Economics Bulletin

Volume 32, Issue 4

Family farming, child labour and the wealth paradox: evidence from Mali

Delphine Boutin
Larefi (University of Bordeaux, France)

Abstract

Possession of land is often associated with higher levels of child labour. This paper will look closer at the "wealth paradox" by testing in rural Mali the relationship between landownership and one of the hidden forms of child labour, namely family-based work. We also experiment a nested logit model in relation to parental decisions processes to send children to work. Findings show that the demand for children helpers within the family increases to a certain threshold with the rise of land owned. Conversely, the larger the land size, the lower the probability for a child to work away from the family farm.

Citation: Delphine Boutin, (2012) "Family farming, child labour and the wealth paradox: evidence from Mali", *Economics Bulletin*, Vol. 32 No. 4 pp. 3471-3479.
Contact: Delphine Boutin - delph.boutin@gmail.com.
Submitted: June 02, 2012. **Published:** December 27, 2012.

1. Introduction

The common opinion of farmers hiring child workers because they lack money is often erroneous or at least imprecise. In Mali, as in many low-income countries, agriculture accounts for a large proportion of economic activity and an even higher proportion of employment. Children play a crucial role in agricultural activities, as approximately 45% of rural Malian children (aged from 7 to 14 years old) contribute to the household's earnings by working on or off the household farms (calculation from ELIM06). Household poverty is often outlined as the main root cause explaining the relatively widespread incidence of child labour. According to the "luxury axiom" hypothesis, an assumption based on the seminal work of Basu and Van (1998, p.416), "a family will send the children to the labor market only if the family's income from non-child-labor sources drops very low". However, the relationship between poverty and child labour is blurred as numerous theoretical and empirical studies focused on this issue reveal contradictory results. For example, Bhalotra and Heady (2003) demonstrate a "wealth paradox" in Pakistan and Ghana, implying that the increase in farm size does lead to greater child labour. Since only the wealthiest households own some land, these findings lead to contradict the poverty hypothesis in agrarian societies.

Extending this line of thought, this paper aims to analyse empirically the relationships between the lack of parental resources, the ownership of land and the children's participation in economic activities in rural Mali. More precisely, we seek to precise the wealth paradox, integrating the place of work performed by rural Malian child labourers. Despite the fact that the wealth paradox suggests that market imperfections constitute an incentive for farm ownership to hire their own children,[1] few studies have made the distinction between child work on the family farm and other forms of work (Koissy-Kpein, 2012). Though this is a concerning issue in rural Mali since more than eight rural child labourers out of ten help their families on farms without being paid.

More specifically, our paper contributes to the literature in two important respects. Firstly we take into account children working on family farms and children working for a non-member household. Following the wealth paradox approach, we suppose that the increase in land size encourages parents to hire their own children but reduces the likelihood for a child to work off the family farm. Secondly, we use an alternative approach for modelling the decision to send children into work, namely the nested logit model. Several econometrical methods exist for testing the household's wealth impact on child labour. The choice between these various methods depends on the household's decision process. More precisely, it depends on if the decision-maker (in general the household head) considers all the opportunities offered to children or if his decision follows a hierarchic process, giving for example priority to one alternative (Diallo, 2001). We assume that parents face a whole range of sequential options concerning the allocation of time of their children. They need first to decide whether or not their children will participate in the labour market and then, having made the decision to send them into work, whether children will help on the household's farm or will work for a non-member household. The sophisticated nature of the decision process leads us to exclude some dichotomous choice modelling. Therefore we add to the literature by estimating a nested logit which takes into account sequencing in the decision making process and thus is more accurate for the analysis of the child labour supply.

This paper is organised as follows: a detailed explanation of the methodology is provided in the first part. The second section presents the data and variables used. The last

