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DISCUSSION PAPER SERIES

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ABSTRACT

Household Behavioral Preferences and the Child Labor-Education Trade-off: Framed Field Experimental Evidence from Ethiopia

Using data from the Rural Ethiopian Household Survey, which contains a behavioral module, we explore the link between adult risk and time preferences and the incidence and the intensity of child labor. While as expected child labor at both the extensive and the intensive margin is a result of high time discount rates, the narrative behind the positive relationship between adult risk aversion and child labor is more complex. While child labor is clearly the result of risk aversion, more risk averse parents react to their uncertain environments by combining child labor and work as opposed to substituting schooling for child labor.

JEL Classification: C93, J43, O55

Keywords: risk and time preferences, education, child labor, Ethiopia

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1. Introduction

A range of global efforts notwithstanding, child labor remains pervasive in the developing world. According to the International Labour Organization (ILO), 168 million children in the 5-17 age group work as child laborers worldwide (ILO, 2015). The incidence is highest in Sub-Saharan Africa with 21% (59 million child laborers), followed by 9.3% in Asia and the Pacific (78 million child laborers), 8.8% in Latin America and the Caribbean (13 million child laborers) and 8.4% in the Middle East and North Africa (9.2 million child laborers). ILO statistics also identify the majority of child laborers as working in the agricultural sector globally (59% or 98 million child laborers).

The literature on the causes, consequences and policies to eliminate child labor is vast, and well established. The supply of child labor is primarily related to poverty (Basu and Van, 1998), failure to internalize the benefits of education (Baland and Robinson, 1999), credit constraints (Grote, Basu and Weinhold, 1998; Ranjan, 2001), debt bondage (Basu and Chau, 2003 and 2004) and stigma (Patrinos and Shafiq, 2008) while the consequences of child labor include impaired childhood development, low educational attainment and fewer gainful employment opportunities as adults which perpetuates the vicious cycle of poverty (Beegle et al, 2008). Policy prescriptions to eliminate child labor range from conditional cash transfers, enforcement of adult minimum wage laws, education subsidies, access to credit and social labelling programs (Bourguignon, Ferreira and Leite, 2003, Basu, 2000; Ravallion and Woden, 2000; Basu, Chau and Grote 2004).

In this paper, we revisit the issue of the *causes* behind the existence of child labor by focusing on an aspect that yet to be explicitly analyzed in the literature: the role of household risk and time preferences on the extensive (whether a child works) and intensive (number of hours worked) margin of child labor supply[1]. Aside from the fact that this is an under researched topic in itself, our interest in this issue is guided by two developments: (i) availability of the 7th round of the Ethiopian Rural Household Survey which, in addition to child labor and schooling information, contains a unique module assessing adults' time and risk preferences, and (ii) a couple of pioneering papers that analyze the impact of parental or household head's risk and time preferences on various child outcomes like body weight, body mass index (BMI) and educational outcomes (Sovero, 2017; Tanaka and Yamano, 2015). This latter link between behavioral preferences and child schooling outcomes serves as a benchmark for us since the trade-off between child labor and schooling is well documented and extensively researched. For example, the literature on the impact of government run conditional cash transfer programs in Latin America and in parts of Africa which incentivizes school attendance for children from poor households at the expense of child labor supply is a testament to how closely the demand for education and the supply of child labor are connected (de Hoop and Rosati, 2013). It is thus interesting to analyze whether the observed effect of household risk and time preferences on child educational outcomes is mirrored by the observed effect of these same preferences on child labor supply.

[1] While empirical research has identified, poverty (Beegle, Dehejia, and Gatti, 2006), wealth (Bhalotra and Heady, 2003), parent's educational attainment (Canagarajah and Coulombe, 1998) and a child's birth order (Emerson and Souza, 2008) as some of the key determinants of child labor supply, the impact of behavioral preferences has remained unexplored, in part due to the late recognition that these preferences play an important role in determining the economic choices of the poor (Bertrand, Mullainathan and Shafir, 2004).

As background, the two recent papers analyzing adult risk and time preferences on child education arrive at broadly similar conclusions. Sovero (2017) uses the Mexican Family Life Survey to find that risk averse parents spend more resources to prioritize schooling for boys over girls[2]. Tanaka and Yamano (2015) uses data from a field experiment in rural Uganda to analyze the impact risk aversion and patience profile of the household head on various schooling related variables. They find that household heads with higher patience rates allocate higher expenditure for children's education. Interestingly, children between 10-13 years of age belonging to households where the household head is impatient exhibit low school attendance rates. Further, risk aversion of the household head delays school enrollment of young children, especially boys. The takeaway from these set of results can be summarized as (i) relatively more patient parents/household heads are more likely to invest in their children's education and (ii) risk averse parents are likely to delay education for boys, but when they do invest in education there is a distinct gender bias in favor of male children. Indeed, if the demand for education is inversely related to the supply of child labor then these results would suggest that (i) more patient parents/household heads are less likely to send their children to work and (ii) more risk averse parents/household heads are more likely to send their children to work. In what follows, we analyze whether these hypotheses hold for rural Ethiopia.

The hypothesis that risk-averse parents or household heads are more likely to send their children to work is counter intuitive at first pass. However, two possible explanations may address this relationship. First, the insurance motive: for risk-averse rural households, income uncertainty in the presence of weather volatility may well entail risk diversification via child labor income. The second is the motive to lower on-farm monitoring costs. As Bhalotra and Heady (2003) show for rural Pakistan, richer (and therefore relatively risk averse) households who hire outside labor can land up saving on monitoring costs by engaging household child labor on own farms – a finding since confirmed by Lima, Mesquita and Wanamaker (2015).

The rest of the paper is organized as follows. Section 2 describes the data, presents descriptive statistics and discusses the risk and time experiments. Section 3 outlines the empirical strategy while Section 4 reports the results. Section 5 concludes.

2. Data

Our empirical analysis is based on the 7th round of the Ethiopian Rural Household Survey, conducted in 2009. This panel survey initiated in 1989 within 6 villages in Central and Southern Ethiopia. Extended follow up surveys - with 15 more villages added - were conducted in 1994, 1995, 1997, 2004 and 2009. We restrict our analysis to the latest cross-section in 2009 since the module exploring household preferences is only available for this wave of data collection. The data collected in this 7th round is representative of the agro-climatic zones of the country. The selection of districts and households within districts is based on stratified sampling. The survey includes 1577 households and 7096 individuals from 21 peasant associations[3].

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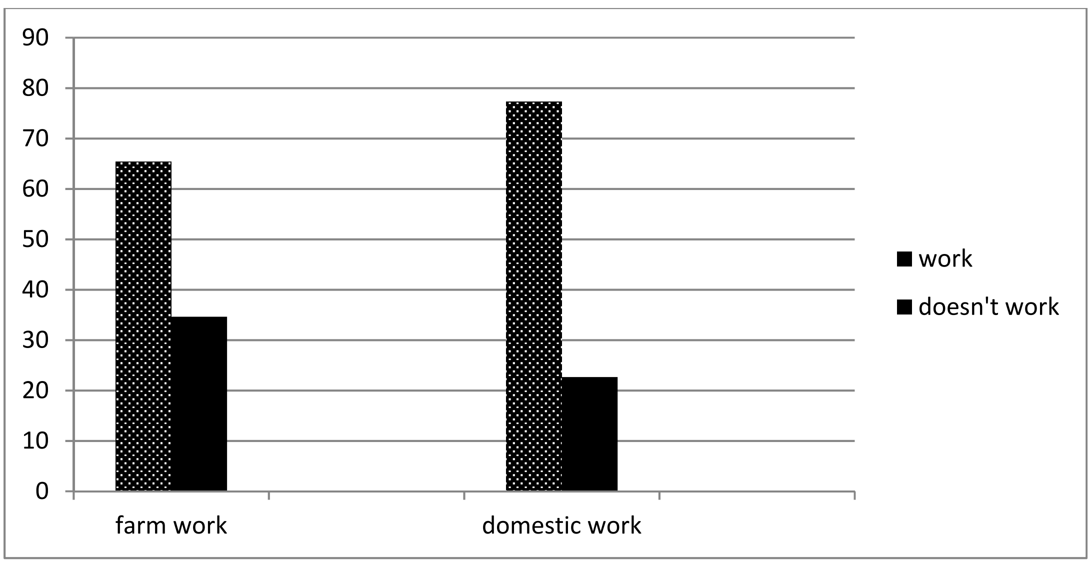
[2] Sovero (2017) also finds that a mother and father's risk aversion have negative effects on their daughter's weight and BMI, but positive effects on their son's weight and BMI.

[3] Data is collected in 4 out of the 9 regions in the country, which are representative for the agro-climatic zones: Tigray, Amhara, Oromia and SNNP (Southern Nations, Nationalities and People's Region). Each

Of special interest to us are the child/youth labor module, and the module on household preferences. The child/youth labor module is conducted for individuals of ages 4-21. It collects information on typical hours of work supplied per week. It also contains detailed questions on education, including starting time, degrees obtained, discontinuity, and so on. Most questions are aimed at acquiring information for the preceding 12 months. Given that only 1% of the children supply work outside the household or family farm premises, our focus is on two categories of child labor supply: (i) child labor on own-farm and (ii) non-farm domestic work undertaken by children within the household. For consistency with the literature on child labor and schooling, we restrict our sample to children within the 7-15 age bracket. Setting the lower bound at age 7 reflects the fact that formal schooling in Ethiopia begins at this age, even though it is not necessarily legally binding (Haile and Haile, 2012).

