Impact of School Quality on Schooling and Child Labour in Selected Zones of Ivory Coast

Abou Pokou Edouard

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Bringing Rigour and Evidence to Economic Policy Making in Africa

Impact of School Quality on Schooling and Child Labour in Selected Zones of Ivory Coast

By

Abou Pokou Edouard

Jean Lorougnon Guede University,
Daloa, Ivory Coast

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Abstract

The fight against child labour is a challenge for policy makers in developing countries. The objective of this study is to find other policies to reduce child labour. Thus, this research shows the effect of school quality on schooling and child labour in Ivory Coast. Primary data from the local survey on child labour and education policies in 2010 collected from a sample of 750 households and 1,338 children with support from PASRES were used. The estimation of two models (Heckman selection model and bivariate probit model) indicates that the presence of canteen and electricity in the school significantly increases the probability of schooling for children and reduces the probability of their work. Thus, policy makers in addressing child labour need to focus on improving the learning environment for children by focusing on the construction of school canteens and electrification of schools from disadvantaged backgrounds.

Key Words: Child labour, School quality, Heckman, Bivariate probit, Ivory Coast

1.0 Introduction

In most developing countries, especially in Sub-Saharan Africa, child labour remains a concern. Indeed, 19.6% of children in this region are involved in work (ILO, 2017). In Ivory Coast, 20.1% of children are affected (INS, 2015). Therefore, the fight against child labour remains a challenge for national decision-makers if they are to ensure quality education throughout life.

Generally, households' decision to send their children to the labour market is influenced by income, uncertainty and relative labour and educational returns (Dammerta et al., 2018). Measures to combat child labour have focused on the development of laws prohibiting child labour. Increasingly, given the difficulties of enforcing laws in the fight against child labour, implementation of public policies is becoming urgent. That is why in different countries, several social programmes (Food for Education in Bangladesh; Burkinabe Response to Improve Girls Chances to Succeed I and II; Progress Programme in Mexico, etc) have been highlighted to promote schooling of children and keeping them in the education system. These programmes have been studied and have shown a positive effect on the reduction of child labour (Ambreen, 2017; De Brauw et al., 2015 ; Fabre and Pallage, 2015 ; Jacobus and Furio, 2014; Carvalho, 2012; Yasuharu, 2010). Some of these studies have shown mixed results. For example, Ximena et al. (2016) showed in the case of Nicaragua that cash transfers conditional on children's schooling reduced child labour in household chores and traditional agriculture. But this programme has increased child labour in commercial activities.

In Ivory Coast, these forms of targeted policies are rare. Nevertheless, since the 2000s, governments have stepped up campaigns aimed at reducing child labour by increasing infrastructure in schools. Unfortunately, there are no studies to analyze the impact of public policies on reducing child labour. In addition, most studies of child labour consider the household environment and ignore that of the school (Abou, 2014; Nkamleu, 2006; Diallo, 2001). However, there is evidence that improving the learning environment for children promotes their well-being at school (Gibbons and Olmo, 2011). This improvement of the school environment presupposes the presence of certain infrastructure (canteen, latrines, library, electricity, drinking water point, absence of multilevel class, etc) which are likely to improve school results. In other words, studies that show the effect of school quality on child labour are rare in Ivory Coast. Moreover, at a macroeconomic level, because of the low quality of the school,

education has a negligible effect on economic growth in Sub-Saharan Africa (Glewwe et al., 2014). The quality of the school therefore becomes a challenge in explaining child labour. Thus, it appears important to know whether the quality of the school is a fundamental determinant in putting children to work in Ivory Coast.

The general objective of this study is to show the role of the quality of school in promoting the education of children and the fight against their participation in work. Indeed, in developing countries, the quality of the school is problematic if one refers to basic infrastructure in schools. Decision-makers in achieving education for all seek to send as many children as possible to school. The goal is to prevent them from being in the labour market. But increasingly, it is important to focus on the qualitative dimension of offering public education service.

In the remainder of this study, we will present in section 2 the discussion of child labour. Section 3 will focus on school quality. The methodological framework will be discussed in section 4 and then the empirical results in section 5 before concluding and developing economic policy recommendations in section 6.

2 Child Labour: Definitions

The definition of the term "child labour" is controversial (Biswajit and Runa, 2019 ; Ali et al., 2017; Pallage and Zimmerman, 2007; Fafchamps and Wahba, 2006; Basu and Van, 1998, etc). When we use this term throughout this study, we refer child labour to be abolished and hazardous work. In other words, work that cannot be performed by children given their age. In the literature, several definitions exist. For example, studies consider child labour as a labour force (Pallage and Zimmerman, 2007; Basu and Tzannatos, 2003). This notion can also be assessed from the specificity of the activity. In the Basu and Van (1998) model, for example, child labour is an economic activity. In addition, the definition of child labour can be specific to each country, each culture, otherwise the definition is not universal.

On analysis, the definition of child labour is not precise. Indeed, some economic activities outside of school hours or during school holidays can be beneficial for children (Ali et al., 2017). Similarly, non-economic activities (e.g. housework) can be performed by children for long hours and have a negative effect on their health and cognitive development. It then becomes harmful. Therefore, the definition of child labour must take into account the number of hours worked (Chiwaula, 2010; Dumas, 2012). Indeed, an activity can be listed as harmless but depending on the number of hours worked it can have adverse effects on health and school performance. Thus, the definition of child labour can be specific to each country and each culture, which shows that it is not universal and will always be the subject of debate.

In Ivory Coast, from the law we can retain the concept of child labour abolition and dangerous to define child labour (Table 1). Thus, the term "child labour to be abolished" refers to the exercise by a child of prohibited work, and more generally of types of work that should be eliminated as deemed undesirable both socially and morally according to national legislation (Annex Table A1). In addition, "hazardous work" is any activity that by its nature or type directly or indirectly results in harmful effects for the safety, health (physical or mental) and moral development of the child. The danger can also be caused by excessive workload, the physical rigors associated with the task, or the number of hours, even when the activity is not dangerous.

In addition, in the definition of child labour, age is important. It lets you know who is considered a child. As shown in Table 1, compared to children aged 14-17, those 5-13 years old are prohibited from all forms of activity. Thus, in this analysis, the age group considered is 6-13 years. Indeed, the entry of official age in the first year of primary

school is six years. In addition, the minimum age for admission to employment is 14 years. Thus, in this study, the age range considered for children is 6-13 years.

