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Risk preference and child labor: Econometric evidence

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Abstract

Households may invest in the human capital development of their children not only for altruistic reasons but also as insurance against future income shocks. Therefore, the allocation of the child's time between school and work is a function of the risk preference of the household head. This paper analyzes the relationship between parental risk preferences and child labor decisions using recall information on child labor and a risk elicitation question. Results reveal that risk-averse households are more likely to send their children to work. Endogeneity issues are addressed by employing instrumental variables. These results suggest that child labor may be driven by the need to maximize the household's expected income from the child. Regarding heterogeneity, we find that the child labor effect of risk-aversion is higher for older children. Furthermore, the father's risk-aversion matters for the probability of child labor, while the intensity of child labor increases with the mother's risk-aversion. The findings call for an understanding of the behavioral context of the affected households and how risk preferences can affect the success of proposed policies to reduce child labor.

KEYWORDS

altruism, child labor, household welfare, human capital, risk preference, uncertainties

JEL CLASSIFICATION

D13; D15; D64

1 | INTRODUCTION

The literature suggests that heads of households make investments into education to increase the human capital of their children. As child labor negatively affects educational attainment (Admassie, 2003; Heady, 2000; Putnick & Bornstein, 2015), a household's overall utility may be smaller as a result of child labor when compared to a situation where children do not have to work (Basu & Van, 1998). An altruistic, rational household head who is interested in his or her child's well-being will invest resources in the child's schooling and leisure.

However, some households may invest in their children for other than altruistic reasons (Lillard & Willis, 1997; Mu & Du, 2015; Strobl, 2017; Willis, 1980). Poor households may depend directly on current income from child labor and may expect remittance from their adult children (Lillard & Willis, 1997). Therefore, the decision to send a child to school involves, on one hand, opportunity costs in the form of lost income from child labor and, on the other hand, the potential higher future income in transfers from the educated adult child. However, a child's abilities and motivation to succeed academically and the returns to human capital are uncertain (Tabetando, 2019); therefore, investing in the child's education is a risky venture for households in developing countries. The optimal allocations of a child's labor supply and schooling may be affected by risk attitudes of the head (or heads) of the household.

This paper contributes to the literature by *directly* investigating the relationship between household risk preferences and child labor. Despite the potential impact of the parent's risk preference on child labor decisions, the literature has considered this relationship only indirectly: Studies that relate risk preference to human capital investment have examined schooling and school enrollment-related variables (Belzil & Leonardi, 2013; Checchi et al., 2014; Mukherjee & Pal, 2016; Tabetando, 2019; Wölfel & Heineck, 2012). However, the findings of these studies may not necessarily explain child labor in contemporary developing countries, where various policies have considerably increased school enrollment in recent decades (UNESCO, 2016), while child labor is still prevalent.

We examine data from the seventh round of the Ghana Living Standards Survey. We measure child labor as the work of children that generates marketable output. Our results show that children who live in households that are headed by a risk-averse person are more likely to engage in child labor. This relationship between risk-aversion and child labor persists after controlling for numerous confounding variables. We explore potential heterogeneous effects of risk-aversion and provide evidence that the age of the child moderates the relationship between risk-aversion on child labor and whether the child can read and write. We try to account for further endogeneity issues through instrumental variables. As an instrument, we use the household head's concern for privacy (as argued by Bonazzi & Grèzes, 2018).[1] Overall, our results are statistically robust.

The remainder of this paper proceeds as follows: Section 2 provides an overview of the literature. Section 3 discusses our empirical strategy, along with the data. Section 4 presents the results and robustness tests. Section 5 offers concluding remarks.

2 | LITERATURE REVIEW

The existing literature focuses on the link between income, poverty, and related economic variables with child labor (Bandara et al., 2015; Basu & Van, 1998; Dayioğlu, 2006; Duryea et al., 2007; Frempong & Stadelmann, 2019). The role of behavioral factors, including culture and norms, on the prevalence of child labor has been explored, too (Delap, 2001; Morrow & Boyden, 2010). However, the relevance of diverse household preference parameters tends to be underexplored.

