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Child labor, schooling and household wealth in African rural area: luxury axiom or wealth paradox[1]

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Abstract: This work uses MVPROBIT model and MICS surveys from rural areas of 8 sub-Saharan African countries to highlight the link between household wealth and child labor. It opposes "wealth paradox" approach of Bhalotra and Heady (2003) to "luxury axiom" approach of Basu and Van (1998). Our analysis is based on the assumption of differences in the wealth's effect according to the gender and the type of labor. The results suggest that heterogeneity among children (gender) and labor activities leads to heterogeneous rules concerning the link between child labor and household wealth.

Keywords: child labor, schooling, luxury axiom, wealth paradox
JEL classification codes: I30, J13, J22, D13, O12

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1. INTRODUCTION

Child labor has received considerable attention in economic literature. It is usually presented in the context of the "luxury axiom" following resulting the works of Basu and Van (1998). Previous works generally reveal a problem of "stark poverty" whereby the parents are obliged to send their children to work for survival reasons (Basu and Van, 1998, Huebler, 2008). Therefore, child labor is perceived as a component of household wealth, and leisure (including education) as a luxury good in the sense that the poorest households cannot afford to consume it. There is a large and well-documented literature supporting this assumption (cf. Huebler, 2008). However, this view has recently encountered significant opposition. Indeed, recent works show that child labor is positively correlated with household wealth. This situation appears particularly in the case of labor market and/or land market imperfection (reinforce by credit market failure), in rural area of agrarian society. In their pioneering work, Bhalotra and Heady (2003), describe the counter-intuitive situation where children in land rich households are more likely to work and less likely to attend school than children in land poor households. Productive assets such as land affect child labor in two opposite directions:

- A negative wealth effect, where large landholdings generate higher income and making easier for household to forgo the income generate by child labor.

- A positive effect in absence of a perfect land and labor market, where owner of land who are unable to productively hire labor on their farms have an incentive to employ their own children.

The authors argue that the incentive effect can be large enough to offset the wealth effect yielding a paradoxical situation where asset rich households have more children in work than asset poor household.

As a result, economists have questioned the link between household wealth and child labor. Nkamleu (2006) notes different effects of different wealth proxies on child labor participation. Basu et al. (2010) suggest the relationship between land holdings and child labor possibly be an inverted-U shaped. All the previous analyses are questionable in two essential points: the definition of child labor in accordance with the theoretical model and the empirical methodology. Indeed, the wealth paradox suggests the existence of an incentive for parents to make their own children work on the household farm due to land and labor market failures (reinforced by credit market failure). We expect a positive association between child labor demand and households' the farm size and a negative one between child labor supply, outside the household. However, in their definition of child labor, Basu et al. (2010), and

Kambhampati and Rajan (2005), consider either the work done by children including domestic work, or the work done without domestic works. This aggregation of child labor may bias results inducing an erroneous interpretation of the wealth effect. Furthermore, authors fail to take into account the interdependency between child work on family farm and the other forms of work.

In this paper, we assume that children's time is shared between schooling, labor outside the household for a non member, labor for a household member, and household chores. We use simultaneous Probit model to show the link between the household wealth and the children's participation in Labor activities. The paper mainly relies on the works of Bhalotra and Heady (2003) and presents the model developed by their precursors in section 2. The description of the data and our empirical specification are in section 3. The results and conclusion are presented in section 4 and 5, respectively.

2. THE ASSUMPTION OF THE WEALTH PARADOX APPRAOCH OF BHALOTRA AND HEADY

The wealth paradox approach emerges with the developments of Bhalotra and heady (2003). The authors use a two-period model to examine how imperfect labor, land and credit markets affect child labor participation. Their model allows explaining to which extent child work in the first period impacts on productivity in the second one relying on the assumptions that

parents always work, households do not contract out labor, and children do not engage in bargaining with their parents.

In the first period, the parents produce output on the farm using land, their own labor and possibly their children's labor. The children may also attend school. So, in the first period, the household income is given by the farm production function:

$$y_1 = f_1(A_0, A_{r1}, L_{p1}, L_{c1}, L_{h1}) - W_{h1}L_{h1} - P_{r1}A_{r1} \quad (2.1)$$

Where:

- A_0, A_{r1} represent owned and rented land area
- L_{p1}, L_{c1}, L_{h1} represent parents, children and hired labor
- W_{h1} the wage of hired labor
- P_{r1} the price of rented land

Under imperfect labor market, hired labor and family labor are not perfect substitute. By the same way, under imperfect land market, the owned land and the rented land are not perfect substitute.

In the second period, the children have grown up and they may have left the household. Their contribution to family income is separate from household farm production. Children's wages are function of first period labor (L_{c1}) and schooling. So, household income is given by

$$y_2 = f_2(A_0, A_{r2}, L_{p2}, L_{h2}) + W_{c2}(S, L_{c1})L_{c2} - W_{h2}L_{h2} - P_{r2}A_{r2} \quad (2.2)$$

Given the assumption that utility is time separable, each household maximizes

$$U = U_1(X_1, L_{p1}, L_{c1}, S) + U_2(X_2, L_{p2}, L_{c2}) \quad (2.3)$$

Subject to

- $K_1 = K_0 + y_1 - X_1 - C(S)$ (2.4)

  Financial wealth in period 1 depends on the initial endowment of household (K_0), household income (y_1) and consumption (X_1) in the first period, the cost of schooling (C).

- Financial wealth in the second period depends on K_1, the household's access to financial services under imperfect capital markets and the interest rate (r). This interest rate depends on the household wealth, the personal characteristics (Z), ownership of land (A_0) and the household's credit worthiness. Hence, the second-period budget constraint can be written as :

  $$X_2 = y_2 + g(K_1, A_0; Z) \quad (2.5)$$

And the optimal quantity (amount) of child labor is given by:

$$L_{c1} = h_2(A_0, X_1, W_{h1}, W_{h2}, A_{r1}, A_{r2}; Z, e) \quad (2.6)$$

Where X_1 captures the (negative) income effects on child labor, associated with both land and other financial capital.

Conditioning on X_1, the expected sign of land coefficient will depend on which market imperfection dominates.

1/ In the case of imperfect land and labor markets, households with lands to farm have an incentive to employ their own children, due to the lack of external labor and also because they can not rented-out or sell unfarmed lands. This incentive increases with land size (since land to farm increases). However, at the same time, land size implies weaker credit constraints and less child labor.

2/ In the case of a perfect land market, even if the labor market is imperfect, the unused or unfarmed land can be rented-out. So land size has a negative effect on child participation to labor. The authors stress that the negative effect is reinforced by credit market imperfection. The effect is null if the credit market is perfect.

3/ in the case of a perfect labor market, labor can be hired out and the positive effect of land disappears. In this case, the effect of land is null if the credit market is assumed to be perfect.

The authors offer an interesting discussion of the link between household wealth (land or farm size) and children labor market participation. The relation can be negative, positive or null, depending on which market imperfection dominates.

However, we wonder how the income of each household member is pooled in

the second period. The authors assume that children transfer all their earnings to the family in the second period. However, it is probably more likely that a child only transfers a fraction of his income to his family and that the size of this transfer be determined by the child's altruistic motives. This assumption would allow us to consider differences among children according to their gender, their relationship with respect to the household head, and so forth. As an example, Knowles and Anker (1981) show that the part of transfers received from girls is lower than the part received from boys. This result potentially explaining smaller investments in girls education compare to that of boys (Koissy-Kpein, 2008), as private transfers constitute an important component of household income in developing countries.

An important work by Basu et al. (2010) suggests the possibility of a non-monotonous relation between land and child labor. According to the authors, poverty remains the primary cause of child labor. They argue that, since in developing countries the labor market is imperfect, when a household acquires some land, the land itself generates employment possibilities, so children's labor participation rise as land rises. Basu et al. (2010) talk about a p*erverse response to greater wealth*. However, if the land continues to rise and exceeds a maximum of landholding, a household becomes so well–off that it will no longer make its children work. So, children labor participation begins to fall as land continues to rise. The authors suggest the possibility of an inverted U relationship between labor and land holdings.

Nkamleu (2006) shows the existence of ambiguous effects of wealth on child labor participation depending on whether farm size, the land quality, productivity (productivity class of cocoa farm measured in yield/ha), and the quality of the household main residence were used as proxies for household wealth in the cocoa sector of Côte d'Ivoire,

In particular, he finds that child labor increases with the farm size and land quality, suggesting that children of land-rich households are more likely to be working than the children of land-poor households (wealth paradox). However, the quality of the household gives evidence of a positive association between poverty and child labor (luxury axiom). Nkamleu concludes that house quality is a much more relevant and robust wealth proxy, and child labor is mainly explained by poverty.

The luxury axiom (wealth paradox) has also been tested in another context than farm rural areas. Indeed, Kambhampati and Rajan (2005) show that the effect of father's wage only seems to support the luxury axiom. On the contrary, mother's employment seems to increase children labor, especially among girls, and this effect is only mitigated when mother's wage increases quite significantly.