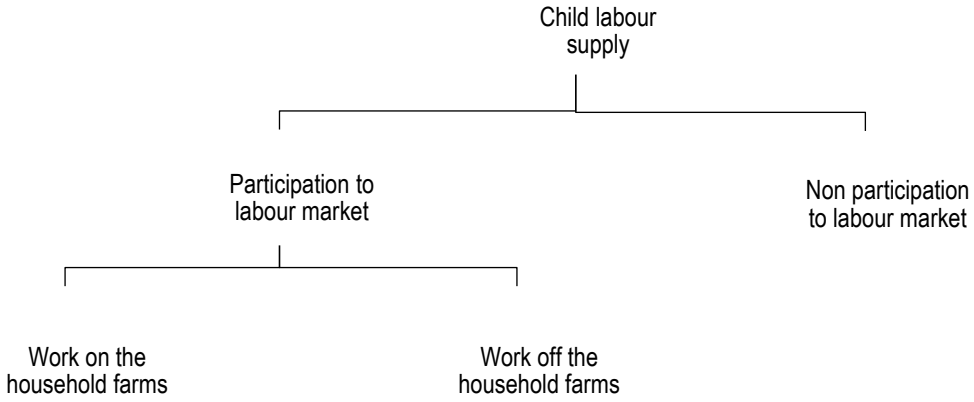
[1] Since smoothly functioning labour markets are rare, land ownership increases the household's demand for child labour in agricultural activities.

part will gauge and analyse the impact of wealth on children's work on and off the family farms.

2. Modelling the allocation of children's time between the different economic activities

Previous studies analysing the activities of children have focused on either a simple binary structure decision process of participation in the labour market or not, or a multinomial logit (MNL) specification allowing for multiple unordered outcomes. Although the limitations of the first approach in relation to the range of choices facing children are obvious, the restrictions of the MNL are less immediately clear. The MNL assumes through the restrictive IIA (Independence of Irrelevant Alternatives) assumption that substitution patterns are proportional.[2] We believe that the decisions concerning the allocation of children's time (participation or non-participation in economic activities) are taken by parents *simultaneously*, but that these decisions are clearly *interrelated*. By relaxing the IIA assumption across each branch, the nested logit model is the most appropriate specification as it allows for the inclusion of the structured (and potentially sequential) decision making process that parents engage in for the participation of their children in the labour market. More specifically, we specify a two-level nesting structure that separates the alternatives into two groups (or "nests"). We assume that the decisions concerning the children's time allocation take place in two stages. First, parents decide if children will participate in the labour force. Then, parents decide if a child worker will work on the family farm or for a non-member household. The probability of the different alternatives (work on or off the household farms) is thus conditioned by the participation to the labour market. The following figure illustrates the two-stage structure of the parental decisions regarding the activities performed by their children.

Figure 1. Nested logit model decision tree structure concerning the children's economic activities



In the decision tree above, the three decisions relating to children's economic activities are broken into two limbs (i=1,2) and then two further branches (j=1,2). The probability not to participate in labour market can be written as following:

[2] The IIA assumption essentially requires that an individual's evaluation of one alternative relative to another alternative should not change if a third (irrelevant) alternative is added to or dropped from the choice set. This assumption is forced in the MNL model because the errors are set to be independent and identically distributed.

$$P(y_{ij} = \bar{p}) = \frac{\exp(\beta_j X_i)}{\exp(\beta_j X_i) + \exp\left[\lambda . \ln(\sum_{j=0}^{2} exp(\beta_j X_i)\right]}$$

Where λ represents a dissimilarity (or logsum) parameter that determines the correlation in unobserved components among alternatives in the nest. However, the probability that a child works for a household member (conditioned by the fact that he works) is given by:

$$P_{ij} = P(y_{ij} = j|p) = \frac{\exp(\beta_j X_i)}{\sum_{j=0}^{2} exp(\beta_j X_i)}$$

Estimated results for the nested logit decision tree and model discussed above are presented in section 3.

3. Nature of the data

The data used in this paper comes from the national Malian survey *Enquête Légère Intégrée auprès des Ménages* (ELIM), conducted in 2006 by the *Direction Nationale de la Statistique et de l'Informatique* (DNSI). The survey collected information from a national representative sample of more than 4500 households, of which 9700 children were aged from 7 to 14 years old. ELIM06 is a rich source of information on children's activities and household characteristics, assets and wealth. This survey constitutes an ideal dataset to study the relation between parental resources and children's activities.

The nested logit model requires a variable that varies across options for the same individual. We created a variable that is specific to the different alternative outcomes that a child can perform. Thus the dependant variable is a categorical one, indicating the three possible activities that a child can perform, namely *non-working, working on a household farm* or *working off the family farm.* Table 1 reports the economic activities performed by children aged 7 to 14 years old in rural Mali. The vast majority of child labourers are working for the family farms. Working for the family clearly interacts with schooling since only one quarter of children helping the family are attending school. These economic activities are mainly performed by boys, while girls are more often inactive, performing domestic chores. It is worth noting that these results do not include the involvement in household chores. Thus, the descriptive evidence presented here suggests that gender considerations are an important factor in the assignment of responsibility for chores in the household – a greater proportion of girls than boys perform chores in Mali.