Theoretical contributions help to elucidate the relationship between risk preferences, human capital investment, and child labor. The *old-age-security* hypothesis suggests that in developing countries, households may invest in children (quantity and quality) to level consumption over time (Lillard & Willis, 1997; Willis, 1980). They invest with the anticipation that middle-aged and working children will remit transfers to elderly members of the household. One perspective is that since adult members want to maintain their level of consumption when their incomes decrease in their old age, the lack of insurance and pension markets may increase the demand for human capital investment and, as a consequence, reduce child labor (Lillard & Willis, 1997; Sovero, 2018). Another strand of the literature suggests that to the extent that access to credit helps households to mitigate the effect of adverse economic shock, financial market development should decrease the incidence of child labor (Dehejia & Gatti, 2005). The *repayment* hypothesis explains another motivation for households to invest in the child's human capital instead of engaging in child labor. This hypothesis assumes a family capital market, where the household provides the child with grants and loans as an investment in the child's human capital and the child is expected to repay those investments in the future (Lillard & Willis, 1997). In such models, we expect investment in human capital to increase if the probability of repayment is high. However, like other investment portfolios, human capital investments are not risk-free. Apart from unforeseen events, like death and unemployment, the child may be disloyal to the family and fail to repay the loan. Rogers and Swinnerton's (2004) theoretical contribution predicts that transfers from the child to the parent decrease when the parent's income is high. In Ghana, Ahiakpor and Swaray (2015) found, among other factors, that expected remittances from the child and the parent's discount rate affect the household's investment in education.

Baland and Robinson (2000) suggest that even when parents are altruistic, child labor rates could still be inefficiently high when there is no parent-to-child-bequest and capital markets are imperfect. They explain that this occurs because parents are not fully able to internalize the negative effects of child labor (Baland & Robinson, 2000; Dessy & Pallage, 2005). Pouliot (2006) expanded on Baland and Robinson's (2000) model to show that when the return to human capital is associated with high uncertainties, child labor rates will be high. This result holds even when there are no credit constraints (Pouliot, 2006). Empirical work on the link between parental expectations and child labor confirms this theoretical position (Ahiakpor & Swaray, 2015; Mukherjee & Pal, 2016). Uncertainties about returns to human capital may reduce investment in schooling and increase the supply of child labor. Such uncertainties are influenced by general economic conditions, individual characteristics, and evaluations of the likelihood of the household being affected by such circumstances.

Empirically, several studies have examined the link between household risk preference and human capital investment. The focus of these studies has mainly been on education, especially school enrollment at the primary and secondary school levels. In general, the findings point to a negative relationship between parental risk-aversion and children's educational outcomes at different levels (Belzil & Leonardi, 2013; Checchi et al., 2014; Wölfel & Heineck, 2012). Checchi et al. (2014) interpreted similar results as a reaction of risk-averse parents to the uncertainties of their children's prospects when they do not fully recognize the children's abilities. This paper takes a complementary view: Child labor literature suggests that children from poor households in developing countries combine school and work (Dessy & Pallage, 2005; USDOL, 2019). Thus, one cannot directly extend the findings of a negative correlation between risk-aversion and education to a positive relationship between risk-aversion and child labor without an empirical test. Even though governments in some developing countries have adopted policies to increase school enrollment rates, child labor remains predominant.[2] Thus, school enrollment is not systematically negatively correlated with child labor. To understand the causes of child labor in developing countries, child labor needs to serve directly rather than indirectly as the variable to be explained. This article contributes to the aforementioned literature by studying

the role of risk preferences in the context of Ghana, a country that has followed a free and compulsory primary education policy since 1995. Our study also provides insights into how risk-aversion of the household translates the economic environment to child labor.

3 | DATA AND METHODOLOGY

3.1 | Data and country context

We employ individual and household-level data from the seventh round of the Ghana Living Standards Survey (GLSS-7) (GSS, 2017), which was administered by the Ghana Statistical Service in 2016 and 2017. There is still a high child labor prevalence in Ghana due to unfavorable economic circumstances, like poverty and rudimentary agriculture. The child labor rate in the country is about 25%, according to the U.S. Department of Labor (USDOL, 2019). Generally, child laborers in Ghana work in the agriculture and fishing industries, especially in the rural areas, where these activities are the primary sources of livelihood for the people. However, about 92% of children in Ghana attend school, and the primary completion rate is about 94% (USDOL, 2019). Schooling, especially at the primary level, has remained highly subsidized since 1995, but public schools sometimes lack the necessary teaching materials to produce skilled graduates (Alagidede et al., 2013).

The Ghanaian economy is characterized by a large informal sector, underdeveloped credit and insurance markets, and consequently high-interest rates. Given these characteristics, poor households in the country tend to depend on earnings from child labor to supplement their incomes (Hilson, 2010; Koomson & Asongu, 2016). The reliance on child labor income increases the opportunity cost of schooling and human capital development. High unemployment rates in the formal sector exacerbate this condition and reduce the household's expected return on education. As argued by Emerson and Knabb (2013), parents rely on beliefs, expectations, and their human capital to balance their allocation of schooling and working time for the child. We hypothesize that, given imperfect foresight and the household's inability to fully internalize the full negative effect of work on the child's human capital development, a risk-averse household would increase its supply of child labor under these adverse economic circumstances.