According to the wealth paradox approach, there is an incentive of parents to employ their own children on the household farm due to land and labor market failure. In this case, the authors refer to labor for the family in household

farms. We expect that rich-households lands in rural areas are more likely to use child labor and less likely to send their children to work outside the household for a non member. So the child labor demand within the household is expected to increase with farm size and the child labor supply to decrease with the latter. Previous contributions have not really examined this scenario. Child labor is defined as the work done by children with and without domestic works (Basu et al., 2010, Kambhampati and Rajan, 2005). This aggregation of child labor may bias results and yield to misinterpreting the actual wealth's effect. In addition, even if the definition of child labor remains consistent with the model discussion (Bhalotra and Heady, 2003, Nkamleu, 2006), the empirical methodology used is questionable. The authors do not take into account the interdependency between child work on family farm and the other labor activities. Indeed, the reason why a child works on the family farm or the quantity of labor provided can depend on its contribution to another task (household chores or paid labor outside the household) and vice versa. Consequently, we can have a correlation between the different labor activities that can bias the results.

Authors generally aggregate across gender, rural and urban area, type of child work. They do not differentiate between gender, type of labor, or living area. The main contribution of this study is to extend the empirical framework by explicitly accounting the interdependency between child work on family farm and the other activities. In this context, we allow that the children's time be

shared between schooling, labor outside the household for a non-member, labor for a household member and household chores.

3. EMPIRICAL FRAMEWORK

a. DATA AND DESCRIPTIVE ANALYSIS

For our analysis, we use the third round of the Multiple Indicator Cluster Surveys (MICS), which was developed by UNICEF (in collaboration with various UN organizations) and carried out in over 50 countries in 2005-06. This third round has been an important data source for monitoring the Millennium Development Goals with 21 MDG indicators collected.

Concerning the quality of the data, the MICS surveys are among the best for developing countries. The samples are representative at national and sub national levels. The MICS surveys provide cross-country comparable data because their methodologies and questionnaires are standardized.

In MICS, three model questionnaires were developed: a household questionnaire, a questionnaire for women aged 15-49, and a questionnaire for children under the age of 5. The modules available collected data on various subjects. For each household member between 5-14 years old, the survey records the participation during seven days in school, paid or unpaid labor for a person apart from the household, domestic (non paid) labor, paid or unpaid

labor for a household members (farming, goods and services which are intended for sale or are sold on the market, and so forth).

The definition of child labor is fundamental. A wide variety of terms, statistical definitions and measures are used in the literature to define child labor. The differences in definitions generally depend on how "work" or "labor" is defined (economic or non-economic activities, market or non-market activities, hours, conditions of child work, and so forth), how we define "child"(age), and the data available. In developing countries, children are sometimes engage in non income generating activities, such as domestic or informal activities, making the analysis of children labor difficult. A child is generally classified as a worker if he is "economically active" (Ashagrie, 1993; Ganglmair, 2006); if he works a positive number of hours (Emerson and Souza, 2007, Sakellariou and Lall, 2000); or if he provides work on a regular basis for which he is remunerated or that results in output destined to the labor market. Huebler (2008) defines child labor as at least one hour per week of income generating activity or 28 hours or more per week in household chores. Muniz (2001) makes a difference between waged workers, non-waged workers and domestic workers. The Understanding Children's work project (UCW), conducted by ILO, UNICEF and the World Bank, differentiates between economic activities (market-oriented or not) which fall within the System of National Accounts (SNA) production boundary, and those activities (especially household chores) which do not (Guarcello et al., 2007).

The paper exploits information on household heads' children aged between 5 and 14 years old. Our definition of Labor includes paid or unpaid labor outside the household for a non member (LABOR1), paid or unpaid labor for a household member (LABOR2) and Household chores (HHC)

We limit our analysis to the children of the household head since we only have limited information on the other children (foster and informally adopted). Why are these children fostered out to another household? Various reasons can cause fostering such as informally contributing to the work activity of another household member, and so forth.

We assume the determinants of labor force participation differ for each activity. We also assume different partial effects of household wealth according to gender and the type of labor considered.

Our empirical model includes both land size in acres and a measure of permanent income based on assets based approach, as elements of the household wealth.

Table 1 presents basic summary statistics of children labor force participation and school enrollment for all countries in our estimation sample which includes 72918 children (37708 boys and 35210 girls) from Burundi (2005), Cameroon (2006), Central Africa Republic (CAR, 2006), Côte d'Ivoire (CIv, 2006), Gambia (2005-2006), Guinea (2006), Somalia (2006) and Togo (2006). The sample reveals that children are more engaged in HHC than any other

labor activities. Given that respondents were sampled in rural areas, it is not surprising that children are more engaged in family farming, than paid or unpaid labor outside the household for a non-family member. For instance, 52.1% of children in Côte d'Ivoire (CIv) work on a family farm, while only 5.4% provide LABOR1.

Similarly, we find that children in Gambia, Guinea, and Somalia provide respectively 40.8%, 53.2% and 47.2% of labor within household farm (LABOR2), while only 7%, 9.34%, 3.2% provide labor outside the household (LABOR1). With the exception of Cameroon and Guinea, this difference is even more important among children of land owners.

In most countries, children participation in LABOR2 seems to increase with farm size, except for Guinea and Central Africa rep. (CAR) where we observe a decrease when farm size is over 10 acres.

Similarly, with the exception of CIv, Gambia and Somalia, school participation is positively correlated with the farm size.

Consistent with prior expectations, girls exhibit lower schooling participation than boys, and the latter participate less household chores than girls. In about half of the countries under study, the proportion of girls providing LABOR1 is lower than that of boys (Cameroon, CAR, CIv, Togo). In contrast, boys are more likely to be working on family farms or family land, with the exception of CAR and Gambia. The finding may be evidence of "learning by doing' provided to boys who are expected to inherit the land.

b. MULTIVARIATE PROBIT FOR CHILD LABOR PARTICIPATION

We use a multivariate Probit approach to model children participation in schooling, LABOR1, LABOR2, and HHC activities in order to allow for the likely correlation among activities. The latter can be written as the following four equations model:

$$\begin{array}{ll} school^* = X_1\beta_1 + \varepsilon_1, & where \quad school = I(school^* > 0) \\ LABOR1^* = X_2\beta_2 + \varepsilon_2 & \quad\quad\quad\quad LABOR1 = I(LABOR1^* > 0) \\ LABOR2^* = X_3\beta_3 + \varepsilon_3 & \quad\quad\quad\quad LABOR2 = I(LABOR2^* > 0) \\ HHC^* = X_4\beta_4 + \varepsilon_4 & \quad\quad\quad\quad HHC = I(HHC^* > 0) \end{array} \qquad (3.1)$$

Where X_k is a vector of exogenous variables and β_k (k=1,k) the corresponding vector of parameters. School*, LABOR1*; LABOR2*, HHC* are the latent outcomes, and the component without the asterisk are binary indicators representing the observed outcomes. I(.) represents an indicator function which takes the value one if its argument is true and zero otherwise. The errors in each equation (ε_s) are assumed to be orthogonal to the predictors. We assume that the ε_s ~N(0, V), where V is a symmetric matrix with typical elements $\rho_{kl} = \rho_{lk}$ for k,l $\in\{\varepsilon_1, \ldots\varepsilon_4\}$ and k≠l, and $\rho_{kl} = 1$, for all k.

The element ρ_{kl} represents the unobserved correlation between the child's activities.

A Quadri-variate Probit is used to estimate the parameter of the model, and highlight the link between schooling, child labor outside of the household (LABOR1), child labor within household farm (LABOR2) and child labor in term of household chores (HHC) and household wealth.

The identification of such model requires some consideration for the identification of the model parameters. Maddala (1983, p. 122) states that for

the two equations Probit model, the parameters of the second equation are not identified if there are no exclusion restrictions on the exogenous variables. Wilde (2000) demonstrates that no additional restrictions on the parameters are needed to achieve the identification of the multivariate Probit model with endogenous dummy regressors. Identification only requires the existence of one varying exogenous regressor. Under standard conditions, the SML estimator is consistent as the number of draws and the number of observations tend to infinity. Thus, other things equal, the more draws there are, the more accurate the results. We apply the rule-of-thumb that the number of draws made by the GHK estimator for each simulation is the square root of the number of observations (see Cappellari and Jenkins, 2003).

We consider two tests for our analysis.

The first one consists in checking the null hypothesis of independence between decisions. The significance of the correlation coefficient ρ means that the non-explained component (residual) related to the fact of a child working in one activity is linked to the non explained component of working decision in another activity.

Secondly, we test the null hypothesis H_0: $\beta_k = \beta_j$; $k \neq j$, to verify whether the decomposition of activities is justified. The decomposition is justified if the determinants of labor participation differ according to labor activities. The independent variables are:

- The child age.

- The demographic composition of the household. We define 12 categories for male and female of less than 5 years old, 5 to 14 years old (here, we made a distinction between children of the household head, who are sisters and brothers of the child, and the other children in the household), 15 to 18 years old, 18 to 59 years old and more than 60 years old. The category of female of more than 60 years represents the basis. We expect a lower probability to make labor with the presence of members between 15 to 59 years old. We also expect a lower participation in HHC with the presence of female between 15-59 years old, especially for girls. Since the schooling concerns mainly children from 5 to 14 years old, we expect a lower probability to attend school with the presence of siblings, between 5-18 years old. We expect that the presence of other children of this age will favor school participation, especially because of their contribution to labor.

- The household's head education and sex. Since households headed by female are generally among the poor, we expect a higher participation of children in labor outside the household. However, since women are generally more altruistic, we expect a higher probability of schooling for children from these households.