Table 1: Definition of forms of child labour from the laws in force in Ivory Coast

<table>
<tr><th>Forms of work</th><th colspan="2">Worst forms of work</th><th>Child labour other than the worst forms of work</th><th>Regular/light work</th></tr>
<tr><td rowspan="2">Criteria according to national laws and conventions of the International Labour Organization (ILO)</td><td>Worst form other than dangerous work (forced labour, child trafficking...)</td><td>Dangerous work</td><td rowspan="2">Decree No. 96-204 of 7th March 1996
Article 2: In apprenticeship more than 16 consecutive hours and during the night of 05 pm to 8 am
Labour Code
Article 23-8 (Minimum Age)</td><td rowspan="2">< or = at 8 h/day
Article. 23-8 of the Labour Code (Minimum age)</td></tr>
<tr><td>Convention 182 of ILO</td><td>Order No. 009 of 19 January 2012 revising the list of works Dangerous (Table A1) and Convention 182 of ILO</td></tr>
<tr><td>5-13 years</td><td></td><td></td><td></td><td></td></tr>
<tr><td>14-17 years</td><td></td><td></td><td></td><td></td></tr>
</table>

Source: the author from IPEC, INS, (2014)

Unacceptable work according to ILO conventions and the Laws of Ivory Coast

Acceptable work according to the conventions of ILO and the Laws of Ivory Coast

3 School Quality and Relationship with Child Labour

The definition of quality is open to debate. This variable takes into account several indicators: school infrastructure or physical resources, resources for teachers, quality of teachers, etc. In most studies, school quality is measured by class size, teacher characteristics, or per capita education expenditures (Dynarski et al., 2013; Chetty et al. 2011; Futoshi, 2011; Valdenaire, 2011; Rivkin et al., 2005, etc). These studies highlight the quality of school on student achievement considering some variables (class size, characteristic of teachers) as explanatory variables in the production function. But for Pedro et al. (2016), these variables do not reflect the quality of the school. Indeed, these variables are directly related to students' achievement. Nevertheless, these authors assume that where the class size and teacher characteristics of a school contribute to better student achievement, then this school is of high quality. In other words, this measure of the school gives an idea of its definition. In other words, school quality is one that enables children to improve their performance at school. However, some of the highlighted variables being debated are not included in the analysis of child labour. This is because child labour surveys do not take into account the characteristics of schools. Another explanation may be that it is difficult to establish a causal link between these indicators and student performance.

The class size sometimes influences student achievement (Giambona and Mariano, 2018; Hans et al., 2014). Indeed, small classes can improve children's academic performance (Krueger, 2003). However, this result is not always obvious. Hanushek (2003) shows, for example, that there is no significant effect of class size. In the analysis, there are contradictions that can be explained by other factors. Abou (2016) taking into account this variable to explain child labour found that parents tend to send their children to overcrowded classrooms as they have no other choice (anything that reduces the child's probability of employment). However, these children usually have poor results. Thus, they will be likely to end up in the job market. In other words, if parents had a choice, they would send their children to schools where classes are small. These schools are not only more expensive but also distant from poor households. As a result, children in poor households are sometimes excluded from these schools if there is no state subsidy (Futoshi, 2011).

To take into account other ways of measuring school quality, some authors consider school infrastructure (Jacobus and Furio, 2014; Bacolod and Ranjan, 2008). These act

synergistically and indirectly on student performance. Thus, parents are encouraged to educate children rather than put them in the labour market. In the Philippines, for example, Bacolod and Ranjan (2008) use two commodity groups to calculate two types of index: a physical installation index and a resource index for teachers. From a multinomial logit, the results showed that children attend schools that have electricity. However, the results do not statistically influence the choice of children's activity. This study identifies the quality of the school from some infrastructure in the school. It therefore considers the physical resources available in schools (latrines, electricity, concrete building material, drinking water supply, etc). It also takes into account the resources to the teachers (room for teachers, file lockers, computer, etc). However, remember that in this study, the authors calculate an index which is an aggregation of several variables. It therefore does not make it possible to assess the effect of each variable.

One of the Sustainable Development Goals (SDGs) is to ensure equal access to quality education for all and promote lifelong learning opportunities. In Ivory Coast, progress in this direction is underway. In fact, after the crisis of the 2010s, the policies of distributing school kits, building schools and classrooms have allowed an increase in the number of school children. For example, over the period 2013 to 2019, the number of schools increased from 11,233 to 14,246, a variation of about 27% (Table 2). During the same period, the number of students increased by 23%. In addition, apart from the number of canteens, which is decreasing (5.53%), other infrastructures such as the number of schools with water points (0.09%), the number of electrified schools (26.98%) and the number of schools with latrines (118.91%) have increased over the same period. Such increases in the number of these school quality indicators can reduce the failure rate, help keep children in school and reduce the number of children in the labour market.

Table 2: Presentation of some indicators of school quality

Years	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	Variation
Number of schools	11,233	11,869	12,537	13,195	13,784	14,246	26.82
Number of students	2,696,397	2,840,181	3,064,073	3,169,303	3,255,797	3,308,667	22.71
Water points	5,400	5,142	4,568	5,317	5,441	5,405	0.09
Electricity	2,958	3,130	3,112	3,378	4,736	3,756	26.98
Canteens	5,712	5,310	5,201	5,434	5,616	5,396	-5.53
Latrines	2,840	4,497	4,756	6,674	6,480	6,217	118.91

Source: Author calculation based on data from DSPS.

Finally, the presence of infrastructure in schools (canteens, latrines, drinking water points, electricity, etc) can be used to define the quality of the school. Otherwise, as long as these basic infrastructure can improve the performance of pupils, then they could also help reduce child labour. Despite the unavailability of corresponding data for the period 2013-2019 as shown in Table 2, Table 3 below shows that child labour has declined. This decrease could be explained by the increase in the number of latrines in schools and the number of schools with electricity.

Table 3: Relationship between child labour and some school quality indicators

Years	2014	2016	Variations
Water points	5,400	4,568	-15.41
Electricity	2,958	3,112	5.21
Canteens	5,712	5,201	-8.95
Latrines	2,840	4,756	67.46
Child labour	28.2	15.00	-46.81

Source: Author calculation based on data from DSPS

On analysis, it would be important to highlight the effect of these basic infrastructure on schooling and child labour. Studies linking child labour and school quality are rare. Our contribution to this study is therefore to estimate the effects of school quality on schooling and child labour in Ivory Coast.