3.2 | Variables and empirical strategy

3.2.1 | Child labor

A child laborer defined in this study is a person between the ages 5 and 15 who engaged in economic activity in the 7 days before the household completed the survey.[3] Because we are interested in studying a household's willingness to forego income from child labor, we define economic activity as any type of work for which the end product is mainly or partly for barter or sale, and we excluded all work that is solely for the household's consumption. This definition may understate the extent to which children work in the country; for example, it does not account for children who work on household farms so that adult members can supply their labor in the market.[4] However, this definition makes the process of drawing inferences on the motivations for risk-averse parents' behaviors regarding child labor supply more straightforward.[5] In the regression models, we define the variable *Childlabor*, equal to one if the child engaged in economic activity.

3.2.2 | Risk preferences

To measure the risk preferences of the household, we rely on a question in the survey that elicits the investment choice of the respondents in the GLSS-7 data set. The question posed to the household's head is as follows:

Suppose you want to invest some money. Which of the following options do you prefer?

- *Option 1: Invest in a business where I can't lose money but profits are low.*
- *Option 2: Invest in a business where there is a small chance I can lose money but profits are potentially high.*

The risk preference variable denoted as *Riskavers* is defined as an indicator variable, where one indicates the individual chose Option 1 and zero indicates the individual chose Option 2. Thus, individuals who chose Option 1 (low risk and low profits) are considered risk-averse.[6]

It is noteworthy that, as is typical in such surveys, these hypothetical investment choices do not present any real benefit or loss to the respondent (Sovero, 2018); therefore, the response may not capture the respondent's *actual* risk-aversion. However, studies that have examined the relationship between self-reported and actual risk preferences have found strong correlations and consistency between the two measurements (Binswanger, 1981; Dasgupta et al., 2019).

3.3 | Empirical strategy

We estimate the following regression model:

$$Childlabor_i = \alpha + \beta Riskavers_i + \boldsymbol{CHILD}_i'\boldsymbol{\gamma} + \boldsymbol{HH}_i'\boldsymbol{\theta} + \boldsymbol{GEO}_i'\boldsymbol{\omega} + \boldsymbol{TIME}_i'\boldsymbol{\phi} + \varepsilon_i \quad (1)$$

where child labor, *Childlabor*, is regressed on the household head's risk preference, *Riskavers*; child-level control variables, ***CHILD***; a vector of household-level control variables, ***HH***; and a set of geographic and time fixed effects, ***GEO*** and ***TIME***.

The vector ***CHILD*** contains the age and gender of the child; whether the child is in school; the ability of the child to read, write, and do simple calculations; and the child's health status. The household-level variables in ***HH*** are the age and gender of the household head, household size, per-capita real total household expenditures; education status of the head; the ability of the head to read, write, and do simple calculations; the ownership of a business enterprise; health and employment status of the head; whether the household took a loan and for what purpose; and the number of agriculture activities undertaken by the household. ***GEO*** contains dummies for the geographical region of the residence. Finally, we control for the year of the interview in the ***TIME*** vector. We estimated a linear probability model for Equation 1.[7] We estimate a Tobit model of the equation when examining the effects of risk-aversion on the intensity of child labor (child labor hours).

A concern with Equation 1 regards the extent to which the coefficient of interest, β, represents the causal effect of risk preference on child labor. One threat to identification is measurement error. Omitted variable bias or (less likely) reverse causality could also be relevant. Risk-aversion and the decision to engage in child labor are both behavioral variables that could be affected by inherent characteristics that are not observed in the data set.

We employ the instrumental variables technique as our identification strategy by exploiting an individual's regard for privacy as an instrument for his or her risk preference. The specific instrument relates to the extent to which a person is willing to reveal his or her date of birth. While potentially surprising as an instrument (as many instruments are), such a choice follows Bonazzi and Grèzes (2018), who referred to a person who has a high level of concern about privacy and personal information disclosure as risk-averse. Similarly, Frik and Gaudeul (2018) found a correlation between disclosure of private information and financial risk-aversion. Therefore, a person who is less willing to reveal his or her date of birth might considered to be more risk-averse. The specific question relating to the instrument is "How important is it to you to keep your date of birth private by not revealing it to others unless necessary?" Econometric tests show that the importance a person places on disclosing the date of birth explains the stated risk preferences, hence the instrument has relevance. For the exclusion restriction to hold, a person's willingness to disclose his or her date of birth must not have any direct or another indirect effect on child labor, apart from its effect on risk preferences; that is, the instrument must not be correlated with the error term to be exogenous. It is difficult to perceive a direct effect of the willingness to disclose one's date of birth on subsequent decisions regarding child labor.

