

Does Child Labor Lead to Vulnerable Employment in Adulthood?

Evidence for Tanzania

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Abstract

This paper investigates the relationship between child labor and status in employment in adulthood. We aim to contribute to the literature that focuses on the obstacles to the formation early in life of the skills that allow people to avoid vulnerability. Using the panel data survey for the Kagera region of Tanzania, we select children who were 7 to 15 years old in the 1990s and follow up with them in the first decade of the 2000s to study the consequences of child labor on adult employment. We estimate fixed effects linear probability models. We find that child labor is associated with vulnerable employment in adulthood. Negative adult employment effects arise when children who are younger than 11-12 work more than ten to twenty hours per week. This result is driven by girls. As for types of child labor, work on the household farm shows the largest negative effects.

JEL classification: J13, J21, J24

Keywords: child labor; vulnerable employment; unpaid work; women's employment in developing countries; Kagera region of Tanzania, Africa

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1. Introduction

Child labor is a pervasive phenomenon in many countries around the world: according to ILO estimates, in 2016, 152 million children aged 5-17, almost half of them below the age of 11, were involved in child labor (ILO, 2017a). Although the number of child laborers is declining, the progress registered since 2000 has recently been slowing down. Child labor continues to be a concern, especially in Africa where the prevalence is 19.6 percent.

Plenty of evidence shows that child labor is associated with the denial of fundamental rights: access to education and health care and the right to rest and enjoy leisure time. Child labor can have irreversible physical, psychological and moral effects on the development, health and well-being of children (IPEC, 2011; ILO, 2017b). Repercussions of child labor differ greatly with the child age and the type and number of hours of work. Although the majority of children who are engaged in an economic activity work in the agricultural sector (71 percent; ILO 2017a), child labor is not a homogeneous phenomenon: children perform various types of labor activities in very different social, health and moral contexts. As a result, the consequences for them can be very different. In addition, not all forms of child labor are considered as harmful, especially in developing countries, where the first priority is survival and where some activities can be considered as apprenticeships or as part of the development process of children. Many of these aspects have been modeled theoretically and tested empirically (comprehensive examples are Grootaert & Kanbur, 1995; Basu, K., & Tzannatos, 2003; Cigno & Rosati, 2005; Edmonds, 2007).

Overall, it is clear that child labor has many implications both in the short term and in the long term. Much economic literature has focused on the determinants of child labor (on the role of income shocks and poverty see, for example, Dehejia & Gatti, 2002; Edmonds, 2003; Dayioğlu, 2006; Guarcello et al., 2009; De Carvalho Filho, 2012). Another strand of research has focused on the short term consequences of child labor (on the trade-off between education and child labor see, for example, Akabayashi & Psacharopoulos, 1999; Ray, 2000; Gunnarsson et al., 2006; Soares et al. 2012; Emerson et al., 2017).

Regarding the long term consequences of child labor, less abundant evidence shows that child labor contributes to determining the employment prospects (ILO 2015) and future incomes of youths (for example Ilahi et al., 2009; Emerson & Souza, 2011).

We study the effects of child labor on adult employment in Tanzania. In a low-income country such as Tanzania, this relationship might be complex: on the one hand, child labor can be harmful to children not only because it might compromise their health but also because it prevents them from acquiring education, thus restricting them to irregular, unskilled, and unpaid or badly paid jobs. On the other hand, there may be some positive benefits deriving from professional training, learning by doing, work experience and the potential for making contacts. In other words, there are many reasons to expect that young laborers can gain some human capital from their work experience, leading them to more skilled and better-paid jobs. The few studies that have examined this relationship have yielded mixed results. Emerson & Souza (2011) find that child labor has a negative effect on adult earnings for children, while for adolescents, the effect turns out to be positive. Ilahi et al., (2009) find a negative relationship between child labor and adult earnings. Beegle et al. (2009) show that, although child labor is associated with a higher probability of wage employment and higher daily earnings, this is only true in the short term. Finally, Beegle et al. (2008) find that child labor is associated with farm activities and low productivity in adulthood. Moreover, to our knowledge, only two studies use panel data (Beegle et al., 2008 and Beegle et al., 2009), while the others use retrospective information.

Regarding the different forms of child labor, distinguishing among types of activities is relevant since child labor is likely to create specific knowledge difficult to transfer to different activities (Rosenzweig & Wolpin, 1985). This might lock individuals who have experienced child labor in the same sort of activities they did in childhood. In Africa, nearly all children do some work for the household, performing domestic chores and/or working in the family farm or business, and paid child laborers are a minority (ILO, 2017a). Although performed within the protective sphere of the family, these activities are nevertheless detrimental for children because they require many hours of work and represent a major obstacle to school activities. Moreover, the heavy involvement of girls in household chores might become one of

the major causes of gender gaps in adulthood (Cigno et al. 2002; Biggeri et al. 2003; Webbink et al., 2012; ILO 2017b).

The questions we address here are whether child labor is associated with specific employment positions in adulthood and whether these employment positions are vulnerable. To our knowledge, no study analyzing the relationship between child labor and vulnerability of employment in adulthood by means of panel data, as we do here, is available. This is an extremely relevant issue for low-income countries. By investigating this relationship, we aim to contribute to the literature that focuses on the obstacles to the formation early in life of the skills that allow people to avoid vulnerable employment and poverty. We focus on gender differences since the effects of child labor may differ greatly between boys and girls for several reasons. First, since girls are less physically strong, working during childhood can be more disruptive for them than for boys. Second, as child labor is an obstacle to education, it deprives girls of an asset that is crucial to compete in the labor market where they are already discriminated against for other reasons. Finally, girls typically engage in domestic chores, a type of work that creates specific skills that may lock them into these activities when they become adults. Child labor, therefore, may contribute to strengthening the usual associations between women and unskilled jobs, domestic chores and unpaid work for the household. In developing countries, the majority of working women hold vulnerable jobs, and the share of vulnerable employment is greater for women (ILO, 2015). Child labor, therefore, might be added to the various explanations of gender discrimination. To understand to which extent engagement in domestic chores is likely to lock girls into vulnerable employment in adulthood, we distinguish between child labor in economic activities and child work in domestic chores performed within the household. More specifically, we aim to contribute in the following aspects. First, we study how child labor affects the probability of being an own-account worker, a contributing family worker, an employee, an employer, or not working in adulthood.¹ Second, we examine whether the different types of activities (work on the household farm, in the household nonfarm business, as employee) and domestic

¹ We refer to the International Classification of Status in Employment (ICSE) approved by the UN.

chores have different implications for the vulnerability² of adult jobs. Third, we measure the extent of gender differences in these relationships.

We use panel data drawn from the Kagera Health and Development Survey (KHDS) for Tanzania, developed by the World Bank, which includes six waves spanning 19 years (1991-2010). In particular, we exploit the early waves, 1992 and 1993, and the last waves, 2004 and 2010. We take advantage of this unique panel structure to observe individuals when they were children in 1992 and 1993 and follow them when they were adults in 2004 and 2010. In other words, we ask whether having worked during childhood in 1992 and 1993 affects the type of employment individuals obtain in adulthood in 2004 and 2010. This sampling strategy allows us to address the problem by which individual and family unobserved attributes (e.g., ability, personal traits, and parental preferences regarding children that might shape personal traits) may affect both child labor and adult employment by means of a fixed effects estimation strategy. We measure child labor as hours per week spent by children in any economic and noneconomic activity, including domestic chores and estimate fixed effects linear probability models for the different employment statuses.

We find that child labor is indeed associated with vulnerable employment in adulthood and that this result is driven by the girls' sample. The analysis by threshold hours shows that child labor significantly affects the probability of getting into nonvulnerable employment when people work more than 20 hours per week during childhood. The results for the subsample of women show larger negative effects and a significant threshold for hours of domestic chores at approximately 12 hours per week. The negative effects of domestic chores are quite large: the probability of escaping vulnerable employment lowers by 20 percentage points for female child laborers under 10 years old. For female child labor on the household farm, we find larger adverse effects since the threshold that reduces the probability of escaping from vulnerable employment lowers to 6 hours.

² The ILO defines vulnerable employment as the sum of own-account workers and contributing family workers.

The paper is organized as follows. Section 2 briefly summarizes the relevant literature. Section 3 describes the context of Tanzania and the Kagera region. Section 4 discusses the empirical strategy, while Section 5 introduces the dataset, explains the variables and presents the descriptive statistics. Section 6 presents the main results, while Section 7 presents the results related to threshold hours of child labor. Section 8 discusses the contribution and the weaknesses of the analysis. Section 9 concludes.

2. Literature review

Child labor has received considerable attention in economics, starting with classical economists. Smith argues that child labor is a driver of fertility; Marx claims that child labor emerged with the industrial revolution since machines allow children to perform tasks previously carried out by adults; Malthus argues that parents make their children work when households' basic needs are unmet. Since the formulation of the human capital theory, child labor has been studied with more sophisticated analytical tools: Shultz (1960) emphasizes that parents evaluate the returns to education against its costs, including the loss of children's economic contribution. Becker (1965) focuses on the opportunity cost of education and on the nonwage uses of time. This framework was applied for the first time to developing countries by Rosenzweig & Evenson (1977), who develop a household time-allocative econometric model that takes into account the economic contribution of children in rural areas of India. In recent years, the interest in child labor has been steadily growing, and as a result, the theoretical and empirical literature on child labor has been rapidly expanding. Despite this increasing attention, little is known about the effect of child labor on adult outcomes.

The assumption that child labor is harmful underpins both the theoretical and the empirical literature. Basu & Van (1998) analyze the child labor phenomenon theoretically. They show that under certain conditions – the luxury and substitution axioms – there are two possible equilibria: a “bad equilibrium”, where wages are low, and parents send their children to work, and a “good equilibrium”, where wages are high, and parents do not send their children to work. Moreover, with his formulation of the “child

labor trap”, Basu (1999) shows that child labor produces poverty and that poverty calls for more child labor. This would lead us to conclude that child labor hampers children’s human capital accumulation, thus decreasing the chances to find a decently paid job in adulthood. Baland & Robinson (2000) build a two-period model without uncertainty to study child labor and its implications for welfare. They assume a trade-off between child labor and the accumulation of human capital. They show that even if parents are altruistic and child labor is socially inefficient, it may arise in equilibrium because parents fail to fully internalize its negative effects. This occurs when bequests are zero or when capital markets are imperfect. Cigno & Rosati (2005) formulate a more general child labor model that allows them to incorporate most of the recent theoretical contributions. This model presents three determinant factors of parents’ decision to send children to work: poverty, relative return to child time in schooling and parental preferences between child time in work and in nonwork activities.

The empirical literature focuses particularly on the relationship between child labor and human capital accumulation. The consequences of child labor, however, are broader and are the subject of a controversial debate. In developing countries, work may represent an important form of socialization, and some activities may be less disruptive than others are. On the one hand, child labor is likely to create an unhealthy and unskilled labor force because it damages children’s health, lowers school attendance and prevents human capital accumulation. On the other hand, some forms of child labor can constitute an important part of children’s development process by providing work experience, learning by doing, and general human capital. Moreover, in developing countries, the quality of schooling is low, and consequently, the returns from schooling can be lower than the returns from working. In this perspective, child labor may be associated with better jobs and higher wages in adulthood. This ambiguity comes up in empirical studies that focus on the effect of child labor on education. Some works suggest that child labor is detrimental to education. Coulombe & Canagarajah (1997) show that there is a significant negative relationship between going to school and working in Ghana. Gunnarsson et al. (2006) estimate that child labor lowers math scores by 7.5 percent and language scores by 7 percent in Latin America. Bezerra et al. (2009) find that Brazilian children and adolescents who do not work have better school

performance than students who work, and those who work outside the house are worse off than those who work only inside the house. However, those who work both inside and outside the house have the lowest test scores. In addition, Emerson et al. (2017) find a negative relationship between working and learning outcomes in both math and language in Brazil. Sim et al (2017), using a longitudinal dataset from Malaysia, find that the growth of math skills and pulmonary functions are negatively affected by child labor in economic activities. The negative effect on educational attainments is larger for children working for a wage outside the household than for those working in the family business.

Other studies find that education and child labor may be complementary activities rather than substitutes. Patrinos & Psacharopoulos (1997), using a Peruvian survey, show that child labor does not damage education and speculate on the possibility of making it possible for children to combine the two activities. Work and education are not mutually exclusive: children engaged in work are often also attending school. They suggest that the negative effects of child labor on school achievements depend on the number of hours of work performed by children and on the age at which they begin work. Additionally, Ravallion and Wodon (2000) question the view that child labor comes largely at the expense of schooling and so is a major factor creating future poverty. Their theoretical model predicts that a targeted enrollment subsidy increases schooling but has an ambiguous effect on child labor. They test these predictions on data for Bangladesh and find that the subsidy increased schooling by far more than it reduced child labor.

Despite being somewhat limited, the literature examining the link between child labor and subsequent labor market outcomes confirms this ambiguity. Emerson & Souza (2011) estimate the impact of child labor on adult earnings in Brazil. They find that child labor is particularly associated with lower adult wages for boys because of the trade-off with educational attainment. However, they highlight that these negative effects become positive around age 12-14. In other words, entry into the labor market during childhood is deleterious and has negative implications for future adult wages, while adolescent labor has a positive impact. Ilahi et al. (2009) study the consequences of child labor on adults' earnings and on the incidence of poverty in Brazil. They find a negative relationship between child labor and adult wages due

to loss of schooling and a high probability of being in poverty for older children working. Nevertheless, for both of these studies, panel data were not available, and so they use retrospective information. Beegle et al. (2009) use panel data for Vietnam to study the consequences of child labor in terms of socioeconomic outcomes such as health, education and wages. They find that school attendance and educational attainment fall significantly five years after the child labor experience but also that those who worked as children had substantially higher wages. Moreover, they show that child labor is associated with a greater probability of wage employment and with higher daily labor and farm earnings, which offset the earnings loss due to reduced schooling. However, this is only true in the short term; over a longer time span, from the age of thirty, the earnings loss due to low education outweighs the earnings gain due to child labor.