4 Methodology

4.1 Theoretical Framework

This theoretical framework highlights a model that provides basic information about school quality and child labour. Unlike Jacobus and Furio (2014), our approach takes into account the quality of the school attended by the child. Thus, consider a unitary model of household decision in which parents maximize a utility function defined by household consumption C, leisure l and the school quality q attended by the child. Here, the household consumes from the parents' income w_p, at the wage from the child's working time h, hw_e. Note q, a function that takes the value 1 if the child attends a quality school and 0 if not. To this indicator q is associated with a cost e related to the quality of the school, eq. Let us consider:

$$C = hw_e + w_p - eq \tag{1}$$

In addition, the total time of the child normalized to 1 is divided between the working time h and the time θ devoted to the attendance of a school of quality or not. Leisure is considered as a given. Let us consider:

$$h + \theta q = 1 h + \theta q = 1 \tag{2}$$

Formally, the head of household maximizes the following function:

$$\max_{C,q} U(C, q)$$

$$\text{s/t} \quad \begin{matrix} C = hw_e + w_p - eq C = hw_e + w_p - eq \\ h + \theta q = 1 \\ q = 0,1 \end{matrix} \tag{3}$$

This model assumes that the household consists of only one child. In addition, there is imperfection in the capital market. Equation 3 allows us to understand the behaviour of the head of the household when the school is good or not. Let us consider:

$$\max_{q} U_1^*\left(hw_e + w_p - e, 1 - \theta, 1\right) \text{ if, } q = 1 \tag{4}$$

$$\max_{q} U_2^*(hw_e + w_p, 1 = h, 0) \text{ if, } q = 0 \quad (5)$$

Equation 4 shows that when the school is good, the head of the household shares the child's time between work and school. Indeed, quality school has a cost, but the household does not have access to the capital market.

In Equation 5, the school is not quality, therefore all the time the child has devoted to work.

This simple theoretical framework shows that parents make the decision about whether or not children participate in work, considering the infrastructure available in schools.

4.2 Empirical Model

The empirical exercise consists in estimating the effect of the presence of school infrastructure on the participation of children in work or not. In addition, this study also consists in highlighting the impact of school infrastructure on the time spent working. This takes into account the intensity of the work, which can lead to better policy making. In the case of this study, we take into account the joint relationship between work and schooling in a school of quality or not. We estimate a bivariate probit model. This model is generally used to estimate the effects of an endogenous binary explanatory variable (Gitto, et al., 2006; Latif, 2009). To take into account the endogeneity of the child's education in a quality school, the study uses a bivariate probit model.

$$w_{ij}^* = \alpha_1 + X_1\beta_1 + Sq_{ij}\delta + \varepsilon_{1i} \quad (6)$$

$$S_{qij}^* = \alpha_2 + X_i\beta_2 + Z_{ij}\gamma + \varepsilon_{2i} \quad (7)$$

$$w_{ij} = 1 \text{ if } w_{ij}^*{}_{>0}, \; Sq_{ij} = 1 \text{ if } Sq_{ij}^* > 0 \quad (8)$$

With,

$w_{ij} = 1$, if the child participates in work in zone j and zero if not

$Sq_{ij} = 1$, if the child attends a school with educational facilities

w_{ij}^* and Sq_{ij}^* are unobserved latent variables that determine whether the child is engaged in work and attending school in an area with a quality school.

$\beta_1, \beta_2, \delta, \gamma$ are parameters of interest that we will estimate, and ε_1 and ε_2 the error terms.

X_i is an observable characteristic vector for children which takes into account age, and level of education.

Z_i is a vector of identification of the restrictions supposed to influence the probability of attending a quality school in a given area, but orthogonal to ε_{1i} and $(\varepsilon_1) = E(\varepsilon_2) = 0$, $Var\ (\varepsilon_1) = Var\ (\varepsilon_2) = 1$ avec $Cov\ (\varepsilon_1 \varepsilon_2) = \rho$. The variable Z_i takes into account household expenses, the cost of education, the level of education of the head of household, and the sex of the head of household.

Finally, ρ is a correlation between $\varepsilon_{1i}\ and\ \varepsilon_{2i}$ and follows a bivariate normal distribution. The likelihood ratio test is used to determine if ρ is significantly different from zero. The estimate will give us the result of the test directly.

We also focus on the number of hours of work. Thus, for a given child, we observe a positive number of hours if the work is harmful and normalized to 0 if not. Therefore, we have a problem of truncation that comes from the fact that the number of hours of harmful work is only observed if the child is working.

Let us consider:

$$z_i^* = \alpha X_i + \mu_i \tag{9}$$

where z* is a latent unobserved variable, which determines the choice of child work, X the vector of the explanatory variables that determine the choice of the head of household to let his/her child work, and μ the random term with mean 0 and variance 1. The observed binary variable is written as follows:

$$z = 1\ if\ z^* > 0\ (for\ choosing\ for\ the\ child\ to\ work) \tag{10}$$

$$z = 0\ if\ z^* \leq 0 (for\ choosing\ for\ the\ child\ not\ to\ work)$$

Using a probit model, the inverse Mills ratio (λ) can be estimated, a ratio which reflects the probability to belong to the selected sample. It is obtained from the following formula:

$$\hat{\lambda}_i = \frac{\phi\left(X_i \hat{\alpha}\right)}{\Phi\left(X_i \hat{\alpha}\right)}$$

with φ as the density function of the reduced centred normal distribution, Φ the distribution function of the reduced centred normal distribution, and λ the Mills ratio. As a second step, λ is included as an additional variable in the estimation of the Ordinary Least Squares in the equation of the number of working hours for the child. This approach is attractive because it eliminates the potential selection bias. However, λ may not be statistically significant, in which case the selection bias is not an issue (Heckman, 1979). Therefore, following Kouame (2011), the regression equation for the number of hours of child labour is expressed as follows:

$$y_i = \beta_0 + \beta_1 W_i + \beta_2 \hat{\lambda}_i + \xi_i \tag{11}$$

Where y is the number of hours of child labour, β_i the parameters to be estimated, and W the vector of the explanatory variables affecting the intensity of child labour. ζ is the new random term, as a property $E(\xi)=0$ (Maddala, 1983).

4.3 Data

Increasingly, thanks to national policy makers and some international bodies such as the International Labour Organization (ILO), child labour surveys exist (the 2002 Household Living Standards Survey, 2008; Child Labour 2005; National Survey on the State of Employment and Child Labour 2013, etc). However, few incorporate a school questionnaire to highlight the effect of availability of certain infrastructure in schools on school enrolment and child labour. In 2010, to contribute to the understanding of the causes of child labour, primary data were collected thanks to the financial support of the Strategic Support Programme for Scientific Research (PASRES1) within the framework of the project "Education and Child Labour in Ivory Coast ". This survey made it possible to collect data in two localities with different socio-economic realities of Ivory Coast: Soubre in Forest zone and Bouake in Savanna zone.