Similarly, there is no evident theoretical channel of how the willingness of disclosure might affect child labor beyond its link through risk-aversion. In any case, we control potential factors in our regressions that could affect the importance one attaches to birthday disclosure, such as one's ability to read and write. However, we note that as with any instrument, there is no ultimate proof for exogeneity, but the identification assumption seems credible.

We re-estimate Equation 1 in a 2SLS setting. In the first stage, we regress risk preference on regard for privacy, *Disclosure*, in Equation 2, and all control variables.

$$Risk = \sigma + \eta Disclosure_i + \boldsymbol{CHILD}_i'\boldsymbol{\rho} + \boldsymbol{HH}_i'\boldsymbol{\pi} + \boldsymbol{REG}_i'\lambda + \boldsymbol{TIME}_i'\boldsymbol{\varphi} + \xi_i \tag{2}$$

In the second stage, we estimate a linear probability model, Equation 3, of the child labor participation equation as a function of the prediction of *Risk*, that is, $\widehat{Riskavers}$ from Equation 2 and all control variables.

$$Childlabour_i = \phi + \beta_{IV}\widehat{Riskavers}_i + \boldsymbol{CHILD}_i'\boldsymbol{\gamma} + \boldsymbol{HH}_i'\boldsymbol{\theta} + \boldsymbol{GEO}_i'\boldsymbol{\omega} + \boldsymbol{TIME}_i'\boldsymbol{\phi} + \varsigma_i \tag{3}$$

It is worthwhile to reflect briefly on a potential bias that can be identified by comparing β from Equation 1 and β_{IV} from Equation 3. If parents who have sent a child to work did so to compensate for potential expected future losses, they might tend to adjust their reported risk-aversion downward. In this case, we would expect that $\beta < \beta_{IV}$; that is, this would imply a downward bias in Equation 1, which may be corrected by the IV estimates.

3.4 | Descriptive statistics

Table 1 contains summary statistics of all variables in our regression models.

About 13% of the children in the sample engage in economic activity as work for which the end product is mainly or partly for barter or sale; 6% of children in risk-taking households and 16% in risk-averse households are working, and the two shares are statistically significantly different from each other. The average age of a child in the sample is 10 years, and 50% of them are boys. It is

TABLE 1 Summary statistics

	Full sample	Risk-taker	Risk-averse	*t*-Test Mean difference
	Mean	Mean	Mean	
Child-level variables	*N = 7,503*	*N = 1,221*	*N = 6,282*	*N = 7,503*
Age of the child	9.84	9.82	9.85	−0.03
Child worked	0.13	0.08	0.14	−0.05***
Child can do calculations	0.25	0.26	0.25	0.01
Child can read and write	0.24	0.26	0.24	0.02
Child is in school	0.99	0.98	0.99	−0.00
Child was ill	0.11	0.12	0.11	0.00
Boy	0.50	0.42	0.52	−0.10***
Household-level variables	*N = 3,774*	*N = 594*	*N = 3,180*	*N = 3,774*
Age of household head	46.77	46.38	46.84	−0.47
Death in household	0.04	0.04	0.04	−0.00
Have an insurance policy	0.22	0.17	0.23	−0.06**
Head can do written calculation	0.54	0.54	0.54	−0.00
Head is employed	0.81	0.77	0.82	−0.05**
Head has been to school	0.66	0.69	0.66	0.03
Head reads and writes	0.44	0.47	0.43	0.05*
Household owns an enterprise	0.48	0.46	0.49	−0.03
Household size	5.23	5.27	5.23	0.05
Household spent on lottery	0.04	0.03	0.04	−0.00
Investment loan	0.06	0.05	0.06	−0.02
Log HH expenditure	7.80	7.84	7.80	0.04
Male-headed household	0.55	0.64	0.54	0.10***
No loan	0.90	0.92	0.89	0.02
Number of agricultural activities	0.38	0.31	0.39	−0.09***
Number of sick members	6.00	5.95	6.01	−0.06
Personal loan	0.04	0.03	0.04	−0.01
Unemployment rate in the area	0.07	0.08	0.07	0.01***
Urban	0.37	0.42	0.36	0.06**
Instrumental variable	*N = 3,774*	*N = 594*	*N = 3,180*	*N = 3,774*
Disclosure of birthdate	0.84	0.97	0.81	0.16***

*$p < .05$; **$p < .01$; ***$p < .001$.

interesting to note that risk-averse households report having comparatively more boys than risk-taking households. In all our regressions, we control for the sex of the child to account for such reporting (or actual) differences. School enrollment is high, as 99% of all the children in the sample are currently enrolled, and the distribution is similar among risk-taking and risk-averse households. About a quarter

of children can do simple calculations or can read and write; the share is similar for risk-averse and risk-taking households.

Table 1 also shows that the two types of households are different regarding the willingness of the household head to disclose his date of birth.