  Concerning the head education, we expect a lower participation in labor for the children of educated head, and a higher probability of schooling.

- As in the works of Nkamleu, we use different proxies for the measure of household economic wealth: size in acres of the land owned by the household and permanent income based on assets based approach.

  Concerning the measure of the permanent income, the MICS provide information about household ownership of various assets and goods, and characteristics of household dwelling such as source of drinking water, main floor/wall material, access to electricity, and so forth. Using principal component analysis, a wealth index was constructed for each country. We use the index provide by the surveys and each household is assigned like in Filmer and Pritchett (2001) for India, to the bottom 40 percent, the middle 40 percent and the top 20 percent of the household.

4. RESULTS AND DISCUSSION

Our discussion of earlier contributions suggests poorest households (in terms of landownership) can have an incentive to send their children to work outside the household (LABOR1) to provide additional income ("luxury axiom"). On the contrary, richest households (in terms of landownership) have an incentive to send their children to work on their own farm (LABOR2), because of the labor, land and credit imperfection ("wealth paradox"). These theoretical predictions suggest a decrease of LABOR1 and an increase of LABOR2 with landholding. Estimation results are reported in Tables 1 and 2.

In most countries, we reject the null hypothesis that the choice between labor activities is not simultaneously interrelated, ρ_{kl} is significantly not null. Our results also indicate that we cannot reject the existence of systematic differences in the determinants of participation in aforementioned labor activities between girls and boys in rural. Both these previous tests justify our disaggregation according to the type of child labor and the child's sex. There has a difference, among activities, in the way that the household wealth influences them. For instance, while boys' participation in LABOR2 increases with land size owned by households in Guinea and Cameroon, no significant association is found for girls. Similarly, in Guinea, girls' participation in HHC does not appear to depend on wealth (land size and permanent income), while the boys' participation increases up to a certain threshold and then decreases with farm size.

Concerning our discussion about the link between household landholding and child participation in household farm works, the proposition of Bhalotra and Heady, of an increase of participation in labor with the household wealth, seems predominant. Indeed, the participation in LABOR2 increases with the land size for girls and boys in Burundi, CAR, CIv, Gambia, Somalia and Togo, and only for boys in Guinea and Cameroon. However, we note that the children of the richest land household (except boys in Cameroon and Guinea), have a lower probability to make labor. We find here the proposed scheme of Basu and his co-authors of a non-monotonous relation between land and child

labor.

The increase of labor with farm's size initially observed may be the "*perverse response to greater wealth*" (Basu et al., 2010). As its land size keeps on rising, a household becomes so well-off that children's participation is not seen necessary by parents triggering a decrease in children labor participation after a critical land size is reached.

For Cameroon and Guinea, we first note a decrease in participation of household farm activities with farm size followed by an increase. According to Bhalothra and Heady (2003), this paradoxical situation may be the result of land and labor market imperfection in rural area, reinforced by credit market imperfection. However, since only boys are concerned, these results probably reflect the importance parents attach to "learning by doing" in case a child stands to inherit the family farm (stressed in Bhalotra and Heady, 2003). Indeed, in patriarchal societies, boys are more concerned by land inheritance than girls yielding parents to further foster boys' experience and/or "learning by doing."

As far as child labor outside the household (LABOR1) is concerned, in most cases, participation in labor outside the household for a non member increases and then decreases with farm size, suggesting that children of the richest landholding have a lower probability to work outside for a non member.

Table 1 Multivariate Probit for Girls' participation in Labor and schooling (1/3)

	BURUNDI								CAMEROON								CAR							
	Schooling		labor1		labor2		HHC		Schooling		labor1		labor2		HHC		Schooling		labor1		labor2		HHC	
	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z
Age	1,469	27.20***	-0,144	-1.57	0,135	1.82*	0,850	13.29***	1,028	12.94***	0,364	4.50***	0,470	6.09***	0,803	8.32***	0,928	14.82***	0,089	1.46	0,562	9.69***	0,394	5.89***
Age²	-0,071	-25.41***	0,012	2.67***	-0,005	-1.21	-0,038	-10.99***	-0,048	-11.43***	-0,016	-3.86***	-0,019	-4.75***	-0,034	-6.51***	-0,044	-13.17***	-0,003	-0.92	-0,023	-7.52***	-0,016	-4.30***
Female head	0,020	0.30	0,283	2.63***	-0,137	-1.34	-0,048	-0.54	0,459	4.72***	0,210	2.23**	0,296	3.35***	0,184	1.43	0,258	3.01***	-0,093	-1.08	-0,047	-0.58	0,167	1.67*
Head educ.: primary	0,311	7.03***	-0,048	-0.66	0,056	0.88	0,012	0.22	0,880	13.33***	0,290	4.04***	0,378	5.62***	0,118	1.43	0,293	5.03***	0,143	2.43**	0,090	1.66*	0,188	2.98***
Head educ.: Secondary and Higher	0,863	5.59***	-3,828	-31.33***	-0,564	-1.99**	-0,370	-2.63***	1,556	15.21***	0,533	5.89***	0,434	4.99***	0,124	1.17	0,799	10.98***	0,139	1.85*	0,200	2.88***	0,188	2.30**
male >60 years old	-0,032	-0.33	0,219	1.36	-0,131	-0.87	0,065	0.50	0,060	0.62	-0,033	-0.32	0,081	0.86	0,191	1.56	-0,241	-1.85*	0,038	0.29	0,054	0.45	0,364	2.07**
Female 18-59 years old	0,080	2.13**	-0,188	-2.77***	-0,040	-0.71	0,066	1.29	-0,060	-1.46	-0,041	-0.94	0,016	0.39	0,066	1.25	0,005	0.12	0,080	2.09**	0,064	1.77*	0,003	0.08
male 18-59 years old	0,053	1.39	0,009	0.14	0,066	1.34	-0,109	-2.36**	0,001	0.02	-0,018	-0.39	-0,015	-0.34	0,031	0.56	-0,012	-0.24	0,020	0.43	0,025	0.56	0,146	2.47**
Female 15-18 years old	0,015	0.37	-0,065	-0.97	-0,019	-0.32	-0,097	-1.86*	0,015	0.20	-0,036	-0.44	-0,155	-2.03**	-0,058	-0.61	0,105	1.65*	0,004	0.06	-0,087	-1.41	-0,060	-0.79
Male 15-18 years old	-0,018	-0.43	-0,050	-0.69	-0,080	-1.23	-0,133	-2.58***	-0,044	-0.81	-0,030	-0.48	-0,078	-1.42	-0,076	-1.11	0,067	1.13	0,150	2.59***	-0,055	-1.00	-0,109	-1.72*
female 5-14 years old	0,088	0.85	0,064	0.43	-0,004	-0.03	-0,108	-1.01	0,126	1.52	0,014	0.17	-0,012	-0.16	0,052	0.44	0,157	2.16**	0,116	1.64*	0,025	0.36	0,037	0.45
Male 5-14 years old	-0,015	-0.16	-0,253	-1.27	-0,159	-1.09	-0,118	-1.16	-0,017	-0.21	0,078	0.94	0,123	1.65*	0,018	0.16	0,040	0.54	0,078	1.12	-0,074	-1.08	-0,065	-0.73
Sisters 5-14 years old	0,016	0.70	-0,025	-0.69	0,020	0.58	0,010	0.33	-0,031	-1.14	-0,027	-0.96	-0,027	-0.88	-0,047	-1.40	0,007	0.29	-0,034	-1.38	-0,061	-2.66***	-0,076	-2.85***
Brothers 5-14 years old	-0,035	-1.51	-0,042	-0.96	-0,003	-0.08	-0,063	-2.19**	0,007	0.27	-0,055	-1.93*	-0,064	-2.44**	-0,047	-1.55	-0,044	-1.86*	0,011	0.46	-0,071	-3.13***	-0,040	-1.55
Female <5 years old	-0,012	-0.39	0,000	-0.00	-0,094	-2.03**	0,023	0.59	-0,066	-1.87	-0,078	-2.02**	-0,101	-2.63***	-0,033	-0.76	0,011	0.35	-0,017	-0.57	-0,104	-3.55***	-0,041	-1.22
Male <5 years old	-0,023	-0.71	0,014	0.24	0,006	0.13	0,035	0.85	-0,050	-1.35	-0,053	-1.34	-0,094	-2.52***	-0,074	-1.77*	0,034	1.05	0,031	0.99	-0,058	-1.88*	-0,024	-0.67
Land	0,000	1.11	0,000	0.71	0,002	3.72***	0,000	0.28	0,005	0.51	0,005	0.56	-0,007	-0.80	0,000	0.01	0,022	1.90*	0,018	1.62	0,041	3.22***	0,052	3.68***
Land²	0,000	-0.63	-0,0001	-1.22	-0,0002	-3.72***	0,000	-0.17	-0,002	-0.16	-0,004	-0.32	0,019	1.58 *(60)	-0,005	-0.32	-0,022	-1.86*	-0,028	-2.43**	-0,041	-3.19***	-0,052	-3.60***
Middle HH	0,213	4.94***	-0,046	-0.63	-0,104	-1.68*	-0,061	-1.11	0,519	6.93***	-0,098	-1.38	0,011	0.17	0,151	1.74*	0,356	7.14***	0,037	0.73	0,070	1.46	0,019	0.34
Richest HH	0,529	8.39***	-0,125	-1.10	-0,127	-1.42	-0,127	-1.68*	0,864	2.03**	-0,103	-0.43	-0,857	-3.31***	-0,146	-0.48	0,938	8.40***	-0,341	-2.66***	-0,395	-3.57***	-0,009	-0.07
_cons	-7,214	-27.75***	-1,361	-3.08***	-2,324	-6.45***	-2,833	-9.98***	-5,218	-14.45***	-2,819	-7.59***	-3,316	-9.26***	-2,882	-6.88***	-5,375	-18.53***	-1,462	-5.33***	-3,046	-11.59***	-1,315	-4.46***
rho school-labor1	-0,238	-5.49***	-0,322						0,138	3.06***							0,000	0.00						
rho school- labor2	-0,072	-1.88*							0,234	5.85***							0,022	0.76						
rho school-HHC	0,092	2.66**							0,192	3.85***							0,083	2.36**						
rho labor1-labor2	0,106	1.77*							0,167	4.30***							0,281	10.01***						
rho labor1-hhc	-0,073	-1.20							0,173	3.03***							0,117	3.26***						
rho labor2-hhc	0,309	5.14***							0,266	5.11***							0,405	13.66***						
n	4909								2557								3578							
test : chi2	857.98								857.98								227.44							
pvalue	0.0000								0.0000								0.0000							
draws	74								60								70							

Note: significant at *** 1% level, **2%level, * 10%level.