Located in southwestern Ivory Coast, Soubre is one of the largest cocoa producing areas with many agricultural employment opportunities. According to the National Institute of Statistics (INS, 2014), the agricultural sector employs the bulk (53.4%) of the children involved in child labour. The poverty incidence in that area is below the national rate (INS, 2015) but, according to the 2014 National Survey on Child Labour (INS, 2014), the proportion of children involved in child labour is still high (over 20%). In 2008, the initial national diagnostic survey showed that 26.5% of children in this area had never been to school, which increased the family labour force in cocoa plantations (Prime Minister's Office, 2008). In addition, according to the Department of Strategies, Planning and Statistics (DSPS, 2014), class sizes in that area were above the UNESCO standards and above the national average (40 and 44 pupils per class, respectively). For instance, in the urban area of Soubre, there were schools with 63 pupils per class, which could only have a negative impact on the quality of education.

Bouake, for its part, is a region located in the centre of Ivory Coast. From 2002 to 2011, this region was out of the control of the national government due to the political crisis that prevailed during that time. The poverty incidence in that area is high (54.9%), according to the 2015 Household Living Standards Survey (INS, 2015). In 2013, the National Survey on Employment and Child Labour showed that 30% of the children were involved in child labour, 31% of whom were girls and 28.8% boys (INS, 2014).) In Bouake, classes have 50 children on average, and multilevel classes can also be found there (DSPS, 2014). All this is likely to be an obstacle to achieving the goal of quality education for all and continuous education opportunities. In other

1 PASRES is Strategic Support Programme for scientific research in Ivory Coast. PASRES has specific strategic goals which are consistent with the Sustainable Development Goals (SDGs).

words, child labour is likely to increase due to lack of school facilities or due to poor school quality.

Based on a household survey that used an ILO/SIMPOC methodology, this study was designed to focus on school quality. To take into account the importance of geographical area, it focused on two strata: one in a Savanna area (Bouake) and the other in a Forest area (Soubre). Each stratum was sub-divided into two areas of residence: urban and rural. This means that the study used a two-stage stratified sample. At the first stage, 15 enumeration districts (EDs) were drawn in each stratum proportionately to their size, with the size of an ED corresponding to the number of households residing there; that is 30 EDs for the two strata, with 10 selected from the urban area and 5 from the rural area in each stratum. A systematic sample was drawn from each ED. This technique made it possible to obtain the list of households that served as a sampling frame for the second-stage sampling. At this latter stage, a fixed number of households were selected from each one of the lists obtained from the enumeration districts, and in each one of these, households with children aged between six and 14 years were identified; some of the households qualified for the study, while others did not. In each enumeration district, 25 households were selected into the sample.

The sampling frame was the complete list of the enumeration districts in both the Bouake and the Soubre areas, a list compiled as part of the National Population and Housing Census (RGPH1998) carried out in 1998 by the National Institute of Statistics. The sample was selected in such a way that it achieved accuracy in terms of the proportion of individuals interviewed (Ardilly, 2006). For example, for a 10% accuracy, the sample size should be at least 100. That is why the survey in this study covered a sample of 750 households, 375 of which were drawn from the savanna area and 375 from the forest area; in either area 250 households came from the urban area and 125 from the rural.

In this methodological approach, the sampling probabilities were separately calculated for each stratum and for the two stages of the sampling. Suppose that p_{1hi} and p_{2hi} are those probabilities at the first and second stages, respectively, of the i[th] enumeration district of stratum h. Suppose also that a_h is the number of enumeration districts in stratum h and M_{hi} the number of households that were eligible for selection in the enumeration district of stratum h and $\sum M_{hi}$ the total number of eligible households in stratum h. At the first stage, the probability of selecting the enumeration district in the sample is given by: $p_{1hi} = \frac{a_h M_{hi}}{\sum M_{hi}}$. At the second stage, the number of eligible households b_{hi} were drawn from the eligible households L_{hi} that had been recently enumerated by the team in the i[th] enumeration district of h during the enumeration, thus: $p_{2hi} = \frac{b_{hi}}{L_{hi}}$. The overall probability P_{hi} of

selecting an eligible household into the i[th] enumeration h is $p_{hi} = p_{1hi} \times p_{2hi}$.

As part of the process to select the households to be surveyed, this study used the STEPS method. Let N be the mother population from which a sample of size n needs to be randomly selected. The STEPS method makes it possible to select such a sample in three steps. The method consists in splitting the mother population into n individuals with an n constant. The aim is to randomly determine the first individual in order to know all the others. Thus, the first step is to calculate the STEP. So, let STEP=N/n. If, for example, there are 25 households, n=25. The enumeration in the enumeration district No. 6065 in the Soubre area enabled the present study to select 73 households (N= 73). In this case, STEP= 73/25= 2.92. The aim of the second step is to calculate the START. Given a random number (RAND) with a value between 0 and 1, START S is the product of STEP and the random number: START=STEPxRAND. Thus, in this case, we have: 2.92x0.2151= 0.6280. The third step aims at determining the selected individuals. These are selected by adding (n-1) x STEP/START. The figures obtained are rounded to the nearest integer. For instance, 0.6280 ≈ 1. The process continues until a series of 25 numbers is obtained.

In practice, researchers will use a form to select the households to be included in the sample. The form will have the format presented in the table below.

Table 4: Sample of the household selection form

Calculate the series (with decimals)	Round them to the nearest integer	Form number	(Housing block/ Compound/ Household)	Number of selection
D =0.6280	1	01	001/01/0001	01
+P = 3.5480	4	01	001/07/001	02
+P = 6.4680	6	01	001/09/001	03
……	……	……	……..	…..
……	……	…….	……	…..
+P = 70.7080	71	06	5025/27/001	25

Source: Enumeration form for the enumeration district No. 6065 in the Soubre area

In total, as part of the 2010 Local Survey on Child Labour and Educational Policies (ELTEPE2010), 1,338 children aged 6-14 years were interviewed from 750 households in Bouake and Soubre.

4.4 Identification of Variables

Work, schooling and hours of work are the dependent variables in this analysis. To identify children who are forced to work, we have referred to decree No. 0009 of 19 January 2012 defining hazardous work (Annex Table A1). In other words, as soon as a

child performs a dangerous work activity, it falls into the child labour category. In the questionnaire, the question, "During the last 12 months (Name) has he undertaken any of the following activities?" The answer to this question makes it possible to know if the work is dangerous or not according to the list of dangerous activities in force in Ivory Coast. Thus, as shown in Table 4, overall 17.49% of children are forced to work with more boys (19.55%) than girls (15.19%).

