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Revisiting the Link between Poverty and Child Labor

The Ghanaian Experience

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In Ghana children from poor households are far more likely to engage in child labor activities than are children from nonpoor households. Girls generally work more than boys, and rural children work more than urban children.

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Summary findings

The link between poverty and child labor has traditionally been regarded as well established. But recent research has questioned the validity of this link, claiming that poverty is not a main determinant of child labor.

Starting from the premise that child labor is not necessarily harmful, Blunch and Verner analyze the determinants of harmful child labor, viewed as child labor that directly conflicts with children's accumulation of human capital, in an effort to identify the most vulnerable groups. Identifying these groups might enable policymakers to take appropriate action.

The authors reinstate the positive relationship between poverty and child labor.

Moreover, they find evidence of a gender gap in child labor linked to poverty. Girls as a group (as well as across urban, rural, and poverty subsamples) are consistently found to be more likely to engage in harmful child labor than boys. This gender gap may reflect cultural norms (an issue that calls for further research).

The incidence of child labor increases with age, especially for girls.

In Ghana there are structural differences—across gender, between rural and urban locations, and across poverty quintiles of households—in the processes underlying child labor.

This paper—a joint product of Human Development 3, Africa Technical Families, and the Economic Policy Sector Unit, Latin America and the Caribbean Region—is part of a larger effort in the Bank to investigate and understand the processes underlying child labor. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Hazel Vargas, room I8-138, telephone 202-473-7871, fax 202-522-2119, email address hvargas@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. The authors may be contacted at nblunch@worldbank.org or dverner@worldbank.org. November 2000. (21 pages)

Revisiting the Link Between Poverty and Child Labor: The Ghanaian Experience[†]

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1. Introduction

Sub-Saharan Africa has long been stagnant in terms of economic growth and development. Indeed, a recent study goes as far as to call it a "Growth Tragedy" (Easterly and Levine, 1997). In order to get out of this dead-lock, economic activity should be stimulated. However, especially when it comes to young children, there exists an (intertemporal) trade-off: should the children work now, and thus instantly contribute to household income or should they attend school, thus accumulating human capital, while foregoing incomes in the meantime, eventually leading to even higher incomes in the future?

Child labor is a widespread phenomenon. ILO (1993) estimates that there are around 70.9 million "economically active" children aged 10-14, while UNICEF (1991) estimates that 80 million children aged 10-14 undertake work, which is "interfering with their normal development". Disregarding the different methodologies and definitions underlying various estimates, it should be stressed that the nature of child labor differs widely across continents and regions.

In developing economies, the child may often be a net contributor to the household, while in the industrialized economies he or she is not. The incidence of child labor may be high in industrialized economies but the children either merely perform small tasks in the house to assist their parents or work in order to finance their own (above subsistence level) consumption. Thus, child labor need not *necessarily* be "bad", nor warrant action from policy makers. Indeed, some (low, non-human capital inflicting) levels of child labor may even stimulate the children in their personal development as well as generate a natural attachment to the labor market already at an early age. Thus, child labor can be beneficial, rather than harmful, as long as it is not undertaken at the expense of educational attainment.

In developing economies child labor is often performed at the expense of education, which makes it an important issue warranting further analysis. The intertemporal trade-off in the contribution of the child to the household and the choice involved - should the household choose school or work on behalf of the child? - is the topic of this paper, analyzing the case of Ghana.

While the Sub-Saharan region has been stagnating over the last decades, Ghana has taken numerous steps to increase economic activity, following the economic break-down in 1983. The Economic Restructuring Program (ERP), initiated in 1983 by the Ghanaian government in collaboration with the World Bank and the IMF, liberalizes trade and encourages industrial invention and production. However, despite these undertakings, which also include improving primary education as well as legislative steps[1] to prevent child labor, child labor is still an integral part of recent Ghanaian economic activity. Hence, there seems to be a need for analyzing in more detail what determines the outcome of the household's labor-work decision for their younger members in Ghana, specifically in order to attempt identifying the most vulnerable groups, thus possibly enabling appropriate actions to be taken by policy makers. Analyzing a new data set, this paper is such an attempt.

While the analysis of incidence and determinants of *harmful*[2] child labor in Ghana leads to several interesting conclusions, the major conclusions emerging from this study are: (1) we reinstate the positive relationship between poverty and child labor, a conjecture that has been questioned by recent literature (2) we find evidence of a gender gap in child labor linked to poverty, since girls as a group as well as across urban, rural and poverty sub-samples consistently are found to be more likely to engage in harmful child labor than boys, and (3) there exist structural differences in the processes underlying harmful child labor in Ghana across gender, across rural/urban location as well as across poverty quintile of the household.

The next section reviews the previous literature, while section three presents a preliminary analysis of the incidence of child labor and schooling in Ghana. Section four presents a simple economic model of the household decision on child labor and discusses the econometric methodology. Section five presents the results from the analysis of child labor determinants. Section six concludes with policy recommendations and directions for further research.

[1] E.g., The Labor Decree (1967), which prohibits employment of children under the age of 15.
[2] Defined as child labor that conflicts with human capital accumulation of the child.