To gain a first impression of the dimension of the child labor phenomenon, Figure 1A reports the proportions of children engaged in the two categories of child labor: own-farm work and domestic non-farm work within the household, respectively. We observe that over 65% of the children are engaged in farm work while more than 75% of the children are engaged in domestic work.

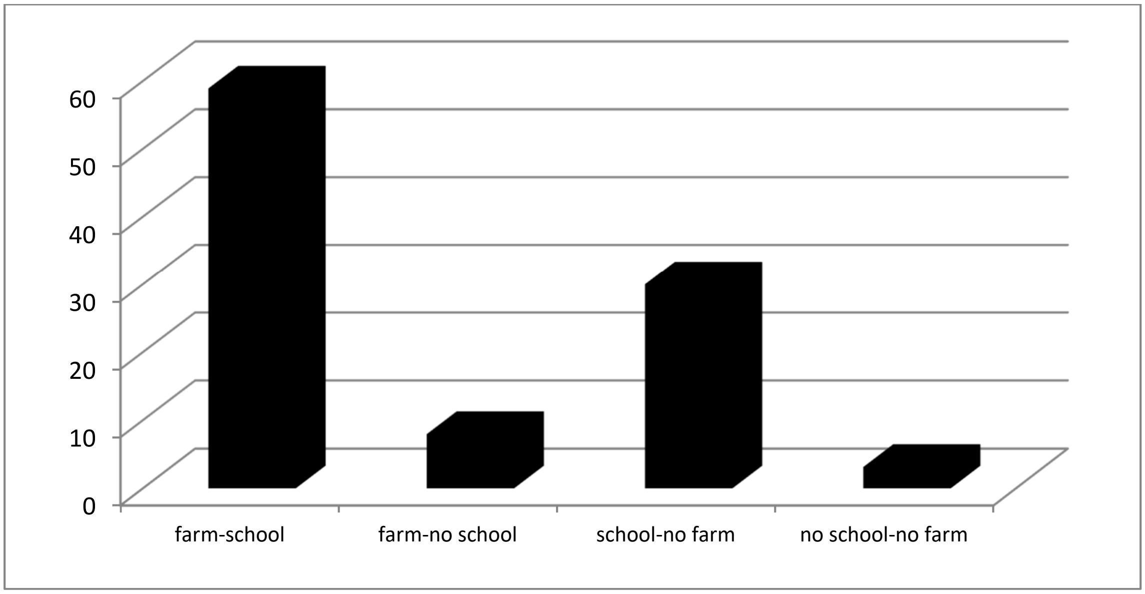
Figure 1A: Incidence of Child Labor: Farm and Domestic Work

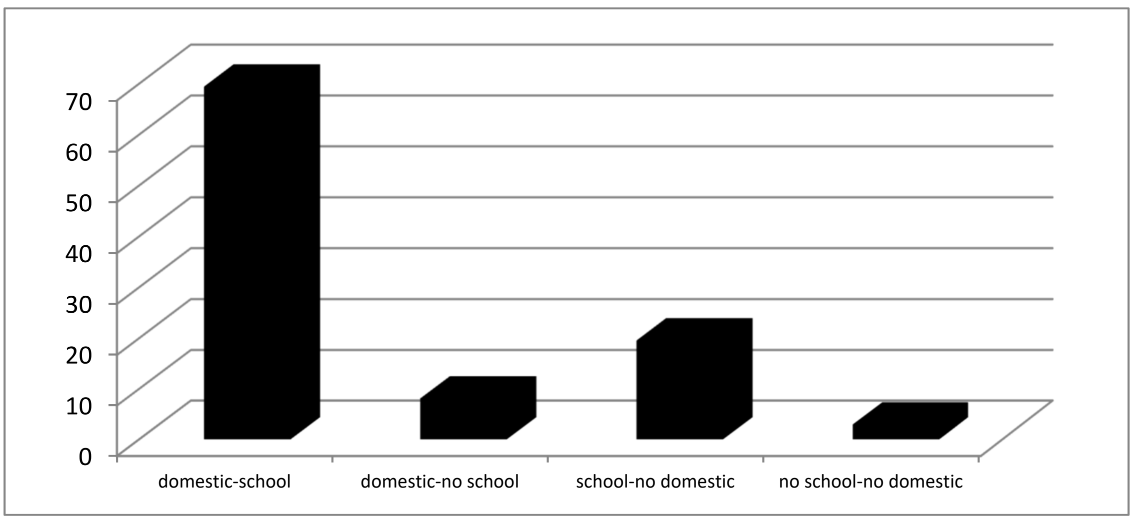


The child labor-education trade-off being the main concern, we look at the cross-tabulation between the two categories of child work and education. As Figure 1B shows, schooling is the preferred choice of households irrespective of whether the children are engaged in work or not. For example, 58.91% of children who engage in farm work and 69.42% of children who engage in domestic work attend school. The corresponding percentages of children who go to school, but do not work on the farm or engage in domestic work are 30% and 19.54%, respectively. Only 11% of eligible children in our sample are not enrolled in a school.

region is further divided into altogether 15 zones, which in turn are divided into Woredas. The smallest (rural) administrative unit is the Peasant Association. The survey includes 21 Peasant Associations. This is an administrative unit that consists of several villages.

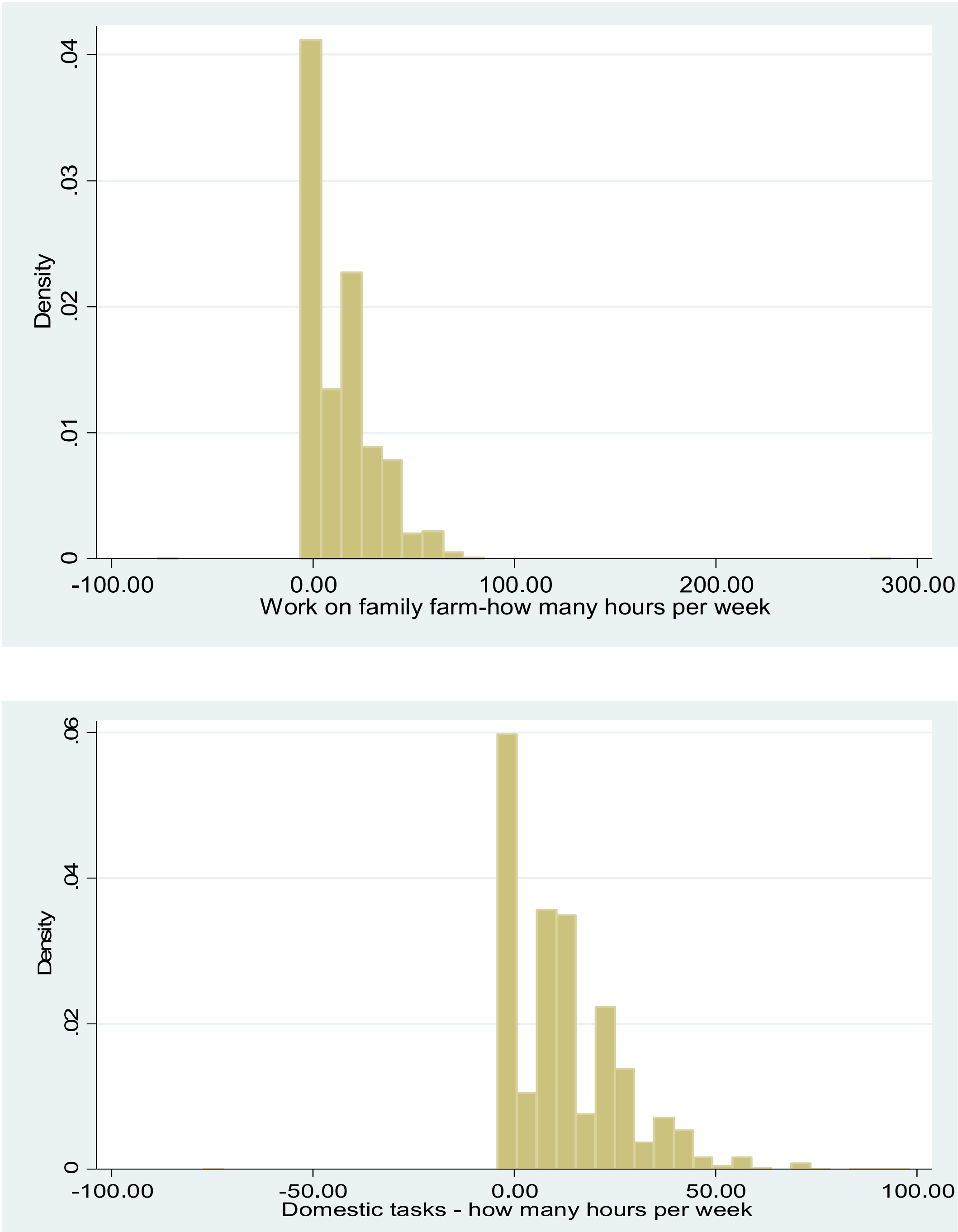
Figure 1B: Cross-tablulations of Farm and Domestic Work with Schooling





A closer look at the rest of the relevant data indicates that less than 10% of the overall (both adult and child/youth) sample have participated in or completed education beyond the 10th degree. Approximately half of them have participated in an adult literacy program as opposed to a higher degree program. Moreover, while the average number of hours that children devote to farm work is 18 per week and those devoted to domestic work are 22 per week, the histograms in Figure 1C indicate that there are children that devote up to 50 weekly hours and even more to work. Children who combine farm work and schooling devote on average 18.94 hours of work per week on the farm while the corresponding number of hours worked by children who do not go to school is 30.14. For children who combine domestic non-farm work with schooling, the average number of hours worked is 17.20 while the average number of hours of domestic work done by children who do not attend school is 23.86 hours per week.