Risk-averse and risk-taking households are similar regarding a broad array of household characteristics with differences in having an insurance policy, employment of the household head, reading and writing skills, male-headed households, agricultural activities, and urban residence. A male member heads the majority (55%) of the households, and the average of a household head is 47 years. Also, 66% of all household heads have been to school. While 44% of household heads can read and write, 54% can do simple calculations. About 81% of all household heads are currently employed, and the rate of the employed is higher for risk-averse household heads than risk-taking household heads. As expected, risk-averse households (23%) are more likely to have an insurance policy than risk-taking households (17%).

3.5 | Validity test of the risk preference variable

The validity of our results relies on the extent to which the risk preference variable captures the actual risk behavior. Theory suggests that risk-averse individuals may demand insurance against uncertainties. We can directly check this prediction in the data set as we have information on whether the household holds some insurance and its aggregate expenditure on insurance, including housing and health. Table S1 in the Supporting Information shows that if the head is risk-averse, the probability that the household has insurance increases significantly. This also holds when implementing our IV strategy, that is, when instrumenting risk-aversion with whether the household head is willing to reveal his or her date of birth. Investigating the logarithm of insurance expenditure reveals a positive and statistically significant relationship between risk-aversion and insurance spending for the IV setting too. Thus, we conclude that our measure for risk preferences is related to an observable measure of actual behavior.

4 | RESULTS

4.1 | The relationship between risk-aversion and child labor

Table 2 presents the relationship between risk preference and child labor. Columns (1) and (2) present models where risk-aversion, child characteristics (in column 2), region, and time fixed effects explain child labor. The literature suggests that one's wealth and income determine his or her willingness to engage in risky ventures (Barsky et al., 1997; Hopland et al., 2016). Wealth is also a significant determinant of child labor (Basu & Van, 1998; Rogers & Swinnerton, 2004); therefore, in column (3), we include the logarithm of the household's total expenditure as an explanatory variable to control for the wealth effect. Column (4) controls for ownership of an enterprise and access to credit. Finally, column (5) presents a full model with all control variables. In all specifications, the relationship between risk-aversion and child labor is statistically significant and positive and the magnitude suggests that risk-aversion is associated with about a 4 percentage points higher probability of child labor. We also investigate the number of hours worked as the dependent variable in column (6). Children in risk-averse households tend to work for about seven more hours per week.

TABLE 2 The relationship between risk-aversion and child labor

	(1)	(2)	(3)	(4)	(5)	(6)
	Child worked	**Child worked**	**Child worked**	**Child worked**	**Child worked**	**Hours of work**
Head is risk-averse	0.06***	0.06***	0.06***	0.05***	0.04***	7.45***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(2.39)
Child characteristics	No	Yes	Yes	Yes	Yes	Yes
Household expenditure	No	No	Yes	Yes	Yes	Yes
Other household economic variables	No	No	No	Yes	Yes	Yes
Household demographic variables	No	No	No	No	Yes	Yes
Region and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	7,503	7,503	7,503	7,503	7,503	7,503
R^2	0.04	0.10	0.10	0.11	0.14	0.09

Notes: Standard errors in parentheses are clustered at the enumeration area.

Estimates are weighted by survey weights. *Control variables:* Age and sex of the child, whether the child was ill; the child is in school, he can do calculations, he can read and write; the age of the household head, death in the household, household size, male-headed household, the number of sick members in the household, the head has been to school, he reads and writes, and can do simple calculations; the head is employed; the household owns an enterprise, the household spent on lottery, the household took no loan, investment loan, and personal loan, and had an insurance policy; log household total expenditure, the number of agricultural activities, the unemployment rate in the area, urban residence year dummies.

*$p < .1$; **$p < .05$; ***$p < .01$.

In addition to the effect of risk-aversion, we point out the following six results for the covariates (results only shown in Table S2 in the Supporting Information): (1) Older children are more likely to work than younger children. (2) Household expenditure has a negative and significant correlation with child labor; that is, children from wealthy homes tend to work less. (3) Households that have taken loans for investment (asset acquisition, farming, or enterprise) are more likely to have their children work. (4) Engagement in more agricultural activities is positively related to child labor. (5) Children in urban areas engage in child labor less often than rural children. (6) Despite the appearance that child labor is more prevalent among boys than girls in Ghana, the regression does not produce a significant difference when controlling for other covariates.

4.2 | Heterogeneous links between risk-aversion and child labor

The main results presented so far show that the household head's risk preference has a significant association with child labor. However, it remains open under which circumstances risk-averse parents decide to revert to having their children work. To explore potential mechanisms and heterogeneous links between risk-aversion and child labor, Table 3 introduces interaction effects between the variable risk-aversion and several covariates.