3. The case of Tanzania and the Kagera region

Low-income countries show the highest prevalence of child labor, 19 percent of children aged 5 to 17. In particular, sub-Saharan Africa shows the most worrying percentage: in 2016, 22.4 percent of children were child laborers.³ Tanzania is representative of this situation since, despite regulations against child labor,⁴ the phenomenon is still a serious problem. The Tanzania Mainland National Labour Survey for 2014 (NBS-ILO 2016) reports that 21.5 percent of children aged 5-17 were engaged in child labor, of whom 90.8 percent worked in the agricultural sector; 92.4 percent of child workers work unpaid; and four percent work paid. In terms of gender differences, more child laborers are boys (52.5 percent) than

³ ILO estimates (2017a). Child labor is defined as children in employment below the minimum age, excluding children in permissible light work. It does not include performing household chores within the children's own households.

⁴ Convention on the Rights of the Child, 1991; African Charter on the Rights and Welfare of the Child, 2003; Employment and Labour Relations Act, 2004.

girls; 84.4 percent of children aged 5-17 perform household chores, 83.3 percent of boys and 86.2 percent of girls.

Tanzania remains one of the poorest countries in the world. The country shows a positive trend in terms of economic growth, although there was no growth acceleration in the period 1960–2014, and it has one of the highest percentages of nonwage employment among all African countries.⁵ The 2015 Tanzania Human Development Index (HDI) was 0.531 (Tanzania ranked 151 out of 188 countries), which is above the average of 0.497 for countries in the low human development group and above the average of 0.523 for countries in Sub-Saharan Africa. Moreover, its Multidimensional Poverty Index (MPI)⁶ shows that in 2010, 66.4 percent of the population was multidimensionally poor and 21.5 percent near multidimensional poverty. Considering the income poverty line, 46.6 percent of the population lived on less than \$1.90 a day.⁷ The Tanzanian economy is heavily dependent on agriculture, which accounted for 32 percent of GDP in 2010 and 2016 and employed 66 percent of the population. Most rural residents are smallholders cultivating cereal crops on rainfed land and raising livestock.⁸ Industry is also quite important (22 percent of GDP in 2010 and 27 percent of GDP in 2016) and includes mining, quarrying, manufacturing, electricity, natural gas, water supply and construction.⁹ As for women position in the labor market, gender gaps are a concern: the number of women in unpaid family work in agriculture is double the number of men, while the opposite is true in paid employment. This situation could be

⁵ African Development Bank (2018).

⁶ The MPI identifies multiple deprivations in the same household in terms of education, health and living standards. A deprivation score higher than 33.3 percent indicates multidimensional poverty, while a score between 20 and 33.3 percent indicates near multidimensional poverty.

⁷ Human Development Report 2016, UNDP.

⁸ Tanzania has dual land tenure systems: customary (deemed right of occupancy whereby village land with or without time limitation is allocated to an individual or group of individuals); and statutory (granted right of occupancy).

⁹ World Development Indicators database, country profile (downloaded May 2018).

associated to limited access to capital and education due to cultural norms and values regarding the role of women in the society (NBS-ILFS, 2014).

One important factor that is likely to affect our research question is the education system. In Tanzania, it consists of seven years of primary school, four years of secondary school, and two years of advanced secondary school. University courses last three years or more. Education is compulsory for children aged 7 to 15. Tanzania has experienced tremendous progress in this sector with a major growth in enrollment in primary and secondary schools: in 2014, 93 percent of children aged 7-15 years were enrolled in primary school, while in 2000, the enrollment rate was 59 percent. Net secondary school enrollment has also expanded quickly, from 6 percent in 2000 to 35 percent in 2014. However, this increase has not been accompanied by a proportional increase in resources for teachers, classrooms or books. Therefore, the quality of the schools is rather low (Sifuna 2007; Bold et al. 2017). As a result, the quality of education is questionable, and the labor market is characterized especially by unskilled jobs. In such a context, is child labor a viable means of finding suitable and decently paid jobs in adulthood, thus avoiding vulnerable employment? As discussed in Section 2, although a large body of empirical evidence shows that child labor has disruptive effects on child development, it could also favor learning by doing processes and the accumulation of some human capital. The Kagera region represents an ideal setting to address this question. Located in Northwestern Tanzania, on the Western shore of Lake Victoria, it is among the most remote parts of Tanzania and is mostly rural with a population of 2.4 million (the fourth most densely populated region). The region covers 40,838 km² of land surface and 11,885 km² of water surface, thus accounting for approximately 3.3 percent of Tanzania's total land area. Agriculture represents 50 percent of the region's GDP, while most inhabitants along the Lake Victoria undertake fishing activities as their main economic activity.

A number of studies have investigated the short term determinants and effects of child labor in Tanzania and the Kagera region. In general, they find a negative impact on human capital accumulation, an increase in child labor after a crop shock and child labor persistence after implementing policies to reduce it. Using time-log data of children from a Tanzanian household survey, Akabayashi &

Psacharopoulos (1999) find a trade-off between child labor and human capital, as hours of work are negatively correlated to reading and mathematical skills. Kondylis and Manacorda (2012), asking whether improved school accessibility is an effective policy tool for reducing child labor, find that school proximity leads to a rise in school attendance but no significant fall in child labor. Bandara et al. (2015), investigating the impact of agricultural shocks, find significant effects on the child's overall work hours, with higher effects for boys. In the Kagera region, Beegle et al. (2006), using four rounds of household panel data, show that transitory income shocks, as measured by accidental crop loss, lead to significantly increased child labor. Typically, children substitute adult labor in household activities such as gathering firewood and water. They also find that household asset holdings mitigate the effects of these shocks. Regarding the long term effects, Beegle et al. (2008) exploit the KHDS up to the 2004 wave to study the impact of child labor on, among other outcomes, the probability of being a farmer in adulthood and on adult productivity in the Kagera region. They use rainfall and crop shocks as instrumental variables and a two-stage least squares strategy. Their results show that child labor is associated with farming and lower marginal productivity in agricultural labor in adulthood.

4. Empirical strategy

As mentioned, we use the KHDS, which is a unique longitudinal dataset spanning from 1991 to 2010 administered to 816 households in 51 communities in all five districts of Kagera. It is composed of six waves: from 1991 to 1994 plus 2004 and 2010. The attrition rate is quite low: 96 percent of the original households were recontacted in 2004, and 92 percent were recontacted in 2010 (De Weerd et al., 2012).

We exploit the panel nature of the data with the following strategy. We collect information on weekly hours of child labor for children between 7 and 15 years of age in 1992 and 1993.¹⁰ We restrict our

¹⁰ Although the panel has more than two waves in the 1990s, we have selected the 1992 wave and the 1993 wave because they maximize the number of individuals we can follow up with in 2004 and 2010.

sample to children of this age because Tanzanian children start school at the age of 7 and complete compulsory school at age 15. We follow up these individuals in 2004 and 2010 to get information on their status in employment. We merge the individual variables of child labor and status in adult employment in 1992 with 2004 and in 1993 with 2010. We then estimate fixed effects linear probability models of the different employment statuses in adulthood as depending on weekly hours of labor performed in childhood. In other words, we test the assumption that the variation in weekly hours of work performed during the age of compulsory education contributes to determining the course and the quality of individual working lives.

The model we estimate is the following:

$$Y_{it} = \beta_0 + \beta_1 H_{i,c} + \beta_2 H_{i,c} age_{ic} + \beta_3 age_{ic} + \beta_4 K_{ic} + \beta_5 F_{it} + z_i + u_{it} \quad (1)$$

$t=2004, 2010$ (time in adulthood),

$c=1992, 1993$ (time in childhood),

where Y_{it} is a categorical variable representing the status in employment of individual i in time in adulthood t . We estimate independent equations of the probability of employment in each status/category, where Y_{it} is transformed into a dummy acquiring the value one if the individual is, in turn, a contributing family worker, an own-account worker, an employer, an employee or not working. $H_{i,c}$ are the weekly hours of labor performed in time in childhood c . We also estimate the model disaggregating $H_{i,c}$ into the different types of activities performed by the children (see Section 5, Table 2, for the description of these variables). age_{ic} is age of individual i at time c ; K_{ic} are other variables when individuals were children (see Section 5, Table 3); F_{it} are individual and family time-varying characteristics in adulthood (see Section 5, Table 3); z_i is the individual fixed effect; and u_{it} is the error term clustered

at the household level.¹¹ The coefficient of the interaction term between age and hours of child labor, $H_{ic}age_{ic}$, estimates the impact of hours of labor performed at different ages during childhood on the adult employment position.¹² Finally, to highlight gender differences, we estimate the model for the whole sample and separately for girls and boys.

Since we select children aged 7-15 in 1992 and 1993, allowing children who turn 7 in 1993 to be part of our sample, we obtain an unbalanced panel. As a result, we have samples of 571 individuals in 1992 and 680 in 1993. We merge 1992 to 2004 and 1993 to 2010 in such a way that each child has information, among other things, on the number of labor hours in 1992 and 1993 (our explanatory variable of interest) and on his/her adult employment status in 2004 and 2010 (our dependent variable).¹³ With this data structure, we can estimate the linear fixed effects model (1) that allows us to control for unobserved heterogeneity.¹⁴ Regarding the choice of a linear model, since our dependent variables are dummies, we could have chosen a fixed effects logit model. Instead, we have opted for the linear model for various reasons. First, we are interested in estimating the relationships between our dependent and independent variables, rather than in forecasting probabilities. Second, a logit model is more computationally complex and generates results that are not easy to interpret as marginal effects.¹⁵ Third, the fixed effects logit model is conditional on the total number of observations for each individual. Therefore, when there is one missing observation within a unit, we lose the entire unit. Finally, the fixed effects logit model is subject to the incidental parameters problem. For these reasons, we opt for the linear probability model

¹¹ We do not include year dummies since age, which always increases by one, is perfectly collinear the year dummies.

¹² In the empirical specification, we have controlled for age squared and its interaction with hours of child labor. Neither are statistically significant.

¹³ The data structure is the following. Each individual has two rows. Each row contains the variables on adult economic activity, number of hours of child labor, and other control variables observed in adulthood and childhood. The first row refers to adult employment in 2004 and child labor in 1992, while the second row refers to adult employment in 2010 and child labor in 1993.

¹⁴ The Hausman specification test (Hausman 1978) supports this choice.

¹⁵ This would be even more the case with a multinomial logit model of our categorical dependent variable.

with fixed effects. With this model, we estimate the so-called “within effect”, which estimates how much the variations in child labor hours affect a person’s variations in the employment state in adulthood and the probability of escaping from vulnerable employment. Since almost all children work at least one hour per week (see Section 5), analyzing the within effect is very relevant, especially as a variation in child labor hours is very likely to negatively affect the time spent in education. Furthermore, with such a high participation rate in child labor, our estimates should not suffer from the problem of sample selection.

4.1 Child labor thresholds.

To test whether there is a specific number of child labor hours beyond which child labor becomes particularly detrimental for the employment state in adulthood, we run several other specifications in which child labor is transformed into threshold variables, namely, dummy variables acquiring the value one if the individual works more than a specified cutoff. We define these thresholds in terms of quintiles of child labor hours: more than 1 hour per week (the mean value of this threshold in percentage also measures the participation rate of child labor), more than 8 hours per week (20th percentile), more than 14 hours per week (40th percentile), more than 20.9 hours per week (60th percentile) and 30 hours per week (80th percentile). We create similar thresholds for each type of child labor hour, i.e., work on the household farm or in domestic chores.

4.2 Time invariant variables in the correlated random effects model.

Despite the good properties of the fixed effects model, we cannot estimate the coefficients of some time-invariant variables of interest, such as tribe, economic activity of the household of origin and gender. Since the fixed effects methodology drops time-invariant variables, we use a correlated random effects model, an econometric method originally introduced by Mundlak (1978) and further developed by Woolridge (2002).

Our model thus becomes:

$$Y_{it} = \beta_0 + \beta_1 H_{ic} + \beta_2 H_{ic} age_{ic} + \beta_3 age_{ic} + \beta_4 K_{ic} + \beta_5 F_{it} + \beta_6 \bar{H}_i + \beta_7 \overline{H_i age_i} + \beta_8 \overline{age_i} + \beta_9 + \beta_{10} \bar{F}_i + \beta_{11} w_i + v_i + u_{it} \quad (2)$$

where β_1 and β_2 measure the “within” effect (these are the same as in eq. 1), while β_6 and β_7 estimate the “between” effects (Schunck, 2013). Finally, β_{11} is the coefficients of time-invariant variables (w_i), such as sex, tribe and father’s state of employment. v_i is the time-invariant error. We estimate this specification to appreciate the gender gap in the same regression. We can also draw inferences on whether some tribes are more likely than others are to be in nonvulnerable employment or and on whether children are locked in an “intergenerational vulnerable employment trap”, continuing to hold their fathers’ employment position. As mentioned, this model is an alternative to the Hausman test: if β_6 and β_7 are not significant, then the fixed effects model is more appropriate.

