the burden of working is likely to be shared between children. When comparing between older and younger siblings, while the effect of both on child labor hours is negative, the presence of an older sibling has a larger negative effect on

child labor hours than the presence of a younger sibling. A striking discovery regarding older siblings is that when sample is further disaggregated by gender, having an older sibling in the household is beneficial for boys only, while girls are seemingly unaffected. This suggest that when the household has an additional source of income in the form of an older sibling, parents prefer to allocate scarce resources, in this case, time spent not working, to male children rather than female children. This result is also somewhat reflected in Edmonds (2006), which found that the time a child spent working increases when younger boys are present in the household.

6. Conclusions and Policy Implications

This study examines the relationship between parental income and child labor supply as well as its subsequent nature in Indonesia, and contributes to the small yet growing literature on child labor in Indonesia. While previous studies on the relationship between parental income and child labor mainly used one period data to estimate the relationship, this study benefits from the panel feature of the Indonesian Family Life Survey, which made it possible to control for household time-invariant unobserved heterogeneity and address potential bias from its correlation with parental income. Regressions were carried out over three types of sample: the full sample, sample disaggregated by gender type, and by type of region to gain a better understanding of child labor phenomenon in Indonesia and isolate location-specific or gender-specific factors.

This study found that in Indonesia, father and child labor are complementary at lower level of wages in all of samples except for urban and boys only samples. However, at higher level of wages, the relationship transforms into a substitute relationship. This implies two things: first, when fathers are working for low wages, the household faces capital constraint. Children are then forced to work to help the household meet their subsequent needs, in line with Basu and Van's luxury axiom where children work only if the income of the household are less than subsistence consumption. Second, when a father's wage is relatively high enough, the household is then assumed to have enough financial security and thus the children do not have to work. This shows that the relationship between child labor hours and father's income resembles an inverted U-shape. This result further reinforces the findings of Ray (2003) and suggests that parental altruism exists with regards to child labor, that is, parents do not let their children work if the family has enough income. For mothers, income and child labor were found to have statistically significant relationship for children in rural areas.

There is no silver bullet when it comes to tackle the child labor problem in a sense that rather than just one policy or measure, a combination of policies and effective law implementation are crucially needed to successfully combat the problem. Policies that aim at banning child labor indiscriminately without addressing the root cause of child labor would help neither the children nor household, especially when the household is facing poverty (Amin et al, 2006). Findings on the unique relationship between mother and children in the household labor supply decision suggest that policies to lessen child labor should focus on improving mother's welfare, chiefly mothers who works for low wages. The improvement in mother's welfare should benefit their children, especially girls, and decrease child labor hours.

A noteworthy method proposed by Amin et al. (2006) to decrease child labor is by increasing access to credit. As shown by Wahid (1999), the presence of microcredit helps increase employment opportunities for women and alleviate poverty in Bangladesh. Widening access to existing labor markets is another avenue to consider, and should also help increase welfare. Finally, social protection programs that targets women and children in Indonesia, such as the Conditional Cash Transfer (*Program Keluarga Harapan*/PKH) and Education Assistance (*Program Indonesia Pintar/*PIP) should also be strengthened by incorporating mechanisms to help deal with child labor issues. As shown by Skoufias and Parker (2001) in Mexico and de Hoop and Rosati (2013) more generally, while cash transfer programs are not usually designed to target child labor, those programs are generally effective in reducing child labor participation.

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Appendices

Table A1. Summary of Treatments on Variables due to Data Imperfections

Source: Author's calculations based on IFLS4 (2007) and IFLS5 (2014)

VARIABLES	Percentage of Treatments
Independent Variables	
Parental Income Characteristics	
Parental Income	7.30%
Household Characteristics	
Years of schooling of most educated parent	13.05%

Note: Observations that are missing or deemed irregular are imputed with the mean of the nearest aggregation level possible. Imputations from other variables that affects the final variable is also counted as treatment to the final variable e.g. imputations on father's hours of work affects hourly income and consequently, father's hourly income.