Figure 1C: Histograms of farm and domestic work of children



We next turn to the module exploring household behavioral preferences. Questions within this module are answered by the actual household head in 95.77% of the cases while for the remaining 4.23% of the cases it was a different household member (when the actual household head was absent). In our empirical analysis we control for characteristics of the key respondent, including the gender and whether the child concerned is his or her biological child or grandchild. We executed our analysis by excluding respondents who are not the head of the household but were acting as a proxy at the time of the survey. But since this exercise did not influence our results, we choose to base our analysis on the full sample of respondents.

Extrapolation of Risk and Time Preferences[4]:

The codification of risk-taking behavior is based on the following question:

- *"Now imagine that you are going to the market to sell a bag of maize. Would you prefer:*
  (a) To be certain you will receive 250 Birr for one bag;
  (b) Have an equal chance that you will be paid 200 Birr or 400 Birr;
  (c) Have an equal chance to be paid 150 Birr or 550 Birr,
  (d) Have an equal chance to be paid 100 Birr or 700 Birr,
  (e) Have an equal chance to be paid nothing or 1000 Birr."

Note that the gambles (a) to (e) above are successively increasing in their payoffs as well as in the levels of riskiness as indicated by higher standard deviations. Based on an individual's choice among the gambles (and assuming that choices are rational and consistent), we can identify the range within which an individual's coefficient of relative risk aversion falls (Kimball, Sahm and Shapiro, 2008). Assuming a utility function that exhibits constant relative risk aversion (CRRA) of the form $u(x) = \frac{x^{1-r}}{1-r}$. Ignoring wealth outside of the experiment, and assuming initial wealth is zero for all individuals, the following condition must hold for all individuals who choose gamble (e) over gamble (d) (and therefore gambles (a), (b) and (c)): $0.5\frac{0^{1-r}}{1-r}\ 0.5\frac{10^{1-r}}{1-r} > 0.5\frac{1^{1-r}}{1-r}\ 0.5\frac{7^{1-r}}{1-r}$. Solving for $r = 0.33$ gives us the CRRA threshold that makes individuals indifferent between gambles (d) and (e)[5]. In similar fashion, the value of r that makes an individual indifferent between gambles (c) and (d) equals 0.68, and so on. The table below summarizes the range of CRRA associated with each of the gambles.

Choice (50/50 Gamble)	Low payoff	High payoff	Expected return	Standard deviation	Implied CRRA range	Degree of risk aversion
Gamble (a)	250	250	250	0	r > 3.25	Highest
Gamble (b)	200	400	250	100	1.10 < r < 3.25	High
Gamble (c)	150	550	250	200	0.68 < r < 1.10	Medium
Gamble (d)	100	700	250	300	0.33 < r < 0.68	Low
Gamble (e)	0	1000	250	500	r < 0.33	Lowest

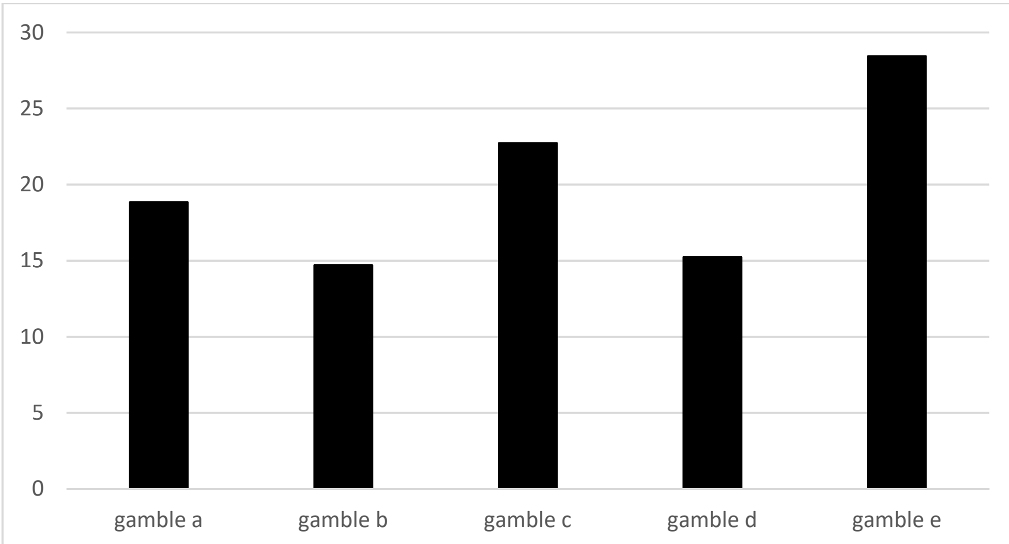
Figure 2 highlights the distribution of risk profiles within the sample. Close to 30% of the respondents are concentrated in the highest risk category, 22% in the medium risk category while

[4] We thank Tung Dang for excellent research assistance with this module in the 7th round of the Ethiopian LSMS survey.

[5] Note that in the calculations the payoffs are scaled by 100 without any loss of generality, and r is solved using Matlab.

less than 20% of the respondents are concentrated in the lowest risk category. Around 15% of respondents are evenly distributed across the low and high-risk category respectively.

Figure 2: Distribution of Responses to the Question on Risk Taking Behavior



We use two questions in the module on household preferences to capture the time discount rate (patience level) of the respondent.

Question 8 in the questionnaire:

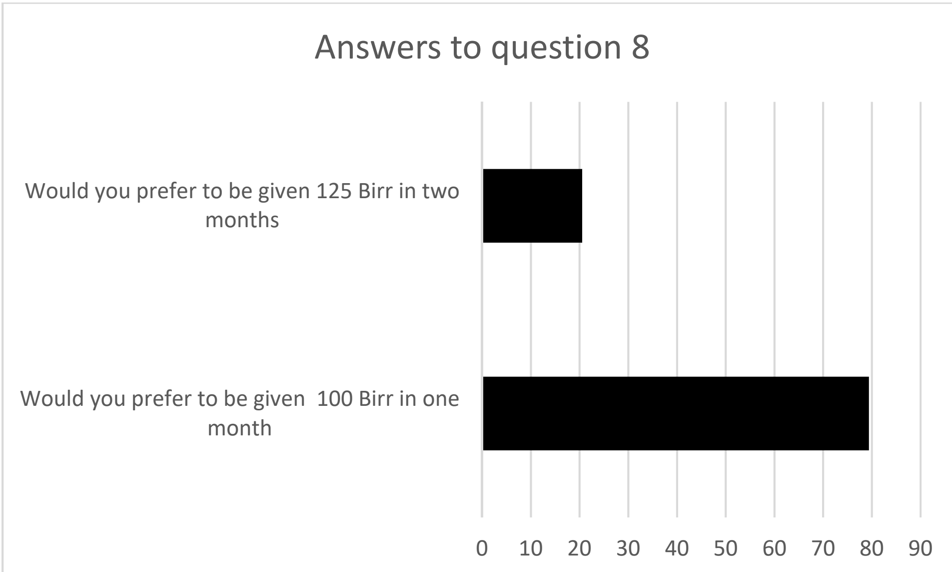
- "*Would you prefer to be given (a) 100 Birr in one month, or (b) 125 Birr in two months*." It takes the value of 0 if the respondent picks answer (a).

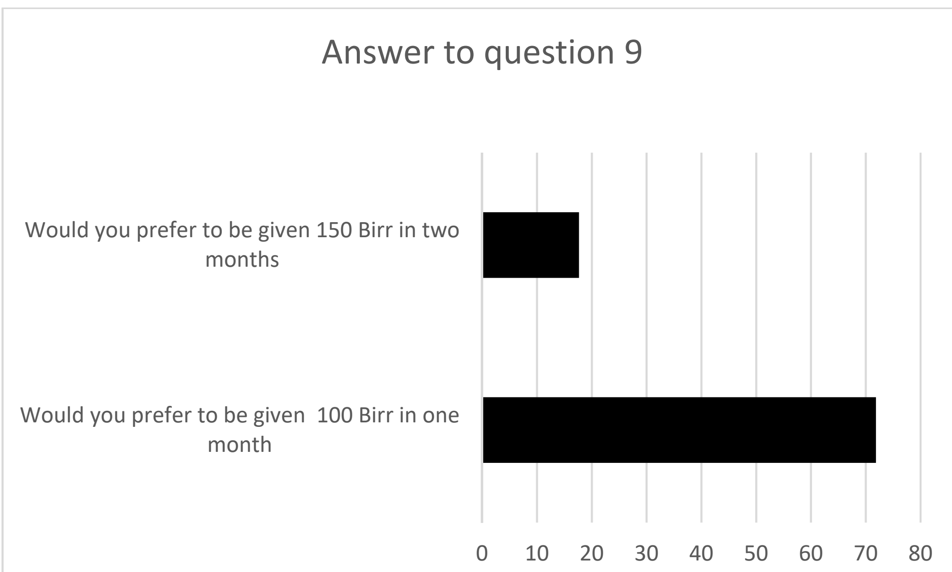
Question 9 in the questionnaire:

- "*Would you prefer to be given (a) 100 Birr in one month, or (b) 150 Birr in two months.*" It takes the value of 0 if the respondent picks answer (a).