5. Data and variables

The labor market in developing countries differs from the labor market in developed countries in substantial respects. First, the majority of people in low-income countries live in rural areas and are employed in agriculture. Second, only a small share of people are employed in the so-called wage labor market. Third, a large share of workers, especially female, work unpaid. To study the impact of child labor on the type of employment in adulthood, we use the employment classification of the International Classification of Status in Employment (ICSE). We distinguish among the following categories. First, “own-account workers” are workers who, working on their own account or with one or more partners, hold the type of job defined as a “self-employment job”¹⁶ and have not engaged any employee(s) to work for them on a continuous basis (as for example workers in small retail trade, street vendors, artisans, service providers etc.). Second, “contributing family workers” are workers who hold self-employment

¹⁶ Jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced.

jobs as own-account workers in a market-oriented establishment operated by a related person living in the same household. They are also defined as “unpaid family workers” (for example workers in the household farm or non-farm business). Third, “employers” are workers who, working on their own account or with one or a few partners, hold the type of job defined as a self-employment job and in this capacity have engaged one or more persons to work for them as employee(s) on a continuous basis. Fourth, “employees” are workers who hold the type of job defined as a “paid employment job”, where the incumbents hold explicit (written or oral) or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they work. Fifth, “other” are individuals who cannot be included in any of the previous categories.

We then aggregate these categories into vulnerable vs nonvulnerable employment states. Following the ILO definition of “vulnerable employment”, we classify own-account workers and contributing family workers as vulnerable. We include in vulnerable employment the category of “other” under the following assumptions: (i) vulnerability is a broad concept, difficult to be captured by standard classifications, and (ii) in developing countries, employees and employers are the only categories that can be considered in a decent and safe employment position. The aggregate category of vulnerable employment provides information on the number of persons vulnerable to economic risk because of weak institutional employment arrangements. Own-account workers and contributing family workers, in fact, are more likely to lack contractual arrangements, adequate social security and “voice” through effective representation by trade unions and similar organizations. Inadequate or no earnings, low productivity and difficult working conditions are the natural outcomes of employment vulnerability.

Our dependent variable is adult status in employment. In the KHDS, the employment questions refer to the 12-month period preceding the interview. As illustrated in the empirical strategy, we estimate independent equations of the probability of employment in each status, where Y_{it} (see eq. 1) is a dummy acquiring the value one if the individual is, in turn, a contributing family worker, an own-account worker, an employer, an employee, other or in nonvulnerable employment.

Table 1 presents the descriptive statistics of these dependent variables.

Employment categories in adulthood	2004		2010	
	Mean	Std. Dev.	Mean	Std. Dev.
Contributory family worker	0.31	0.46	0.03	0.17
Own account worker	0.15	0.36	0.56	0.50
Employer	0.21	0.41	0.14	0.35
Employee	0.19	0.39	0.22	0.42
Other	0.14	0.35	0.05	0.21
Nonvulnerable employment	0.40	0.49	0.36	0.48
Obs.	571		680	

Authors' elaboration on the KHDS

Table 1. Descriptive statistics of employment status in adulthood

Mobility among different occupations is especially present among jobs classified as vulnerable employment: 31 percent of observations were contributing family workers in 2004, while this category decreased to 3 percent in 2010. This decrease is counterbalanced by an increase over time in own-account workers, from 15 to 56 percent. In addition, the share of people in the category “other” tends to decrease over time: in 2004, they represented 14 percent, while in 2010, this percentage fell to 5 percent. The nonvulnerable employment, instead, is more stable overtime, showing a decrease of 4 percent. Employees represent 18 percent in 2004 and 21 percent in 2010, while employers decrease from 18 to 14 percent.

Figures 1 and 2 show the types of employment that the children in our sample obtain in adulthood (2004 and 2010), highlighting the differences by gender. Regarding vulnerable employment, i.e., the sum of own-account workers and contributing family workers, we note that the majority of women are in this

category and that their share remains quite stable over time: in 2004, 78 percent were in vulnerable employment, and in 2010, this percentage decreases to 72. For the male sample, in 2004, only 44 percent were in vulnerable employment, while six years later, this percentage increases to 55 percent. Within vulnerable employment, there is a certain mobility between the two types: in 2004, 16 percent of men and 47 percent of women were contributing family members, while these shares fell to two and five percent, respectively, in 2010. This reduction is counterbalanced by an increase over time in own-account workers, from 15 to 51 percent in the male sample and from 14 to 61 percent in the female sample. This suggests that getting older reduces the probability of being a contributing family worker and increases the probability of being an own-account worker. In addition, the share of people without a job tends to decrease over time: among men from 12 to three percent and among women from 17 to six percent.

Looking at nonvulnerable employment, we note a strong male presence. However, the men's percentage decreases over time, while the women's percentage increases slightly. In 2004, 22 percent of women were in nonvulnerable employment, and in 2010, this increases to 28 percent. For the male sample, the share of men in nonvulnerable employment drops over time, from 56 to 46 percent. While the share of employees or employers among women does not increase by more than four percentage points from 2004 to 2010, the share of employers among men drops considerably, from 28 to 12 percent, and the share of employees increases from 28 to 33 percent. This suggests the presence of gender discrimination in the labor market, since women are especially confined in vulnerable employment. However, getting older helps women to improve their employment status within vulnerable employment.

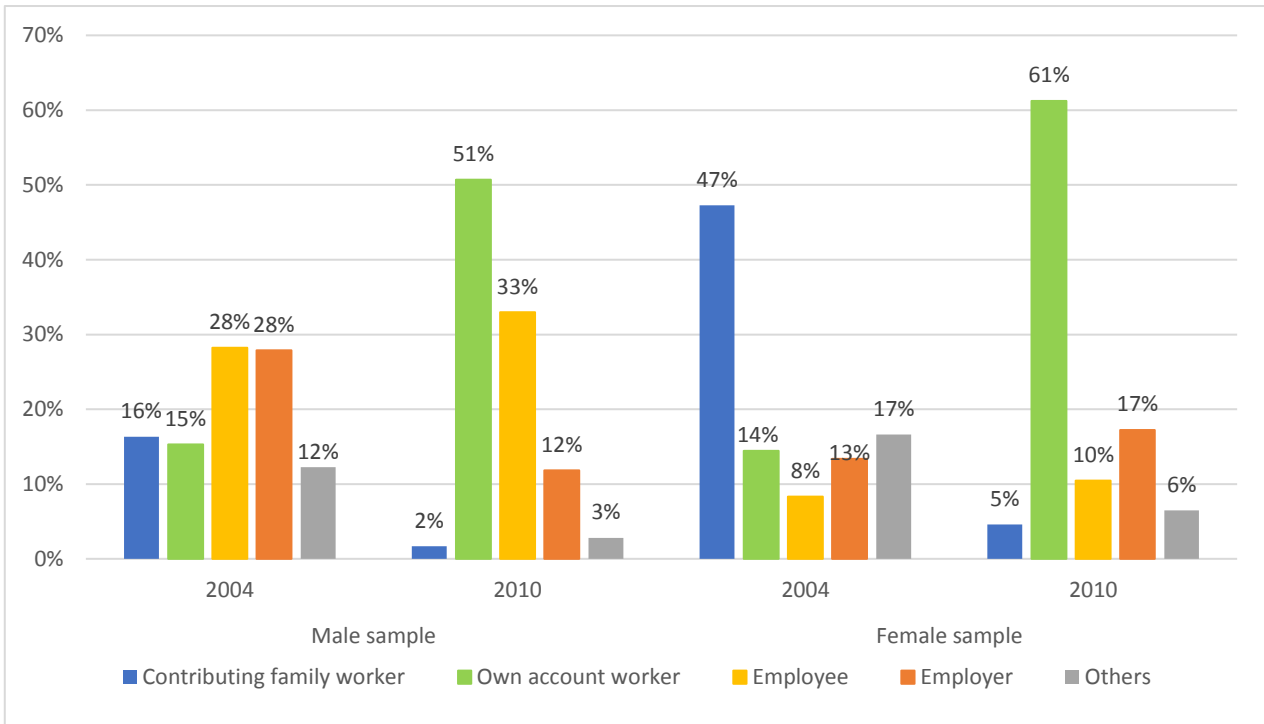


Figure 1: Employment status by year and gender

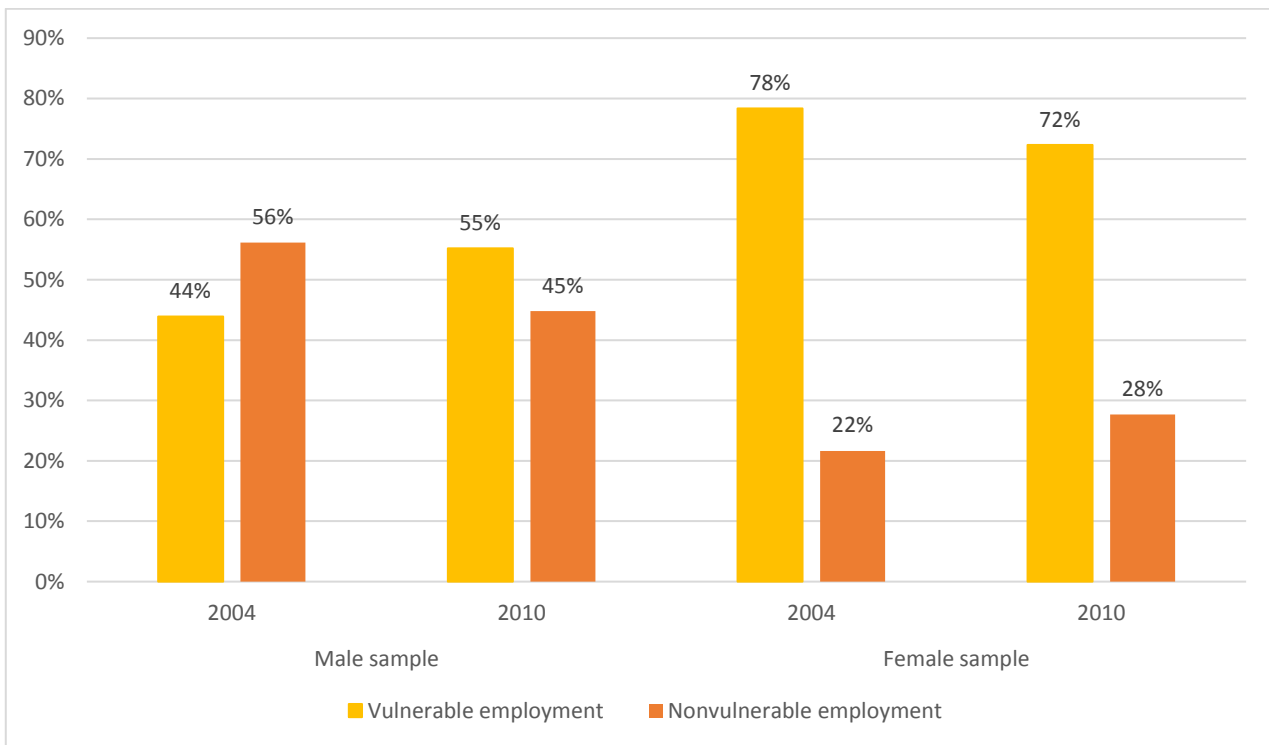


Figure 2: Vulnerable employment by year and gender

Turning to our explanatory variable of interest, our measure of child labor (H_{ic}) is hours spent by children between 7 and 15 years of age in the 7 days before the interview. The types of work are: working on the family farm (sowing, harvesting and livestock herding), in the family nonfarm business, in domestic chores for the household (collecting firewood, fetching water, cleaning the house, preparing meals) or as someone else's employee.

Tables 2a and Table 2b present the descriptive statistics of the child labor variables in our estimated models.

Child labor variables	1992		1993	
	Mean	Std. Dev.	Mean	Std. Dev.
<i>Child labor participation rates</i>				
Children participating in child labor	0.96	0.20	0.98	0.15
<i>Child labor participation rates by type of work</i>				
Participating in household farm work	0.72	0.45	0.79	0.40
Participating in domestic chores	0.91	0.29	0.95	0.20
Participating as employee	0.001	0.04	0.01	0.08
Participating in household nonfarm business	0.01	0.12	0.03	0.18
<i>Child labor hours</i>				
Child labor hours per week	19.00	13.78	19.02	12.15
<i>Child labor hours by type of activity</i>				
In the HH farm	7.37	9.64	7.14	7.57
In domestic chores	11.57	8.89	11.67	8.33
As employee	0.01	0.17	0.03	0.38
In the HH nonfarm business	0.09	0.83	0.17	0.16
<i>Thresholds of child labor hours</i>				
> 1 hour (child labor participation rate)	0.96	0.20	0.98	0.15
> 8 hours (20° percentile)	0.77	0.42	0.81	0.39
>14 hours (40° percentile)	0.59	0.50	0.60	0.49
> 20.9 hours (60° percentile)	0.39	0.49	0.39	0.49
> 30 hours (80° percentile)	0.17	0.38	0.16	0.36
<i>Thresholds by type of activity</i>				
In the HH farm				
>1 hour (child labor participation rate)	0.72	0.45	0.79	0.40
> 4 hours (20° percentile)	0.47	0.50	0.55	0.50
> 6 hours (40° percentile)	0.36	0.48	0.43	0.49
> 10 hours (60° percentile)	0.24	0.43	0.24	0.42
> 16 hours (80° percentile)	0.13	0.34	0.09	0.28
In domestic chores				
>1 hour (child labor participation rate)	0.91	0.29	0.95	0.20
> 4.3 hours (20° percentile)	0.76	0.43	0.78	0.42
> 8.1 hours (40° percentile)	0.58	0.49	0.59	0.49
> 12.6 hours (60° percentile)	0.41	0.49	0.39	0.49
> 19 hours (80° percentile)	0.18	0.39	0.19	0.39
<i>Number of children</i>	571		680	

Authors' elaboration on the KHDS

Table 2a. Descriptive statistics of child labor

Regarding the participation in child labor (see Table 2a), nearly all children (96 percent) do some work, 91 percent do at least one hour of domestic chores and 72 percent work on the household farm. Therefore, since almost all children are involved in child labor, the problem of sample selection bias should not arise. Children participating as employees or in the household nonfarm business are nearly absent. This is in line with statistics provided by the Tanzania National Bureau of Statistics (NBS) and International Labour Organization (ILO) for rural Tanzania (NBS-ILO, 2016), as the Kagera region is mostly rural. Given this evidence, we concentrate on domestic chores and work on the household farm.