2. Review of Previous Research of Child Labor and Schooling

Previous research on child labor has focussed almost exclusively on empirical work. An important exception, however, is Basu and Van (1998). They develop a model of an economy in which child labor is a potentially important component. The economy exhibits multiple equilibria. Whether child labor exists in equilibrium depends on the general level of productivity of the economy. If the economy is very unproductive, child labor exists in equilibrium, while if very productive, it does not. Two assumptions are identified as essential to this result. First, their "Luxury Axiom" states that the children are sent to work only if the household's income from other sources than child labor is very low. Secondly, their "Substitution Axiom", assumes that – from the viewpoint of firms - child labor is a substitute for adult labor.

While these two crucial assumptions are related to the micro-behavior of households and firms, Swinnerton and Rogers (1999) show that in addition to these micro-level assumptions there also exists an essential assumption linked to the macro-behavior. They term this the "Distribution Axiom", which states that income or wealth from non-labor sources must be sufficiently concentrated within only a few of the agents. In particular, Swinnerton and Rogers show that with sufficient equality in the distribution of non-labor income, a market equilibrium with child labor cannot exist in the Basu and Van model. This view is now increasingly held by international organizations, e.g., the World Bank (see Fallon and Tzannatos, 1998). While, thus, some progress has been made in establishing important characteristics and determinants of child labor in developing economies in the theoretical literature, the main focus has been on empirical studies.

The empirical literature has mainly been occupied with the schooling decision, merely viewing child labor as the lack of schooling. Chao and Alper (1998) analyze the access to basic education in Ghana for children between 10-14 years of age. Two supply-side factors that reduce participation are identified, namely (1) distance to primary school, and (2) pupil-teacher ratio at the primary level. Furthermore, demand-side constraints affecting enrollment and drop-out rates are access to drinking water and roads. Lastly, household income, demand for child labor, and parental education are found to be key factors in determining the likelihood of children attending primary school.

More recently, the literature has moved to incorporate the work decision and thus analyzing schooling and child labor jointly. Nielsen (1998) analyzes child labor and schooling in Zambia. A gender gap is established, as boys are found more likely to go to school than girls. However, there does not seem to exist any gender related differences in the working decision. Transport costs in the form of walking distance to school affects schooling adversely. Furthermore, supply constraints on secondary schooling in the form of distance are found to negatively affect the demand for primary schooling. This accords with the view in Lavy (1996), who suggests that completion of primary schooling may serve as a ticket to secondary schooling. Nielsen does not find a positive relation between poverty and child labor, and thus raises doubts to the claim of poverty being a main determinant of child labor, see, e.g., Grootaert and Kanbur (1995).

Canagarajah and Coulombe (1997) analyze 1991-92 data on child labor in Ghana and find, similar to Nielsen, evidence of a gender gap in schooling, as boys have a higher probability of attending school than girls. Again, there is no substantial differences in the tendency to work. Including expenditure per capita of the household as a proxy for welfare (or an "inverse" measure of poverty), a weak inversely u-shaped relationship with child labor is established. This seems, in accordance with Nielsen's results, to contradict the traditional claim of poverty being a main determinant of child labor. However, a strong positive (negative) relation is found between wealth (poverty) and schooling. Livestock owned by the household is found to affect the working decision positively and the schooling decision negatively, due to the labor intensity of livestock, which increasingly finds use of child labor. Lastly, monetary costs of schooling affect the schooling choice adversely.

Sasaki and Temesgen (1999), analyze child labor in Peru. In accordance with the studies reviewed above, a gender gap related to schooling is established, i.e., females tend to be less likely to be sent to school. However, in addition to the studies previously reviewed, it is further found that girls are more likely to work than boys. Hence, the work of girls may be said to somewhat subsidize the building up of human capital of their brothers. Furthermore, a positive relation between mothers' educational level and the likelihood of the child attending school is established. Lastly, no significant relationship

between household income per capita and the schooling/work decision seems to exist for this case, either.

While there are differences in the various studies as reviewed above, there are some common points that stand out. Most convincingly, the existence of a gender gap in schooling - girls tending to be less likely to attend school than boys - seems to be a fairly well established result. Further, there does not seem to be consistent evidence of discrimination in child labor. Lastly, the often hypothesized relationship between poverty and child labor seems not to be well grounded in empirical studies. Together with other issues of the previously reviewed research as discussed above, these are issues that will be incorporated in this study.

3. Presentation of the Data and Preliminary Analysis

In this section we present the data and perform a preliminary analysis of the incidence of child labor and primary schooling in Ghana.

3.1 The Data

The data originates from the "Core Welfare Indicators Questionnaire" (CWIQ) 1997 for Ghana. The CWIQ is a household survey, collected by Ghana Statistical Service in collaboration with the World Bank in 1997. It covers a total of 14,514 households and 60,686 individuals. Among the information covered is age and relationship of individuals to the household head, the socioeconomic status of the household head, poverty quintile of the household, whether the household is engaged in agriculture and/or raising cattle or sheep, all of which are important factors in the analysis of child labor. To our knowledge, this sample has not been applied previously to study the issue of child labor in Ghana.