TABLE 3 Mechanisms and heterogeneity of the relationship between risk-aversion and child labor

	(1)	(2)	(3)	(4)	(5)
	Child worked	**Child worked**	**Child worked**	**Child worked**	**Child worked**
Head is risk-averse	−0.07**	0.03**	0.06	0.03***	0.03***
	(0.03)	(0.01)	(0.05)	(0.01)	(0.01)
Age of the child	0.01***	0.02***	0.02***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male child	0.01	−0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
In school	−0.00	0.01	0.02	0.00	0.00
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Do calculation	0.08**	0.08**	0.08**	0.05	0.08**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Read and write	−0.06*	−0.07*	−0.07*	−0.07*	−0.10***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
(Head is risk-averse) × (Age of the child)	0.01***				
	(0.00)				
(Head is risk-averse) × (male child)		0.02			
		(0.01)			
(Head is risk-averse) × (in school)			−0.02		
			(0.05)		
(Head is risk-averse) × (Do calculation)				0.04	
				(0.03)	
(Head is risk-averse) × (Read and write)					0.05*
					(0.03)
Child characteristics	Yes	Yes	Yes	Yes	Yes
Household expenditure	Yes	Yes	Yes	Yes	Yes
Other household economic variables	Yes	Yes	Yes	Yes	Yes
Household demographic variables	Yes	Yes	Yes	Yes	Yes
Region and year fixed effects	Yes	Yes	Yes	Yes	Yes
Linear combination of interaction	−0.06	0.05	0.04	0.07	0.08
	(0.03)	(0.01)	(0.01)	(0.03)	(0.03)
N	7,503	7,503	7,503	7,503	7,503
R^2	0.14	0.14	0.14	0.14	0.14

Notes: Standard errors in parentheses are clustered at the enumeration area.

Estimates are weighted by survey weights. *Control variables:* Age and sex of the child, whether the child was ill; the child is in school, he can do calculations, he can read and write; the age of the household head, death in the household, household size, male-headed household, the number of sick members in the household, the head has been to school, he reads and writes, and can do simple calculations; the head is employed; the household owns an enterprise, the household spent on lottery, the household took no loan, investment loan, and personal loan, and had an insurance policy; log total household expenditure, number of agricultural activities, the unemployment rate in the area, urban residence year dummies.

*$p < .1$; **$p < .05$; ***$p < .01$.

Older children are more productive than younger children. Therefore, we expect the effect of risk preference on child labor to be higher among older children if the objective of the household is to maximize income. Column (1) of Table 3 presents the full model with the interaction term of risk preference and the child's age as an additional explanatory variable. The interaction term is positive and statistically significant, while the coefficient for the risk-averse variable is negative. Once children are older than 8 years, the baseline effect of − 7% and the interaction effect of (1*8=) 8% yields a positive effect of risk-averse households, which further increases with age. Thus, starting from the age of between 7 and 8, the link between risk-aversion and child labor becomes relevant.

As shown in column (2), we do not find a significant interaction effect of risk-aversion and sex of the child. Thus, the risk-aversion of the household head is not moderated by the sex of the child.

If the reason for sending children to work is to maximize lifetime earnings, then the effect of risk-aversion on child labor should be lower if the child is already in school and performs well academically. Columns (3)–(6) try to investigate this mechanism. We find no robust evidence that this is the case when investigating interaction terms in columns (3)–(6). The interaction with being able to read and write is marginally significant at the 10% level and would even, if anything, suggest a positive moderation effect of being able to read and write.

Table S3 further explores the role of household factors in moderating the effect of risk preference on child labor. In general, we do not find any significant interaction terms, suggesting that risk preferences do not tend to be largely moderated by other household characteristics. Thus, there is little heterogeneity regarding the link between risk-aversion and child labor, and risk-aversion systematically affects all children old enough to provide work.

4.3 | Accounting for children's risk preferences and decisions related to education

A child's risk preference may correlate with both child labor rates and the risk preference of the parent (Checchi et al., 2014). The risk preference variable is available for all individuals who are 12 years or older in our data set. The correlation between the head and the child risk preference is 0.41 ($p < .001$). To take care of the concerns of omitted variable bias due to the non-inclusion of the child's risk preference, Table 4 presents the results for this limited sample of observations. The table does not show any significant effect of the children's risk preferences on their probability of work. The effect of risk-aversion of the household head remains statistically significant and positive in this sample, supporting our findings in Table 2. This supports the notion that child labor is mainly an adult decision in developing countries.

To understand the effect of child labor on human capital development, we examine the effect of child labor and risk-aversion on the number of hours the child spends in class, spends doing homework, and missed class, as well as the expenditure on education. The results in Table S4 in the Supporting Information show that children who engage in child labor tend to spend fewer hours in class and on their homework, and they miss classes more often. However, risk preferences of the household do not play a systematic role once we have accounted for child labor for these variables. Households spend less on education when children are working, and risk-aversion is associated with a lower household education expenditure.