On average, children worked approximately 19 hours per week in 1992 and in 1993. They were engaged in domestic chores for approximately 12 hours per week and in work on the household farm for 7 hours per week. The distinction by gender (see Table 2b) shows that girls work more hours than boys do, and this is particularly due to domestic chores, since the gender difference in hours spent on the household farm is much lower. Over the two years, girls' hours of work in domestic chores increase, while work on the household farm remains approximately the same. Boys' hours of work, instead, decrease in both activities.

Variable	Girls				Boys			
	1992		1993		1992		1993	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Child labor hours per week	19.52	13.39	20.29	12.84	18.50	14.14	17.84	11.36
Child labor hours by type of activity								
On the household farm	6.59	8.06	6.51	7.08	8.10	1.09	7.71	7.95
In domestic chores	12.99	9.46	13.56	8.85	10.41	8.16	9.94	7.42
As employee	0	0	0.03	0.39	0.01	0.23	0.03	0.37
In the household nonfarm business	0.13	1.04	0.18	1.87	0.05	0.56	0.16	1.21
Obs.	277		325		294		355	

Authors' elaboration on the KHDS

Table 2b. Child labor by sex and type of activity.

We compute child labor frequencies by threshold hours using quantiles of the distribution of child labor. In 1992, 78 percent of children worked more than 8 hours per week, 54 percent worked more than 16 hours per week and 25 percent worked more than 26 hours per week. Moreover, growing one year older makes the number of working hours increase. This is because children increasingly become substitutes for adults in work activities. In particular, there is a substantial increase in the number of those claiming to work more than 8 hours per week. The comparison between 1992 and 1993 shows that there are relevant changes in just one year, thus creating enough variability for our fixed effects strategy.

Regarding the other control variables, some refer to childhood and others to adulthood. The former are dummies for having experienced community shocks that may affect both child labor and employment outcomes (such as flood, drought, war, epidemic, insects, crop disease and fire) and hours of schooling in the week preceding the survey. Among the latter variables are household size, marital status, level of education, residence in rural or urban areas, religion, ethnic group, and household expenditure.¹⁷ Table 3 shows the descriptive statistics of the other control variables. Table 6 in the annex shows the distribution of age by years in childhood.

¹⁷ Expenditure is at current prices. This should not be a problem since we study a specific region of Tanzania where prices are likely to be approximately the same for all households (and we do not have information on prices at lower levels of aggregation).

Variables related to childhood	1992		1993	
	Mean	Std. Dev.	Mean	Std. Dev.
Age	11.51	1.96	12.20	2.09
Community shocks	0.78	0.42	0.74	0.44
Hours of school per week	21.53	14.50	22.85	13.96
Obs.	571		680	

Variables related to adulthood	2004		2010	
	Mean	Std. Dev.	Mean	Std. Dev.
HH size	4.76	2.70	4.42	2.10
Married	0.53	0.50	0.72	0.45
No. of employed household members	1.63	1.35	1.24	0.91
Orphan in adulthood	0.61	0.49	0.68	0.47
Rural area	0.96	0.20	0.66	0.47
Primary school	0.68	0.47	0.69	0.46
Secondary school	0.08	0.28	0.08	0.28
University	0.00	0.00	0.02	0.15
HH expenditure (1° quantile)	0.75	0.43	0.80	0.40
HH expenditure (2° quantile)	0.48	0.50	0.60	0.49
HH expenditure (3° quantile)	0.23	0.42	0.32	0.47
Female	0.49	0.50	0.48	0.50
Father worked in the HH farm	0.12	0.14	0.13	0.17
Haya tribe	0.68	0.47	0.67	0.47
Hangaza tribe	0.10	0.30	0.11	0.31
Nyambo tribe	0.16	0.37	0.16	0.36
Catholic	0.57	0.49	0.55	0.50
Protestant	0.17	0.38	0.18	0.38
Muslim	0.16	0.37	0.12	0.33
Obs.	571		680	

Authors' elaboration on the KHDS

Table 3. Descriptive statistics of other control variables

6. Results

6.1 Marginal effects of child labor

Table 4 shows the marginal effects of child labor estimated for the whole sample and by sex with the linear probability model with fixed effects. We estimate our model for each employment category, namely, contributing family worker, own-account worker, employer, employee and other. We also estimate our model for the aggregate category of nonvulnerable employment that includes employees and employers. We estimate different specifications: one for the impact of child labor irrespective of the type of child labor (hours of child labor as a whole) and the others for each type of child labor activity.

The results for child labor as a whole show that one additional hour of child labor is significantly and negatively associated with nonvulnerable employment. Among the different employment statuses, it only affects the probability of being a contributing family worker (see panel *a*). Disentangling the effect by type of activity (panel *b*) shows that hours of domestic chores significantly affect the probability of being an employer, but hours spent working on the household farm are not significant. In the female sample (see panel *c*), we find significant effects on becoming a contributing family worker, an employee and in vulnerable employment. Hours spent in domestic chores have an impact on vulnerable employment, and hours spent working on the household farm have an impact on being a contributing family worker and on vulnerable employment (see panel *d*).

All these effects seem to be driven by the female sample since child labor does not have any statistically significant impact on men (see panel *e* and *f*).

	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) Child labor hours	0.021** (0.010)	-0.003 (0.009)	-0.019 (0.012)	-0.003 (0.009)	0.004 (0.008)	-0.022* (0.011)
Child labor hours*age	-0.002** (0.001)	0.000 (0.001)	0.002* (0.001)	0.000 (0.001)	-0.000 (0.001)	0.002** (0.001)
(b) Hours spent in domestic chores	0.025 (0.015)	-0.004 (0.016)	-0.023* (0.012)	-0.008 (0.014)	0.009 (0.012)	-0.030 (0.019)
Hours*age	-0.002* (0.001)	0.000 (0.001)	0.002** (0.001)	0.001 (0.001)	-0.001 (0.001)	0.003* (0.001)
Hours spent on HH farm	0.017 (0.012)	-0.005 (0.014)	-0.016 (0.018)	0.004 (0.012)	-0.000 (0.010)	-0.012 (0.016)
Hours*age	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.000 (0.001)	0.001 (0.001)

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Panel (a) presents results for total child labor hours while panel (b) disaggregates them into hours spent in domestic chores and on the household farm for all children between 7 and 15 years old. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood (Table 7 in the Annex shows all coefficients for the regression with child labor as a whole). Cluster-robust standard errors at household level are in parentheses.

Table 4. Child labor effect on labor market outcomes. Whole sample.

	(1) Contributing family worker	(2) Own- account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
<i>(c)</i> Child labor hours	0.043** (0.018)	0.000 (0.013)	-0.028* (0.016)	-0.017** (0.008)	0.002 (0.011)	-0.045** (0.019)
Child labor hours*age	-0.003** (0.001)	-0.000 (0.001)	0.002 (0.001)	0.001** (0.001)	0.000 (0.001)	0.004** (0.002)
<i>(d)</i> Hours spent in domestic chores	0.031 (0.024)	0.006 (0.016)	-0.026 (0.017)	-0.019 (0.014)	0.009 (0.019)	-0.046** (0.022)
Hours*age	-0.002 (0.002)	-0.001 (0.001)	0.002 (0.001)	0.002 (0.001)	-0.001 (0.001)	0.004* (0.002)
Hours spent in HH farm	0.071*** (0.020)	-0.013 (0.026)	-0.033 (0.024)	-0.012 (0.015)	-0.012 (0.014)	-0.046* (0.024)
Hours*age	-0.006*** (0.002)	0.001 (0.002)	0.003 (0.002)	0.001 (0.001)	0.001 (0.001)	0.004* (0.002)

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Panel *(c)* presents results for total child labor hours while panel *(d)* disaggregates them into hours spent in domestic chores and in the household farm for all girls between 7 and 15 years old. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood (Table 8 in the Annex shows all coefficients for the regression with child labor as a whole). Cluster-robust standard errors at household level are in parentheses.

Table 4 cont. Child labor effect on labor market outcomes. Female sample.

	(1)	(2)	(3)	(4)	(5)	(6)
	Contributing family worker	Own- account worker	Employer	Employee	Other	Nonvulnerable
<i>(e)</i> Child labor hours	0.003 (0.010)	-0.007 (0.013)	-0.011 (0.014)	0.005 (0.015)	0.011 (0.007)	-0.007 (0.015)
Child labor hours*age	-0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.001 (0.001)
<i>(f)</i> Hours spent in domestic chores	-0.003 (0.015)	-0.008 (0.025)	0.006 (0.021)	-0.008 (0.032)	0.013 (0.011)	-0.002 (0.034)
Hours*age	0.000 (0.001)	0.000 (0.002)	0.000 (0.002)	0.000 (0.003)	-0.001 (0.001)	0.001 (0.003)
Hours spent in the HH farm	0.006 (0.012)	-0.009 (0.017)	-0.023 (0.016)	0.016 (0.017)	0.010 (0.013)	-0.007 (0.017)
Hours*age	-0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.001)

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Panel *(e)* presents results for total child labor hours while panel *(f)* disaggregates them into hours spent in domestic chores and in the household farm for all boys between 7 and 15 years old. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood (Table 9 in the Annex shows all coefficients for the regression with child labor as a whole). Cluster-robust standard errors at household level are in parentheses.

Table 4 cont. Child labor effect on labor market outcomes. Male sample.

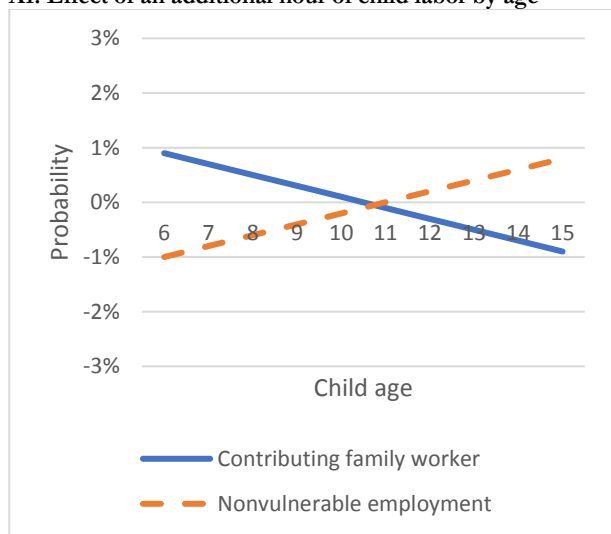
To appreciate the sign and the size of these effects, it is necessary to calculate $\beta_1 + \beta_2 age_{ic}$ (see eq. 1) using the estimated coefficients presented in Table 4. As already discussed, previous results in the literature highlight the fact that the interacted variable contributes importantly to the overall effect of an additional hour of child labor on the employment status in adulthood. We find that when the child labor variable is significant, the interaction term with age is jointly significant in almost all cases.

Figure 3 plots the significant effects of an additional hour of child labor by child age for the whole sample and for the female sample (see Panel A and B). Overall, our results are in line with the literature since the negative effect of an additional hour of child labor disappears with child age. After a certain age, child labor even increases the chances of finding a better job in adulthood. However, the size of the negative effects is always greater than that of the positive effects. In the whole sample, the turning point, namely, the age at which the sign of the effect of child labor becomes positive, is 11. For children older than eleven, instead, the probability of nonvulnerable employment increases (Figure 3, panel A1). The distinction by type of child labor shows that domestic chores have a negative influence on the probability of becoming employers in adulthood, and the turning point is again 11 (Figure 3, panel A2).

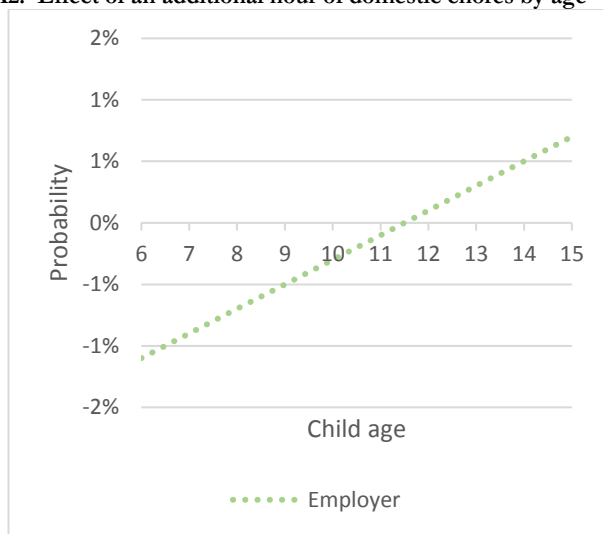
Compared to the whole sample, in the subsample of women, an additional hour of child labor has even larger negative impacts on the probability of getting into nonvulnerable employment (Figure 3, panel B1). The line representing the relationship between child labor and the probability of becoming a contributing family worker in adulthood shifts up so much that there is no longer a turning point. In addition, the chance of becoming an employee is always negative. Regarding the type of child labor, an extra hour of child labor on the household farm (Figure 3, panel B2) or in domestic chores (Figure 3, panel B3) is negatively associated with nonvulnerable employment until age 11-12. In both cases, the negative effects are larger than the positive effects.