3.2 Preliminary Analysis

A child is defined as a person less than 15 years of age. This coincides with the end of the primary school age. Likewise, we define that the cut-off age between infancy and childhood is at the age of five. While, at least from a Western point of view, this may seem extreme, Canagarajah and Coulombe (1997) report that "a child begins to work as early as five years in rural Ghana". Thus, at the outset the sample is Ghanaian youth

between 5 and 14 (incl.) years of age. However, we will later have to modify the lower bound to nine years due to econometric considerations.

The incidence of child labor and schooling across age is shown in table 3.1. The figures for the full sample seem to indicate that child labor is not a substantial issue in Ghana, since the vast majority attend school. However, when breaking the sample up by age it is revealed that there is a substantial amount of harmful child labor (defined as child labor directly conflicting with education, i.e. obtaining whenever the child works only) taking place for the older children. This may reflect that earnings foregone raises with age. As children grow older and their potential earnings increase, they are pulled out of school.

Table 3.1 Incidence of Child Labor and Primary Education Across Age

Age	School	Work	Both	Neither
5	99.0	0.0	0.4	0.0
6	98.7	0.1	0.3	0.9
7	98.0	0.5	0.5	1.0
8	98.3	0.5	0.3	0.9
9	97.2	1.2	0.4	1.3
10	96.6	1.7	0.3	1.4
11	95.3	2.7	0.4	1.7
12	95.3	2.5	0.5	1.8
13	93.2	3.2	0.5	3.1
14	87.0	5.9	0.3	6.8
Total	96.0	1.8	0.4	1.9

Source: Core Welfare Indicators Questionnaire 1997 (Ghana).

Turning to the incidence of child labor and school attendance across rural/urban location, table 3.2 reveals that the incidence of harmful child labor is more than twice as high in rural areas than in urban (although still low), possibly reflecting the usage of children in agriculture.

Tentatively investigating the incidence of child labor and school attendance across gender, reveals the existence of gender related differences, see table 3.2. While boys are more likely to attend school, girls are more likely to engage in harmful child labor activities.

The second main focus of our study, investigating the possible link between poverty and child labor, is initially touched upon in table 3.2, also. The table reveals a

consistent pattern of children from poorer households[3] to be more likely to engage in harmful, i.e., human capital inflicting, child labor. Similarly, an almost similar pattern is seen for school attendance, in that children from wealthier households are more likely to attend school (even though the incidence "jumps" a bit in the case of children from the next-to-lowest poverty quintile).

Table 3.2 Incidence of Child Labor and Primary Education

	School only	Work only	Both	Neither
Across rural/urban location				
Rural	95.7	2.1	0.4	1.9
Urban	96.6	1.0	0.4	1.9
Across gender				
Girls	95.6	2.1	0.4	1.9
Boys	96.4	1.4	0.4	1.8
Across poverty quintile				
Lowest	94.1	3.0	0.6	2.3
Next-to-lowest	96.0	1.9	0.3	1.8
Middle	95.3	1.8	0.3	2.7
Next-to-highest	96.9	1.2	0.4	1.6
Highest	97.7	0.9	0.4	1.1
Across full sample				
	96.0	1.8	0.4	1.9

Source: Core Welfare Indicators Questionnaire 1997 (Ghana).

Based on these initial results on the incidence of child labor and schooling, we choose to divide the sample in two dimensions in the econometric analysis in section five. First, we will only include children 9-14 years of age (both included).[4] Nine years of age is chosen as the lower cut-off value, since at age nine the incidence of harmful child labor for the first time passes one percent. Second, the preliminary findings induce us to focus exclusively on the work/no-work decision, since almost all children attend school. Hence, there is not much of a schooling "choice" to model. Also, including the schooling "choice" would bias the results in the "no-harmful child labor" direction.

[3] Households are weighted according to various poverty predictors, e.g., how frequent they get meat to eat, whether the household uses toothpaste, etc, and subsequently divided into poverty quintiles, based on their ranking– see Fofack (1998) for details.

[4] This is because that if *not* doing so, the results of the econometric analysis of the next section would become biased in the "no-harmful child labor" direction.

4. Economic Model and Econometric Methodology

In this section, we start by presenting the economic model underlying the analysis. Following that is a discussion of econometric methodology of previous research and of the methodology applied in this paper.

4.1. Economic Model

The choice of child activities may be viewed as a joint decision: the household chooses whether the child should work, attend school, both, or neither. Formally, the economic model is derived from the theory of household demand for schooling, in which education is viewed as an investment in human capital. Households will thus choose to invest in education of their children up to the point where the marginal benefit from an additional year of schooling equals the marginal cost of an additional year of schooling; see Khandker, Lavy and Filmer (1994) and Mason and Khandker (1997) for a detailed description of the model. The outcome of this decision - schooling, work, both or neither - is determined by various individual, household and community characteristics, giving rise to the following simple model:

$$S_i = S(I_i, H_i, C_i) \tag{4.1}$$

$$W_i = W(I_i, H_i, C_i) \tag{4.2}$$

where S and W are the decision variables (schooling or work of child i), I is a vector of individual characteristics (e.g. age and age squared, the latter to capture possible non-linearities; whether the child is a child of the household-head or not, since we hypothesize that children of the household-head would be less likely to work, relative to non-related children), H is a vector of household characteristics (e.g., labor demand of the household, proxied by whether the household is engaged in agriculture, owns cattle and/or sheep; wealth of the household, proxied by the socioeconomic status of the household and the poverty quintile of the household), C is a vector of community variables (whether the household belongs to a rural or an urban community, the distance to nearest primary and secondary school[5], the latter two which are exclusively supply factors, while the former