Table 1 Multivariate Probit for Girls' participation in Labor and schooling (2/3)

	CIV								GAMBIA								GUINEA							
	Schooling		labor1		labor2		HHC		Schooling		labor1		labor2		HHC		Schooling		labor1		labor2		HHC	
	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z
Age	1,104	15.52***	0,103	0.96	0,516	8.19***	0,702	10.78***	0,828	12.47***	0,424	3.86***	0,628	9.13***	0,657	9.10***	0,734	9.31***	0,261	2.38**	0,271	3.71***	0,349	4.12***
Age²	-0,052	-14.16***	-0,001	-0.10	-0,020	-6.04***	-0,028	-8.21***	-0,038	-11.23***	-0,015	-2.79***	-0,022	-6.33***	-0,024	-6.16***	-0,031	-7.67***	-0,009	-1.64	-0,011	-2.92***	-0,014	-3.00***
Female head	0,356	4.01***	-0,228	-1.54	0,094	1.06	-0,015	-0.16	-0,066	-0.55	0,330	1.97**	-0,220	-1.90**	0,018	0.13	0,128	0.89	0,111	0.62	-0,117	-0.88	0,154	0.93
Head educ.: primary	0,564	9.07***	-0,083	-0.82	-0,083	-1.41	-0,113	-1.79*	0,735	10.94***	0,976	12.27***	0,005	0.08	0,169	2.27**	0,200	3.04***	-0,110	-1.17	0,123	1.91*	0,148	1.89**
Head educ.: >Secondary	1,126	13.48***	-0,183	-1.30	-0,387	-4.84***	-0,213	-2.61***	0,643	6.22***	0,322	2.02**	0,094	0.96	0,144	1.34	1,010	7.65***	0,088	0.56	-0,115	-0.97	0,014	0.10
male >60 years old	-0,081	-1.08	0,189	2.00**	-0,050	-0.71	-0,079	-1.07	-0,013	-0.20	0,029	0.34	0,175	2.81***	0,086	1.23	0,013	0.17	-0,100	-1.03	-0,082	-1.14	0,006	0.07
Female 18-59 years old	0,010	0.31	-0,063	-1.46	0,025	0.89	-0,072	-2.40**	-0,005	-0.23	-0,003	-0.10	-0,001	-0.06	0,051	2.02**	0,041	1.31	-0,007	-0.19	0,052	1.74*	0,043	1.20
male 18-59 years old	-0,024	-0.87	-0,100	-2.01**	-0,021	-0.82	-0,015	-0.54	0,010	0.49	-0,071	-1.97**	-0,030	-1.41	-0,021	-0.87	-0,025	-0.85	-0,103	-2.10**	0,026	0.90	0,034	0.99
Female 15-18 years old	0,177	3.33***	0,038	0.47	-0,152	-3.11***	-0,086	-1.61	0,078	1.76*	-0,026	-0.46	-0,081	-1.88*	-0,094	-2.05**	-0,045	-0.75	0,229	3.17***	-0,008	-0.14	-0,056	-0.81
Male 15-18 years old	0,005	0.11	0,085	1.44	-0,048	-1.20	0,002	0.04	0,001	0.03	0,043	0.82	-0,016	-0.42	-0,149	-3.49***	-0,124	-2.30**	-0,123	-1.72*	0,020	0.39	0,024	0.37
female 5-14 years old	0,204	4.47***	0,057	0.85	-0,032	-0.75	-0,031	-0.71	-0,051	-1.83*	0,041	1.20	0,009	0.32	0,035	1.11	0,085	1.49	0,233	3.37***	0,042	0.75	0,034	0.51
Male 5-14 years old	0,031	0.81	0,042	0.70	-0,016	-0.43	-0,036	-0.97	0,019	1.23	-0,013	-0.44	0,013	0.68	-0,010	-0.52	-0,007	-0.13	-0,111	-1.31	-0,075	-1.45	-0,075	-1.25
Sisters 5-14 years old	-0,057	-2.35**	0,002	0.04	0,021	0.93	-0,002	-0.10	-0,024	-1.16	-0,040	-1.36	0,033	1.55	-0,006	-0.26	-0,060	-2.36**	0,045	1.43	0,007	0.27	-0,040	-1.34
Brothers 5-14 years old	-0,044	-2.07**	0,008	0.25	-0,011	-0.55	-0,007	-0.33	0,019	0.91	-0,036	-1.18	0,002	0.10	-0,048	-2.14**	-0,033	-1.38	-0,055	-1.69*	0,001	0.04	0,017	0.64
Female <5 years old	-0,003	-0.11	-0,016	-0.33	0,024	0.79	0,050	1.50	-0,050	-1.83*	0,016	0.43	-0,034	-1.22	-0,016	-0.52	-0,045	-1.32	0,117	2.69***	0,024	0.74	0,002	0.05
Male <5 years old	-0,021	-0.68	0,016	0.34	-0,053	-1.78*	0,048	1.53	-0,005	-0.18	0,026	0.68	-0,044	-1.57	-0,087	-2.88***	-0,070	-1.92*	0,019	0.41	-0,005	-0.14	-0,030	-0.71
Land	-0,007	-1.34	-0,003	-0.42	0,019	3.78***	0,018	3.13***	-0,044	-7.49***	0,045	6.12***	0,018	2.95***	0,028	4.23***	0,005	0.41	0,017	1.24	-0,001	-0.09	0,018	1.30
Land²	0,005	0.76	0,006	0.62	-0,013	-2.01***	-0,015	-2.12**	0,045	6.93***	-0,050	-4.75***	-0,017	-2.61***	-0,036	-4.97***	-0,004	-0.31	-0,018	-1.27	-0,002	-0.21	-0,020	-1.40
Middle HH	0,463	8.20***	0,029	0.32	-0,113	-2.12**	-0,086	-1.48	0,280	4.91***	-0,268	-2.91***	-0,271	-4.74***	-0,079	-1.25	0,141	2.29**	-0,025	-0.30	-0,258	-4.35***	-0,059	-0.83
Richest HH	0,880	3.58***	-3,999	-35.24***	-1,152	-4.05***	-0,142	-0.64	0,793	4.94***	-0,537	-1.97**	-0,731	-5.05***	-0,260	-1.66*	0,383	1.53	0,360	1.45	-0,563	-2.40**	0,073	0.28
_cons	-5,951	-18.08***	-2,376	-4.73***	-2,819	-9.89***	-3,034	-10.54***	-3,923	-12.83***	-4,305	-7.91***	-3,709	-11.63***	-3,054	-9.53***	-3,955	-10.97***	-2,900	-5.58***	-1,477	-4.47***	-1,078	-2.90***
rho school-labor1	-0,108	-2.02**							-0,162	-3.30***							0,076	1.46						
rho school- labor2	-0,103	-3.19***							-0,094	-2.82***							0,147	4.09***						
rho school-HHC	-0,009	-0.25							0,085	2.30**							0,144	3.34***						
rho labor1-labor2	0,152	3.11***							0,166	3.67***							0,072	1.52						
rho labor1-hhc	0,048	0.88							0,115	1.95**							-0,020	-0.35						
rho labor2-hhc	0,619	26.08***							0,746	33.37***							0,424	11.64***						
n	3076								2827								2056							
test																								
chi2	615.58								390.63								107.36							
pvalue	0.0000								0.0000								0.0000							
draws	74								68								61							

Note: significant at *** 1% level, **2%level, * 10%level

Table 1 Multivariate Probit for Girls' participation in Labor and schooling (3/3)