Table 1. Children's economic activities according school attendance and gender- 7-14 years old/Rural Mali

	Children's activities		Of which attending school		Gender	
	Number	%	Number	%	Boys (%)	Girls (%)
Children working on the family farms	2514	39,6	677	26,9	56,9	43,1
Children working for a non-family member	624	9,8	218	34,9	59,5	40,5
Children non- working	3216	50,6	1906	59,3	52,3	47,7

Source : *Enquête Légère Intégrée auprès des Ménages au Mali*, 2006.

We use three variables to measure household wealth: the household land-holding size (in hectares) the number of livestock held and the household expenditure (per adult equivalent).[3] The other independent variables include various child characteristics (age, gender, level of educational attainment), characteristics of the household's head (age, gender, level of educational attainment, occupations) and characteristics of the household (number of children aged less than 7 years old, number of children aged from 7 to 14 years old, proportion of paid adult, credit and water access). These control variables are likely to influence the participation of children to the labour market (Diallo, 2001; UCW, 2010).

3. Results

Table 2 reports the marginal probabilities for the nested logit model.[4] The likelihood ratio test for the IIA assumption within the nested logit model rejects the null at the 1% significance level, which confers some robustness to our alternative modelling approach.

Table 2 examines the different levels of decision in relation to the participation of children to the labour market. An initial observation is that the land's size and the household expenditures influence the need for child labour in two opposite directions. The probability of not participating in labour activities increases by 5% when the household expenditures double. On the contrary, the likelihood of a child working increases by 3% with a raised household's land of one hectare. In contrast, the number of livestock held by the family seems to have no influence on the decision to send a child into work. Hence, in the case of rural Mali, we validate both the wealth paradox and the luxury axiom. These results are consistent with the fact that the relationship between poverty and child labour depends on the variable used as a proxy for wealth (Nkamleu and Kielland, 2006).

Moving on to the second level of the model, table 2 also focuses on the factors correlated with the place of children's economic activities chosen by the parents (namely on or off the family farm). We observe that the larger the land size held by the household, the higher the probability of a child working on the household farm. This result specifies the wealth paradox, which is valid only if the child works for his family. On the contrary, a child is less likely to work outside the network of kin when the land size held by the household raises.

Data also suggests that the lack of parental resources increases the probability of a child working, which confirms the luxury axiom. The simultaneity of the luxury axiom and the wealth paradox for the children working for their family suggests the existence of threshold effects. In line with Basu, Das and Dutta's work (2010) we assume that the relationship between child labour and wealth is not linear and is likely to reverse beyond a certain point of household wealth.

We test this hypothesis using a nonparametric Gaussian kernel regression. The next figure shows the interactions between land and child economic activities (2a). We can see that child labour (regardless of the place where children are working) and land size relationship is an inverted-U shape, with a stationary point of around 61 hectares.[5] As household's land rises, child labour first increases and then declines. Consistent with previous studies (Basu, Das and

[3] The household expenditures include consumption expenditures as well as taxes, insurance, gifts and remittances. However, the imputed value of the accommodation has been removed from this variable.

[4] The parameters of the nested logit model were estimated by the Full Information Maximum Likelihood estimation.

[5] The turning point was estimated using the square of the size of land in the nested logit model.

Dutta, 2010 ; Bar and Basu, 2009), this outcome highlights the parental altruism and confirm both the luxury axiom and the wealth paradox. Results support the widespread assumption that poverty and market imperfections are the main cause of the use of children in rural economic activities. Parents send their children to work because they need the children's income contribution to escape from poverty. However, up to a certain threshold of wealth (in this case 61 hectares), the imperfections of land and labour markets prevent them from "retiring" their children from work. Indeed, in the absence of perfect land and labour markets, small landowners can hardly employ an additional productive workforce (Bhalotra and Heady, 2003, Dumas, 2007). Beyond 61 hectares, the household is wealthy enough not to need the child's contribution and opts for an adult workforce.