Panel A: Whole Sample

A1: Effect of an additional hour of child labor by age

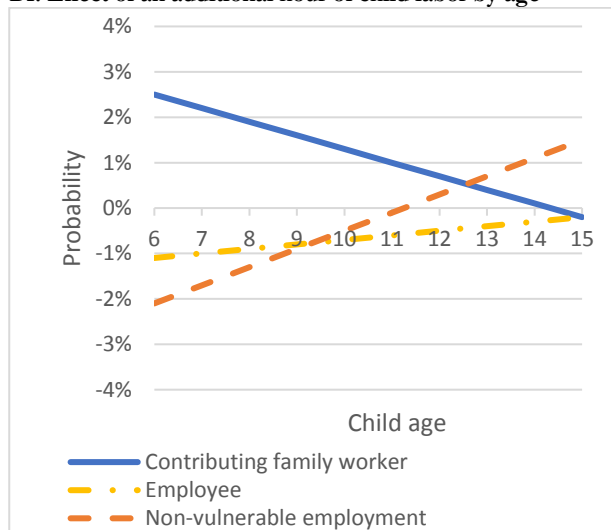


A2: Effect of an additional hour of domestic chores by age

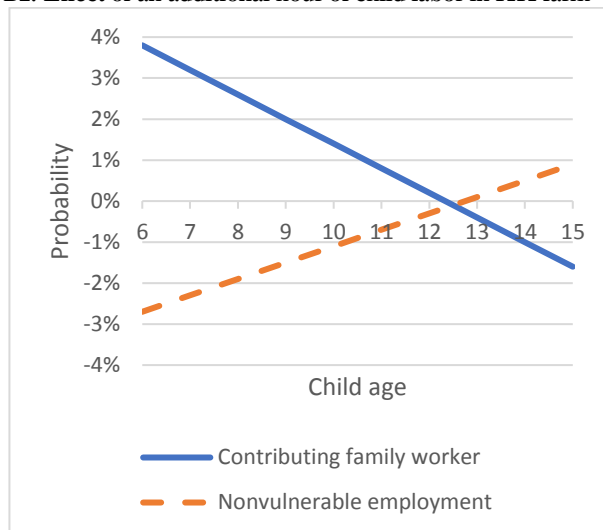


Panel B: Female Sample

B1: Effect of an additional hour of child labor by age



B2: Effect of an additional hour of child labor in HH farm



B3: Effect of an additional hour of domestic chores by age

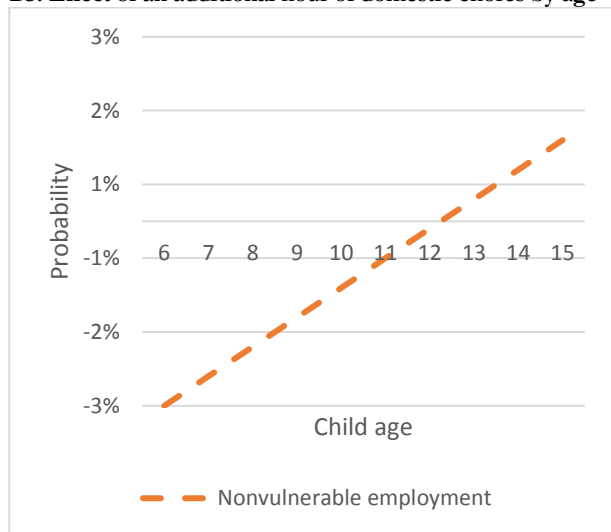


FIGURE 3: Child labor effect on labor market outcomes by child age and type of child labor

6.2 The role of education

Tables 7-9 in the Annex show the coefficients of all the covariates. We comment on some results concerning education. It is interesting to note that the number of weekly hours of school in childhood does not affect the position in employment for both sexes (Tables 8-9). This might mean that, if there is a trade-off between schooling and child labor, substituting schooling to child labor does not necessarily imply better employment outcomes in adulthood. If there is no trade-off, and children manage to combine regular school attendance with child labor, this might mean that the benefits of education are compromised by children's weariness due to child labor. For the level of completed education, it must be kept in mind that we are considering the effects of variations between 2004 and 2010, which are small since our individuals are already adults. The descriptive statistics of education also show little variability in the levels of education at the year level since nearly 20 percent of the sample has had no education (the reference category), approximately 70 percent primary education, 8 percent secondary education, and 2 percent tertiary education (see Table 3). Among the significant coefficients, we find that secondary education is associated with being contributing family workers for women, and university contributes to nonvulnerable employment for men (although the number of observation is very small for men, and only three for women). In all cases, these results on the role of education are likely to be due to the low quality of education and the low demand of skilled work in the country.

7. Extensions

7.1 Results by threshold hours of child labor

To assess the child labor effect from another perspective, we also estimate the model by threshold hours (see Table 2 for the descriptive statistics of thresholds). Figure 4 plots the probabilities of getting

into nonvulnerable employment in adulthood. Panel A refers to the whole sample, while Panel B refers to the subsample of women.¹⁸

As in the previous results, the negative effects prevail over the positive ones irrespectively of the type of child labor and sample. Considering the whole sample, child labor significantly affects the probability of getting into nonvulnerable employment when children work more than 20.9 hours per week (Figure 4, panel A1). The turning point is at age 12: younger children have fewer chances, up to 30 percentage point less, while the older ones have up to 12 percentage points more chances. For the type of child labor, we find significant thresholds only for hours of domestic chores. The negative effects are already present at 4.3 hours per week, 20th percentile, and there is no significant difference from the coefficient of the 12.6-hour threshold (Figure 4, panel A2).

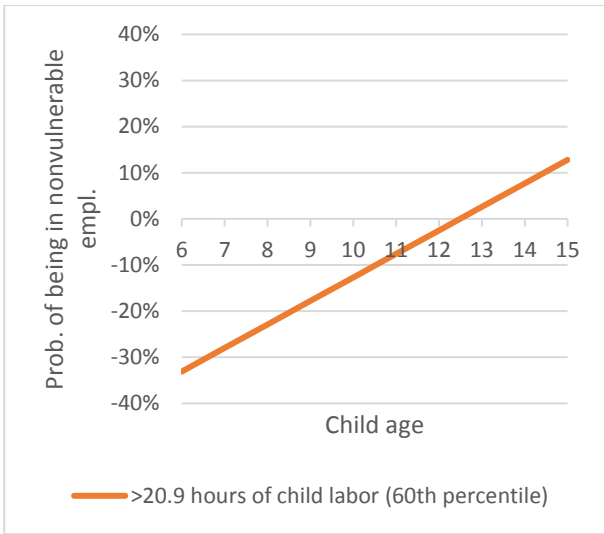
The results for the subsample of women show larger negative effects (Figure 4, panel B1). We distinguish these effects of child labor by type of activity. We find a significant threshold for hours of domestic chores at 12.6 hours per week (Figure 4, panel B2). Positive effects of domestic chores appear at age 13, but they are comparatively smaller. The negative effects, instead, are quite large: the probability of escaping vulnerable employment lowers considerably for child laborers under 10. For child labor on the household farm (Figure 4, panel B3), we find more significant adverse effects: the threshold that reduces the probability of escaping from vulnerable employment lowers to 6 hours. The turning point is at approximately age 12, and the negative effects can reach 40 percentage points for female laborers under 10.

¹⁸ The estimated coefficients are presented in the Annex. In particular, Tables 10-12 show, respectively, the coefficients of thresholds of weekly child labor hours, of weekly child labor hours spent on the household farm and of weekly child labor hours spent in domestic chores for the whole sample. Tables 13-15 show analogous results for the sub-sample of women and Tables 16-18 for the sub-sample of men.

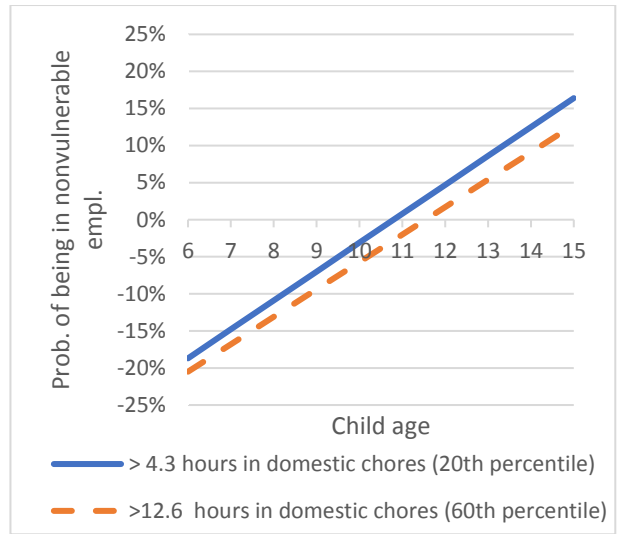
The distinction by type of employment and type of child labor highlights other interesting aspects. Working for more than 8 hours, not only increases the probability of becoming a contributing family worker, but also decreases the probability of becoming an own account worker. Working on own account (a paid activity by definition), represents a significant improvement with respect to working unpaid as contributing family worker, but child labor reduces this chance (see Table 10 in the Annex). These results are driven by the female sample (see Table 13 in the Annex). Regarding the type of child labor, in the female sample, working on the household farm seems to have large positive effects (significant at one percent) on the chance of becoming a contributing family worker at almost all child labor thresholds (see Table 14 in the Annex), while domestic chores have a smaller effect (significant at 10 percent; see Table 15 in the Annex). In the male sample, we find mixed effects: a positive coefficient of the 16 hours on the household farm threshold for the probability of becoming an employee (only significant at 10 percent), but also a positive coefficient for the probability of being in the category “other” (see Table 17 in the Annex).

Panel A: Whole Sample

A1

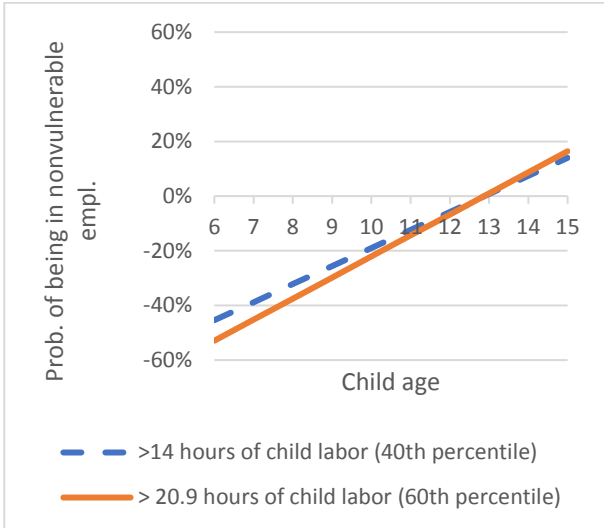


A2

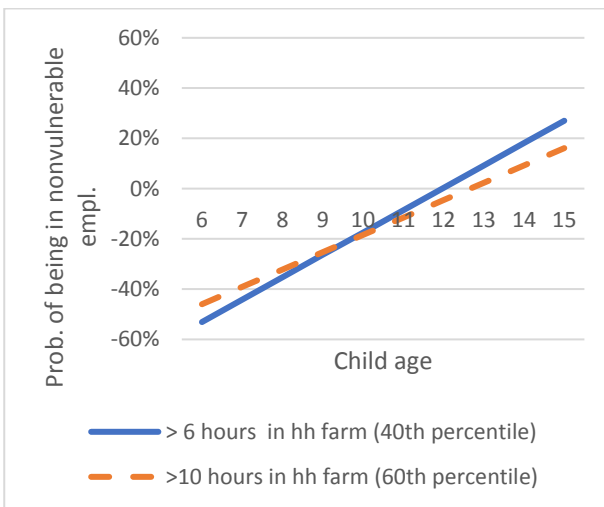
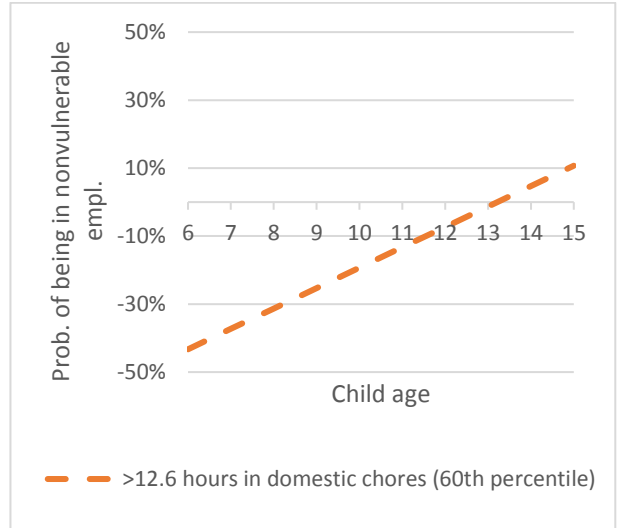


Panel B: Female Sample

B1



B2



B3

FIGURE 4: Child labor effect on the probability of being in nonvulnerable employment by thresholds and type of child labor

7.2 Results of the correlated random effects specification

Equation (2) in the empirical strategy specifies the correlated random effects model we estimate. We estimate this model for two reasons: 1) we are interested in the coefficients of some time-invariant variables, gender in particular, and 2) the results provide another test of our choice of a fixed effects model as our baseline. Table 5 presents the estimated coefficients of the time invariant variables (the coefficients of the time-varying variables are the same as those presented in Table 4). Regarding the gender gap, women's probability of being in nonvulnerable employment is 21.5 percentage points lower than men's probability. In particular, women are more likely to become contributing family workers (+15.4 percentage points) and less likely to become employers (-4.8 percentage points) or employees (-17 percentage points). This is a significant evidence of the existence of discrimination in the labor market locking women into unpaid jobs and vulnerable jobs.