	SOMALIA								TOGO							
	schc		labor1		labor2		hhc		schc		labor1		labor2		hhc	
	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z
Age	0,586	7.92***	0,009	0.07	0,424	6.39***	0,626	8.76***	0,994	14.53***	0,233	2.60***	0,500	7.50***	0,596	8.17***
Age²	-0,026	-6.83***	0,004	0.68	-0,018	-5.20***	-0,027	-6.97***	-0,048	-13.33***	-0,008	-1.71*	-0,020	-5.69***	-0,022	-5.69***
Female head	0,048	0.54	0,001	0.01	0,018	0.21	0,088	0.92	0,408	3.94***	0,043	0.34	-0,119	-1.22	0,127	1.12
Head educ.: primary	0,173	2.33**	0,090	0.73	-0,526	-6.93***	0,152	1.92*	0,528	8.80***	0,285	3.81***	0,000	0.01	0,141	2.12**
Head educ.: >Secondary	0,452	4.01***	-0,098	-0.45	-0,319	-2.82***	-0,028	-0.24	1,029	11.76***	-0,034	-0.31	-0,266	-3.30***	0,098	1.10
male >60 years old	-0,070	-0.82	0,158	1.14	0,032	0.40	-0,030	-0.34	0,038	0.48	-0,213	-1.81*	-0,271	-3.52***	-0,166	-1.92**
Female 18-59 years old	-0,052	-0.94	-0,021	-0.25	0,152	2.88***	0,014	0.25	0,033	0.95	0,009	0.19	0,021	0.59	-0,004	-0.09
male 18-59 years old	0,018	0.45	0,030	0.44	0,058	1.55	0,071	1.54	0,080	2.34**	-0,080	-1.70*	-0,005	-0.16	0,002	0.04
Female 15-18 years old	0,016	0.25	0,289	3.39***	-0,067	-1.15	-0,067	-1.02	0,062	0.84	0,135	1.50	0,152	2.12**	-0,017	-0.20
Male 15-18 years old	0,018	0.34	-0,069	-0.76	-0,052	-1.02	0,079	1.38	0,034	0.67	-0,119	-1.88*	0,062	1.30	0,147	2.42**
female 5-14 years old	0,052	0.47	0,293	1.75*	-0,206	-1.67*	-0,192	-1.60	0,072	1.03	0,053	0.64	-0,014	-0.21	-0,104	-1.30
Male 5-14 years old	0,241	1.86*	-0,122	-0.43	-0,189	-1.54	-0,115	-0.84	0,080	1.19	0,099	1.34	0,094	1.50	0,148	1.65*
Sisters 5-14 years old	0,080	3.10***	0,119	2.82***	-0,077	-3.16***	-0,211	-8.00***	-0,069	-3.28***	-0,017	-0.55	0,024	1.13	-0,045	-1.90*
Brothers 5-14 years old	-0,009	-0.32	0,012	0.25	-0,097	-3.80***	-0,080	-2.93***	-0,085	-3.72***	-0,028	-0.93	0,053	2.40**	-0,001	-0.03
Female <5 years old	-0,017	-0.43	0,144	2.14**	0,049	1.31	0,049	1.21	-0,060	-1.56	-0,018	-0.35	0,006	0.16	0,046	1.05
Male <5 years old	-0,057	-1.48	-0,051	-0.75	-0,034	-0.94	0,075	1.88*	-0,038	-1.01	0,019	0.41	-0,008	-0.21	0,074	1.72*
Land	0,001	0.12	-0,008	-0.59	0,021	3.01***	-0,022	-3.17***	-0,010	-1.13	0,030	3.10***	0,026	3.24***	-0,006	-0.71
Land²	0,000	-0.04	0,015	0.99	-0,018	-2.46**	0,023	3.00***	0,022	1.97**	-0,018	-1.65*	-0,025	-2.69***	0,011	0.92
Middle HH	0,615	10.80***	0,107	1.07	-0,245	-4.51***	-0,062	-1.06	0,529	8.46***	-0,018	-0.23	0,053	0.90	0,077	1.11
Richest HH	1,441	5.83***	-0,199	-0.47	-0,632	-2.55***	-0,214	-1.02	0,998	3.29***	-3,642	-36.25***	0,143	0.55	0,315	0.90
_cons	-3,853	-11.14***	-2,699	-4.29***	-2,213	-7.37***	-2,320	-7.27***	-4,923	-15.62***	-2,793	-6.66***	-3,303	-10.68***	-2,594	-8.12***
rho school-labor1	-0,131	-2.13**							0,007	0.16						
rho school- labor2	-0,042	-1.22							0,015	0.44						
rho school-HHC	0,175	4.58***							0,171	4.59***						
rho labor1-labor2	0,014	0.24							0,314	8.00***						
rho labor1-hhc	-0,199	-3.15***							0,029	0.57						
rho labor2-hhc	0,410	13.06***							0,388	11.26***						
n	2691								2856							
test :chi2	243.28								592.43							
pvalue	0.0000								0.0000							
draws	60								70							

Note: significant at *** 1% level, **2%level, * 10%level

The effect of permanent income[2] differs according to labor activities, the country and the sex of the child. The results suggest that children from the richest and the middle income households have a lower probability to participate in LABOR1 and LABOR2 compare to children in the poorest households. Consistent with Nkamleu (2006), different wealth proxies seem to trigger opposite effects. These findings reinforce the hypothesis of Basu and al. (2010) according to which the acquisition of lands generates employment opportunities within the household and child labor appears like a perverse reaction to compensate the lack of available workforce.

We do not expect that participation in HHC significantly differs from all other forms of labor. Our results mainly reveal that children of land rich households, and girls and boys from the middle and the richest household have a lower probability to participate in HHC. Some exceptions suggest an increase of participation in HHC with farm size in Somalia, and for boys in Ivory Coast. This result may be due to tasks specialization among household members or to workload induced by farm size.

Is "schooling" a luxury good? The results suggest an increase in the probability of school participation with landholdings for children in Gambia and Togo. At the same, we note these countries exhibit a decrease in labor participation with landholdings. In theses cases, we found evidence supporting the view that well-off households do not need child labor and will not want their children to work (Basu & al., 2010).

In CAR, we find an inverse u-shaped association between schooling

[2] The effect of permanent income is measured through asset.

participation and landholdings. The situation is singular since participation in LABOR2 follows the same pattern. Finally, for boys in CIv, our results suggest a negative correlation with land size.

When we turn to indicators of permanent income, we find children from wealthiest and middle household exhibit higher probability to attend school compare to those living in poorest households.[3] Unsurprisingly, children from richest households (land or permanent income) appear to have a higher probability to attend school. As a result, "schooling" can be defined as a luxury good in the sense that the poor households cannot afford to consume it. However, this correlation should be interpreted carefully and should not hinder the effect of labor market imperfection which leads some among the wealthiest households to withdraw their children from school to work in the family business.

[3] Except boys and girls from richest household in Guinea for which we find a positive but not statistically significant coefficient.

Table 2 Multivariate Probit for Boys' participation in Labor and schooling (1/3)