Table 5: Proportion of working children

	Girls		Boys		Whole	
	Number	%	Number	%	Number	%
Non-work	568	84.81	536	80.45	1104	82.51
Child labour	138	15.19	96	19.55	234	17.49
Whole	706	100.00	632	100.00	1338	100.00

Source: Author calculations

In addition, we considered the number of hours usually spent on the main activity during the last seven (7) days. Remember that according to the legislation in Ivory Coast, children from 5 to 13 years old do not have to spend time on an activity. Unfortunately, on average they devote 25 hours to economic activities, or about 4 hours per day (Table 6).

Table 6: Estimation of the number of work per week

	Mean	Std. Err	[95% Conf. Interval]
Number of week per week	25.17053	0.7389641	23.71848 26.62258

Source: Author calculations

Regarding the schooling of children, these are those who attended school at the time of the survey. They account for 66.67% of children, 61.05% of whom are girls and 72.94% of boys (Table 7).

Table 7: Proportion of school children

	Girls		Boys		Whole	
	Number	%	Number	%	Number	%
No schooling	275	38.95	171	27.06	446	33.33
School children	431	61.05	461	72.94	892	66.67
Whole	602	100.00	736	100.00	1,338	100.00

Source: Author calculations

Several explanatory variables are the subject of this analysis. In this section, we highlight those that constitute our variables of interest (Table 8). These are obtained from the question "what are the conveniences available in your school?" To confront

the answers to the realities, the investigators visited the schools to ensure existence or not of these conveniences or services. When these facilities exist, investigators make sure they work.

The availability of canteens in schools

The goal of school canteens is to contribute to the development dynamic of education by promoting the cognitive development of children, improving school enrolment rates, and keeping children in the education system. Table 8 indicates that only 36.25% of the children in the sample live in an environment where there is a canteen in the school.

Availability of drinking water point

Water points are part of basic services in schools. Their availability can help improve student scores. Indeed, they will not have to travel for kilometres to find a source of water. Unfortunately, very few children (31.24%) live in communities that have access to drinking water.

Presence of electricity in the school

To make the learning conditions optimal, the class must benefit from electricity. The importance of lighting on well-being is proven, and several recent studies show that good lighting increases the pleasure of working in a place, and therefore performance. In recent years, efforts have been made in this direction as shown in Table 8 (many children, 71.67%, live in localities where schools have electricity).

Latrines

The elimination of open defecation is one of the goals of global sanitation and one of the key indicators for monitoring the SDGs. The provision of functional latrines in schools is essential for the perseverance of the environment and the health of students. The presence of latrines in schools enhances girls' safety and retention in the education system. Table 8 shows that 47.46% of children are in localities where schools have latrines.

Multilevel class

The multilevel class is a reality more and more common in some schools in Ivory Coast. In these schools, a teacher takes care of several levels in the same class. One of the consequences is that students may have poor results.

Library in the school

Access to books in schools in some schools may allow children to improve their performance. As Table 8 shows, few children (36.08%) live in localities where schools have libraries.

Variables	Observation	Mean	Std. Dev.	Min	Max
Drinking water point	1,338	0.3124	0.4636	0	1
Electricity	1,338	0.7167	0.4507	0	1
Latrines	1,338	0.4746	0.4995	0	1
Class multilevel	1,338	0.4589	0.4985	0	1
Canteen	1,338	0.3625	0.4809	0	1
Library	1,338	0.3608	0.4828	0	1

Table 8: Availability of some basic services in schools
Source: Author calculations

In total, all the other explanatory variables are the subject of descriptive analyses in the following section.

5 Empirical Results

5.1 Descriptive Analysis of the Explanatory Explicative

Table 9 presents the descriptive statistics for each explanatory variable. On average, the scores obtained are low (1.49). They correspond to schools of average quality. In other words, children are in localities where schools do not have basic services such as canteens, electricity, a drinking water point, latrines, a library, etc. The disadvantage is that, for example, lack of school canteen can force children to walk miles for lunch or to join parents in the field to have lunch. In addition, the children are in localities where classes are important. For example, children live in areas where the student/teacher ratio is 46, on average, but national standards are 41 students per class. Since parents have no other choice, given the low incomes, they send their children to the nearest schools. Their low income does not allow them to enrol children in schools with small numbers (private schools for example). In fact, household heads in the survey areas spend on average FCFA 234,545 (US$ 470) per head per year. These expenditures show that parents of children in the survey areas live below the poverty line (INS, 2015). In addition, the average expenditure on education is US$ 76.71 per schooled child per year. Thus, given the size of the household, it becomes difficult for some parents to educate all their children.

In addition, several heads of households (43.20%) have no level of education. Moreover, very few have reached the secondary school level (17.34%) and higher (06.28%). However, the level of education has a great explanatory power in the analysis of child labour (Abou, 2014; Nkamleu, 2006, etc).

Table 9: Descriptive statistics on explanatory variables

Variables	Measure	Obs.	Mean	Std. Dev.	Min.	Max.
Household expenditure ($ US)	Household expenditure per capita and per year	1,338	419.56	192, 237	117.39	5704.83
Land	Ownership of arable land in ha	1,338	4.410	20.50922	0	300
Livestock	Number of animals bred on the farm	1,338	7.011	32.5517	0	500
Sex of the head of household	Male = 1 if the head is male		79.52	0.403694	0	1
	Female = 2 if the head is male female	1,338	20.48	0.403694	0	1
Education level of the head of household	No formal education = 0		43.20	0.495538	0	1
	Primary school level =1		33.18	0.4710494	0	1
	Secondary school level =2		17.34	0.3787283	0	1
	Tertiary education level =3	1,338	06.28	0.242658	0	1
Area of residence	Urban =1	1,338	62.33	0.4847352	0	1
	Rural = 2		37.67	0.4847352	0	1
Age	Number of years	1,338	10	2.751522	5	14
The child's sex	Female =1	1,338	52.77	0.4994214	0	1
	Male= 2		47.23	0.4994214	0	1
Cost of schooling ($ US)	Average expenditure on education by cluster per year	1,338	76.71	39,399.38	2.19	595.14
School size	Ratio pupil / teacher	1,338	46	15.01302	25	107
Electricity	School without electricity = 0	1,338	0.2833	0.4120	0	1
	School with electricity =1		0.7167	0.4507	0	1
Latrine	School without latrine = 0	1,338	0.5224	0.4975	0	1
	School with latrine = 1		0.4746	0.4995	0	1
Multilevel class	School without multilevel class =0	1,338	0.5411	0.4920	0	1
	School with multilevel class =1		0.4589	0.4985	0	1
Canteen	School without canteen =0	1,338	0.6375	0.4965	0	1
	School with canteen =1		0.3625	0.4809	0	1
Library	School without library =0	1,338	0.6392	0.4921	0	1
	School with library =1		0.3608	0.4828	0	1
Drinking water point	School without drinking water point =0		0.6876	0.4955	0	1
	School without drinking water point =1	1,338	0.3124	0.4636	0	1

Source: The author

Note also that in the sample, there are fewer women (20.48%) heads of households than men (79.52%). Girls make up a larger proportion (52.77%) than boys (47.23%).