TABLE 4 Linear probability estimate of the effect of risk-aversion on child work—children 12 years and older

	(1)	(2)	(3)	(4)	(5)	(6)
	Child worked	**Child worked**	**Child worked**	**Child worked**	**Child worked**	**Hours of work**
Head is risk-averse	0.11***	0.11***	0.11***	0.09***	0.08**	2.92
	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(3.18)
The child's risk-aversion	−0.01	−0.00	−0.00	0.01	−0.00	2.93
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(2.82)
Child characteristics	No	Yes	Yes	Yes	Yes	Yes
Household expenditure	No	No	Yes	Yes	Yes	Yes
Household demographic variables	No	No	No	No	Yes	Yes
Region and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,664	1,664	1,664	1,664	1,664	1,664
R^2	0.08	0.09	0.10	0.14	0.19	0.06

Notes: Standard errors in parentheses are clustered at the enumeration area.

Estimates are weighted by survey weights. *Control variables:* Age and sex of the child, whether the child was ill; the child is in school, he can do calculations, he can read and write; age of household head, death in the household, household size, male-headed household, the number of sick members in the household, the head has been to school, he reads and writes, and can do simple calculations; the head is employed; the household owns an enterprise, the household spent on lottery, the household took no loan, investment loan, and personal loan, and had an insurance policy; log household total expenditure, number of agricultural activities, the unemployment rate in the area, urban residence year dummies.

*$p < .1$; **$p < .05$; ***$p < .01$.

4.4 | Parental risk preference and child labor

The intra-household bargaining literature suggests that child welfare depends on the preferences of both parents (Afoakwah et al., 2020; Frempong & Stadelmann, 2017; Lépine & Strobl, 2013). Table 5 explores the relationship between fathers' and mothers' risk preference and child labor. The analysis is limited to 2,088 observations (less than one-third of the total number of observations) who live with both parents. Risk-aversion of the father has a positive and statistically significant effect on the probability of child labor. In contrast, the risk-aversion of the mother has a positive but statistically insignificant effect. Interestingly, the hours of observed child labor supply increase significantly if the mother is risk-averse. This result does not necessarily contradict the expected maternal preference for human capital accumulation. In certain societies, parents consider child work an essential preparation for adult life such that mothers may perceive additional working hours as not necessarily harmful for their children.

4.5 | Causal evidence of an effect of risk-aversion on child labor (IV evidence)

To allow a causal interpretation of our results, we employ IV estimation to deal with potential endogeneity bias. Results are presented in Table 6.

TABLE 5 The relationship between risk-aversion and child labor—father and mother's risk preference

	(1)	(2)	(3)	(4)	(5)	(6)
	Child worked	**Child worked**	**Child worked**	**Hours of work**	**Hours of work**	**Hours of work**
Mother is risk-averse	0.02		0.00	8.21**		7.41*
	(0.03)		(0.03)	(3.22)		(3.83)
Father is risk-averse		0.05*	0.05*		4.02	1.49
		(0.02)	(0.03)		(2.96)	(3.46)
Child characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Separate father and mother variables	Yes	Yes	Yes	Yes	Yes	Yes
Region and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2,088	2,088	2,088	2,088	2,088	2,088
R^2	0.20	0.21	0.21	0.12	0.12	0.12

Notes: Standard errors in parentheses are clustered at the enumeration area.

Estimates are weighted by survey weights. *Child characteristics:* age of the child, school enrollment status, read and write, do simple calculations, gender, illness. *Household demographic and economic variables*: sex of household head, participation in a lottery, death shock, the number of sick people in the household, household size, the number of agricultural activities, the logarithm of total household expenditure, enterprise ownership, and unemployment rate. *Separate father and mother characteristics*: schooling ability to read, write, and do simple calculations, age, employment status, access to and purpose of the loan, and ownership of insurance. *Region and time fixed effects*: region dummies, year dummies.

*$p < .1$; **$p < .05$; ***$p < .01$.

Our first-stage results show a statistically significant and negative effect of date of birth disclosure on risk-aversion, suggesting that the instrumental variable satisfies the relevance requirement. The *F*-statistic of the weak identification test also suggests a strong correlation between the instrument and the risk preference.

In all specifications, except child labor hours, we find a statistically significant and positive effect of risk-aversion on child labor, which may be interpreted as causal under IV identification assumptions. The results for the full model in column (5) mean that the probability of child labor is about 27 percentage points higher when the household head is risk-averse. The magnitude of the coefficient further shows that the effect of household risk preference on child labor is both statistically and economically relevant.