Tableau 2. Nested logit estimation of the supply of child labour (7-14 years old) in rural Mali. [6]

1er level of decision: Participating or not to the labour market *(nested logit)*

		Non-participation to the labour market			
		Coefficient	**Standard deviation**	**Odd-ratios**	**Standard deviation**
	Land-holding size	-0,03***	0,00	0,97***	0,00
	Ln household expenditures	0,05	0,06	1,05*	0,42
Household wealth	Nb of livestock held	0,00**	0,00	1,00***	0,03
	Nb of observations	12709		Wald chi2(30)	1007
	Nb of cases	6354		Prob> chi2	0,00
	Log likelihood	-5108			

2nd level of décision : Working or not on the family farm

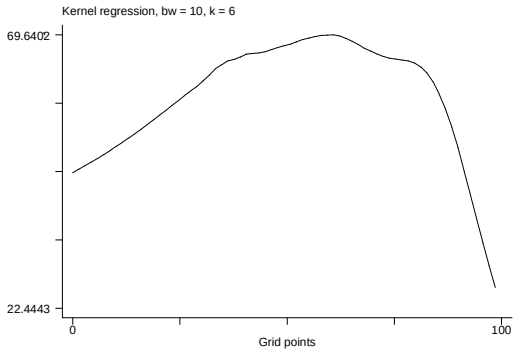
		Participation to economic activities inside the household farm				Participation to economic activities outside the household farm			
		Coefficient	**Standard deviation**	**Odd-ratios**	**Standard deviation**	**Coefficient**	**Standard deviation**	**Odd-ratios**	**Standard deviation**
	Land-holding size	0,03***	0,00	1,04***	0,00	-0,04***	0,01	95***	0,01
Household wealth	Ln household expenditures	-0,11*	0,06	0,89*	0,05	-0,58***	0,09	0,56***	0,05
	Nb of livestock held	0,00**	0,00	1,00**	0,00	0,00**	0,00	1,00**	0,00
		Chi 2	13.365			Chi 2	3.325		
		Prob >chi2	0.646			Prob >chi2	1.000		
		IIA	Accepted			IIA	Accepted		

Source : *Enquête Légère Intégrée auprès des Ménages au Mali*, 2006.

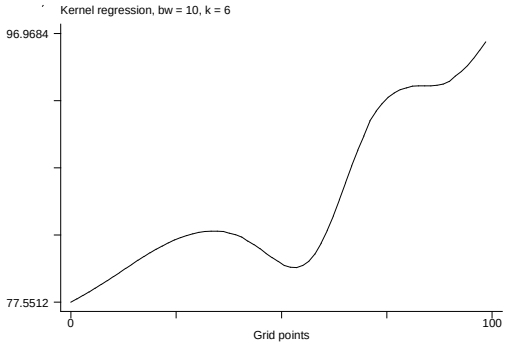
[6] in order to gain some space, only the variables of interest have been reproduced in this paper. The whole tables (with the control variable) are available upon request.

Figure 2. Gaussian kernel regression of the probability for a child aged from 7 to 14 years old to be employed, according to the size of lands held by the household and the place of employment

(a) First level of decision
Economic activities (N=6354)



(b) Second level of decision
Family farm activities (N=3138)



Source : *Enquête Légère Intégrée auprès des Ménages au Mali*, 2006.

The second figure (2b) highlights the relationship between the land size and the use of children in the family circle, for the second level of decisions.[7] We can see that rural Malian households show a clear preference for their own children. Several reasons can be found to help explain the preference for the familial workforce. First of all, work in farms is seasonal and the households, especially those holding large areas of land, may regularly be confronted by a lack of labour supply. Children are an easy and cheap way to face this kind of rural market failure. Children are also preferred if the household faces a negative income shock (Guarcello et al., 2003;Grootaert and Kanbur ,1995). Indeed child labour can be a part of a strategy aimed at minimising adverse income fluctuations. Consequently, it is easier for poor landowners to engage their own children. However, even for richer households, moral hazard concerns may induce a preference for the familial workforce. In fact children are often considered as easier to manipulate, to supervise and less likely to commit thefts (Deolalikar and Vijverberg, 1987). Furthermore, working on family farms under parental supervision may be considered beneficial to the child in terms of socialization and skill acquisition. Through "learning by doing", working in agriculture enables children to acquire practical skills they will need later to perpetuate the farm heritage of land. From this point of view, the engagement in agricultural and family business work may be considered as education by the parents (Cigno and Rosati, 2005; Emerson and Souza, 2007). To summarize, there are numerous incentives for a landowner to hire their own children.