As for tribes, Hangaza people, who are the most numerous ethnic group in Kagera, have a higher probability of being in nonvulnerable employment, in particular of becoming employees. The hypothesis of an "intergenerational vulnerable employment trap" is rejected since the father's employment position is not significant.

Regarding the "between" effects of child labor hours, the coefficients of the mean of child labor hours per week are not significant except for the probability of becoming a contributing family worker. This result supports our choice in favor of a fixed effects model.

	(1) Contributing family worker	(2) Own- account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
Whole sample						
Female	0.154*** (0.020)	0.037 (0.027)	-0.048** (0.022)	-0.167*** (0.025)	0.023 (0.016)	-0.215*** (0.027)
Haya tribe	-0.003 (0.041)	-0.110** (0.055)	0.037 (0.046)	0.090* (0.050)	-0.017 (0.032)	0.130** (0.056)
Hangaza tribe	-0.068 (0.048)	-0.074 (0.065)	0.065 (0.054)	0.080 (0.059)	-0.005 (0.038)	0.141** (0.066)
Nyambo tribe	-0.030 (0.045)	-0.038 (0.061)	0.090* (0.051)	0.008 (0.056)	-0.035 (0.036)	0.097 (0.062)
Father worked in the HH farm	0.155 (0.191)	0.253 (0.259)	-0.243 (0.215)	-0.154 (0.238)	-0.018 (0.151)	-0.374 (0.264)
Father was an employee	-0.184 (0.193)	0.153 (0.252)	-0.094 (0.218)	0.196 (0.222)	-0.073 (0.144)	0.097 (0.267)
Mean child labor hours	-0.026** (0.011)	0.009 (0.013)	0.018 (0.012)	0.002 (0.011)	-0.003 (0.007)	0.020 (0.015)
Mean child labor hours*age	0.002** (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.000 (0.001)	0.000 (0.001)	-0.002 (0.001)
Mean age	0.227*** (0.034)	-0.452*** (0.042)	0.159*** (0.039)	-0.051 (0.034)	0.119*** (0.023)	0.105** (0.047)

*** p<0.01, ** p<0.05, * p<0.1

Notes: Additional controls include age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Robust standard errors in parentheses.

Table 5. Time invariant variables: estimated coefficients with the correlated random effects model.

8. Discussion

The literature on the effects of child labor on children's outcomes seems to support the hypothesis of the predominance of negative short term effects. We contribute to the literature by measuring the marginal and threshold effects of child labor on different categories of adult employment, by types of child labor and by gender. Our results show that the negative effects that emerge in the short term carry over into employment in adulthood.

As already mentioned in the introduction, we cannot compare our result with other relevant literature. Nevertheless, some comparisons with the literature on child labor are in order. Our results confirm the evidence showing that the specific age at which children are engaged in work activities makes a difference for individual outcomes: when children are very young, child labor is more disruptive, as shown in Patrinos & Psacharopoulos, 1997 and in Emerson & Souza, 2011. In our sample, the turning point, namely, the age at which the sign of the effect of child labor may become positive in terms of employment status, is 11-12 years. This is somewhat earlier compared to the findings by Emerson & Souza (2011), who find, although in the different context of Brazil, that the negative impact on adult earnings of starting to work as a child reverses around ages 12-14, when the probability of becoming an employee increases. Their general conclusions are very similar to ours: even in a low-income environment, where opportunities are scarce, there are negative consequences of working at a young age, especially in agriculture. They also do not find a trade-off between schooling and child labor and conclude, as we do, that working early in life does not have a large negative effect on the quantity of schooling but may have strong negative effects on the quality of education.

Our study differs in several ways from that of Beegle et al. (2008), which uses the same dataset for the Kagera region. First, we study different dependent variables. Beegle et al. (2008) focus on the impact of child labor on many outcomes but as far as employment is concerned, only on the probability of becoming a farmer in adulthood: they find that this probability increases with child labor. Second, we

have a different strategy: we study whether child labor in 1993 and 1994 affects the type of employment that individuals obtain in adulthood in 2004 and 2010, while Beegle et al. (2008) had the panel dataset available only up to 2004. They therefore use a 2SLS approach, while we use a linear probability model with fixed effects. Third, they investigate child labor all together, while we also examine whether the type of work in which children are engaged – household chores or work on the household farm - has different implications for the adult job. They only touch this issue when they attribute their finding that child labor increases the probability of marriage for girls to the fact that they specialize as children in household chores.

Since the results appear to be driven largely by females being pressed into heavy chores, it seems important to discuss both the selection and the causal effects. The selection is reasonably well controlled for in the within estimator, but is still calling for some insight. In developing countries, families routinely underinvest in girls because of gender discrepancies in the adult labor market that make this a rational decision. Our sample is representative of this situation: (i) more than 70 per cent of women are in vulnerable employment, while only 55 per cent of men are in this employment status; (ii) although both girls and boys participate to child labor, girls on average work longer hours. The correlated random effects estimates confirm the presence of discrimination in the labor market.

As for the mechanism, we do not directly investigate the potential two-way causal direction between discrimination in the labor market and human capital underinvestment for girls. We have focused on the effects of child labor, and our estimates contribute to show that child labor matters for the group already discriminated in the labor market.

One weakness of our study is represented by the quality of the data on child labor and employment, a common problem in surveys for developing countries. Our measures of child labor (hours worked in the week prior to the survey) and employment (state of employment in the last 12 months) are likely to suffer from measurement errors. Findings from a survey experiment in Tanzania (Bardasi et al., 2011) show that employment statistics can vary considerably depending on the questions used to identify participation in employment and the choice of respondent (proxy or self-respondent). For example,

according to these findings, weekly hours of child labor may be under-estimated if reported by a proxy respondent. For employment, the low-reported labor force participation rates in developing countries is a well-known phenomenon, especially in the case of women, who tend to under-report their involvement in productive work. Moreover, the ILO classifications, also used by KHDS, for measuring labor are likely to be problematic in settings such as rural Tanzania, where the majority of labor is found in the informal, self-employed, and farm sectors (Arthi et al., 2018). Another weakness of our study is that, although we control for a large number of time-varying variables related to childhood and adulthood, there might be other relevant time-varying unobserved heterogeneity that we are not able to account for.

Nonetheless, one strength of our study lies in the empirical strategy. This has allowed us to overcome the problem, common to the child labor literature, of the unobservable attributes (e.g. individual ability, personal traits, parental preferences, social norms) that affect the child labor decisions. Much of the recent research relies on the use of instrumental variables, but the requirement of a robust set of instruments remains a challenge. Our fixed effects approach has attempted to overcome this problem. However, a potential pitfall remains, since this approach does not address the problem of differential trends due to non-stationary effects of unobserved individual characteristics such as ability and human capital accumulation.

Another strength is represented by the detail of the analysis, which had the objective of disentangling the estimated effects by employment types, child labor activities, threshold hours, age and gender. This level of detail, not available in previous studies, has provided evidence on the size of effects of many features of child labor on a long term outcome such as adult employment.

9. Conclusions

As shown by our descriptive evidence, children in the Kagera region work many hours in the week doing domestic chores in the household or working on the household farm. Such activities, such as fetching water or collecting firewood, have low human capital content and may be particularly tiring and

time consuming. In adulthood, people's employment position in the labor market is quite vulnerable, characterized by a large share of contributing family workers who work unpaid and, in terms of paid employment, of own account workers. Our empirical strategy has allowed us to measure the marginal and threshold effects of child labor hours on adult employment, controlling for the age in childhood at which child labor was performed, several other variables related to childhood and adulthood and the unobserved heterogeneity due to individual fixed effects.

Our main contribution concerns the roles of age and gender in shaping the child labor effect on vulnerable employment in adulthood. As far as age is concerned, we find that child labor is indeed associated with vulnerable employment in adulthood. Child laborers' age plays a crucial role, and our results add relevant insights to the strand of literature showing that the effect of child labor changes according to the age at which it is performed. When child labor is performed before the age of eleven, it always has negative effects on adult employment. After the age of 11-12, it might lead to nonvulnerable employment, but the size of the positive effects in terms of probabilities is always lower than the size of the negative effects of child labor performed beforehand. As far as gender is concerned, we show that these results are driven by the women sample where an additional hour of child labor, both in domestic chores and on the household farm, has even larger negative impacts on the probability of getting into nonvulnerable employment. In the men sample, child labor does not affect vulnerability. We impute this difference to gender discrimination in the labor market that for men makes the effect of child labor insignificant, while for women it is a relevant determinant of adult employment. Thus, for women the child labor effect adds to the discrimination effect.

The analysis by threshold hours has revealed that: (i) the negative effects arise when children work approximately eight to 20 hours per week and (ii) this result is driven by the girls' sample. Regarding the type of child labor, work on the household farm seems to have the largest negative effects for girls: (i) the threshold that reduces the probability of escaping from vulnerable employment lowers to 6 hours, (ii) the turning point is at approximately age 12, and (iii) the probability of escaping from vulnerable employment decreases by approximately 20 to 40 percentage points for child laborers under 10.

Household chores also have a negative effect on employment status in adulthood, although smaller and less significant than work on the household farm. Therefore, the gender implications of these results are strong: our evidence suggests that several hours of work spent in farm activities for the household or in domestic chores, although performed in a supposedly protective sphere, lead girls to vulnerable employment in adulthood.

These results raise serious doubts on the existence in low-income countries of any positive effect of child labor on accessing better employment opportunities. Child labor might well represent in the short term a source of income support for poor households, but in the long term it helps perpetuating the vulnerability of employment in developing countries. The evidence presented in this paper might help to target policies aimed at reducing child labor and improving labor market conditions in Africa. In particular, it might help policy makers to address the problem of the long term effects of child labor performed for the household with a special attention to girls.

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Glossary

Employment classification:

1. “own-account workers”: workers who, working on their own account or with one or more partners, hold the type of job defined as a “self-employment job” and have not engaged any employee(s) to work for them on a continuous basis.
2. “contributing family workers” : workers who hold self-employment jobs as own-account workers in a market-oriented establishment operated by a related person living in the same household. They are also defined as “unpaid family workers”.
3. “employers”: workers who, working on their own account or with one or a few partners, hold the type of job defined as a self-employment job and in this capacity have engaged one or more persons to work for them as employee(s) on a continuous basis.
4. “employees”: workers who hold the type of job defined as a “paid employment job”, where the incumbents hold explicit (written or oral) or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they work.
5. “other” : individuals who cannot be included in any of the previous categories.
6. “vulnerable employment”: is the sum of own-account workers, contributing family workers and “other” .

Child labor types:

1. work on the family farm (sowing, harvesting and livestock herding)
2. work in the family nonfarm business
3. work in domestic chores for the household (collecting firewood, fetching water, cleaning the house, preparing meals)
4. work as someone else’s employee.

Annex

Age	1992			1993		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
6	1	0.18	0.18	-	-	-
7	17	2.98	3.15	8	1.18	1.18
8	31	5.43	8.58	27	3.97	5.15
9	56	9.81	18.39	56	8.24	13.38
10	70	12.26	30.65	63	9.26	22.65
11	78	13.66	44.31	88	12.94	35.59
12	94	16.46	60.77	101	14.85	50.44
13	127	22.24	83.01	105	15.44	65.88
14	97	16.99	100.00	136	20.00	85.88
15	-	-	-	96	14.12	100.00
Total	571	100.00		680	100.00	

Table 6. Distribution of age in childhood.

	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
Child labor hours	0.021** (0.010)	-0.003 (0.009)	-0.019 (0.012)	-0.003 (0.009)	0.004 (0.008)	-0.022* (0.011)
Child labor hours*age	-0.002** (0.001)	0.000 (0.001)	0.002* (0.001)	0.000 (0.001)	-0.000 (0.001)	0.002** (0.001)
Age	-0.227*** (0.037)	0.465*** (0.034)	-0.153*** (0.045)	0.052 (0.032)	-0.137*** (0.017)	-0.101** (0.044)
Community shocks	-0.069* (0.040)	0.162*** (0.049)	-0.127** (0.050)	0.033 (0.028)	0.002 (0.024)	-0.094* (0.051)
Household size in adulthood	-0.010 (0.010)	0.013 (0.013)	-0.037*** (0.009)	-0.010 (0.009)	0.044*** (0.006)	-0.047*** (0.014)
Hours of school per week in childhood	-0.001 (0.001)	0.000 (0.001)	0.000 (0.002)	-0.000 (0.001)	0.001 (0.001)	0.000 (0.002)
Primary school	-0.042 (0.071)	0.212*** (0.072)	-0.132* (0.078)	0.002 (0.052)	-0.040 (0.043)	-0.131 (0.097)
Secondary school	0.068 (0.089)	0.066 (0.104)	0.057 (0.117)	-0.122 (0.092)	-0.069 (0.133)	-0.065 (0.113)
University	0.302*** (0.081)	-0.225* (0.119)	-0.157 (0.141)	0.457** (0.188)	-0.376** (0.168)	0.299** (0.121)
Married	0.083** (0.040)	-0.089* (0.044)	0.159*** (0.044)	-0.019 (0.041)	-0.134*** (0.033)	0.140*** (0.041)
No. of empl. household members	0.077*** (0.014)	-0.027 (0.021)	0.070*** (0.015)	0.023 (0.022)	-0.143*** (0.017)	0.093*** (0.032)
Orphan in adulthood	-0.033 (0.064)	-0.035 (0.088)	-0.042 (0.076)	0.024 (0.073)	0.085** (0.036)	-0.018 (0.100)
Rural area	0.045 (0.054)	0.082 (0.068)	-0.103** (0.046)	0.016 (0.047)	-0.039 (0.027)	-0.088 (0.065)
HH expenditure (2° quartile)	0.045 (0.054)	0.082 (0.068)	-0.103** (0.046)	0.016 (0.047)	-0.039 (0.027)	-0.088 (0.065)
HH expenditure (3° quartile)	-0.082 (0.055)	0.052 (0.042)	0.003 (0.057)	-0.005 (0.050)	0.032 (0.019)	-0.002 (0.057)
HH expenditure (4° quartile)	-0.078** (0.035)	0.026 (0.046)	0.033 (0.041)	-0.057 (0.046)	0.076*** (0.019)	-0.024 (0.047)
Constant	2.850*** (0.483)	-5.448*** (0.401)	2.288*** (0.524)	-0.463 (0.395)	1.773*** (0.207)	1.826*** (0.512)
No. Observations	1,251	1,251	1,251	1,251	1,251	1,251
R-squared	0.327	0.403	0.112	0.061	0.326	0.109

*** p<0.01, ** p<0.05, * p<0.10. Cluster-robust standard errors at household level in parentheses.

Table 7. Child labor hours and labor market outcomes, linear probability model with fixed effects. Whole sample.