Figure 3 below show the distribution of responses to the two questions above.

Figure 3: Answers to time preference questions





We assume that utility is time-separable and take the following stationary form: $U(c_t, c_{t+k}) = u(c_t) + \delta^k u(c_{t+k})$ where the period specific utility takes the liner form $u(c) = c$, which implies $\delta \approx \left(c_t/c_{(t+k)}\right)^{(1/k)}$. The intertemporal discount rate, IDR, is thus defined as: $IDR = 1/\delta - 1$, with a higher IDR implying a greater degree of impatience (Tanaka, Camerer, and Nguyen, 2010). Focusing on questions 8 and 9 on the survey, which respectively asks respondents to choose between two amounts, we can estimate the IDR by assuming that transaction costs involving future choices are zero as,

	t=30	t=60	'Indifference' discount factor (ô)	Indifference' discount rate (IDR)
Question 8	100	125	0.993	0.007
Question 9	100	150	0.987	0.014

Once the IDR is estimated, we can use the specific choices to each of the questions - 8a, 8b, 9a and 9b respectively - to extrapolate the patience level of a respondent in the table below:

Choices	Implied discount factor range	Implied discount rate range	Patience level
8a & 9a	< 0.987	IDR > 0.014	Least patient
8a & 9b	0.987 < < 0.993	0.007 < IDR < 0.014	Medium patient
8b & 9a	-	-	-
8b & 9b	> 0.993	IDR < 0.007	Most patient

For our empirical analysis, we define a "least_patient" variable that takes the value of 1 if the respondent chose options 8a and 9a while a value of 0 is assigned to all those who did not pick 8a and 9a as their response. A "medium_patient" variable takes on the value 1 if the options 8a and 9b are chosen and 0 otherwise. Finally, a "highly_patient" variable captures those respondents picking options 8b and 9b with value 1 while a value of 0 is assigned to all others. 63.51% of the sample belongs to the "least_patient" category, 14.95% of the sample is "medium_patient" while 21.54% belong to the most patient category.

To conclude our preliminary look at the data, Table 1 highlights descriptive statistics that link child labor and schooling to our key variables of interest, namely risk taking and time preferences, along with other standard child and household charactersitics used in the literature on child labor. The description of these variables is available in Table 1A in the appendix. It is interesting to note that the sample of children engaged in domestic non-farm work is very similar to those engaged in farm work. A key distinctive characteristic across these two samples is the child's gender with more boys engaged in farm work and more girls engaged in domestic non-farm work. This finding is in consonance with the established literature on child labor in rural Africa. As one would expect, patience is positively correlated with the incidence of schooling and negatively correlated with the incidence of child labor on the farm, although this distinction is not clear in the case of domestic non-farm work. Indeed, in a statistical sense, the differences in the means of both the risk aversion and the patience variables are statistically significant across the farm work and non-farm work (including domestic non-farm work) samples. By contrast the hypothesis of equality of the means of the risk averison and time preference variables across the domestic non-farm work and no domestic non-farm work (including own farm work) samples is rejected. At the same time, the proportion of adults with high affinity to risk taking is higher in the sample of children who do not go to school than in the school going and child labor supplying counterparts.

In so far as other variables of interst are concerned, we observe a positive correlation between asset ownership (both land and livestock) and both farm work and schooling. This is consistent with Bhalotra and Heady (2003) who find a positive relationship between farmwork and wealth and inconsistent with Basu and Van (1998) who surmise child labor as a consequence of poverty. Girls are significantly less likely to be involved in agricultural labor and more likely to go to school and be engaged in domestic work, while higher education of the head of household is positively associated with child schooling and domestic work and negatively associated with child labor on the farm. The children of head of households who practice farming as a primary occupation are both more likely to go to school and be involved in child labor. As expected, greater proportion of children in the 5-to-15 age group is positively associated with greater incidence of both child labor and schooling.

3. Empirical strategy

To reiterate, our main focus is on exploring the implications of parental time and risk preferences on both the incidence and intensity of child labor. For consistency with the relevant literature (e.g. Bhalotra and Heady, 2003) we start with logit models of the determinants of child labor at the extensive margin (namely, the incidence of child work) and Tobit estimations of determinants of child labor at the intensive margin (namely, the intensity of child work). We perform these estimations separately for children working on the farm and for children engaged in domestic activities.

Given that – and as indicated in Figure 1B – a large proportion of the children in our sample combine child labor and schooling while 3% of the children are idle, the ideal empirical methodology for our analysis would be a bivariate probit model. This would allow us to estimate the probabilities associated with all four possible combinations of choices- work and school, namely work and no school, no work and school and no work and no school, as well as the marginal effects of the explanatory variables associated with each of these four choices. Theoretically, it would permit us to explore the full range of adult preferences with respect to child welfare, including for instance the rather rare in our case possibility that the residual chaimant of a child's time off work is not schooling but leisure (Cigno and Rosati, 2005).

However, the estimation of a bivariate probit model, across a range of different empirical specifications, yielded an insignificant correlation between the residuals in each equation of interest. This is consistent with the evidence that schooling is largely taken for granted, and is the dominant parental choice for both children who work and children who do not work. As a result, we revert to a Multinomial logit estimation of the four different combinations of choices across work and schooling as in Maitra and Ray (2002), performed separately for the samples of children engaged in farm and domestic non-farm work.

The implications of high time discount rates on the incidence and intensity of child labor is conceptually straightforward, even if not formally explored. Theoretically, one would expect parents with high discount rates to be more likely to engage their children in child labor (at the expense of schooling). Hence, in keeping with theoretical predictions and the descriptive statistics, highlighted in Table 1B and 1C, we expect the coefficients of the least_patient and medium_patient variables to be positive in the child labor equations.

The implications of parental risk profiles on child labor is are more complex. Although, and as indicated at the outset, the assumption of substitutability between child labor and schooling would imply negative association between parental risk aversion and child labor (consistent with the negative association between parental risk aversion and schooling witnessed in the literature), concern with the welbeing of the child may well make this association counter-intuitive. For example, Tanaka and Yamano (2015) argue that the negative association between risk aversion and schooling found in the context of Uganda is driven by parental concern with regards to child safety as opposed to the stylised logic of intertemporal investment in education. In effect, the direction of the relation between the risk profile of the household head and child labor supply is difficult to determine ex ante, and is hence subject to empirical verification.

Household risk aversion can also be reconciled with the two most prominent causes for the existence of child labor. The first is the well-established result of Basu and Van (1998) where poverty is the main reason as to why poor households sends a child to work. But are the poor also risk averse? Murdoch (1995) and Tanaka, Camerer, and Nguyen (2010) find evidence that the poor are risk averse and opt for low risk and low return strategies – one of which being child labor at the expense of schooling that traps households in the vicious cycle of poverty (Dercon, 1998, 2005). On the other hand, Bosch-Domenech and Silvestre (2006) and Banerjee and Duflo (2007) find evidence that the poor are risk-takers – evidenced by their propensity to enagage in high risk entreprenueral activities and avoidance of income diversification strategies that mitigate the risks of idiosyncratic shocks affecting their occupations. If this is indeed the case in Ethiopia, then we may well observe that poorer households favor schooling for their children.

The second cause of child labor is due to the wealth effect as evidenced by Bhalotra and Heady (2003) and Bhalotra (2003). Both these papers show that larger land owners are more likely to involve children within their households in work. This result is driven by labor market imperfections where high monitoring costs associated with hired labor is addressed by employing cheaper household labor, including those of the children. If richer households are also risk averse following the standard expected utility framework, then we are likely to observe a higher incidence of child labor amongst richer households.

To explore these different possibilities, we include in our specifications measures of wealth, namely land size and total livestock value, as well as the interaction terms between these asset variables and our risk preference variable. Land size is expected to be positively associated with child labor on account of labor market imperfections while livestock value (as a proxy for liquid wealth that relaxes credit constraints) should have the opposite, negative, effect on child labor. In addition to the uninteracted proxies of household wealth, we include their interactions with our "highrisk" variable, which we would expect to have an inverse sign vis-a-vis those associated with the landsize-child labor and livestock-child labor relationships.

The rest of our empirical specifications are consistent with the literature on (rural) child labor. Following this literature, we control for the age and gender of the child as well as the structure of the household, captured by the proportions of household members in different age and gender groups. Notable here is that an average smallholder household in sub-Saharan Africa tends to be labor constrained, and hence household size has an important impact on the observed incidence of child labor. We also control for key characteristics of the head of household, namely the gender of the head of household and whether he or she is a biological parent or a biological grandparent of the child. Aside from serving as standard explanatory variables these characteristics capture features of the household respondent whose risk and time preferences are measured in our survey.

4. Empirical results

Table 2 highlights the marginal effects from our logit model of the determinants of child labor at the extensive margin. In the cases of both child labor on the farm and child involvement in domestic work, the marginal effect of our highrisk variable is negative and statistically significant. This is not inconsistent with the theoretical framework highlighted at the outset, which treats child labor and schooling as substitutes. Specifically, under the assumption of substitutability between child labor and schooling, the negative association between high affinity to risk taking and child labor is the reverse coin of the positive association between high affinity to risk taking and schooling as in Sovero (2017) and Tanaka and Yamano (2015). In addition, and consistent with expectations, we observe a positive association of high level of household head impatience and child involvement in farm work, although the association between time preferences and child labor is not significnat in the case of domestic activities.