Table A2. OLS and Fixed Effect Estimates of Child Labor Hours (Full Sample)

VARIABLES	(1) OLS	(2) Fixed Effect	(3) OLS	(4) Fixed Effect
Total hours worked per month (natural log)	Full Sample		Full Sample	
Parental Income Characteristics				
Father's monthly income (ln)	0.004	-0.004	0.026**	0.060*
	(0.003)	(0.011)	(0.012)	(0.036)
Father's monthly income (ln) – squared			-0.001*	-0.004*
			(0.001)	(0.002)
Mother's monthly income (ln)	0.010***	0.010	0.023*	0.067
	(0.002)	(0.007)	(0.012)	(0.041)
Mother's monthly income (ln) – squared			-0.001	-0.004
			(0.001)	(0.003)
Individual Characteristics				
=1 if child is still in school	-0.678***	-0.880***	-0.678***	-0.868***
	(0.106)	(0.192)	(0.106)	(0.192)
Age of child	-0.273	0.039	-0.272	0.065
	(0.170)	(0.295)	(0.170)	(0.296)
Squared age of child	0.015**	0.001	0.015**	0.000
	(0.007)	(0.012)	(0.007)	(0.012)
Father's education	-0.012***	0.005	-0.011***	0.004
	(0.004)	(0.019)	(0.004)	(0.019)
Mother's education	-0.012***	-0.017	-0.011***	-0.012
	(0.004)	(0.033)	(0.004)	(0.033)
Household Characteristics				
Number of male adults in HH	-0.003	0.030	-0.004	0.025
	(0.015)	(0.054)	(0.015)	(0.055)
Number of female adults in HH	-0.015	-0.030	-0.012	-0.027
	(0.016)	(0.048)	(0.016)	(0.049)
Number of older children in HH	0.083***	-0.243***	0.083***	-0.238***
	(0.032)	(0.066)	(0.032)	(0.066)
Number of younger children in HH	0.091***	-0.097*	0.090***	-0.092*
	(0.015)	(0.055)	(0.015)	(0.055)
=1 if year is 2014	0.056**	-0.107	0.069***	-0.048
	(0.025)	(0.077)	(0.025)	(0.081)
Constant	2.049**	0.862	1.992**	0.510
	(1.008)	(1.784)	(1.006)	(1.793)
Observations	8,475	8,475	8,475	8,475
R-squared	0.054	0.076	0.055	0.080
Number of parents		6,357		6537

Source: Author's analysis based on IFLS4 (2007) and IFLS5 (2014).

Note:***, **, and * denotes significance at the 1, 5, and 10 percent level respectively. Robust-heteroskedasticity and household level-clustered standard errors in parentheses. Regression also include dummy variables to control for imputation for wage and education of the parents.

Table A3. OLS and Fixed-Effects Estimates of Child Labor Hours: Boys vs Girls

VARIABLES	(1) OLS	(2) Fixed Effect	(3) OLS	(4) Fixed Effect
Total hours worked per month (natural log)	Boys		Girls	
Parental Income Characteristics				
Father's monthly income (ln)	0.046**	-0.001	0.007	0.139*
	(0.020)	(0.070)	(0.015)	(0.072)
Father's monthly income (ln) – squared	-0.003*	0.001	-0.000	-0.009**
	(0.001)	(0.004)	(0.001)	(0.004)
Mother's monthly income (ln)	0.007	0.094	0.037**	0.056
	(0.018)	(0.070)	(0.016)	(0.072)
Mother's monthly income (ln) – squared	-0.000	-0.006	-0.002	-0.003
	(0.001)	(0.005)	(0.001)	(0.005)
Individual Characteristics				
=1 if child is still in school	-0.787***	-0.993***	-0.492***	-0.972**
	(0.143)	(0.272)	(0.153)	(0.381)
Age of child	-0.296	-0.027	-0.209	0.524
	(0.244)	(0.572)	(0.236)	(0.458)
Squared age of child	0.017	0.004	0.012	-0.017
	(0.010)	(0.024)	(0.010)	(0.019)
Father's education	-0.021***	0.052	-0.001	-0.043
	(0.006)	(0.048)	(0.005)	(0.037)
Mother's education	-0.006	-0.016	-0.016***	0.045
	(0.006)	(0.081)	(0.006)	(0.046)
Household Characteristics				
Number of male adults in HH	0.013	0.170	-0.019	0.021
	(0.022)	(0.107)	(0.022)	(0.123)
Number of female adults in HH	-0.033	-0.086	0.006	-0.002
	(0.023)	(0.084)	(0.024)	(0.093)
Number of older children in HH	0.099**	-0.276**	0.069	-0.106
	(0.045)	(0.131)	(0.044)	(0.104)
Number of younger children in HH	0.093***	-0.108	0.087***	-0.082
	(0.021)	(0.110)	(0.020)	(0.090)
Year dummy (2007 = 1)	0.106***	-0.226	0.027	-0.040
	(0.036)	(0.184)	(0.035)	(0.132)
	(0.056)	(0.219)	(0.053)	(0.177)
Constant	2.175	0.580	1.513	-2.492
	(1.439)	(3.449)	(1.403)	(2.845)
Observations	4,310	4,310	4,165	4,165
R-squared	0.074	0.130	0.041	0.096
Number of parents		3,697		3,579