	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
Child labor hours	0.043** (0.018)	0.000 (0.013)	-0.028* (0.016)	-0.017** (0.008)	0.002 (0.011)	-0.045** (0.019)
Child labor hours*age	-0.003** (0.001)	-0.000 (0.001)	0.002 (0.001)	0.001** (0.001)	0.000 (0.001)	0.004** (0.002)
Age	-0.299*** (0.058)	0.513*** (0.047)	-0.019 (0.053)	0.007 (0.034)	-0.202*** (0.032)	-0.012 (0.071)
Community shocks	-0.096 (0.060)	0.241*** (0.067)	-0.145*** (0.051)	-0.023 (0.038)	0.023 (0.032)	-0.168*** (0.059)
Household size in adulthood	-0.030 (0.019)	0.018 (0.017)	-0.015 (0.013)	-0.007 (0.015)	0.033*** (0.009)	-0.022 (0.020)
Hours of school per week in childhood	-0.002 (0.002)	0.000 (0.001)	0.002 (0.002)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.002)
Primary	-0.003 (0.112)	0.149 (0.098)	-0.232* (0.123)	0.171** (0.074)	-0.085 (0.099)	-0.061 (0.162)
Secondary	0.425*** (0.096)	-0.249* (0.131)	-0.012 (0.060)	-0.059 (0.076)	-0.105 (0.184)	-0.070 (0.117)
Married	0.182** (0.070)	-0.160** (0.070)	0.146 (0.090)	0.058 (0.065)	-0.226*** (0.067)	-0.205* (0.112)
No. empl. household members	0.159*** (0.031)	-0.036 (0.028)	0.072** (0.030)	0.011 (0.027)	-0.206*** (0.035)	0.083* (0.044)
Orphan in adulthood	-0.064 (0.080)	-0.030 (0.082)	-0.115 (0.114)	0.049 (0.058)	0.159** (0.074)	-0.065 (0.133)
Rural area	0.098 (0.092)	0.003 (0.068)	-0.054 (0.068)	0.057 (0.049)	-0.104* (0.052)	0.003 (0.096)
HH expenditure (2° quartile)	-0.022 (0.080)	0.062 (0.057)	-0.026 (0.067)	-0.064 (0.048)	0.050 (0.038)	-0.090 (0.083)
HH expenditure (3° quartile)	-0.079* (0.046)	0.040 (0.045)	-0.025 (0.037)	-0.024 (0.041)	0.088*** (0.030)	-0.048 (0.046)
HH expenditure (4° quartile)	0.013 (0.097)	-0.114 (0.082)	-0.009 (0.077)	0.084 (0.052)	0.026 (0.073)	0.075 (0.108)
Constant	3.586*** (0.758)	-5.794*** (0.558)	0.753 (0.666)	-0.225 (0.473)	2.681*** (0.421)	0.528 (0.900)
No. Observations	602	602	602	602	602	602
R-squared	0.492	0.512	0.110	0.119	0.385	0.112

*** p<0.01, ** p<0.05, * p<0.10. Cluster-robust standard errors at household level in parentheses.

Table 8. Child labor hours and labor market outcomes, linear probability model with fixed effects. Female sample.

	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
Child labor hours	0.003 (0.010)	-0.007 (0.013)	-0.011 (0.014)	0.005 (0.015)	0.011 (0.007)	-0.007 (0.015)
Child labor hours*age	-0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.001 (0.001)
Age	-0.100** (0.042)	0.387*** (0.055)	-0.337*** (0.068)	0.121** (0.044)	-0.072*** (0.020)	-0.216*** (0.066)
Community shocks	-0.044 (0.044)	0.110* (0.061)	-0.152** (0.069)	0.087** (0.038)	-0.001 (0.024)	-0.065 (0.062)
Household size in adulthood	0.012 (0.009)	0.018 (0.016)	-0.060*** (0.015)	-0.022 (0.013)	0.052*** (0.006)	-0.082*** (0.017)
Hours of school per week in childhood	0.000 (0.002)	0.000 (0.002)	-0.001 (0.003)	0.000 (0.002)	0.001 (0.001)	-0.001 (0.003)
Primary	-0.075 (0.090)	0.278*** (0.093)	-0.105 (0.088)	-0.075 (0.085)	-0.024 (0.048)	-0.180 (0.129)
Secondary	-0.005 (0.081)	0.210* (0.123)	-0.013 (0.185)	-0.102 (0.135)	-0.091 (0.173)	-0.115 (0.169)
University	0.214*** (0.067)	-0.167 (0.125)	-0.096 (0.188)	0.389** (0.175)	-0.340** (0.150)	0.293** (0.124)
Married	-0.105*** (0.036)	-0.009 (0.060)	0.290*** (0.074)	-0.070 (0.058)	-0.106*** (0.030)	0.219*** (0.063)
No. empl. household members	0.031 (0.021)	-0.044 (0.030)	0.078*** (0.021)	0.050 (0.032)	-0.116*** (0.022)	0.128*** (0.040)
Orphan in adulthood	-0.084 (0.093)	-0.034 (0.119)	0.045 (0.093)	0.016 (0.104)	0.058 (0.034)	0.060 (0.111)
Rural area	0.018 (0.057)	0.131 (0.094)	-0.190** (0.070)	0.009 (0.084)	0.032 (0.025)	-0.181 (0.113)
HH expenditure (2° quartile)	-0.178*** (0.063)	0.060 (0.098)	0.039 (0.073)	0.057 (0.093)	0.022 (0.014)	0.096 (0.079)
HH expenditure (3° quartile)	-0.110* (0.055)	0.027 (0.082)	0.101 (0.074)	-0.076 (0.081)	0.058* (0.030)	0.025 (0.085)
HH expenditure (4° quartile)	-0.071 (0.051)	0.017 (0.108)	-0.007 (0.093)	0.054 (0.130)	0.006 (0.046)	0.048 (0.090)
Constant	1.440** (0.530)	-4.714*** (0.664)	4.536*** (0.762)	-1.183** (0.494)	0.920*** (0.223)	3.353*** (0.730)
No. Observations	649	649	649	649	649	649
R-squared	0.268	0.331	0.242	0.102	0.406	0.216

*** p<0.01, ** p<0.05, * p<0.10. Cluster-robust standard errors at household level in parentheses.

Table 9. Child labor hours and labor market outcomes, linear probability model with fixed effects. Male sample.

Child labor	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours	-0.281 (0.372)	0.142 (0.673)	0.836 (0.651)	-0.643 (0.421)	-0.054 (0.319)	0.193 (0.704)
>1 hours*age	0.030 (0.034)	-0.034 (0.063)	-0.077 (0.064)	0.074* (0.039)	0.007 (0.031)	-0.003 (0.071)
(b) <u>More than 8 hours (20° percentile)</u>						
>8 hours	0.535** (0.205)	-0.646** (0.241)	-0.213 (0.291)	0.246 (0.352)	0.078 (0.230)	0.033 (0.296)
>8 hours*age	-0.046** (0.017)	0.058** (0.023)	0.018 (0.024)	-0.026 (0.030)	-0.004 (0.019)	-0.008 (0.026)
(c) <u>More than 14 hours (40° percentile)</u>						
>14 hours	0.475*** (0.161)	-0.093 (0.270)	-0.460 (0.308)	0.083 (0.227)	-0.005 (0.147)	-0.377 (0.316)
>14 hours*age	-0.040*** (0.014)	0.013 (0.023)	0.036 (0.023)	-0.008 (0.020)	0.000 (0.012)	0.027 (0.025)
(d) <u>More than 20.9 hours (60° percentile)</u>						
>20.9 hours	0.686*** (0.221)	-0.124 (0.228)	-0.779** (0.291)	0.141 (0.186)	0.076 (0.166)	-0.637*** (0.226)
>20.9 hours*age	-0.057*** (0.018)	0.013 (0.019)	0.064*** (0.022)	-0.013 (0.014)	-0.007 (0.013)	0.051*** (0.019)
(e) <u>More than 30 hours (80° percentile)</u>						
>30 hours	0.616 (0.520)	0.147 (0.504)	-0.439 (0.386)	-0.193 (0.382)	-0.131 (0.335)	-0.631 (0.373)
>30 hours*age	-0.052 (0.041)	-0.012 (0.038)	0.033 (0.031)	0.020 (0.029)	0.011 (0.026)	0.053* (0.029)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all children between 7 and 15 years old. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 10. Threshold effects of child labor hours, linear probability model with fixed effects.

Whole sample.

Child labor on the household farm	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours spent in the household farm	0.182 (0.262)	-0.181 (0.323)	0.129 (0.302)	-0.074 (0.347)	-0.055 (0.242)	0.054 (0.369)
>1 hours*age	-0.022 (0.022)	0.020 (0.028)	-0.009 (0.027)	0.009 (0.029)	0.003 (0.020)	-0.000 (0.031)
(b) <u>20° percentile</u>						
>4 hours spent in the household farm	0.071 (0.201)	-0.067 (0.258)	-0.048 (0.266)	-0.100 (0.190)	0.144 (0.126)	-0.148 (0.289)
>4 hours*age	-0.006 (0.016)	0.012 (0.021)	-0.002 (0.021)	0.008 (0.016)	-0.012 (0.009)	0.006 (0.023)
(c) <u>40° percentile</u>						
>6 hours spent in the household farm	0.097 (0.194)	0.257 (0.303)	-0.306 (0.304)	-0.127 (0.191)	0.079 (0.124)	-0.433 (0.326)
>6 hours*age	-0.008 (0.016)	-0.014 (0.024)	0.018 (0.024)	0.009 (0.016)	-0.006 (0.009)	0.028 (0.025)
(d) <u>60° percentile</u>						
>10 hours spent in the household farm	0.330 (0.248)	-0.006 (0.337)	-0.542 (0.326)	0.133 (0.211)	0.085 (0.137)	-0.409 (0.287)
>10 hours*age	-0.025 (0.020)	0.007 (0.028)	0.039 (0.026)	-0.015 (0.017)	-0.005 (0.011)	0.023 (0.024)
(e) <u>80° percentile</u>						
>16 hours spent in the household farm	0.330 (0.294)	0.063 (0.313)	-0.457 (0.404)	0.186 (0.372)	-0.121 (0.252)	-0.272 (0.348)
>16 hours*age	-0.029 (0.024)	-0.004 (0.023)	0.041 (0.033)	-0.018 (0.030)	0.009 (0.019)	0.023 (0.028)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all children between 7 and 15 years old. All regressions include the variable “Hours spent in domestic chores” and its interaction with age. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 11. Threshold effects of child labor hours spent on the household farm, linear probability model with fixed effects. Whole sample.

Child labor in domestic chores	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours spent in domestic chores	-0.270 (0.411)	-0.022 (0.430)	0.268 (0.527)	-0.073 (0.361)	0.097 (0.275)	0.195 (0.475)
>1 hours*age	0.037 (0.035)	-0.021 (0.036)	-0.028 (0.049)	0.014 (0.032)	-0.002 (0.025)	-0.014 (0.043)
(b) <u>20^o percentile</u>						
>4.3 hours spent in domestic chores	0.227 (0.288)	-0.046 (0.253)	-0.169 (0.250)	-0.251 (0.272)	0.240** (0.116)	-0.421* (0.240)
>4.3 hours*age	-0.018 (0.024)	-0.004 (0.021)	0.015 (0.022)	0.024 (0.021)	-0.017* (0.009)	0.039* (0.020)
(c) <u>40^o percentile</u>						
>8.1 hours spent in domestic chores	0.348 (0.224)	-0.037 (0.324)	-0.196 (0.222)	0.012 (0.193)	-0.126 (0.113)	-0.184 (0.255)
>8.1 hours*age	-0.029 (0.018)	0.000 (0.026)	0.019 (0.018)	-0.002 (0.017)	0.012 (0.009)	0.017 (0.021)
(d) <u>60^o percentile</u>						
>12.6 hours spent in domestic chores	0.339 (0.250)	0.086 (0.255)	-0.311 (0.265)	-0.115 (0.173)	0.002 (0.145)	-0.427* (0.229)
>12.6 hours*age	-0.028 (0.020)	-0.008 (0.021)	0.025 (0.021)	0.012 (0.014)	-0.000 (0.011)	0.037** (0.018)
(e) <u>80^o percentile</u>						
>19 hours spent in domestic chores	0.604 (0.421)	0.021 (0.456)	-0.852** (0.320)	-0.045 (0.342)	0.272 (0.362)	-0.897 (0.531)
>19 hours*age	-0.049 (0.033)	-0.002 (0.035)	0.068*** (0.023)	0.001 (0.026)	-0.018 (0.028)	0.070* (0.040)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all children between 7 and 15 years old. All regressions include the variable “Hours spent in the household farm” and its interaction with age. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 12. Threshold effects of child labor hours in domestic chores, linear probability model with fixed effects. Whole sample.