Although these observations are consistent with our expectations, based on the literature that relates parental behavioural preferences and education, there could be alternative possible explanations of these relationships. The positive association between parental risk aversion and child labor could simply be the reverse of the negative association between parental risk aversion and schooling, but it could be a result of the Bhalotra-Heady (2003) type dynamics whereby the link between risk preferences and child labor are an indirect consequence of labor market imperfections. To verify this, in columns 2 and 4 of Table 2 we report the interaction terms between our two asset variables and the measure of risk preferences, which turn out to be insignficiant in this context.

The rest of the results in Table 2 are broadly consistent with our expectations. While the involvement of the head of household in farming as a primary occupation is positively associated with child labor on the farm, greater education by the head of household is positively associated with domestic child work. This is in consonance with Estudillo, Quisumbing and Otsuka (2001) who argue that, in the context of patrilineal social norms, parents are likely to achieve lifetime equalization of the investment of resources across children by investing more in girl's education (which in our context is consistent with greater domestic as opposed to farm work on the part of girls) and greater investment in the form of farm assets in boys. As expected, higher young child dependency rates are associated with greater involvement of children in domestic work, which is also consistent with the positive and significant association between the female child variable and domestic work and the negative and significant sign of this same variable in the farm work equation. The marginal effects from our Tobit estimates on the determinants of child labor at the intensive margin (Table 3) are consistent with the results at the extensive margin. One important variable that is not significant in Table 2, but is positive and significant in Table 3 is the livestock value variable. Yet, although we find a positive association between the livestock variable and the intensity of farm work holds, this variable is not significant in the domestic labor intensity equation[6].

To evaluate child labor as part of the bigger picture of decision making that affects chidlren in the household, we report in Tables 4 and 5 the marginal effects from the multinomial logit estimations on the farm work-schooling and domestic-work-schooling combinations, respectively. The results highlighted in Table 4 indicate that the combination between child labor and schooling is a consequence of parental risk aversion, while parents who have high affinity to risk taking are willing to engage their children only in education and do not involve them in work on the farm. This reconciles the potential puzzle on the differential effects of parental risk preferences on education and child labor, emanating from our descriptive statistics and logit and Tobit results. In addition, parents in the highest level of impatience category are most likely to involve their children in farm work and keep them off school, while the opposite is true for children in the school-no-child labor category. As expected, we find that (i) girls are less likely to be engaged in farm labor whether they go to school or not, (ii) biological children of the head of household are less likely to be involved in child labor without investing in their schooling, (iii) heads of household who are involved in farming as their primary occupation are more likely to combine child labor and schooling than send their children to school without engaging them in any child labor and (iv) greater household labor resources (captured by the greater household size) prevent households from engaging in the extreme situation of engaging children in work witout investing in their schooling.

The results on the combination of schooling and domestic child work (Table 5) are consistent with the descriptive statistics and those highlighted in Table 4. Aside from the diametrically different gender effect, perhaps the only difference that is worth re-emphasising is that the effect played by the household heads' education in the case of domestic work of the child is a mirror image of the effect of the household head's involvement in farming as a primary education in the case of farm labor of the child. Similarly, and analogically, greater level of wealth, captured by the livestock variable increases the probability of a child to be at school and not to be involved in domestic child labor.

Before concluding, it is worthwhile revisiting some robustness issues. In particular, the stylised literature on child labor that takes asset and income measures seriously in account emphasizes the potential endogeneity of these variables. An important obstacle that we face in this context is finding a good instrumental variable that is significantly associated with household wealth, but does not influence child labor and schooling. Typical candidates that are frequently used in this literature, such as exogenous weather shock, would affect both the household wealth and child labor variables. Given that non-instrumentation is generally preferred to the use of weak instruments (Young, 2018), we opt for the alternative robustness check of using lagged values of our livestock and land size variables instead of their contemporaneous counterparts. The results, reported in Tables A2-A5 confirm our overall narrative, even though on a few occasions

[6] This is also true for the interaction terms of the wealth variables and the risk preference variable, which we do not report for parsimonity reasons, but are available upon request.

(especially in the baseline logit and Tobit equations, though not in the multinomial logit estimates) the level of significance of the risk preference variable is reduced.

5. Concluding remarks

Child labor continues to be one of the most high profile issues in development economics. Rural areas of sub-Saharan Africa are characterized by the largest incidence and intensity of child labor and its consequence in terms of impaired childhood development, low educational attainment and fewer gainful employment opportunities as adults is well documented. While previous research has identified poverty and market imperfections as some of the primary determinants of child labor with accompanying policy prescriptions that target households accordingly, no research – to the best of our knowledge – has explored whether behavioral preferences of adults (in terms of risk taking and time preferences) are systematically correlated with either the existence of child labor or it's intensity.

Using representative household data from rural Ethiopia, which contains a unique module on household preferences, we explore the implications of adult risk and time preferences on both the incidence of child labor and schooling, and on the intensity of child labor. We find that while, consistent with our theoretical expectations, greater adult patience is associated with more schooling and less child labor, the link between risk preferences, child labor and schooling is more complex. While child labor is clearly the result of risk aversion, more risk averse parents react to their uncertain environments by combining child labor and work as opposed to substituting schooling for child labor. Only parents with the greatest level of affinity to risk taking engage their children in schooling full time at the expense of child labor, even after controlling for household assets and other relevant characteristics. Indeed, after accounting for the risk preferences of key decision makers in the household, the wealth of the household does not appear to play a signficant role on either the incidence or the intensity of child labor.

Our results are interesting from a policy point of view. Although much of the academic literature and policy discourse assume that ensuring free schooling or cash transfers aimed at keeping children at school would potentially resolve the child labor problem, we do not find evidence in favour of this proposition. Moreover, we do not find confirmation of the proposition that child labor is a result of poverty and hence transfers towards the poor would alleviate the child labor problem, at least for Ethiopia. Any policy aimed at enhancing the human capital development of the young generation while simultaneously minimising the negative implications of child labor should be based on understanding the behavioral-cum-social norm framework within which decisions on investments in children are undertaken.

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Table 1: Descriptive statistics

	farm work	no farm work	domestic work	no dom. work	school	no school
age_child	11.2515	10.8827	11.2083	10.8387	11.4160	12.0088
	(2.5303)	(2.6552)	(2.5497)	(2.6603)	(2.4197)	(2.4747)
child_girl	0.3475	0.7410	0.5761	0.1791	0.4909	0.4027
	(0.4763)	(0.4383)	(0.4943)	(0.3838)	(0.5000)	(0.4915)
biological_child	0.8327	0.8339	0.8337	0.8298	0.8408	0.8451
	(0.3733)	(0.3724)	(0.3724)	(0.3762)	(0.3660)	(0.3625)
biological_grandchild	0.0941	0.1115	0.1008	0.0957	0.1003	0.0841
	(0.2921)	(0.3149)	(0.3011)	(0.2945)	(0.3004)	(0.2781)
highrisk	0.4213	0.4832	0.4343	0.4681	0.4287	0.4602
	(0.4939)	(0.5000)	(0.4958)	(0.4994)	(0.4950)	(0.4995)
least_patient	0.6550	0.6039	0.6358	0.6418	0.6259	0.6637
	(0.4755)	(0.4894)	(0.4813)	(0.4799)	(0.4840)	(0.4735)
medium_patient	0.1494	0.1603	0.1486	0.1684	0.1581	0.1327
	(0.3566)	(0.3671)	(0.3558)	(0.3746)	(0.3650)	(0.3401)
female_head	0.1962	0.2125	0.2005	0.2022	0.2017	0.2434
	(0.3972)	(0.4093)	(0.4005)	(0.4019)	(0.4013)	(0.4301)
education_head	0.5953	0.6225	0.6229	0.5426	0.6320	0.5575
	(0.4910)	(0.4850)	(0.4848)	(0.4986)	(0.4824)	(0.4978)
farmer_head	0.8333	0.7921	0.8140	0.8404	0.8138	0.7788
	(0.3727)	(0.4060)	(0.3891)	(0.3665)	(0.3894)	(0.4160)
prfagelt5	0.0436	0.0411	0.0437	0.0399	0.0391	0.0509
	(0.0769)	(0.0739)	(0.0767)	(0.0732)	(0.0728)	(0.0806)
prmagelt5	0.0438	0.0488	0.0452	0.0466	0.0443	0.2216
	(0.0770)	(0.0821)	(0.0786)	(0.0790)	(0.0766)	(0.1501)
prfage5_15	0.2125	0.2267	0.2003	0.1624	0.1917	0.1535
	(0.1424)	(0.1512)	(0.1488)	(0.1341)	(0.1459)	(0.1424)
prmage5_15	0.2125	0.1747	0.1906	0.2272	0.1972	0.2216
	(0.1425)	(0.1408)	(0.1454)	(0.1310)	(0.1414)	(0.1501)
prfagegt60	0.0210	0.0318	0.0255	0.0222	0.0251	0.0227
	(0.0631)	(0.0899)	(0.0772)	(0.0595)	(0.0750)	(0.0717)
prmagegt60	0.0327	0.0301	0.0314	0.0334	0.0315	0.0399
	(0.0692)	(0.0695)	(0.0701)	(0.0667)	(0.0687)	(0.0787)
hhsize	7.1224	7.1475	7.0732	7.3262	7.2160	6.6106
	(2.2904)	(2.3631)	(2.3170)	(2.2929)	(2.3511)	(2.3511)
landsize	2.4632	2.2268	2.3607	2.4457	2.4047	2.2197
	(4.2129)	(4.7836)	(3.8114)	(6.0481)	(4.0165)	(2.3683)
livestock	1.0146	0.8014	0.9092	1.0599	0.9882	0.7876
	(1.2394)	(1.1694)	(1.1844)	(1.3481)	(1.2240)	(1.0102)
N observations	1626	861	1995	564	1815	226