Source: Author's analysis based on IFLS4 (2007) and IFLS5 (2014)

Note: ***, **, and * denotes significance at the 1, 5, and 10 percent level respectively. Robust-heteroskedasticity and household level-clustered standard errors in parentheses. Regression also include dummy variables to control for imputation for wage and education of the parents.

Table A4. OLS and Fixed Effect Estimates of Child Labor Hours: Rural vs Urban

VARIABLES	(1) OLS	(2) Fixed Effect	(3) OLS	(4) Fixed Effect
Total hours worked per month (natural log)				
	Urban		*Rural*	
Parental Income Characteristics				
Father's monthly income (ln)	-0.005	0.010	0.051**	0.119**
	(0.014)	(0.052)	(0.021)	(0.047)
Father's monthly income (ln) – squared	0.000	-0.000	-0.003**	-0.008***
	(0.001)	(0.003)	(0.001)	(0.003)
Mother's monthly income (ln)	0.051***	0.037	-0.001	0.177**
	(0.015)	(0.046)	(0.020)	(0.073)
Mother's monthly income (ln) – squared	-0.003***	-0.002	0.001	-0.012**
	(0.001)	(0.003)	(0.001)	(0.005)
Individual Characteristics				
=1 if child is still in school	-0.546***	-0.351	-0.760***	-1.094***
	(0.154)	(0.260)	(0.144)	(0.268)
Age of child	-0.130	-0.156	-0.423	0.247
	(0.206)	(0.373)	(0.278)	(0.482)
Squared age of child	0.008	0.008	0.022*	-0.007
	(0.009)	(0.016)	(0.012)	(0.020)
Father's education	-0.013***	-0.005	-0.002	0.024
	(0.005)	(0.027)	(0.006)	(0.035)
Mother's education	-0.000	0.027	-0.017**	-0.018
	(0.005)	(0.043)	(0.007)	(0.052)
Household Characteristics				
Number of male adults in HH	0.009	0.118	-0.004	-0.037
	(0.018)	(0.074)	(0.026)	(0.087)
Number of female adults in HH	-0.004	0.021	-0.011	-0.170*
	(0.019)	(0.060)	(0.029)	(0.101)
Number of older children in HH	0.017	-0.287***	0.141***	-0.218*
	(0.034)	(0.080)	(0.052)	(0.116)
Number of younger children in HH	0.051***	-0.106	0.132***	-0.073
	(0.018)	(0.071)	(0.023)	(0.092)
=1 if year is 2014	0.070**	-0.151	0.081*	0.122
	(0.031)	(0.099)	(0.042)	(0.135)
Constant	1.081	1.058	2.757*	-0.340
	(1.223)	(2.212)	(1.638)	(2.949)
Observations	4,537	4,537	3,938	3,938
R-squared	0.040	0.062	0.068	0.110
Number of parents		3,458		3,004

Source: Author's analysis based on IFLS4 (2007) and IFLS5 (2014)
Note: ***, **, and * denotes significance at the 1, 5, and 10 percent level respectively. Robust-heteroskedasticity and household level-clustered standard errors in parentheses. Regression also include dummy variables to control for imputation for wage and education of the parents.

Drawing on the substitution axiom formulated by Basu and Van (1998) this study examines the nature of relationship between parental income and child labor supply in Indonesia. To estimate such relationship, we are benefited by panel data from the last two waves of Indonesia Family Life Survey (2007 and 2014). We tackle the potential endogeneity in parental income by controlling for parental fixed-effect. Results shows that parental income matter to child labor supply. The effect of father's income looks more significant to all sample particularly to girls. In rural areas, both parental income matter to girls, and not to boys. The relationship between a father's income (and mother's in rural) with children's labor hours are complementary at low level of income, and as income rises, the increments in child labor hours decreases and at high levels of income, the relationship transforms into a substitute relationship –resembling an inverted-U shape.