[5] Supply constraints on secondary education may affect the demand for primary education, since

also somewhat catches supply factors to the degree that schools are more dispersed in rural areas but, additionally, also catches possible regional differences in the "taste" or propensity to engage in child labor activities). By this choice of explanatory variables, we seek to control for as wide a spectrum of demand and supply factors -- which a priori may be hypothesized to be affecting the household's decision of child labor activities -- as possible.

4.2 Econometric Methodology

As discussed in the previous section, previous research has focussed almost exclusively on the schooling decision. With its almost exclusive focus on the schooling decision, this literature - at least implicitly - merely views labor supply as the "inverse" of demand for schooling. However, it seems more appropriate that the work and schooling decision should be seen as two distinct, and, at the same time, joint decisions (while there may be some truth in viewing child labor as the "flip side of the schooling coin", in the sense that these for practical purposes are almost mutually exclusive usages of a child's time, it seems overly restrictive that the determinants would have opposite effects - *and* of the *exact* same size - which seems to be the implication from a strict "flip of the coin"-view).

Hence, recently the literature has moved into analyzing the school-work decision as a joint decision, by applying either (1) a bivariate probit, thus simultaneously estimating a probit for the schooling decision and one for the work decision in a SUR-structure; see, e.g., Canagarajah and Coulombe (1997) and Nielsen (1998)), or (2) a multinomial logit for the four possible outcomes (school, no work), (school, work), (no school, work), (no school, no work); see, e.g., Sasaki and Temesgen (1999) and Grootaert (1998). We will apply a univariate probit model due to the considerations discussed previously, hence focussing on the work decision only, i.e. estimating equation (4.2) above. Our dependent variable is the binary indicator variable:

$$y_i = \begin{cases} 1 \text{ if child } i \text{ works} \\ 0 \text{ otherwise} \end{cases}$$

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primary school may be viewed as a "ticket" to secondary education, see Lavy (1996).

The indicator variable is based on responses to the question "What was [NAME]'s main work status during the past 4 weeks". If the main work status was labor related activities rather than school, we interpret this as indicating that the child is engaged in harmful child labor activities, i.e. child labor that directly conflict with the accumulation of human capital.

The determinants of work is analyzed in a standard probit. Given the choice of dependent variable, the estimated parameters and predicted probabilities from (4.1) will then readily be interpretable as impacts on harmful child labor, rather than merely on child labor per se, harmful or non-harmful, which had been the case had we chosen a broader definition of child labor.

5. The Determinants of Child Labor in Ghana

This section presents the empirical findings from the analysis of determinants of harmful child labor in Ghana. In the first subsection we estimate the probit model for the full sample, as well as for various sub-samples (across gender, urban/rural location and highest/lowest poverty quintile, rural/urban girls and boys and poor-/non-poor girls and boys), in order to highlight possible gender, location, and poverty related differences. Then follows a further analysis of the possible link between child labor and gender and poverty in the form of predicted possibilities for the full sample, as well as for sub-samples.

5.1 Estimation of a Probit Model of Child Labor Determinants

The results from the full sample as well as the various sub-samples are presented in the table in Appendix B. The table reveals the presence of a gender gap in child labor at the aggregate level, and girls are around four percent more likely to work than boys. When we disaggregate the sample into various sub-samples, this result appears robust across all sub-samples. This is consistent with a conclusion of discrimination in favor of boys being present in urban and rural areas as well as among households in the lowest and highest poverty quintiles. Hence, we may conclude the presence of a poverty related gender gap in child labor in Ghana.

It appears that children from poor households are more likely to engage in child labor as they grow older. The intuition behind this result is that the value of the child's labor increases with age, thus leading to an increased likelihood of working over time.

A child of the household head is less likely to engage in harmful child labor activities, thus confirming our a priori hypothesis, as discussed previously. However, children of poor households as well as rural boys and boys from poor households are found to be more likely to engage in harmful child labor than other children. This is somewhat puzzling, but may reflect that these groups have a higher demand for labor (rural areas) and/or do not have non-biologically related children living in the household to substitute for the labor of the household's own children (poor households).

The socioeconomic status of the household head is an important determinant of child labor. Children of self-employed workers – from both agriculture and non-agriculture - are more likely to engage in harmful child labor activities for virtually all (sub-) samples. This is also – though less consistently so – the case for children of workers from the informal private sector. Surprisingly, children of unemployed or non-active household heads are only more prone to engage in child labor for the poor, urban boys and poor boys sub-samples. However, this may reflect that it is more likely for the household head to be unemployed or non-active for these groups.