Note: The figures in brackets are standard errors

Table 2: Farm and domestic child labor at the extensive margin

VARIABLES	(1) farm_labor	(2) farm_labor+	(3) domestic_labor	(4) domestic_labor+
age_child	0.0105***	0.0104***	0.0152***	0.0151***
	(0.00349)	(0.00349)	(0.00286)	(0.00286)
child_girl	-0.354***	-0.353***	0.331***	0.331***
	(0.0176)	(0.0177)	(0.0189)	(0.0189)
biological_child	-0.0392	-0.0412	0.0584*	0.0578*
	(0.0356)	(0.0353)	(0.0307)	(0.0306)
biological_grandchild	-0.0404	-0.0411	0.0901**	0.0910**
	(0.0443)	(0.0440)	(0.0385)	(0.0386)
highrisk	-0.0393*	-0.0290	-0.0349**	-0.0210
	(0.0220)	(0.0315)	(0.0171)	(0.0236)
least_patient	0.0563**	0.0528**	0.00550	0.00433
	(0.0269)	(0.0266)	(0.0197)	(0.0197)
medium_patient	0.0351	0.0339	-0.0125	-0.0138
	(0.0341)	(0.0340)	(0.0250)	(0.0252)
female_respondent	0.0259	0.0262	0.0294	0.0301
	(0.0374)	(0.0375)	(0.0303)	(0.0302)
education	-0.0292	-0.0267	0.0491***	0.0497***
	(0.0238)	(0.0238)	(0.0185)	(0.0185)
farmer	0.0794**	0.0782**	-0.0273	-0.0274
	(0.0382)	(0.0385)	(0.0291)	(0.0291)
prfagelt5	0.0774	0.0741	0.298***	0.295***
	(0.148)	(0.149)	(0.109)	(0.109)
prmagelt5	-0.226*	-0.238*	0.240**	0.241**
	(0.137)	(0.137)	(0.116)	(0.116)
prfage5_15	-0.00347	-0.0152	-0.0657	-0.0702
	(0.0900)	(0.0907)	(0.0714)	(0.0717)
prmage5_15	-0.217**	-0.224**	0.145**	0.144**
	(0.0948)	(0.0947)	(0.0704)	(0.0705)
prfagegt60	-0.366***	-0.369***	0.0495	0.0474
	(0.139)	(0.139)	(0.125)	(0.124)
prmagegt60	-0.0993	-0.108	0.0298	0.0360
	(0.158)	(0.158)	(0.130)	(0.131)
hhsize	-0.00138	-0.00120	-0.0127***	-0.0122***
	(0.00564)	(0.00578)	(0.00395)	(0.00405)
landsize	-0.00133	-0.000708	-0.00167***	-0.00144***
	(0.00130)	(0.00164)	(0.000575)	(0.000544)
livestock	0.0206	0.0131	-0.0150**	-0.0130
	(0.0134)	(0.0161)	(0.00737)	(0.00947)
landsize_highrisk		-0.0197		-0.00766
		(0.0132)		(0.00790)
livestock_highrisk		0.0344		0.00217
		(0.0261)		(0.0154)
Rsq	0.1734	0.1749	0.2962	0.2967
Observations	2,487	2,487	2,489	2,489

Robust standard errorts in brackets; *** p<0.01,** p<0.05; *p<0.1. PA fixed effects

Table 3: Farm and domestic child labor at the intensive margin

	Farm labor intensity			Domestic labor intensity		
VARIABLES	Unconditional	Conditional	Probability	Unconditional	Conditional	Probability
age_child	0.174	0.122	0.00472	0.959***	0.706***	0.0244***
	(0.111)	(0.0784)	(0.0030)	(0.0886)	(0.0653)	(0.0022)
child_girl	-13.89***	-9.980***	-0.375***	12.16***	9.141***	0.305***
	(0.671)	(0.473)	(0.0183)	(0.5250)	(0.3870)	(0.0134)
biological_child	-4.584***	-3.263***	-0.110***	0.981	0.719	0.0259
	(1.1330)	(0.7980)	(0.0308)	(0.9050)	(0.6660)	(0.0230)
biological_grandchild	-4.116***	-2.892***	-0.128***	3.188***	2.400***	0.0698**
	(1.4220)	(1.0010)	(0.0387)	(1.1300)	(0.8320)	(0.0287)
highrisk	-0.989*	-0.696*	-0.0270*	-0.884*	-0.650*	-0.0226*
	(0.5850)	(0.4120)	(0.0159)	(0.4630)	(0.3410)	(0.0118)
least_patient	1.430*	1.006*	0.0395**	-0.4790	-0.3530	-0.0121
	(0.7300)	(0.5140)	(0.0198)	(0.5730)	(0.4220)	(0.0146)
medium_patient	0.6940	0.4900	0.0185	-1.977***	-1.441**	-0.0545***
	(0.9660)	(0.6800)	(0.0263)	(0.7620)	(0.5610)	(0.0194)
female_head	1.518	1.072	0.0398	-0.314	-0.231	-0.00808
	(0.978)	(0.6880)	(0.0266)	(0.7740)	(0.5700)	(0.0197)
education_head	-1.935***	-1.364***	-0.0518***	0.3240	0.2390	0.00827
	(0.6470)	(0.4560)	(0.0176)	(0.5130)	(0.3780)	(0.0130)
farmer_head	2.782***	1.955***	0.0813***	-0.6850	-0.5060	-0.0170
	(0.8870)	(0.6250)	(0.0241)	(0.6890)	(0.5080)	(0.0175)
prfagelt5	5.455	3.841	0.148	11.23***	8.272***	0.286***
	(3.7810)	(2.6620)	(0.1030)	(3.0110)	(2.2170)	(0.0765)
prmagelt5	-4.113	-2.896	-0.112	7.899***	5.816***	0.201***
	(3.7650)	(2.6510)	(0.1020)	(2.989)	(2.201)	(0.076)
prfage5_15	0.373	0.262	0.0101	3.691*	2.718*	0.0938*
	(2.500)	(1.7600)	(0.0680)	(1.9700)	(1.451)	(0.0501)
prmage5_15	-6.436***	-4.532***	-0.175***	9.573***	7.050***	0.243***
	(2.484)	(1.749)	(0.0676)	(1.9680)	(1.4490)	(0.0500)
prfagegt60	-6.609	-4.653	-0.18	6.477*	4.769*	0.165*
	(4.4700)	(3.1470)	(0.1220)	(3.3670)	(2.4800)	(0.0856)
prmagegt60	2.0700	1.457	0.0563	2.602	1.916	0.0661
	(4.5610)	(3.2110)	(0.1240)	(3.6160)	(2.6630)	(0.0919)
hhsize	-0.0376	-0.0265	-0.00102	-0.380***	-0.280***	-0.00967***
	(0.1460)	(0.1030)	(0.00397)	(0.1150)	(0.0849)	(0.00293)
landsize	-0.0393	-0.0276	-0.00107	-0.0428	-0.0315	-0.00109
	(0.0670)	(0.0472)	(0.00182)	(0.0562)	(0.0414)	(0.00143)
livestock	0.794***	0.559***	0.0216***	-0.156	-0.115	-0.00397
	(0.3030)	(0.2130)	(0.00825)	(0.2430)	(0.1790)	(0.00619)
Constant	17.57***	12.37***	0.478***	-15.91***	-11.72***	-0.404***
	(2.8370)	(1.9980)	(0.0772)	(2.3040)	(1.6960)	(0.0586)
Observations	2,487	2,487	2,487	2,489	2,489	2,489

Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1. The results are robust to the inclusion of PA fixed effects.

Table 4: Farm child labor and education, marginal effects

	CL-ED	CL-NoEd	NoCL-Ed	NoCL-NoEd
age_child	-0.0053	0.0078***	-0.0027	0.0001
	(0.0043)	(0.0265)	(0.0039)	(0.0016)
child_girl	-0.3248***	-0.0364***	0.3310***	0.0302***
	(0.0211)	(0.0136)	(0.0188)	(0.0091)
biological_child	-0.0255	-0.0416*	0.0339	0.0331
	(0.0460)	(0.0218)	(0.0430)	(0.0305)
biological_grandchild	-0.0125	-0.0556*	0.0491	0.0339
	(0.0562)	(0.0306)	(0.0513)	(0.0430)
highrisk	-0.0581***	0.0102	0.0521***	-0.0042
	(0.0211)	(0.0121)	(0.0191)	(0.0080)
least_patient	0.0246	0.0491***	-0.0605**	-0.0132
	(0.0266)	(0.0166)	(0.0236)	(0.0089)
medium_patient	0.0219	0.0231	-0.0301	-0.0149
	(0.0352)	(0.0217)	(0.0312)	(0.0131)
female_head	-0.0107	0.0076	0.0045	-0.0014
	(0.0355)	(0.0201)	(0.0321)	(0.0135)
education_head	-0.0103	-0.0149	0.0226	0.0025
	(0.0239)	(0.0136)	(0.0218)	(0.0089)
Farmer_head	0.0823***	-0.0055	-0.0760***	-0.0007
	(0.0311)	(0.0182)	(0.0276)	(0.0118)
prfagelt5	0.0387	0.1671**	-0.3444**	0.1385***
	(0.1436)	(0.0763)	(0.1343)	(0.0492)
prmagelt5	-0.3341**	0.0459	0.2286*	0.0596
	(0.1373)	(0.0772)	(0.1251)	(0.0508)
prfage5_15	0.0396	-0.0593	0.0218	-0.0021
	(0.0902)	(0.0525)	(0.0806)	(0.0360)
prmage5_15	-0.2879***	0.0803*	0.1741**	0.0334
	(0.0897)	(0.0483)	(0.0834)	(0.0373)
prfagegt60	-0.2984*	-0.0420	0.2572*	0.0833
	(0.1608)	(0.0985)	(0.1374)	(0.0615)
prmagegt60	-0.1819	0.0157	-0.0206	0.1868***
	(0.1640)	(0.0885)	(0.1513)	(0.0610)
hhsize	0.0048	-0.0114***	0.0028	0.0037*
	(0.0053)	(0.0034)	(0.0048)	(0.0021)
landsize	0.0032	0.0001	-0.0001	-0.00254
	(0.0040)	(0.0021)	(0.0038)	(0.0029)
livestock	0.0139	-0.0007	-0.0025	-0.0107*
	(0.0121)	(0.0121)	(0.0113	(0.0066)
Rsq		0.1709		
Observations		2037		

Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1. The results are robust to the inclusion of PA fixed effects. The model passes the IIA condition.