4. Concluding remarks

Using a nested logit model, this paper assesses an improved version of the wealth paradox by testing the relationship between wealth and place of working for rural Malian children aged from 7 to 14. Child family farm work is significant in Mali as 80% of the child labourers work on household farm.

[7] We create a dummy variable for children in economic activities (n=3138), taking the value 1 if the child is employed in the family farm, and 0 if the child works for a non-member household.

We found a non-linear and inverted-U shaped relation between child labour and land size, confirming the findings of other studies (Basu, Das and Dutta, 2010; Bar and Basu, 2009). Thus, the demand for child labour might increase with farm size to the point that parents can afford to hire adult workers. From then on, children's participation is declining. Results also suggest that the more the land size rises, the more children are used to help the family in agricultural activities. This "wealth paradox" effect shows a clear land ownership preference for child workforce from the family, and has interesting policy implications.

Government funded initiatives of land reform programmes may have an undesirable effect on agricultural child labour. In the same vein, policies aiming at improving household income via transfers or increasing the level of agrarian assets can have adverse effects on one of the hidden forms of child labour, namely working for the family. Households have to increase the land size to a very high threshold (the average size of land in rural Mali is approximately 7 hectares) in order to thwart the positive effect of land size on the probability of a child working on the family farm. Therefore, policies should focus on reducing the parental preference for their own children. To this purpose, some solutions include improving credit, labour and market access in rural areas to curtail market imperfections. Improving the quality of school in proportion to the rural labour market can also be a successful way to offer alternatives to parents for the children's education.

References

Bar,T and K.S. Basu . 2009. "Children, Education, Labor and Land: in the long run and short run". *Journal of the European Economic Association:* Volume 7, Issue 2-3, p.487-497.
Basu, K., S. Das, and B. Dutta. 2010. "Child labor and household wealth: Theory and empirical evidence of an inverted-U". *Journal of Development Economics* 91 (1): 8–14.

Basu, K. and P. H. Van. 1998. " The economics of child labor". *American Economic Review*: 412–427.

Bhalotra, S., et C. Heady. 2003. " Child farm labor: The wealth paradox". *The World Bank Economic Review* 17 (2): 197–227.

Cigno, A., et F. C. Rosati. 2005. "*The economics of child labour"*. Oxford University Press, USA.

Deolalikar, A. B. 1981. "The inverse relationship between productivity and farm size: A test using regional data from India"». *American Journal of Agricultural Economics* 63 (2): 275–279.

Deolalikar, Anil B., et Wim P. M. Vijverberg. 1987. "A Test of Heterogeneity of Family and Hired Labour in Asian Agriculture". *Oxford Bulletin of Economics and Statistics* 49 (3): 291-305.

Diallo Yacouba. 2001. " Les enfants et leur participation au marché du travail en Côte d'Ivoire ". Bordeaux: Montesquieu Bordeaux IV.

Dumas, C. 2007. "Why do parents make their children work? A test of the poverty hypothesis in rural areas of Burkina Faso". *Oxford Economic Papers* 59 (2): 301–329.

Emerson, P. M., et A. P. Souza. 2007. "Child labor, school attendance, and intrahousehold gender bias in Brazil". *The World Bank Economic Review* 21 (2): 301–316.

Grootaert, C., et S. M.R Kanbur. 1995. "*Child labor: A review*." 1454. World Bank Publications.

Guarcello, L., F. Mealli, F. C Rosati, and World Bank. Human Development Network Social Protection Team. 2003. "*Household vulnerability and child labor: the effect of shocks, credit rationing and insurance"*.

Koissy-Kpein, S. 2012. "*Child labor, schooling and household wealth in African rural area: luxury axiom or wealth paradox*." CEPS/INSTEAD Working Paper Series.

Nkamleu, G. B, et A. Kielland. 2006. "Modeling farmers' decisions on child labor and schooling in the cocoa sector: a multinomial logit analysis in Côte d'Ivoire". *Agricultural Economics* 35 (3): 319–333.

UCW. 2010. *Joining Forces against Child Labour: Inter-agency report for The Hague Global Child Labour Conference of 2010*.