	Burundi								Cameroon								Central Africa Republic							
	Schc		labor1		labor2		hhc		schc		labor1		labor2		hhc		schc		labor1		labor2		hhc	
	Coef	Z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z	Coef	z
Age	1,331	24.66***	0,037	0.38	0,229	3.19***	0,837	13.72***	0,954	11.91***	0,317	4.02***	0,637	8.20***	0,591	7.38***	0,932	15.99***	0,125	2.17**	0,396	7.27***	0,408	6.82***
Age²	-0,062	-22.08***	0,002	0.34	-0,010	-2.67***	-0,038	-11.58***	-0,042	-9.92***	-0,012	-2.85***	-0,028	-6.86***	-0,025	-5.72***	-0,041	-13.12***	-0,005	-1.52	-0,015	-5.32***	-0,018	-5.65***
Female head	-0,030	-0.43	0,108	0.96	-0,015	-0.16	-0,048	-0.58	0,516	4.57***	0,295	3.36***	0,054	0.61	0,118	1.12	0,053	0.61	-0,010	-0.12	-0,037	-0.45	0,092	1.01
Head educ.: primary	0,197	4.33***	0,050	0.66	0,240	3.80***	0,138	2.63***	0,802	11.85***	0,130	1.88*	0,320	5.00***	0,447	6.45***	0,333	6.22***	0,211	3.82***	0,082	1.60	0,306	5.60***
Head educ.: >Secondary	0,638	4.20***	0,115	0.44	0,168	0.88	-0,308	-2.11***	1,339	12.55***	0,385	4.34***	0,278	3.29***	0,610	6.43***	0,552	8.01***	0,160	2.27**	0,074	1.13	0,308	4.29***
male >60 years old	0,011	0.11	0,087	0.52	-0,334	-2.08**	-0,216	-1.95*	0,284	2.86***	0,059	0.64	-0,033	-0.37	0,055	0.57	-0,065	-0.56	0,082	0.73	-0,138	-1.29	0,032	0.27
Female 18-59 years old	0,076	1.86*	-0,196	-2.78***	0,044	0.86	0,027	0.59	-0,053	-1.28	-0,161	-3.55***	0,039	1.00	-0,090	-2.15**	0,014	0.39	0,094	2.63***	0,086	2.48**	-0,031	-0.78
male 18-59 years old	0,031	0.79	-0,030	-0.46	0,035	0.71	0,030	0.60	-0,022	-0.51	-0,012	-0.28	-0,080	-1.82*	-0,083	-1.94*	-0,044	-0.87	0,020	0.41	-0,052	-1.11	0,112	2.11**
Female 15-18 years old	0,055	1.27	-0,086	-1.24	0,133	2.55**	-0,068	-1.36	0,169	2.14**	0,197	2.78***	0,111	1.61	0,062	0.82	-0,003	-0.05	0,055	0.89	0,033	0.56	-0,045	-0.68
Male 15-18 years old	0,030	0.68	-0,054	-0.73	-0,094	-1.63	-0,053	-1.07	-0,061	-1.16	-0,032	-0.56	0,010	0.18	0,023	0.39	0,027	0.49	0,095	1.70*	-0,022	-0.42	0,084	1.34
female 5-14 years old	0,122	1.14	-0,087	-0.47	0,016	0.12	0,114	0.95	0,001	0.01	-0,106	-1.43	-0,127	-1.81*	-0,014	-0.20	0,133	1.96**	0,057	0.87	-0,017	-0.28	0,050	0.70
Male 5-14 years old	0,055	0.53	0,144	0.99	0,037	0.30	0,201	1.56	0,117	1.44	0,176	2.53**	0,081	1.16	-0,183	-2.57***	0,049	0.71	0,098	1.54	-0,027	-0.43	0,066	0.76
Sisters 5-14 years old	-0,004	-0.16	-0,064	-1.54	0,044	1.42	-0,002	-0.06	-0,035	-1.30	-0,109	-3.79***	-0,063	-2.45**	-0,116	-4.32***	-0,001	-0.03	0,006	0.28	-0,006	-0.28	0,003	0.12
Brothers 5-14 years old	-0,013	-0.53	0,056	1.30	0,048	1.48	-0,071	-2.48**	-0,048	-1.94**	-0,021	-0.84	0,013	0.53	0,026	1.00	0,002	0.07	-0,030	-1.35	-0,026	-1.21	-0,043	-1.83*
Female <5 years old	-0,030	-0.92	0,004	0.07	0,075	1.82*	0,055	1.45	0,009	0.23	-0,032	-0.85	-0,101	-2.80***	0,133	3.54***	0,112	3.71***	0,001	0.03	0,004	0.13	0,078	2.52**
Male <5 years old	0,011	0.33	0,026	0.45	0,002	0.04	0,080	2.02**	-0,036	-0.97	0,003	0.08	-0,096	-2.69***	0,016	0.45	0,055	1.83*	0,071	2.39**	-0,062	-2.18**	-0,080	-2.61***
Land	0,001	1.50	0,001	0.98	0,001	3.25***	0,000	-0.79	0,015	1.09	0,025	3.00***	-0,035	-4.03***	0,022	2.08**	0,019	1.75*	0,003	0.29	0,033	3.20***	0,016	1.23
Land²	0,000	-1.26	-0,0001	-1.50	-0,0002	-3.52***	0,000	0.95	0,013	0.40	-0,021	-1.66*	0,064	4.89***	-0,026	-2.15**	-0,021	-1.80*	-0,013	-1.17	-0,037	-3.46***	-0,017	-1.24
Middle HH	0,184	4.13***	-0,068	-0.90	-0,066	-1.12	-0,006	-0.12	0,560	7.23***	-0,005	-0.08	0,088	1.41	0,216	2.85***	0,307	6.53***	0,040	0.84	0,007	0.15	0,085	1.65*
Richest HH	0,381	6.22***	-0,121	-1.10	-0,104	-1.33	-0,076	-1.08	4,738	37.33***	0,273	1.14	-0,695	-2.16**	-0,329	-1.17	0,738	6.55***	-0,400	-3.37***	-0,398	-3.75***	-0,356	-3.44***
_cons	-6,567	-25.40***	-2,067	-4.42***	-2,965	-8.60***	-3,108	-11.42***	-4,760	-13.10***	-2,606	-7.11***	-3,904	-10.92***	-2,277	-6.49***	-5,290	-19.51***	-1,674	-6.40***	-2,410	-9.66***	-1,518	-5.66***
rho school-labor1	-0,197	-4.49***							0,003	0.07							-0,031	-1.03						
rho school- labor2	0,028	0.75							0,141	3.33***							-0,013	-0.46						
rho school-HHC	0,145	4.41***							0,255	6.26***							0,099	3.22***						
rho labor1-labor2	0,125	2.16**							0,247	6.86***							0,282	10.79***						
rho labor1-hhc	-0,184	-3.38***							0,261	5.45***							0,162	5.19***						
rho labor2-hhc	0,177	3.78***							0,080	1.86*							0,460	17.84***						
n	4797								2706								3906							
test : chi2	194.16								153.01								170.55							
pvalue																								
draws	74								60								70							

Note: significant at *** 1% level, **2%level, * 10%level

Table 2 Multivariate Probit for Boys' participation in Labor and schooling (2/3)

	Ivory Coast								Gambia								Guinea							
	Schc		Labor1		Labor2		HHC		schc		Labor1		Labor2		HHC		schooling		labor1		labor2		HHC	
	coef	Z	coef	z	coef	z	coef	z	coef	z	coef	z	coef	z	coef	z	coef	z	coef	z	coef	z	coef	z
Age	1,111	17.46***	0,271	2.59***	0,513	8.87***	0,467	8.11***	0,759	11.09***	0,638	4.19***	0,344	4.95***	0,482	7.31***	0,887	11.72***	0,142	1.47	0,329	4.86***	0,350	4.90***
Age²	-0,051	-15.31***	-0,008	-1.51	-0,020	-6.47***	-0,020	-6.51***	-0,033	-9.10***	-0,026	-3.41***	-0,012	-3.25***	-0,019	-5.30***	-0,037	-9.32***	-0,003	-0.58	-0,013	-3.74***	-0,015	-3.89***
Female head	0,286	3.28***	0,260	2.20**	0,023	0.27	0,142	1.74*	0,015	0.13	-0,075	-0.33	-0,208	-1.66*	-0,215	-1.93**	0,435	2.61***	0,060	0.33	-0,218	-1.51	0,018	0.12
Head educ.: primary	0,442	7.95***	0,121	1.39	-0,338	-6.30***	0,011	0.20	0,620	9.12***	0,893	9.19***	0,053	0.82	0,109	1.68*	0,265	4.31***	0,009	0.11	0,172	2.94***	-0,083	-1.33
Head educ.: >Secondary	0,897	11.97***	0,207	1.94*	-0,342	-4.80***	0,073	1.07	0,859	8.76***	0,667	4.27***	-0,153	-1.57	0,133	1.52	0,736	6.62***	0,261	1.91*	0,030	0.29	-0,075	-0.68
Male >60 years old	-0,054	-0.76	0,126	1.21	-0,010	-0.15	0,163	2.37**	0,078	1.22	-0,018	-0.17	0,161	2.64***	0,041	0.67	0,096	1.38	0,097	1.13	-0,038	-0.57	-0,105	-1.49
Female 18-59 years old	-0,039	-1.44	-0,067	-1.54	-0,018	-0.67	-0,082	-3.14***	0,021	0.82	0,023	0.57	0,025	1.04	0,000	-0.00	0,046	1.65*	0,056	1.54	0,058	2.19**	-0,019	-0.66
Male 18-59 years old	0,008	0.35	-0,031	-0.84	-0,014	-0.63	0,008	0.37	-0,034	-1.57	-0,082	-1.96**	0,041	1.94**	0,025	1.08	-0,054	-1.93**	-0,104	-2.64**	0,064	2.44**	-0,051	-1.79*
Female 15-18 years old	0,110	2.22**	-0,100	-1.27	-0,049	-1.04	-0,149	-3.19***	0,042	0.87	0,051	0.72	-0,104	-2.34**	-0,096	-2.14**	-0,107	-1.94**	0,221	3.44***	-0,029	-0.56	-0,004	-0.06
Male 15-18 years old	0,036	0.95	0,052	0.91	-0,017	-0.45	0,061	1.67*	-0,069	-1.81*	0,090	1.52	-0,069	-1.88*	-0,090	-2.44**	-0,189	-3.77***	-0,074	-1.05	0,000	0.00	0,050	0.95
Female 5-14 years old	0,099	2.41**	-0,027	-0.45	0,006	0.15	0,070	1.85*	-0,062	-2.25**	-0,039	-0.96	0,053	2.08**	0,043	1.47	0,166	3.56***	0,072	1.18	0,049	1.08	-0,045	-0.97
Male 5-14 years old	0,041	1.10	0,092	1.85*	0,034	0.98	-0,095	-2.67***	0,040	2.50**	-0,078	-1.91**	-0,010	-0.86	-0,001	-0.06	-0,023	-0.42	-0,164	-1.88*	-0,047	-0.89	-0,012	-0.21
Sisters 5-14 years old	-0,046	-2.14**	-0,065	-1.85*	0,011	0.55	0,013	0.67	-0,032	-1.49	0,004	0.13	0,037	1.83*	-0,001	-0.03	-0,047	-1.99**	-0,021	-0.65	-0,048	-2.10**	0,092	3.52***
Brothers 5-14 years old	-0,063	-3.13***	-0,013	-0.41	0,023	1.23	-0,009	-0.49	-0,010	-0.44	-0,047	-1.31	0,017	0.85	0,018	0.88	-0,037	-1.67*	0,013	0.42	0,024	1.09	0,066	2.72***
Female <5 years old	0,069	2.37**	-0,008	-0.17	0,034	1.21	0,049	1.81*	-0,012	-0.43	0,035	0.85	-0,049	-1.81*	-0,120	-4.42***	-0,038	-1.30	-0,014	-0.36	0,033	1.15	0,039	1.28
Male <5 years old	0,002	0.08	-0,106	-2.23**	-0,003	-0.10	0,023	0.89	-0,026	-0.90	-0,012	-0.25	-0,051	-1.87*	-0,041	-1.53	-0,023	-0.70	0,029	0.68	0,053	1.65*	-0,064	-1.93*
Land	-0,010	-1.91*	0,011	1.64	0,019	3.90***	-0,007	-1.44	-0,036	-6.30***	0,037	4.11***	0,018	3.17***	0,041	7.01***	-0,003	-0.30	0,003	0.22	-0,017	-1.96**	0,037	3.16***
Land²	0,008	1.33	-0,004	-0.46	-0,014	-2.27**	0,010	1.72*	0,036	5.50***	-0,039	-3.53***	-0,029	-4.18***	-0,053	-7.39***	0,003	0.30	-0,004	-0.30	0,014	1.57	-0,039	-3.22***
Middle HH	0,373	7.17***	-0,173	-2.00**	-0,203	-4.03***	-0,116	-2.33**	0,374	6.38***	-0,339	-3.23***	-0,282	-4.85***	-0,128	-2.32**	0,172	2.99***	-0,188	-2.38**	-0,173	-3.17***	-0,046	-0.79
Richest HH	0,964	3.79***	-0,703	-1.88*	-0,870	-4.07***	-0,518	-2.72***	0,693	3.81***	-0,758	-1.86*	-0,822	-4.00***	-0,346	-2.20**	0,338	1.32	-0,836	-1.92*	-0,881	-3.74***	0,054	0.24
_cons	-5,755	-19.80***	-3,230	-6.40***	-2,669	-10.33***	-2,427	-9.35***	-3,735	-12.11***	-5,601	-7.51***	-2,601	-8.18***	-2,455	-8.32***	-4,869	-13.93***	-2,352	-5.23***	-1,779	-5.83***	-1,222	-3.81***
rho school-labor1	0,006	0.13							0,012	0.19							0,006	0.12						
rho school- labor2	-0,069	-2.35**							-0,008	-0.24							0,125	3.68***						
rho school-HHC	0,013	0.46							0,078	2.36**							0,057	1.53						
rho labor1-labor2	0,154	3.53***							0,264	5.27***							-0,085	-1.93**						
rho labor1-hhc	0,098	2.35**							0,140	2.46**							-0,073	-1.51						
rho labor2-hhc	0,459	19.68***							0,598	23.77***							0,322	10.04***						
n	3694								2818								2526							
test : chi2	185.61								170.29								148.15							
pvalue	0.000								0.000								0.000							
draws	74								68								61							