Being disabled has an adverse effect on child labor. One explanation is that the value of disabled childrens' marginal products would seem to be low, leading to the household not choosing to use them for child labor purposes, and rather view them as a human capital investment. However, in urban areas disability may not be affecting productivity quite as much as in rural areas (where the distances and the types of labor require mobility), since children in urban areas may be serving as vendors, shoe cleaners, etc., activities which do not require much physical activity. The result of an insignificant parameter estimate is consistent with this phenomenon, although one might have expected a statistically significantly positive parameter estimate.

Ownership of land, sheep and cattle is an important determinant of child labor. This points towards the importance of these areas for usage of childrens' time (confirming the results found by Canagarajah and Coulombe (1997).[6] This finding is

[6] Unfortunately, we do not have data to investigate whether children engage in cooking and other

further supported by the finding that children from rural communities tend to have a higher likelihood of engaging in child labor, except children from the wealthiest households.

Poverty affects the likelihood of engaging in harmful child labor positively and is a very robust finding since it is found to be statistically significant for the full sample as well as all the sub-samples (except for urban girls). While the *impact* is somewhat small, the link is very clearly existing in data. This confirms our a priori beliefs, of a positive link between poverty and engagement in harmful child labor activities, while contradicting the findings of recent research, which typically have found this link to be absent (see Canagarajah and Coulombe (1997) and Nielsen (1998)).

Supply factors affect child labor, especially the distance to the nearest primary school. Across most (sub-) samples, there is a positive relation between the distance to nearest primary school and the likelihood of engaging in child labor activities. Lavy (1996) suggests that primary education serves as a "ticket" to secondary education. Hence, if secondary education is rationed, there will be less of an incentive for the household to invest (in terms of direct costs to school uniforms, books, etc., as well as foregone earnings) in primary education. We find support for this hypothesis, since there is a positive impact from the distance to the nearest secondary school and engaging in harmful child labor activities. These results points towards the importance of supply factors as determinants of harmful child labor in Ghana.

Lastly, note that tests for the split of the sample across gender, rural-urban location and across poverty quintiles support a split.[7] Hence, there *are* structural differences between the full sample and the sub-groups.

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housework, which could be hypothesized to engage a substantial amount of child labor.

[7] Note that while the results from estimating the model for the three middle quintiles are not shown, the log-likelihoods of these are part of the test.

5.2 Predictions – Further Analysis of the Child Labor-Poverty/Gender Link

We now turn to predictions of the mean probability of being engaged in child labor for the full sample -- as well as the sub-samples -- and across gender for the full sample as well as each of the sub-samples in order to further identify the most vulnerable groups, as related to harmful child labor.

The findings are presented in table 5.1. They confirm our earlier findings of rural children being more likely than urban children (10.7 and 4.1 percent, respectively) and girls more likely than boys (10.6 and 6.2 percent, respectively) and poor children more likely than non-poor (16.2 and 2.5 percent, respectively, when controlling for individual, household and community characteristics of the children. The gender gap is robust across all sub-samples, rural girls work more than rural boys, urban girls work more than urban boys, and poor and non-poor girls work more than poor and non-poor boys.[8]

Table 5.1 Predictions of Child Labor Across (Sub-) Samples (Percent)

		All	Rural	Urban	Girls	Boys	Poor	Non-poor
Predicted Probability (at the mean)		8.5	10.7	4.1	10.6	6.2	16.2	2.5
Observed Probability		12.1	15.0	5.3	13.6	10.7	20.2	5.3
	Rural Girls	Rural Boys	Urban Girls	Urban Boys	Poor Girls	Poor Boys	Non-poor Girls	Non-poor Boys
Predicted Probability (at the mean)	12.5	9.1	6.2	1.9	18.9	11.0	2.9	1.6
Observed Probability	16.5	13.8	7.6	2.9	21.6	19.0	7.5	3.3

Source: Core Welfare Indicators Questionnaire 1997 (Ghana).

In the preliminary data analysis, we found the incidence of child labor to increase with age. In order to evaluate the estimated model, a natural next step, then, would be to predict children's activities over age. The findings from this exercise are presented in table 5.2, and confirm that the incidence of child labor increase with age, when controlling for individual, household and community characteristics of the children. However, again, this increase is most pronounced for girls, who – starting at more or less the same level as boys at age nine – increases rapidly and almost double at age fourteen,

[8] Note, however, that the model consistently under-predicts the incidence of child labor – this is a well-known feature of the probit model, which predicts best, when the two outcomes are distributed fifty-fifty, see Greene (1997).

while the incidence for boys increase with less than 80 percent. The gender gap is consistent in the other sub-samples, as well, girls generally work more than boys. Children from poor households are much more likely to engage in child labor activities than children from non-poor households at all ages.