Table 5: Domestic child labour and education, marginal effects

	CL-ED	CL-NoEd	NoCL-Ed	NoCL-NoEd
age_child	0.0061	0.0066**	-0.0131***	0.0003
	(0.0040)	(0.0027)	(0.0032)	(0.0016)
child_girl	0.2999***	0.0408***	-0.2858***	-0.0550***
	(0.0221)	(0.0131)	(0.0203)	(0.0150)
biological_child	0.0366	-0.0050	-0.0063	-0.0252**
	(0.0403)	(0.0267)	(0.0338)	(0.0128)
biological_grandchild	0.0706	-0.0071	-0.0158	-0.0476**
	(0.0499)	(0.0337)	(0.0408)	(0.0203)
highrisk	-0.0482**	-0.0097	0.0420***	0.0158**
	(0.0191)	(0.0124)	(0.0158)	(0.0080)
least_patient	-0.0179	0.0191	-0.0159	0.0147
	(0.0239)	(0.0153)	(0.0199)	(0.0106)
medium_patient	0.0078	-0.0155	-0.0109	0.0186
	(0.0320)	(0.0221)	(0.0257)	(0.0127)
female_head	0.0262	-0.0039	-0.0333	0.0110
	(0.0332)	(0.0206)	(0.0282)	(0.0130)
education_head	0.0631***	-0.0058	-0.0468***	-0.0105
	(0.0212)	(0.0136)	(0.0177)	(0.0092)
farmer_head	-0.0352	-0.0116	0.0449*	0.0018
	(0.0300)	(0.0183)	(0.0259)	(0.0119)
prfagelt5	0.0024	0.2762***	-0.2776**	-0.0010
	(0.1285)	(0.0749)	(0.1096)	(0.0513)
prmagelt5	0.1226	0.0749	-0.2061**	0.0086
	(0.1240)	(0.0766)	(0.1042)	(0.0501)
prfage5_15	0.0291	-0.0896*	0.0592	0.0013
	(0.0815)	(0.0527)	(0.0678)	(0.0357)
prmage5_15	0.0851	0.0534	-0.1898***	0.0513
	(0.0811)	(0.0508)	(0.0682)	(0.0322)
prfagegt60	0.0925	-0.0758	-0.0956	0.0790
	(0.1530)	(0.1022)	(0.1293)	(0.0545)
prmagegt60	-0.1855	0.1573*	0.0283	-0.0001
	(0.1451)	(0.0878)	(0.1233)	(0.0598)
hhsize	-0.0049	-0.0066**	0.0111***	0.0005
	(0.0049)	(0.0033)	(0.0040)	(0.0022)
landsize	0.0045	-0.0043	-0.0007	0.0006
	(0.0044)	(0.0044)	(0.0028)	(0.0008)
livestock	-0.0058	-0.0131	0.0158**	0.0031
	(0.0110)	(0.0091)	(0.0079)	(0.0040)
Rsq		0.2404		
Observations		2033		

Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1. The results are robust to the inclusion of PA fixed effects. The model passes the IIA condition.

Appendix

Table A1: Description of variables used in the empirical analysis

Variable	Description
Age_child	Age of the child
Child_girl	Dummy variable taking the value of one if the child is a girl
Biological_child	Dummy variable taking the value of one if the child is a biological child of the adult respondent
Biological_grandchild	Dummy variable taking the value of one if the child is a biological grandchild of the adult respondent
Highrisk	Dummy variable=1 if the respondent has high affinity to risk, as explained in Section 2
Least_patient	Dummy=1 indicating low tolerance to postponing gratification as explained in Section 2
Medium_patient	Dummy=1 indicating medium willingness of the respondent to postpone instant gratification as explained in Section 2
Female_respondent	Dummy=1 if the main respondent (typically a head of household) is a female
Education_respondent	Dummy=1 if the main respondent (typically a head of household) completed any education
Farmer_respondent	Dummy=1 if the primary occupation of the main respondent (typically a head of household) is farming
Prfagelt5	Proportion of girls of age less than 5
Prmagelt5	Proportion of boys of age less than 5
Prfage5_15	Proportion of girls of age between 5 and 15
Prmage5_15	Proportion of boys of age between 5 and 15
Prfagegt60	Proportion of women of ages greater than 60
Prmagegt60	Proportion of men of ages greater than 60
Hhsize	Household size
Livestock	Total value of livestock owned
Landsize	Cultivated land in hectares

Table A2: Replication of Table 2 with lagged land and livestock variables

VARIABLES	(1) farm_labor	(2) farm_labor+	(3) domestic_labor	(4) domestic_labor+
age_child	-0.00170	-0.00169	0.0250***	0.0249***
	(0.00442)	(0.00441)	(0.00377)	(0.00377)
child_girl	-0.371***	-0.371***	0.379***	0.378***
	(0.0229)	(0.0228)	(0.0231)	(0.0229)
biological_child	-0.0425	-0.0450	0.0872**	0.0862**
	(0.0429)	(0.0433)	(0.0419)	(0.0421)
biological_grandchild	-0.0369	-0.0397	0.104**	0.106**
	(0.0542)	(0.0544)	(0.0505)	(0.0509)
highrisk	-0.0181	-0.0479	-0.0335	-0.0163
	(0.0273)	(0.0430)	(0.0236)	(0.0354)
least_patient	0.0828***	0.0811**	0.0228	0.0241
	(0.0318)	(0.0315)	(0.0258)	(0.0258)
medium_patient	0.0595	0.0593	-0.00891	-0.00899
	(0.0420)	(0.0418)	(0.0332)	(0.0332)
female_respondent	0.0294	0.0302	0.0118	0.0144
	(0.0456)	(0.0453)	(0.0413)	(0.0417)
education	-0.0141	-0.0151	0.0517*	0.0531**
	(0.0269)	(0.0269)	(0.0264)	(0.0265)
farmer	0.107**	0.107**	-0.0611	-0.0592
	(0.0465)	(0.0463)	(0.0372)	(0.0376)
prfagelt5	0.283	0.292*	0.214	0.215
	(0.176)	(0.176)	(0.143)	(0.141)
prmagelt5	-0.266	-0.264	0.237	0.248
	(0.166)	(0.166)	(0.158)	(0.157)
prfage5_15	0.101	0.107	-0.171*	-0.179*
	(0.116)	(0.117)	(0.0986)	(0.0983)
prmage5_15	-0.240**	-0.238**	0.168*	0.156*
	(0.118)	(0.118)	(0.0941)	(0.0943)
prfagegt60	-0.319*	-0.324*	0.145	0.140
	(0.165)	(0.166)	(0.144)	(0.144)
prmagegt60	-0.0170	-0.0247	-0.0599	-0.0470
	(0.191)	(0.191)	(0.178)	(0.178)
hhsize	-0.00610	-0.00633	-0.0143***	-0.0142***
	(0.00637)	(0.00631)	(0.00518)	(0.00521)
land_lagged	-0.000304	-0.00146	-0.0115	-0.00781
	(0.00778)	(0.00786)	(0.00763)	(0.00626)
livestock_lagged	0.606	0.405	-0.174	-0.395
	(0.470)	(0.507)	(0.307)	(0.384)
land_highrisk_lagged		0.00813		-0.0236*
		(0.0230)		(0.0133)
livestock_highrisk_lagged		0.561		0.669
		(1.073)		(0.637)
Rsq	0.1684	0.1691	0.3165	0.3184
Observations	1,501	1,501	1,502	1,502

Robust standard errorts in brackets; *** p<0.01,** p<0.05; *p<0.1. PA fixed effects

Table A3: Replicating Table 3: Child labor intensity with lagged land and livestock variables