Note also that Heckman's selection model is an adjustment for selection in child labour, which is also a form of endogeneity. This therefore requires an exclusion restriction in the second step; that is to say in the substantial equation. In other words, it is necessary to find a variable that explains child labour but not the number of child labour hours. In other words, the idea is that some variables that explain the choice of work decision or not (selection model) could have ambiguous effects on the number of hours worked by children (substantial equation). With the estimation of child labour intensity, the following variables are excluded from the substantial equation.

School size

The decision to put one's child to work or not can be influenced by class sizes in the household's environment, and the link between class size and the number of hours of work is ambiguous.

Schooling

While the decision to send a child to the labour market may be influenced by the cost of schooling, this is not the case for the number of hours worked. Indeed, working children are not paid by the hour. Their remuneration, when it is the case, is negotiated with the guardian. He can work for hours and receive a pittance.

5.2 Econometric Analysis

The analysis of the results of the bivariate probit model (Annex Table A2) indicates that globally, the null hypothesis that all the coefficients are equal to zero is rejected (prob> chi^2 = 0.0000). In addition, the correlation between the error terms is significantly negative. In other words, unobserved factors that increase the probability of working reduce those who attend school quality.

Concerning the estimation of Heckman's selection model (Annex Table A3), the Wald statistic is significant. The model is therefore well specified. The null hypothesis that all the coefficients are equal to zero is rejected. In addition, the sample is made up of 1,338 children as expected. In other words, the estimation of the selection model is done with all the observations; whether the children have worked or not. In the second step, only uncensored observations, i.e. children who have worked hours greater than zero, are considered in the estimation. In addition, the decisions of the choice of work and the number of working hours are taken jointly; therefore there is a problem of selection.

We thus interpret the marginal effects of bivariate probit (Table 10) and the coefficients of the Heckman selection model (Annex Table A3). It should be noted that we have separate estimates by gender.

The effect of school quality

The quality of the school measured by a set of indicators (electricity, latrine, canteen, multilevel class, library, drinking water point) plays a fundamental role in the analysis of child labour.

Table 10: Marginal effects resulting from the regression of the bivariate probit

Variables	Whole		Girls		Boys	
Expenditure per capita	0.026390	-0.022402	0.044542	-0.02012	0.011222	-0.018248
Gender of the household head	-0.024367	0.0141969	-0.032214	0.027162	-0.001154	-0.005966
Age	-0.015298	0.078123	0.008028	0.090738	-0.019746	0.077628
Age_2	0.062990	-0.180913	-0.029147	-0.199707	0.074133	-0.22169
Primary	0.160640	-0.061228	0.180488	-0.092844	0.155538	-0.056237
Secondary	0.135390	-0.070820	0.174874	-0.066338	0.132116	-0.071247
Higher level	0.206748	-0.093882	0.225530	-0.100879	0.181108	-0.090733
Electricity	0.029261	-0.031312	0.109541	-0.068564	0.183689	-0.124946
Latrine	-0.054456	0.023257	-0.048297	0.032303	-0.069284	0.031180
Multilevel class	-0.026091	0.021460	-0.062461	0.034460	0.029390	-0.002202
Canteen	0.315251	-0.095448	0.407991	-0.140135	0.228051	-0.057145
Library	0.040895	0.007504	0.010232	0.015823	0.066059	-0.003088
Drinking water point	0.059561	0.004699	-0.006884	0.039879	0.107268	-0.054006
Schooling	0.028761	0.041010	0.118815	-0.001641	-0.053106	0.057278
Class size	0.093568	-0.022910	0.148039	-0.018701	0.027205	-0.023765

Source: Author calculations

Whatever the model (The Heckman's selection and bivariate probit model), the quality of the school significantly influences the decision to choose work and schooling for children.

The bivariate probit model indicates that an improvement in some infrastructure increases the likelihood of children attending school and reduces the likelihood of schooling. Indeed, as shown in Table 10, the availability of a canteen in the school is significant and strongly increases the probability of schooling of children (0.3153) and reduces their employment (0.0954). Gender analysis shows that the presence of canteen pushes parents to more school girls, with a probability of 0.4080 compared to boys where the chances of schooling are 0.2280. In study areas, especially in rural areas, schools are sometimes distant from households. Thus, the heads of households prefer not to send them to the school when the school does not have canteen to ensure the safety of the girls. But, as soon as there is a canteen in the school, children move less for lunch at noon. The canteens create a feeling of security for the households.

This result is consistent with that of Abou (2016).

In addition, when classes attended by students are provided with electricity, the probability of girls and boys attending school increases (0.1095 and 0.1836, respectively). In terms of reduction of their work, that of girls decreases significantly (0.1249). In general, this result confirms the importance of electricity in schools and shows that parents take into account the learning environment in the choice of schooling for children (Marshall, 2011).

In addition to the results of the bivariate probit model, Heckman's selection model (Annex Table A3) shows that the presence of canteen in a school reduces the number of child labour hours overall (0.734), but it decreases girls (0.872) compared to boys (0.367). The importance of electricity in the school is confirmed by Heckman's selection model. There is a reduction in the number of hours of work and the probability of working when classes are lit. In short, lighting could improve student performance because the pleasure of learning increases.

These results show that parents prefer to send their children to schools that have basic services (school canteens, drinking water points, toilets, etc). Thus, they integrate the learning environment into their children's school choice. Generally, parents choose schools based on performance of test scores. Concerns about children's development are largely ignored. However, the well-being of children in school and the enjoyment of the learning environment are closely related to children's learning outcomes and their subsequent success in the labour market (Aturupane, et al. 2013; Gibbons and Olmo, 2011).

The effects of class size

In this analysis, the size of the class positively affects children's schooling and negatively puts them to work. This result is contrary to our expectations, but it shows that this variable is subject to debate (Biswajit and Runa, 2019; Valdenaire, 2011 ; Krueger, 2003). With the bivariate probit model, the increase in the number of students in the classroom significantly increases the probability of children attending school by 0.0935. This result implies that when in an area, many children are in school, unwilling parents are forced to also send their children to school. This results in an increase in the number of classes. By this behaviour, parents avoid a social stigma (Hideaki, 2011). It is as if the head of household has to send these children to school to satisfy the community. In these conditions, the quality of the school no longer matters.