Table 5.2 Predicted and Observed Incidence of Child Labor Across Age (Percent)

Age/ (Sub-) sample	9	10	11	12	13	14
All	5.9	7.8	6.6	9.9	8.7	10.6
	(9.0)	(12.6)	(10.7)	(13.8)	(12.9)	(13.2)
Rural	7.5	11.3	10.2	11.6	9.6	13.5
	(11.2)	(16.3)	(14.8)	(16.6)	(16.4)	(16.4)
Urban	2.1	1.9	0.5	5.5	5.6	5.1
	(3.4)	(3.8)	(3.8)	(7.5)	(6.5)	(7.1)
Girls	6.4	9.1	7.9	13.6	11.7	12.0
	(10.5)	(13.6)	(12.2)	(16.1)	(15.3)	(14.6)
Boys	5.0	1.6	4.4	1.9	5.2	8.1
	(8.2)	(12.1)	(9.4)	(12.4)	(11.1)	(12.1)
Poor	12.5	--	11.0	18.0	14.8	13.2
	(17.1)		(19.2)	(22.1)	(25.4)	(22.6)
Non-poor	1.4	0.0	0.0	1.3	1.1	5.7
	(3.1)	(3.0)	(4.9)	(8.1)	(4.8)	(10.5)
Rural girls	7.3	12.6	5.9	14.9	14.4	14.4
	(12.5)	(17.7)	(16.2)	(18.4)	(20.4)	(17.6)
Rural boys	6.9	4.5	8.7	4.3	5.8	15.4
	(10.2)	(15.6)	(13.5)	(15.6)	(13.6)	(17.8)
Urban girls	3.6	2.9	1.7	9.8	7.5	7.3
	(4.9)	(5.2)	(7.0)	(11.6)	(8.5)	(10.1)
Urban boys	0.0	0.0	0.0	0.2	2.1	2.7
	(2.8)	(3.3)	(1.9)	(4.6)	(4.8)	(3.8)
Poor girls	16.9	20.1	11.9	17.3	18.6	13.9
	(20.9)	(24.2)	(20.9)	(19.4)	(26.5)	(25.1)
Poor boys	8.9	9.3	9.4	13.1	11.6	11.2
	(15.6)	(18.8)	(17.3)	(27.9)	(24.8)	(20.6)
Non-poor girls	0.2	0.1	--	4.5	2.5	10.8
	(3.4)	(3.1)		(14.4)	(7.6)	(15.7)
Non-poor boys	0.3	2.1	0.2	0.0	--	2.1
	(3.5)	(21.3)	(4.8)	(22.4)		(9.2)

Note: The number in parenthesis is the observed probability.
Source: Core Welfare Indicators Questionnaire 1997 (Ghana).

6. Conclusion

This paper analyzes the incidence and determinants of *harmful* child labor (defined as child labor that conflict with human capital accumulation of the child) in Ghana applying a new data set, in an attempt of identifying the most vulnerable groups, thus possibly enabling appropriate actions to be taken by policy makers. While several interesting results are obtained, the major conclusions emerging from this study are (1) we reinstate the positive relationship between poverty and child labor, a conjecture that has been questioned by recent literature, and (2) we find evidence of a gender gap in child labor linked to poverty, since girls as a group as well as across urban, rural and poverty sub-samples consistently are found to be more likely to engage in harmful child labor than boys (3) there exist structural differences in the processes underlying harmful child labor in Ghana across gender, across rural/urban location as well as across poverty quintiles of households. The established gender gap need not necessarily imply discrimination but rather reflect cultural norms. A further exploration of this issue seems to be a potentially fruitful avenue for further research.

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Appendix A: Definition of Variables:

Dependent Variable:

Work :	1 if main occupation is work, zero otherwise

Explanatory Variables:

Individual characteristics:

Female:	1 if female, zero otherwise
Age:	Age
Age Squared:	Age squared
Child of HHhead:	1 if child of household head, zero otherwise
Disable:	1 if disabled, zero otherwise

Household characteristics:

Socio economic group of household head dummies:1 if as stated below, zero otherwise: ("public or semi-public sector employee" is reference group)

Private Formal:	private sector employee (formal)
Private Informal:	private sector employees (informal)
Self-employed, Agr:	own account worker (agriculture)
Self-employed, Non-Agr:	own account worker (non agriculture)
Unemployed:	unemployed or non active
Other:	other or unknown
Owns land:	1 if household operates land, zero otherwise
Owns Cattle:	1 if household owns cattle, zero otherwise
Owns Sheep:	1 if household owns sheep, zero otherwise
Quintile:	household wealth quintile

(households are weighted according to various poverty predictors, e.g., how frequent they get meat to eat, whether the household uses toothpaste, etc – see Fofack (1998) for details).

Community characteristics:

Urban location:	1 if urban community (1984 population>5000)
Primary:	nearest primary school (minutes)
Secondary:	nearest secondary school (minutes)