	Farm labor intensity			Domestic labor intensity		
VARIABLES	Unconditional	Conditional	Probability	Unconditional	Conditional	Probability
age_child	-0.294*	-0.208*	-0.00704*	1.136***	0.812***	0.0321***
	(0.154)	(0.109)	(0.00368)	(0.123)	(0.088)	(0.00347)
child_girl	-15.73***	-11.38***	-0.376***	13.64***	10.02***	0.372***
	(0.946)	(0.67)	(0.0226)	(0.745)	(0.533)	(0.021)
biological_child	-4.904***	-3.518***	-0.104***	1.908	1.357	0.0573*
	(1.529)	(1.082)	(0.0366)	(1.212)	(0.867)	(0.0342)
biological_grandchild	-4.034**	-2.839**	-0.109**	4.478***	3.277***	0.106**
	(1.893)	(1.34)	(0.0453)	(1.493)	(1.068)	(0.0422)
highrisk	-0.671	-0.475	-0.0161	-0.832	-0.594	-0.0237
	(0.829)	(0.587)	(0.0198)	(0.658)	(0.47)	(0.0186)
least_patient	2.498**	1.766**	0.0614**	-0.253	-0.181	-0.00712
	(1.007)	(0.713)	(0.0241)	(0.783)	(0.56)	(0.0221)
medium_patient	2.447*	1.744*	0.0548*	-1.767	-1.257	-0.0532*
	(1.369)	(0.97)	(0.0328)	(1.085)	(0.776)	(0.0306)
female_respondent	1.237	0.878	0.0289	-1.368	-0.975	-0.0401
	(1.355)	(0.959)	(0.0324)	(1.069)	(0.765)	(0.0302)
education	-1.602*	-1.136*	-0.0379*	0.105	0.0751	0.00297
	(0.923)	(0.653)	(0.0221)	(0.732)	(0.523)	(0.0207)
farmer	3.899***	2.748***	0.102***	-1.544	1.11	-0.0416
	(1.228)	(0.869)	(0.0294)	(0.945)	(0.676)	(0.0267)
prfagelt5	7.759	5.494	0.186	7.024*	5.024*	0.198*
	(5.23)	(3.704)	(0.125)	(4.225)	(3.022)	(0.119)
prmagelt5	-7.342	-5.199	-0.176	8.465*	6.054*	0.239*
	(5.457)	(3.864)	(0.131)	(4.338)	(3.103)	(0.123)
prfage5_15	3.129	2.216	0.0749	2.123	1.519	0.06
	(3.616)	(2.561)	(0.0866)	(2.837)	(2.029)	(0.0801)
prmage5_15	-7.660**	-5.424**	-0.183**	10.76***	7.694***	0.304***
	(3.475)	(2.46)	(0.0832)	(2.722)	(1.947)	(0.0769)
prfagegt60	-6.021	-4.264	-0.144	8.095*	5.790*	0.229*
	(5.911)	(4.186)	(0.141)	(4.449)	(3.182)	(0.126)
prmagegt60	3.324	2.354	0.0796	0.625	0.447	0.0177
	(6.289)	(4.453)	(0.151)	(4.979)	(3.561)	(0.141)
hhsize	-0.111	-0.0789	-0.00267	-0.389**	-0.278**	-0.0110**
	(0.202)	(0.143)	(0.00484)	(0.159)	(0.114)	(0.0045)
Land_lagged	0.122	0.0866	0.00293	-0.18	-0.129	-0.00508
	(0.256)	(0.181)	(0.00612)	(0.202)	(0.144)	(0.0057)
livestock_lagged	10.56	7.475	0.253	-3.038	-2.173	-0.0858
	(11.06)	(7.833)	(0.265)	(9.089)	(6.501)	(0.257)
Constant	22.86***	16.19***	0.547***	-19.34***	-13.83***	-0.546***
	(3.811)	(2.699)	(0.0912)	(3.052)	(2.183)	(0.0862)
Rsq		0.0480			0.0622	
Observations	1,501	1,501	1,501	1,502	1,502	1,502

Robust standard errorts in brackets; *** p<0.01,** p<0.05; *p<0.1. PA fixed effects

Table A4: Replicating Table 4 with lagged variables (for farm labor+edu)

	CL-ED	CL-NoEd	NoCL-Ed	NoCL-NoEd
age_child	-0.0071	0.0028	0.0039	0.0004
	(0.0050)	(0.0029)	(0.0048)	(0.0020)
child_girl	-0.3067***	-0.0517***	0.3260***	0.0324***
	(0.0278)	(0.0173)	(0.0245)	(0.0118)
biological_child	-0.0638	-0.0196	0.0620	0.0215
	(0.0583)	(0.0261)	(0.0563)	(0.0307)
biological_grandchild	-0.0327	-0.0291	0.0504	0.0114
	(0.0691)	(0.0338)	(0.0651)	(0.0330)
highrisk	-0.0441*	0.0214	0.0265	-0.0035
	(0.0269)	(0.0143)	(0.0246)	(0.0102)
least_patient	0.0386	0.0539**	-0.0731**	-0.0194*
	(0.0335)	(0.0210)	(0.0293)	(0.0109)
medium_patient	0.0253	0.0480*	-0.0575	-0.0158
	(0.0451)	(0.0258)	(0.0399)	(0.0158)
female_head	-0.0023	0.0062	-0.0144	0.0105
	(0.0446)	(0.0241)	(0.0408)	(0.0161)
education_head	0.0115	-0.0210	0.0015	0.0080
	(0.0304)	(0.0166)	(0.0277)	(0.0117)
Farmer_head	0.1158***	-0.0061	-0.1104***	0.0007
	(0.0387)	(0.0212)	(0.0347)	(0.0142)
prfagelt5	0.1342	0.1124	-0.3194*	0.0728
	(0.1781)	(0.0859)	(0.1695)	(0.0622)
prmagelt5	-0.4133**	0.0942	0.3402**	-0.0210
	(0.1785)	(0.0923)	(0.1629)	(0.0736)
prfage5_15	0.1245	-0.0479	-0.0857	0.0092
	(0.1179)	(0.0655)	(0.1060)	(0.0440)
prmage5_15	-0.2430**	0.0270	0.1643	0.0517
	(0.1139)	(0.0590)	(0.1056)	(0.0445)
prfagegt60	-0.3438*	-0.0098	0.2561	0.0975
	(0.1869)	(0.1019)	(0.1644)	(0.0670)
prmagegt60	-0.2082	0.0860	-0.0495	0.1717
	(0.2045)	(0.0974)	(0.1901)	(0.0760)
hhsize	-0.0004	-0.0104**	0.0078	0.0030
	(0.0067)	(0.0041)	(0.0060)	(0.0027)
Landsize_lagged	-0.0039	0.0016	-0.0056	0.0079**
	(0.0091)	(0.0041)	(0.0088)	(0.0037)
Livestock_lagged	0.5240	0.1236	-0.2373	-0.4103*
	(0.4239)	(0.1492)	(0.4267)	(0.2248)
Rsq			0.1670	
Observations		1295		

Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1. The results are robust to the inclusion of PA fixed effects. The model passes the IIA condition.

Table A5: Replicating Table 5 with lagged variables (for domestic labor+edu)

	CL-ED	CL-NoEd	NoCL-Ed	NoCL-NoEd
age_child	0.0167***	0.0026	-0.0191***	-0.0002
	(0.0047)	(0.0028)	(0.0040)	(0.0021)
child_girl	0.3339***	0.0369**	-0.3044***	-0.0664***
	(0.0262)	(0.0150)	(0.0242)	(0.0192)
biological_child	0.0580	0.0029	-0.0401	-0.0209
	(0.0501)	(0.0291)	(0.0435)	(0.0196)
biological_grandchild	0.0796	0.0022	-0.0433	-0.0385
	(0.0598)	(0.0346)	(0.0517)	(0.0275)
highrisk	-0.0508**	0.0048	0.0333*	0.0128
	(0.0239)	(0.0139)	(0.0207)	(0.0109)
least_patient	0.0035	0.0212	-0.0337	0.0090
	(0.0297)	(0.0172)	(0.0262)	(0.0141)
medium_patient	0.0020	0.0091	-0.0275	0.0164
	(0.0399)	(0.0243)	(0.0346)	(0.0166)
female_head	-0.0143	0.0090	-0.0009	0.0061
	(0.0405)	(0.0229)	(0.0359)	(0.0180)
education_head	0.0531**	-0.0063	-0.0371	-0.0098
	(0.0270)	(0.0159)	(0.0237)	(0.0131)
Farmer_head	-0.0736**	-0.0079	0.0819**	-0.0003
	(0.0371)	(0.0204)	(0.0334)	(0.0161)
prfagelt5	0.0731	0.1476*	-0.2224*	0.0017
	(0.1534)	(0.0815)	(0.1349)	(0.0698)
prmagelt5	0.2088	0.0490	-0.2796**	0.0218
	(0.1611)	(0.0911)	(0.1410)	(0.0714)
prfage5_15	-0.0303	-0.0931	0.0963	0.0271
	(0.1041)	(0.0626)	(0.0907)	(0.0488)
prmage5_15	0.1874*	0.0193	-0.2502***	0.0436
	(0.1026)	(0.0577)	(0.0912)	(0.0461)
prfagegt60	0.0931	-0.0202	-0.1565	0.0837
	(0.1741)	(0.0999)	(0.1572)	(0.0693)
prmagegt60	-0.3403*	0.2292**	0.1321	-0.0210
	(0.1769)	(0.0933)	(0.1577)	(0.0823)
hhsize	-0.0087	-0.0028	0.0148***	-0.0033
	(0.0061)	(0.0037)	(0.0051)	(0.0031)
Landsize_lagged	-0.0161**	0.0085*	0.0065	0.0011
	(0.0066)	(0.0046)	(0.0055)	(0.0026)
Livestock_lagged	0.1338	-0.4201	0.1677	0.1186
	(0.3737)	(0.2660)	(0.2931)	(0.0974)
Rsq		0.2646		
Observations			1.296	

Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1. The results are robust to the inclusion of PA fixed effects. The model passes the IIA condition.