Effects of income on work and schooling of children

The importance of parental income at the centre of the empirical debates in the literature on child labour is well established. Our estimate (Table 10) gives the expected results with both models with different interpretations. Indeed, the bivariate probit model shows that an increase in household expenditure per capita significantly increases the probability of children attending school (0.0345) and reduces their

overall work chance (-0.0232). In particular, the effect of income is substantially the same for both boys and girls in terms of increasing school enrolment or reducing work. Indeed, an increase in household expenditure per capita significantly increases the probability of schooling of children and decreases that of work. Thus, this model validates the luxury axiom or the strong poverty hypothesis of Basu and Van (1998). Children work because households are poor. Thus, if income meets basic needs, then children are not put on the job market. Instead, children are enrolled in schools with infrastructure. This result confirms other studies such as those Guarcello et al. (2010) and Goulart and Arjun (2008).

The luxury axiom validated by the bivariate probit model seems to be violated by the substantial equation in the Heckman selection model. Indeed, an increase in expenditures increases the number of hours worked by children, especially that of boys (0.0947) compared to that of girls (0.0493) (Annex Table A3). We expected a contrary result. One explanation is that insufficient income in the household pushes parents to increase the number of child labour hours. As a result, the substantial equation in Heckman's selection model gives another explanation of the luxury axiom. This increase in working time is a strategy that allows parents to increase household income for their survival. This explanation then joins that of the luxury axiom. In reality, this axiom is verified with Heckman's selection model. Thus, income is also a determinant of the number of child labour hours.

The effects of schooling cost

The cost of schooling may seem like a bottleneck for poor households. According to the results, an increase in the cost of schooling significantly increases (0.0410) the probability of work and reduces (-0.1188) that of working. Heckman's selection model provides a finding that increased tuition increases the number of hours worked by boys. As households are poor, children work to help finance their schooling. If this cost of schooling constraint is lifted, households will send their children to school (Lincove, 2012).

The effects of the education level of the head of household

The importance of the level of education of the head of household in the explanation of the choice of the activity of the children is confirmed with the different models (bivariate probit and selection of Heckman model). Indeed, there is a significantly positive relationship between the education level of the household head and the probability of schooling for children. These results confirm the explanatory power of the level of education of the head of the household in the work of children. At a high level of education, the head of the household takes into account the future well-being of the child (Baland and Robinson, 2000). He therefore educates his children rather than preferring immediate consumption by putting them to work.

6 Conclusion and Policy Implications

The fight against child labour remains a major challenge in policies to reduce inequalities in several African countries south of the Sahara. Therefore, appropriate policies are needed. Education seems so be an effective means of reducing child labour. Unfortunately, an essential aspect such as the quality of the school is not always taken into account because of its measurement challenges.
Therefore, to participate in this debate and look for other ways to fight against child labour, this study aims to show the effect of the quality of school on the work and schooling of children in Ivory Coast. 'Ivory. Thus, using primary data collected through the local child labour survey and educational policies, Heckman's bivariate probit model and selection model yielded several results.

The most important result relates to the quality of the school. Improvement of the quality of the school pushes heads of households to educate their children regardless of gender. In other words, schools of poor quality are a negative signal for households especially since they do not have the choice of school for their children.

Therefore, the unavailability of some basic infrastructure (canteens, latrines, electricity, drinking water points, etc) in schools sometimes pushes children out of the education system.

This result shows the importance of the quality of the school in the explanation of the decision of the choice of the activity of the children. From this basic infrastructure, the availability of canteen and electricity in schools significantly favours the schooling of children. These basic infrastructures can serve as an incentive mechanism for the schooling of children for poor households.

In addition to the quality of the school, most results also show that regardless of the model, moving from lower to higher education reduces the likelihood of child labour. Moreover, the size of the class positively affects the schooling of children, especially that of girls.

The contribution of this research to the analysis of child labour is taking into account the quality of the school. This is measured by a set of infrastructure. Their presence in the school can influence children's choice of activity. Thus, this study with the use of two econometric models is in phase with most research work. It shows that depending on the model and available data, the results may differ from one study to another.

In the analysis, policy makers need to focus on the school environment to significantly reduce child labour. The focus is on providing basic services such as canteens, toilets, drinking water points, etc. Specifically, the focus should be on the construction of canteens in schools in disadvantaged areas. This would be a way for the government to encourage poor parents to educate their children. In addition, given its importance in children's learning, national decision-makers must provide electricity to schools in poor communities. This could start with the use of solar energy that can support education in remote areas. These provisions will achieve the goal of quality education for all throughout life by year 2030.

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Annex

Table A1: Decree No. 009 of 19 January 2012 specifying the types of hazardous work for children under the age of 18

Types of hazardous work	Localization
In agriculture and forestry • Felling of trees • Burning of fields • Sale, transport, handling and spreading of agro-pharmaceutical products (insecticides, herbicides, fungicides, nematicides, chemical fertilizers, etc) • Hunting • Charcoal production and woodcutting • Oxen-drawn ploughing	Throughout the country
In animal breeding • Traditional ways of harvesting honey • Herding of animals • Animal slaughtering	Throughout the country
In fishing • Fishing at sea, in lagoons, or in rivers • Deep-water diving	The lagoon area The littoral areas The fluvial areas
In the urban domestic sector • Child caring • Working in drinking places (nightclubs, bars, restaurants, etc) • Begging	Throughout the country
In different types of trade • Selling pornographic material • Serving as prostitution or a prostitute procurer • Collecting materials from rubbish dumps • Emptying, pre-collecting and collecting of household refuse • Producing, buying and selling chemical products (traditional and non-traditional medicines, detergents ...) • Engaging in porter activities at markets (i.e. those locally known as [luggage for auntie] and [luggage for uncle])	Throughout the country

Continued next page

Types of hazardous work	Localization
In industries and crafts • Lubricating, cleaning, visiting or repairing machines or mechanisms in operation • Adjusting, grinding, emptying, sharpening, milling, laminating, stripping down an engine, and handling of batteries • Manufacturing or repairing of firearms • Manufacturing and handling of explosives • Motorized leather sanding and animal skin tanning • Dyeing and printing • Mechanized planing and chemical and mechanized treatment of wood • Ginning and spinning • Production of detergents (manufacturing of liquid soap, bleach, etc) • Brewing and production of alcohol • Boilermaking • Handling oil and gas products and other flammable products • Blacksmith's work (making ploughing materials such as hoes, knives ...) • Ironwork • Digging of wells • Being an "apprentice" of the "GBAKA" mini cars	Throughout the country