Appendix B: Results From Estimation of Probit of Child Labor Determinants

	All	Rural	Urban	Girls	Boys	Poor	Non-poor
Individual Characteristics:							
Female	**0.042**	**0.040**	**0.040**			**0.057**	**0.019**
	(0.006)	**(0.008)**	**(0.006)**			**(0.018)**	**(0.007)**
Age	0.056	0.076	0.027	*0.084*	0.023	**0.209**	0.008
	(0.027)	(0.037)	(0.031)	*(0.043)*	(0.032)	**(0.080)**	(0.033)
Age squared	*-0.002*	*-0.003*	-0.001	-0.003	-0.001	-0.009	0.000
	(0.001)	*(0.002)*	0.001)	(0.002)	(0.001)	(0.003)	(0.001)
Child of	-0.015	0.007	**-0.053**	**-0.050**	0.018	**0.062**	**-0.099**
Household Head	(0.008)	(0.010)	**(0.011)**	**(0.013)**	(0.008)	**(0.018)**	**(0.018)**
Disabled	-0.058	-0.071	0.002	*-0.078*	*-0.041*	-0.075	
	(0.016)	(0.022)	(0.045)	*(0.026)*	*(0.015)*	(0.060)	
Household characteristics:							
Socioeconomic Status of Household Head:							
Private Formal Sector	*0.043*	-0.025	*0.034*	0.073	-0.004		0.009
Employee	*(0.029)*	(0.040)	*(0.021)*	(0.042)	(0.034)		(0.016)
Private Informal Sector	**0.082**	*0.090*	0.059	0.022	**0.177**	0.286	-0.004
Employee	**(0.038)**	*(0.063)*	(0.035)	(0.042)	**(0.076)**	(0.216)	(0.020)
Self-employed,	**0.077**	**0.093**	**0.038**	**0.085**	**0.073**	**0.203**	0.014
Agriculture	**(0.012)**	**(0.016)**	**(0.017)**	**(0.019)**	**(0.017)**	**(0.057)**	(0.011)
Self-employed, Non-	**0.042**	*0.070*	*0.018*	0.044	*0.047*	0.231	0.014
agriculture	**(0.018)**	*(0.033)*	*(0.011)*	(0.024)	*(0.030)*	(0.118)	(0.012)
Unemployed or Non-	0.019	0.020	0.013	0.002	0.048	0.223	-0.012
active	(0.020)	(0.034)	(0.015)	(0.025)	(0.036)	(0.124)	(0.013)
Other or Unknown	-0.027	0.062		-0.028			
	(0.051)	(0.121)		(0.072)			
Owns Land	*0.011*	*0.015*	*0.003*	0.004	0.016	0.009	-0.005
	(0.006)	*(0.009)*	*(0.008)*	0.010)	(0.008)	(0.019)	(0.007)
Owns Cattle	**0.276**	**0.310**	*0.038*	**0.306**	**0.234**	**0.312**	**0.188**
	(0.021)	**(0.023)**	*(0.029)*	**(0.032)**	**(0.027)**	**(0.048)**	**(0.047)**
Owns Sheep	**0.023**	**0.034**	0.008	*0.018*	**0.026**	**0.066**	-0.002
	(0.007)	**(0.009)**	(0.009)	*(0.010)*	**(0.008)**	**(0.019)**	(0.007)
Poverty Quintile	**-0.026**	**-0.038**	*-0.004*	**-0.025**	**-0.026**		
	(0.002)	**(0.003)**	*(0.002)*	**(0.004)**	**(0.003)**		
Community Characteristics:							
Urban Location	**-0.021**			-0.007	**-0.037**	**-0.127**	0.007
	(0.007)			(0.012)	**(0.008)**	**(0..18)**	(0.009)
Distance to Nearest:							
Primary School	**0.014**	**0.017**	-0.003	**0.016**	**0.010**	**0.026**	**0.009**
(minutes)	**(0.002)**	**(0.002)**	(0.003)	**(0.003)**	**(0.002)**	**(0.005)**	**(0.003)**
Secondary School	**0.008**	**0.016**	0.001	**0.010**	0.006	0.006	0.005
(minutes)	**(0.002)**	**(0.003)**	(0.002)	**(0.003)**	(0.002)	(0.006)	(0.002)
Number of Observations	11583	7754	3811	5615	5952	2441	2091
Pseudo R^2	17.8	19.4	7.9	14.7	22.4	16.7	23.7
Log-Likelihood	-3503.1	-2645.5	-727.6	-1901.5	-1570.5	-1022.8	-327.4
Tests for Sample Split[9]:	Split by:		*Mann-Whitney Test*			*LR-test*	
	Rural/Urban Location:		**t* = 13.9**			**$\chi^2(15) = 260.0$**	
	Gender:		**t* = -5.1**			**$\chi^2(15) = 62.2$**	
	Poverty Quintiles:		**t* = -13.8**			**$\chi^2(60) = 234.4$**	

[9] For a description of these tests, see Appendix C.