Child labor	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours of child labor	-0.731 (0.620)	1.271 (1.236)	0.886 (0.998)	-0.910* (0.484)	-0.516 (0.553)	-0.024 (1.296)
>1 hours*age	0.089 (0.057)	-0.135 (0.120)	-0.085 (0.103)	0.078 (0.047)	0.052 (0.056)	-0.007 (0.133)
(b) <u>20^o percentile</u>						
>8 hours of child labor	1.347*** (0.221)	-0.886** (0.355)	-0.372 (0.525)	0.016 (0.251)	-0.105 (0.371)	-0.356 (0.576)
>8 hours*age	-0.109*** (0.021)	0.071** (0.032)	0.023 (0.047)	0.001 (0.023)	0.014 (0.032)	0.024 (0.052)
(c) <u>40^o percentile</u>						
>14 hours of child labor	0.943*** (0.217)	-0.024 (0.361)	-0.615 (0.414)	-0.235 (0.188)	-0.069 (0.150)	-0.850* (0.416)
>14 hours*age	-0.076*** (0.018)	0.003 (0.030)	0.045 (0.032)	0.021 (0.017)	0.006 (0.012)	0.066* (0.034)
(d) <u>60^o percentile</u>						
>20.9 hours of child labor	1.213*** (0.387)	-0.205 (0.366)	-0.965** (0.385)	-0.026 (0.141)	-0.018 (0.192)	-0.991** (0.427)
>20.9 hours*age	-0.096*** (0.031)	0.018 (0.029)	0.072** (0.029)	0.005 (0.012)	0.001 (0.017)	0.077** (0.033)
(e) <u>80^o percentile</u>						
>30 hours of child labor	1.201* (0.642)	-0.270 (0.602)	-0.530 (0.376)	-0.201 (0.403)	-0.200 (0.428)	-0.731 (0.516)
>30 hours*age	-0.096* (0.049)	0.018 (0.046)	0.038 (0.031)	0.022 (0.030)	0.019 (0.034)	0.059 (0.042)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all girls between 7 and 15 years old. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 13. Threshold effects of child labor hours, linear probability model with fixed effects.

Female sample.

Child labor on the household farm	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours spent in the hh farm	0.843** (0.357)	-0.070 (0.432)	-0.342 (0.446)	-0.032 (0.359)	-0.400 (0.290)	-0.374 (0.663)
>1 hours*age	-0.080** (0.031)	0.002 (0.035)	0.032 (0.039)	0.004 (0.030)	0.043 (0.026)	0.036 (0.058)
(b) <u>20° percentile</u>						
>4 hours spent in the hh farm	0.332 (0.364)	-0.204 (0.424)	-0.049 (0.409)	-0.145 (0.243)	0.066 (0.217)	-0.194 (0.426)
>4 hours*age	-0.027 (0.029)	0.021 (0.034)	0.000 (0.034)	0.009 (0.021)	-0.003 (0.018)	0.009 (0.038)
(c) <u>40° percentile</u>						
>6 hours spent in the hh farm	0.607** (0.295)	0.421 (0.446)	-0.724 (0.433)	-0.342 (0.244)	0.037 (0.200)	-1.065** (0.388)
>6 hours*age	-0.053** (0.025)	-0.035 (0.035)	0.059* (0.034)	0.030 (0.021)	-0.001 (0.017)	0.089** (0.032)
(d) <u>60° percentile</u>						
>10 hours spent in the hh farm	0.833** (0.388)	0.161 (0.447)	-0.585 (0.491)	-0.290 (0.250)	-0.121 (0.232)	-0.874** (0.385)
>10 hours*age	-0.066** (0.032)	-0.016 (0.037)	0.043 (0.038)	0.026 (0.022)	0.013 (0.020)	0.069** (0.031)
(e) <u>80° percentile</u>						
>16 hours spent in the hh farm	1.448*** (0.429)	-0.180 (0.427)	-0.780* (0.432)	0.152 (0.133)	-0.640*** (0.229)	-0.628 (0.440)
>16 hours*age	-0.118*** (0.035)	0.010 (0.035)	0.070* (0.035)	-0.011 (0.011)	0.049** (0.019)	0.059 (0.035)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all girls between 7 and 15 years old. All regressions include the variable “Hours spent in domestic chores” and its interaction with age. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 14. Threshold effects of child labor hours on the household farm, linear probability model with fixed effects. Female sample.

Child labor in domestic chores	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours spent in domestic chores	-0.724 (0.606)	0.805 (0.778)	0.322 (0.802)	-0.326 (0.351)	-0.078 (0.522)	-0.004 (0.898)
>1 hours*age	0.099* (0.051)	-0.095 (0.074)	-0.032 (0.078)	0.020 (0.035)	0.008 (0.049)	-0.012 (0.086)
(b) <u>20° percentile</u>						
>4.3 hours spent in domestic chores	0.274 (0.511)	-0.282 (0.471)	0.025 (0.432)	-0.145 (0.180)	0.128 (0.207)	-0.120 (0.417)
>4.3 hours*age	-0.014 (0.044)	0.023 (0.039)	-0.013 (0.040)	0.014 (0.017)	-0.009 (0.019)	0.001 (0.038)
(c) <u>40° percentile</u>						
>8.1 hours spent in domestic chores	0.717 (0.426)	-0.072 (0.379)	-0.544 (0.366)	-0.002 (0.221)	-0.099 (0.300)	-0.546 (0.417)
>8.1 hours*age	-0.056 (0.035)	0.009 (0.031)	0.034 (0.030)	0.002 (0.019)	0.011 (0.025)	0.037 (0.034)
(d) <u>60° percentile</u>						
>12.6 hours spent in domestic chores	0.710* (0.386)	0.160 (0.320)	-0.717* (0.351)	-0.076 (0.226)	-0.077 (0.281)	-0.793* (0.431)
>12.6 hours*age	-0.054* (0.031)	-0.012 (0.026)	0.050* (0.028)	0.010 (0.018)	0.006 (0.023)	0.060* (0.033)
(e) <u>80° percentile</u>						
>19 hours spent in domestic chores	0.566 (0.601)	-0.254 (0.437)	-0.581 (0.402)	-0.134 (0.354)	0.403 (0.419)	-0.715 (0.573)
>19 hours*age	-0.044 (0.045)	0.017 (0.033)	0.043 (0.029)	0.011 (0.027)	-0.027 (0.032)	0.054 (0.043)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all girls between 7 and 15 years old. All regressions include the variable “Hours spent in the household farm” and its interaction with age. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 15. Threshold effects of child labor hours in domestic chores, linear probability model with fixed effects. Female sample.

Child labor	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>Works more than 1 hour</u>						
>1 hours of child labor	0.379 (0.439)	-0.783 (0.742)	0.667 (0.790)	-0.640 (0.654)	0.376 (0.242)	0.027 (0.940)
>1 hours*age	-0.050 (0.042)	0.055 (0.073)	-0.057 (0.078)	0.082 (0.064)	-0.031 (0.023)	0.025 (0.095)
(b) <u>20^o percentile</u>						
>8 hours of child labor	0.100 (0.352)	-0.511 (0.516)	-0.171 (0.374)	0.175 (0.526)	0.408 (0.258)	0.003 (0.463)
>8 hours*age	-0.014 (0.027)	0.052 (0.045)	0.018 (0.031)	-0.024 (0.045)	-0.032 (0.021)	-0.006 (0.041)
(c) <u>40^o percentile</u>						
>14 hours of child labor	0.102 (0.211)	-0.171 (0.365)	-0.379 (0.341)	0.239 (0.385)	0.210 (0.197)	-0.140 (0.434)
>14 hours*age	-0.010 (0.016)	0.019 (0.030)	0.030 (0.026)	-0.022 (0.031)	-0.017 (0.016)	0.008 (0.034)
(d) <u>60^o percentile</u>						
>20.9 hours of child labor	0.178 (0.301)	0.015 (0.444)	-0.571 (0.478)	0.164 (0.384)	0.215 (0.191)	-0.407 (0.372)
>20.9 hours*age	-0.015 (0.022)	0.000 (0.036)	0.049 (0.038)	-0.019 (0.030)	-0.016 (0.015)	0.031 (0.033)
(e) <u>80^o percentile</u>						
>30 hours of child labor	-0.101 (0.314)	0.432 (0.497)	-0.212 (0.581)	-0.198 (0.718)	0.080 (0.353)	-0.410 (0.561)
>30 hours*age	0.008 (0.023)	-0.033 (0.036)	0.012 (0.046)	0.020 (0.058)	-0.007 (0.027)	0.032 (0.045)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all boys between 7 and 15 years old. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 16. Threshold effects of child labor hours, linear probability model with fixed effects.

Male sample.

Child labor on the household farm	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours spent in the hh farm	-0.154 (0.362)	-0.121 (0.405)	0.110 (0.470)	-0.181 (0.514)	0.346 (0.303)	-0.071 (0.429)
>1 hours*age	0.006 (0.028)	0.019 (0.036)	-0.010 (0.040)	0.019 (0.041)	-0.034 (0.025)	0.008 (0.036)
(b) <u>20° percentile</u>						
>4 hours spent in the hh farm	0.036 (0.254)	-0.090 (0.338)	-0.383 (0.300)	0.007 (0.306)	0.429** (0.168)	-0.376 (0.337)
>4 hours*age	-0.004 (0.019)	0.014 (0.029)	0.021 (0.024)	0.003 (0.025)	-0.034** (0.013)	0.024 (0.027)
(c) <u>40° percentile</u>						
>6 hours spent in the hh farm	-0.019 (0.251)	-0.098 (0.362)	-0.411 (0.337)	0.194 (0.331)	0.333* (0.194)	-0.217 (0.338)
>6 hours*age	0.002 (0.019)	0.020 (0.030)	0.021 (0.027)	-0.018 (0.026)	-0.025* (0.015)	0.003 (0.027)
(d) <u>60° percentile</u>						
>10 hours spent in the hh farm	0.273 (0.257)	-0.274 (0.591)	-0.757* (0.417)	0.582* (0.295)	0.177 (0.195)	-0.176 (0.582)
>10 hours*age	-0.020 (0.020)	0.033 (0.049)	0.052 (0.035)	-0.053** (0.024)	-0.012 (0.015)	-0.001 (0.048)
(e) <u>80° percentile</u>						
>16 hours spent in the hh farm	-0.033 (0.243)	-0.111 (0.391)	-0.341 (0.372)	0.339 (0.542)	0.146 (0.280)	-0.002 (0.516)
>16 hours*age	0.006 (0.021)	0.011 (0.028)	0.024 (0.032)	-0.032 (0.044)	-0.009 (0.021)	-0.008 (0.042)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all boys between 7 and 15 years old. All regressions include the variable “Hours spent in domestic chores” and its interaction with age. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 17. Threshold effects of child labor hours on the household farm, linear probability model with fixed effects. Male sample.

Child labor in domestic chores	(1) Contributing family worker	(2) Own-account worker	(3) Employer	(4) Employee	(5) Other	(6) Nonvulnerable
(a) <u>More than 1 hour</u>						
>1 hours spent in domestic chores	-0.054 (0.350)	-0.504 (0.527)	0.201 (0.611)	0.069 (0.584)	0.288* (0.169)	0.270 (0.561)
>1 hours*age	0.002 (0.027)	0.024 (0.045)	-0.014 (0.056)	0.005 (0.050)	-0.018 (0.014)	-0.009 (0.046)
(b) <u>20^o percentile</u>						
>4.3 hours spent in domestic chores	-0.114 (0.314)	0.139 (0.557)	0.078 (0.414)	-0.463 (0.557)	0.359** (0.164)	-0.385 (0.621)
>4.3 hours*age	0.006 (0.024)	-0.024 (0.045)	0.004 (0.035)	0.041 (0.042)	-0.026** (0.013)	0.045 (0.047)
(c) <u>40^o percentile</u>						
>8.1 hours spent in domestic chores	-0.133 (0.235)	0.079 (0.408)	0.313 (0.325)	-0.236 (0.357)	-0.023 (0.172)	0.078 (0.426)
>8.1 hours*age	0.010 (0.018)	-0.013 (0.033)	-0.016 (0.026)	0.016 (0.030)	0.003 (0.014)	0.000 (0.034)
(d) <u>60^o percentile</u>						
>12.6 hours spent in domestic chores	-0.345 (0.282)	0.173 (0.283)	0.444 (0.378)	-0.501 (0.474)	0.230 (0.166)	-0.058 (0.314)
>12.6 hours*age	0.026 (0.022)	-0.020 (0.024)	-0.032 (0.031)	0.043 (0.039)	-0.018 (0.014)	0.012 (0.026)
(e) <u>80^o percentile</u>						
>19 hours spent in domestic chores	-0.003 (0.313)	0.886 (0.866)	-0.816 (0.578)	-0.176 (0.723)	0.109 (0.310)	-0.991 (0.970)
>19 hours*age	0.001 (0.023)	-0.069 (0.069)	0.068 (0.045)	0.008 (0.056)	-0.008 (0.026)	0.077 (0.073)

*** p<0.01, ** p<0.05, * p<0.10

Notes: Each group from (a) to (e) presents results from a separate regression for all boys between 7 and 15 years old. All regressions include the variable “Hours spent in the household farm” and its interaction with age. Each regression has a common set of controls: age, education, rural area of residence, quintile of household expenditure, number of household members and number of household members in employment, marital status, religion, loss of parents and community shocks during childhood. Cluster-robust standard errors at household level are in parentheses.

Table 18. Threshold effects of child labor hours in domestic chores, linear probability model with fixed effects. Male sample.