The coefficient of the risk preference in the IV estimates in Table 6, column (5), is about four to six times larger than the OLS estimates presented in Table 2. Such differences between OLS and IV are not unusual, especially in the case of a dummy endogenous variable (e.g., Currie & Cole, 1993). de Jong (2016) attributes this to the fact that we are replacing the dummy variable with the predicted probability of risk-aversion, which is less than one. Therefore, the coefficient of the probability of risk-aversion must be larger to be comparable to the LPM estimates. Apart from this technical reason, it is likely that the OLS estimates suffered from a negative bias, as discussed earlier.

TABLE 6 The causal effect of risk-aversion and child labor (IV results)

	(1)	(2)	(3)	(4)	(5)	(6)
	Linear Probability Model					*IV-Tobit*
	Child worked	**Child worked**	**Child worked**	**Child worked**	**Child worked**	**Hours**
Head is risk-averse	0.27**	0.26*	0.26*	0.24*	0.27*	23.23
	(0.14)	(0.14)	(0.14)	(0.14)	(0.15)	(17.98)
Child characteristics	No	Yes	Yes	Yes	Yes	Yes
Household expenditure	No	No	Yes	Yes	Yes	Yes
Household demographic variables	No	No	No	No	Yes	Yes
Region and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	7,503	7,503	7,503	7,503	7,503	7,503
Kleibergen-Paap rk LM stat.	10.91	11.00	10.09	10.42	10.02	
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	
Kleibergen-Paap rk Wald F stat.	12.12	12.20	11.13	11.48	10.82	
First stage result of the effect of privacy on risk-aversion						
Disclosure of birthdate	−0.07***	−0.07***	−0.06***	−0.06***	−0.06**	−0.06**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)

Notes: Standard errors in parentheses are clustered at the enumeration area.

Estimates are weighted by survey weights. *Control variables:* age and sex of the child, whether the child was ill; the child is in school, he can do calculations, he can read and write; the age of the household head, death in the household, household size, male-headed household, the number of sick members in the household, the head has been to school, he reads and writes, and can do simple calculations; the head is employed; the household owns an enterprise, the household spent on lottery, the household took no loan, investment loan, and personal loan, and had an insurance policy; Log household total expenditure, number of agricultural activities, the unemployment rate in the area, urban residence year dummies.

*$p < .1$; **$p < .05$; ***$p < .01$.

5 | CONCLUSION

The literature indicates that income constraints on households and adverse economic shocks increase the probability of child labor. Moreover, parental risk preferences are commonly linked to education decisions. In developing countries, children often participate in both school and work. Therefore, the risk preference of households could have an independent effect on child labor, aside from the indirect impact through education and school enrollment.

We offer an analysis of the effect parental risk preferences on child labor using nationally representative data from Ghana. We use a risk elicitation question to evaluate parental risk-aversion. Our validity tests show that the variable contains relevant information on actual behavior. The econometric

analysis further suggests that children who live with risk-averse parents are more likely to engage in economic work. We account for possible endogeneity of the risk preference variable by using one's willingness to disclose private information regarding the date of birth. Our results suggest that the observed relationship is motivated by the parent's interest in maximizing personal gains from the child rather than from an altruistic motive of helping the child gain additional skills outside formal education.

The findings reported in this paper contain relevant information for policymakers. Economic policies on fighting child labor involve poverty-reduction strategies, but they tend to pay less attention to the behavioral characteristics of the parents. Our findings call for an understanding of the behavioral context of the affected households and of how certain traits, like risk preference, can affect the success of proposed policies to reduce child labor.

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ENDNOTES

[1] An individual's concern for privacy is correlated with stated risk preference and arguably satisfies the exclusion restriction.

[2] For example, over 90% of the children in our sample are in school, while 16% engage in child labor.

[3] The ILO website defines *child labor* as "work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development. It refers to work that: is mentally, physically, socially or morally dangerous and harmful to children; and/or interferes with their schooling by: depriving them of the opportunity to attend school." (see https://www.ilo.org/ipec/facts/lang--en/index.htm, accessed September 1, 2020). The ILO Convention No. 138, adopted in 1973, sets 15 years as a minimum age for work in developed and 14 years in developing countries. However, exceptions due to apprenticeships or vocational training exist. The upper age for child labor studies is usually 14 and 15 years (Beegle et al., 2006). In Ghana, the legal age for employment into light work is 15 years.

[4] Our conclusions remain robust when we include all forms of work (see Table S5, which yields similar results as the baseline model).

[5] The literature and international conventions do not provide clear suggestions on how to treat non-commercial activities, like family farm support, so our definition avoids this conventional difference.

[6] See Barsky et al. (1997) for a similar setting.

[7] A logit or a probit estimation of Equation (1) yields similar results.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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