	Rural Girls	Rural Boys	Urban Girls	Urban Boys	Poor Girls	Poor Boys	Non-poor Girls	Non-poor Boys
Individual Characteristics:								
Age	0.092	0.054	0.055	-0.016	0.076	**0.282**	0.049	-0.031
	(0.058)	(0.048)	(0.053)	(0.030)	(0.119)	**(0.120)**	(0.047)	(0.035)
Age Squared	-0.003	-0.002	-0.002	0.001	-0.003	**-0.012**	-0.001	0.001
	(0.003)	(0.002)	(0.002)	(0.001)	(0.005)	**(0.005)**	90.002)	(0.002)
Child of	-0.016	0.027	**-0.106**	0.003	0.042	**0.065**	**-0.153**	**-0.038**
Household Head	(0.016)	(0.012)	**(0.018)**	(0.007)	(0.029)	**(0.020)**	**(0.028)**	**(0.020)**
Disabled	*-0.098*	-0.048	0.069		-0.094	-0.054		
	(0.028)	(0.028)	(0.134)		(0.108)	(0.044)		
Household characteristics:								
Socioeconomic Status of Household Head:								
Private Formal	-0.012	-0.041	0.057	0.012			0.042	-0.010
Sector Employee	(0.065)	(0.047)	(0.035)	(0.026)			(0.036)	(0.011)
Private Informal	*0.141*	0.036	-0.037	**0.187**		0.898	0.022	
Sector Employee	*(0.090)*	(0.088)	(0.020)	**(0.092)**		(0.020)	(0.041)	
Self-employed,	**0.108**	**0.083**	*0.044*	0.045	*0.164*	0.700	0.037	0.003
Agriculture	**(0.024)**	**(0.021)**	*(0.026)*	(0.028)	*(0.086)*	(0.286)	(0.019)	(0.010)
Self-employed,	*0.081*	0.066	0.022	0.018	0.179	*0.981*	0.024	0.005
Non-agriculture	*(0.048)*	(0.049)	(0.017)	(0.016)	(0.141)	*(0.031)*	(0.019)	90.0120
Unemployed or	0.019	0.025	-0.006	0.051	0.144	*0.966*		0.035
Non-active	(0.050)	(0.048)	(0.019)	(0.035)	(0.143)	*(0.033)*		(0.037)
Other or	0.083							
Unknown	(0.159)							
Owns land	0.006	0.022	0.000	**0.008**	0.003	0.012	0.003	-0.010
	(0.013)	(0.011)	(0.013)	**(0.008)**	(0.028)	(0.021)	(0.011)	(0.008)
Owns Cattle	**0.340**	**0.283**	0.030	*0.041*	**0.337**	**0.250**	**0.194**	**0.154**
	(0.036)	**(0.031)**	(0.045)	*(0.035)*	**(0.077)**	**(0.058)**	**(0.070)**	**(0.059)**
Owns Sheep	0.031	**0.036**	-0.003	0.013	0.065	**0.059**	0.003	-0.003
	(0.013)	**(0.011)**	(0.013)	(0.010)	(0.029)	**(0.023)**	(0.011)	90.007)
Poverty Quintile	**-0.039**	**-0.037**	-0.002	**-0.007**				
	(0.005)	**(0.004)**	(0.004)	**(0.002)**				
Community Characteristics:								
Urban Location					**-0.124**	**-0.113**	0.038	*-0.018*
					(0.028)	**(0.023)**	(0.018)	*90.008)*
Distance to Nearest:								
Primary School	**0.020**	**0.015**	-0.002	*-0.005*	**0.035**	**0.016**	**0.011**	0.005
(minutes)	**(0.004)**	**90.003)**	(0.005)	*(0.003)*	**(0.008)**	**(0.006)**	**(0.004)**	90.003)
Secondary School	**0.018**	**0.014**	0.004	-0.001	0.010	0.002	*0.006*	0.003
(minutes)	**(0.005)**	**(0.004)**	(0.003)	(0.002)	(0.009)	(0.007)	*(0.003)*	(0.002)
Number of Observations	3628	4120	1979	1823	1136	1300	974	1046
Pseudo R^2	17.7	21.1	7.8	9.5	13.5	20.7	29.0	20.4
Log-Likelihood	-1338.4	-1302.9	-490.0	-214.4	-513.3	-501.8	-183.8	-121.0

Notes: **Bold:** Statistically significant at 1 percent; underline: Statistically significant at 5 percent; *cursive*: Statistically significant at 10 percent; numbers in parentheses are robust Huber-White Sandwich standard errors (see White; 1980).

Source: Core Welfare Indicators Questionnaire 1997 (Ghana).

Appendix C: Description of Tests For Split of Sample:

(i) Two-sample Wilcoxon rank-sum/Mann-Whitney test:

This is a non-parametric test, i.e., it makes no distributional assumptions. It tests the hypothesis that two independent samples (i.e., unmatched data) are from populations with the same distribution using the Wilcoxon rank-sum test, which is also known as the Mann-Whitney two-sample statistic. Hence, the hypotheses are:

H_0: Distribution of child labor (group 1) = Distribution of child labor (group 2)
H_A: The distributions are not the same, i.e., split of sample is required.

(ii) Likelihood-Ratio Test:

Contrary to the) Two-sample Wilcoxon rank-sum/Mann-Whitney test, this test is parametric in the sense that it – in this context -- builds on the estimated log-likelihoods from (several) probit models, which assumes normally, identically, independently distributed error-terms. The test statistic is:

$$2\{\text{abs}[\text{log-likelihood}_{\text{full model}} - \text{loglikelihood}_{\text{reduced model}}]\}$$

and is distributed χ^2 with degrees of freedom given as the difference of the number of parameters estimated in the full model (i.e., under H_A) and the number of parameters estimated in the reduced model (i.e., under H_0). Hence, the hypotheses are:

H_0: Split of sample is *not* required
H_A: Split of sample *is* required

Notes:
For technical details of these tests, see, for example, Greene (2000).

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