Note: significant at *** 1% level, **2%level, * 10%level

Table 2 Multivariate Probit for Boys' participation in Labor and schooling (3/3)

	SOMALIA								TOGO							
	schc		Labor1		Labor2		HHC		schc		Labor1		Labor2		HHC	
	Coef	Z	Coef	Z	Coef	Z	Coef	Z	Coef	Z	Coef	Z	Coef	Z	Coef	Z
Age	0,625	9.19***	-0,201	-1.54	0,463	7.01***	0,346	5.35***	1,042	15.13***	0,338	3.63***	0,550	8.32***	0,684	10.42***
Age²	-0,026	-7.33***	0,014	2.10**	-0,019	-5.34***	-0,014	-4.07***	-0,047	-12.91***	-0,012	-2.46**	-0,022	-6.45***	-0,029	-8.28***
Female head	0,063	0.73	-0,046	-0.26	-0,162	-1.85*	0,089	1.02	0,091	0.79	0,332	2.78***	-0,345	-3.41***	0,082	0.80
Head educ.: primary	0,317	4.36***	0,215	1.67*	-0,253	-3.54***	0,014	0.20	0,606	9.57***	0,098	1.31	-0,003	-0.05	0,258	4.27***
Head educ.: >Secondary	0,588	5.12***	-0,134	-0.52	-0,356	-3.01***	0,110	0.96	0,745	8.63***	0,152	1.53	-0,175	-2.27**	0,267	3.46***
Male >60 years old	-0,057	-0.69	0,107	0.68	0,060	0.73	-0,005	-0.07	-0,054	-0.66	-0,122	-1.22	-0,220	-2.83***	-0,024	-0.30
Female 18-59 years old	-0,002	-0.04	-0,010	-0.14	-0,032	-0.62	-0,039	-0.77	0,011	0.29	0,079	1.57	-0,069	-1.95**	-0,026	-0.71
Male 18-59 years old	0,029	0.78	0,023	0.29	-0,001	-0.02	-0,002	-0.06	-0,015	-0.43	-0,088	-1.88*	-0,091	-2.78***	0,010	0.30
Female 15-18 years old	-0,029	-0.50	0,062	0.56	-0,070	-1.20	-0,155	-2.66***	0,235	3.10***	-0,042	-0.45	0,058	0.85	-0,056	-0.79
Male 15-18 years old	-0,113	-2.26**	-0,344	-2.82***	0,085	1.71*	0,017	0.35	-0,004	-0.07	-0,152	-2.34**	0,053	1.14	0,090	1.89**
Female 5-14 years old	0,025	0.21	0,035	0.19	-0,048	-0.39	-0,117	-0.97	0,157	1.94**	0,035	0.40	0,116	1.75*	0,097	1.23
Male 5-14 years old	0,045	0.41	0,176	1.05	-0,013	-0.12	0,229	2.03**	0,211	2.91***	-0,001	-0.01	0,091	1.36	0,211	2.59**
Sisters 5-14 years old	-0,027	-1.12	0,093	2.08**	-0,065	-2.70***	-0,072	-3.09***	-0,047	-2.12**	-0,074	-2.34**	0,059	2.80***	0,013	0.60
Brothers 5-14 years old	-0,026	-1.04	0,016	0.37	-0,032	-1.27	-0,053	-2.17**	-0,052	-2.26**	-0,032	-1.10	-0,024	-1.13	0,014	0.63
Female <5 years old	0,018	0.49	-0,059	-0.85	0,003	0.09	0,070	1.94**	-0,064	-1.63	-0,062	-1.23	0,023	0.60	0,015	0.38
Male <5 years old	-0,017	-0.49	-0,056	-0.77	-0,015	-0.44	0,030	0.85	-0,044	-1.16	-0,034	-0.73	0,006	0.16	0,080	2.08**
Land	-0,005	-0.64	0,015	1.18	0,029	4.36***	-0,024	-3.61***	-0,019	-2.21**	0,028	2.98***	0,026	3.20***	0,004	0.51
Land²	0,002	0.23	-0,012	-0.93	-0,029	-4.05***	0,023	3.15***	0,029	2.43**	-0,016	-1.49	-0,021	-2.17**	0,008	0.60
Middle HH	0,407	7.54***	0,217	2.10**	-0,415	-7.71***	-0,084	-1.58	0,571	8.84***	-0,124	-1.61	-0,121	-2.09**	0,022	0.37
Richest HH	0,888	3.55***	-3,350	-15.53***	-0,630	-2.61***	-0,138	-0.59	1,605	2.64***	-0,334	-0.81	-0,792	-2.47**	0,409	1.36
_cons	-3,621	-11.51***	-1,609	-2.57***	-2,216	-7.34***	-1,408	-4.81***	-5,049	-16.15***	-3,251	-7.35***	-3,196	-10.51***	-3,325	-11.31***
rho school-labor1	0,013	0.20							-0,044	-1.01						
rho school- labor2	-0,088	-2.76***							-0,026	-0.76						
rho school-HHC	0,121	3.83***							0,175	5.23***						
rho labor1-labor2	0,066	1.06							0,216	5.63***						
rho labor1-hhc	-0,037	-0.59							0,145	3.39***						
rho labor2-hhc	0,364	12.79***							0,296	9.58***						
n	2792								2998							
test : chi2	398.58								145.59							
pvalue																
draws	60								70							

Note: significant at *** 1% level, **2%level, * 10%level

It is challenging to identify a unique pathway to explain the association between household wealth and child labor without accounting for differences between countries, labor activities, socio cultural context and gender specialization. For example, participation in LABOR2 increases and decreases with the farm size for girls and boys in Burundi and Togo, while we have the inverse phenomenon for boys in Cameroon and Guinea. In Somalia, the participation of girls in LABOR2 increases and, then, decreases with farm size, while we have the inverse phenomenon for girls' participation in HHC and the effect on the participation in LABOR1 is not significant. We cannot define a unique rule since the link between farm size and activities differ according to the kind of labor activities, the sex of the children and the country. However, some similarities appear, probably at varying degrees, between girls and boys in some countries.

As far as the other variables are concerned, many of our results corroborate previous studies on child labor or schooling in developing countries. Children's living in a household whose head is educated have a higher probability to attend school. However, no clear patterns emerge regarding their participation to labor. Children of an educated household head have a higher probability to provide LABOR1 in Cameroon, CAR, and Gambia compared to children of non educated household head while we observe the inverse phenomenon for girls in Burundi. In Ivory Coast and Somalia children of educated household head have a lower probability to make LABOR2, while girls and boys of educated household head in Cameroon and CAR have a higher probability to provide LABOR2. Since households headed by women are expected to be among the

poorest, we may expect a higher probability of participation in children labor in these households. Our results reveal that children in Cameroon and girls in Burundi and Gambia, from household headed by a woman have a higher probability to work outside the household for a non member. However, we do not find any statistically significant effect in the others countries. We also note in some countries (Gambia, boys in Somalia and Togo, as an example) that children from household headed by a lone mother are mostly less likely to work in household farm. Finally, children in Cameroon, and CIV, girls in CAR and Togo and boys in Guinea have a higher probability to attend school when a woman heads the household.

Concerning the household demographic composition, the results confirm our prediction in some cases. We note that the participation outside the household and the participation in the household farm decrease with the presence of male and female in the age to be active (between 15-59 years old). We have the example of Gambia where the presence of male between 18-59 years old has a negative and significant impact on the participation of boys and girls in LABOR1. In Cameroon, CIv, Gambia and Togo, the presence of female between 15-18 years old in the household decreases the girls' participation in LABOR2. In Togo, the presence of household members between 18-59 years old decreases the boys' participation in LABOR2.

The presence of women able to provide HHC negatively affects the probability of participation in HHC. As an example for CIv, the presence of female members between 18-59 years old decreases the children participation in HHC. In Somalia and Gambia, the

female between 15-18 years old have a negative impact on boys' participation; and in Somalia and Togo, the presence of female between 5-14 years old has a negative impact on girls' contribution.

Concerning the schooling decision, following the quantity –quality model of Becker and Lewis (1973), Becker and Tomes (1976, 1986) and Becker(1991), it appears that the presence of brothers and sisters in school-age decrease the probability of school participation. However, we note that the presence of other children of school-age favors school participation. We have the example of CIv where school participation decreases with the number of sisters and brothers between 5-14 years old, for the children of the household head. In Togo, the presence of other male and female between 5-14 years old increases the probability of school participation, for both boys and girls. However, the numbers of brothers and sisters of the same age decreases the probability of schooling for boys. In Guinea, the other girls of 5 to 14 years old increase the probability of boys participation, while the presence of sisters between 5-14 years old decrease the probability of participation for boys and girls.

We also observe the case of girls in Somalia, where the quantity-quality failed and where we have an increase of the participation with the number of sisters. Concerning investment in education, Morduch (2000) also find that there is an advantage for children in Ghana and Tanzania to have sisters.

The differences observed concerning the household decomposition fully justify our choice.

5. CONCLUSION

This study uses Multiple Indicator Cluster Surveys from rural areas of 8 sub-Saharan African countries (Burundi, Cameroon, Central African Republic, Cote d'Ivoire, Gambia, Guinea, Malawi, Somalia and Togo) to explore the link between household wealth (acreage of farm land) and child labor. Our main focus is to evaluate empirically the "luxury axiom" approach, which suggests that child labor is the result of poverty, and the "wealth paradox" approach, which postulates that children of land rich households are more likely to work. Our analysis is based on the assumption that the wealth effect varies according to gender and labor activities. We examine child labor separately for boys and girls, and we consider the following three activities: the labor outside the household for a non member (LABOR1), labor in the family farm (LABOR2) and household chores (HHC). Our results indicate that children of land rich household are more likely to work in family farm compared to children of poor household. However, children participation to labor appears like a first response to greater wealth (landholdings) since the paradoxical effect of land on child labor tends to disappear, except for boys in Cameroon and Guinea where the paradoxical effect of land on child labor is persistent. Our results strongly suggest gender differences in the sense that in some countries, boys are significantly more involved in household farm. This result probably reflects specific gender role specificity in society where boys' contribution in this activity acts as learning by doing experience to prepare them to take over the farm upon inheriting it, since they are more concerned about inheritance compared to girls. As far as paid or unpaid labor

outside the household are concerned, we find that children of land rich household have a lower probability to be engaged and schooling appears as a luxury good.

As a result, we do not find evidence supporting the existence of a unique link between child labor and household wealth. Our analysis reveals how omitting to account for differences in labor activities, gender and countries socio-cultural context, may bias interpretations of the link between child labor and poverty.

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Appendix

Table 1 Descriptive statistics for school and labor participation

		Participation			Participation for the children of land owner			participation for the children of land owner								
								<5 hc			5 at 10 hc			>10 hc		
		boys	girls	children	boys	girls	children	boys	girls	children	boys	girls	children	boys	girls	children
Burundi	schooling	0.640	0.599	0.619	0.636	0.605	0.620	0.591	0.591	0.591	0.526	0.470	0.499	0.654	0.621	0.638
	HHC	0.858	0.882	0.870	0.863	0.895	0.879	0.880	0.905	0.893	0.862	0.878	0.870	0.861	0.895	0.878
	Labor1	0.035	0.040	0.038	0.044	0.049	0.047	0.049	0.074	0.062	0.097	0.094	0.095	0.038	0.041	0.040
	Labor2	0.083	0.061	0.072	0.093	0.076	0.084	0.040	0.037	0.039	0.087	0.044	0.066	0.101	0.084	0.093
Cameroon	schooling	0.732	0.653	0.694	0.708	0.620	0.665	0.691	0.599	0.646	0.701	0.683	0.693	0.837	0.693	0.767
	HHC	0.829	0.885	0.856	0.825	0.886	0.855	0.816	0.880	0.847	0.833	0.909	0.868	0.882	0.901	0.891
	Labor1	0.200	0.171	0.186	0.180	0.157	0.169	0.154	0.141	0.148	0.207	0.230	0.218	0.330	0.177	0.256
	Labor2	0.272	0.257	0.264	0.241	0.235	0.238	0.244	0.229	0.237	0.221	0.239	0.229	0.251	0.276	0.263
CAR	schooling	0.502	0.375	0.441	0.534	0.402	0.471	0.531	0.389	0.463	0.579	0.512	0.546	0.525	0.423	0.478
	HHC	0.782	0.833	0.807	0.805	0.846	0.825	0.808	0.847	0.827	0.766	0.792	0.779	0.806	0.877	0.839
	Labor1	0.253	0.242	0.248	0.274	0.263	0.269	0.301	0.286	0.294	0.281	0.268	0.274	0.084	0.088	0.086
	Labor2	0.423	0.469	0.445	0.441	0.499	0.469	0.446	0.496	0.470	0.462	0.512	0.487	0.395	0.508	0.447
CIv	schooling	0.496	0.398	0.451	0.480	0.387	0.438	0.514	0.405	0.465	0.436	0.373	0.408	0.473	0.369	0.427
	HHC	0.467	0.711	0.578	0.464	0.723	0.581	0.468	0.696	0.571	0.477	0.724	0.588	0.445	0.768	0.588
	Labor1	0.058	0.050	0.054	0.064	0.048	0.057	0.067	0.038	0.054	0.054	0.056	0.055	0.068	0.056	0.063
	Labor2	0.544	0.493	0.521	0.574	0.510	0.545	0.551	0.471	0.515	0.573	0.517	0.547	0.612	0.568	0.592
Gambia	schooling	0.596	0.576	0.586	0.568	0.546	0.557	0.646	0.629	0.638	0.496	0.484	0.490	0.513	0.476	0.494
	HHC	0.597	0.753	0.675	0.643	0.777	0.710	0.666	0.757	0.711	0.538	0.789	0.666	0.719	0.796	0.758
	Labor1	0.049	0.091	0.070	0.067	0.117	0.092	0.053	0.084	0.068	0.076	0.137	0.107	0.082	0.150	0.117
	Labor2	0.328	0.488	0.408	0.363	0.538	0.451	0.334	0.549	0.441	0.375	0.545	0.462	0.398	0.512	0.456
Guinea	schooling	0.477	0.467	0.473	0.461	0.454	0.458	0.473	0.458	0.466	0.399	0.348	0.376	0.465	0.504	0.483
	HHC	0.737	0.826	0.777	0.774	0.846	0.807	0.775	0.871	0.819	0.824	0.795	0.811	0.740	0.803	0.769
	Labor1	0.093	0.095	0.094	0.092	0.102	0.097	0.102	0.112	0.107	0.057	0.068	0.062	0.083	0.092	0.087
	Labor2	0.559	0.500	0.532	0.520	0.466	0.495	0.530	0.468	0.501	0.539	0.484	0.514	0.483	0.451	0.468
Somalia	schooling	0.438	0.284	0.363	0.452	0.254	0.355	0.494	0.250	0.375	0.419	0.216	0.322	0.348	0.297	0.322
	HHC	0.595	0.747	0.670	0.591	0.758	0.672	0.634	0.799	0.714	0.576	0.704	0.637	0.467	0.686	0.579
	Labor1	0.026	0.037	0.032	0.027	0.041	0.034	0.021	0.044	0.032	0.041	0.025	0.034	0.031	0.046	0.039
	Labor2	0.493	0.450	0.472	0.538	0.513	0.526	0.533	0.501	0.517	0.521	0.528	0.524	0.573	0.536	0.554
Togo	schooling	0.641	0.560	0.602	0.603	0.510	0.557	0.601	0.501	0.552	0.570	0.485	0.527	0.683	0.646	0.667
	HHC	0.683	0.782	0.731	0.689	0.774	0.731	0.694	0.779	0.736	0.628	0.757	0.693	0.772	0.768	0.770
	Labor1	0.109	0.093	0.101	0.104	0.095	0.099	0.089	0.085	0.087	0.111	0.084	0.098	0.198	0.213	0.205
	Labor2	0.371	0.368	0.369	0.391	0.376	0.383	0.378	0.361	0.370	0.413	0.379	0.395	0.446	0.506	0.473

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