Types of hazardous work	
In transport • Loading heavy luggage or equipment in transport vehicles • Porter activities	Throughout the country
In the public works and building sector • General construction and public works activities (digging, excavation, construction of foundations and of walls, formwork, electrical and sanitary installation, laying of frames and roof structures, slabs, tiles, windows, etc) • Extraction of building materials • Construction, reconstruction, maintenance, repair, modification or demolition of any buildings, and any preparatory work preceding such works • Manufacturing building materials • Shipyard activities	Throughout the country

Source: Decree No. 009 of 19 January 2012

Table A2: Estimation results of the bivariate probit

	Whole		Girls		Boys	
Variables	School 1 = yes	Work 1 = yes	School 1 = yes	Work 1 = yes	School 1 = yes	Work 1 = yes
Gender of the household head	-0.0733	0.0664	-0.0935	0.122	-0.00391	-0.0310
	(-0.82)	(0.73)	(-0.78)	(1.00)	(-0.03)	(-0.18)
Age	-0.0460	0.366***	0.0233	0.407***	-0.0668	0.404**
	(-0.70)	(5.06)	(0.27)	(4.19)	(-0.62)	(3.22)
Age_2	0.190	-0.847*	-0.0846	-0.895	0.251	-1.154
	(0.55)	(-2.38)	(-0.19)	(-1.90)	(0.44)	(-1.84)
Expenditure per capita	0.0859**	-0.0911**	0.148***	-0.0766*	0.0401	-0.0849
	(3.22)	(-3.23)	(4.00)	(-1.98)	(1.01)	(-1.92)
Primary	0.523***	-0.249*	0.599***	-0.353**	0.555***	-0.262
	(5.32)	(-2.26)	(4.51)	(-2.58)	(3.72)	(-1.54)
Secondary	0.441***	-0.288*	0.580***	-0.252	0.472**	-0.332
	(3.99)	(-2.34)	(3.53)	(-1.53)	(2.84)	(-1.68)
Higher level	0.673***	-0.382**	0.748***	-0.384*	0.646***	-0.422
	(5.57)	(-2.79)	(4.81)	(-2.29)	(3.29)	(-1.91)
Electricity	0.0952	-0.127	-0.363*	0.261	0.656***	-0.582**
	(0.83)	(-0.99)	(-2.36)	(1.55)	(3.70)	(-2.97)
Latrine	-0.177	0.0946	-0.160	0.123	-0.247	0.145
	(-1.63)	(0.74)	(-1.12)	(0.78)	(-1.50)	(0.74)
Multilevel class	-0.0849	0.0873	-0.207	0.131	0.105	-0.0103
	(-0.96)	(0.80)	(-1.74)	(0.97)	(0.81)	(-0.07)
Canteen	1.026***	-0.388***	1.354***	-0.533***	0.814***	-0.266
	(10.70)	(-3.77)	(10.03)	(-3.95)	(6.18)	(-1.85)
Library	0.133	0.0305	0.0339	0.0602	0.236	-0.0144
	(1.46)	(0.31)	(0.29)	(0.51)	(1.73)	(-0.10)
Drinking water point	0.194	0.0191	-0.0228	0.152	0.383*	-0.251
	(1.88)	(0.17)	(-0.17)	(1.11)	(2.42)	(-1.39)
Schooling	0.0865	0.192*	0.345**	-0.00736	-0.180	0.298
	(0.98)	(2.14)	(2.75)	(-0.06)	(-1.22)	(1.82)
Class size	0.282*	-0.107	0.430*	-0.0839	0.0920	-0.124
	(2.10)	(-0.80)	(2.31)	(-0.44)	(0.45)	(-0.60)
_cons	-2.435***	1.604*	-3.696***	0.992	-1.656	1.763
	(-3.97)	(2.48)	(-4.29)	(1.09)	(-1.81)	(1.73)
Observation	1338		706		632	
Log vraisemblance	-999.81122		-548.07933		-413.89822	
Wald chi2(30)	402.50		266.18		159.53	
prob >chi2	0.0000		0.0000		0.0000	
P	-0.7895		-0.7255		-0,7177	
LR test of rho=0: chi2(1)	639.137		317.589		294.862	
prob>chi2	0.0000		0.0000		0.0000	

Source: Author calculations

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3: Heckman selection model estimation results

	Whole		Girls		Boys	
Variable	Number of working hours	Work 1=yes	Number of working hours	Work 1=yes	Number of working hours	Work 1=yes
Gender of the household head	-0.0303	0.0587	0.0406	0.147	0.0469	-0.0811
	(-0.43)	(0.53)	(0.60)	(0.96)	(0.37)	(-0.45)
Age	0.0304	0.680***	0.150***	0.822***	0.0151	0.814***
	(1.80)	(8.12)	(4.08)	(6.03)	(0.59)	(5.59)
Age_2		-2.128***		-2.636***		-2.880***
		(-5.48)		(-4.21)		(-4.26)
Expenditure per capita	0.0727***	-0.0862**	0.0493*	-0.0461	0.0947**	-0.111*
	(3.74)	(-2.91)	(2.20)	(-1.07)	(2.96)	(-2.45)
Primary		-0.117		-0.167*		0.207
		(-1.92)		(-2.33)		(1.41)
Secondary		-0.0700		-0.0454		-0.213
		(-1.02)		(-0.56)		(-1.26)
higher level		-0.312***		-0.351***		-0.135
		(-3.96)		(-3.84)		(-0.70)
Electricity	-0.577***	-0.555***	-0.509***	-0.436**	-0.0170	-0.796***
	(-5.37)	(-5.43)	(-3.39)	(-3.15)	(-0.13)	(-4.83)
Latrine	0.168	-0.106	0.180	-0.0779	0.0974	-0.0737
	(1.58)	(-1.09)	(1.23)	(-0.60)	(0.80)	(-0.46)
Multilevel class	-0.161	0.115	-0.0483	0.0713	-0.121	0.168
	(-1.93)	(1.48)	(-0.42)	(0.69)	(-1.36)	(1.32)
Canteen	-0.734***	-0.192*	-0.872***	-0.215*	-0.367***	-0.218
	(-9.10)	(-2.50)	(-7.71)	(-2.07)	(-4.10)	(-1.79)
Library	0.00948	-0.0215	0.132	-0.120	-0.0437	0.129
	(0.11)	(-0.26)	(1.10)	(-1.10)	(-0.51)	(0.98)
Drinking water point	0.127	-0.0858	0.00472	-0.484**	0.0307	0.0322
	(1.20)	(-0.92)	(0.03)	(-2.94)	(0.18)	(0.27)
Schooling		0.156		0.117		0.294*
		(1.80)		(0.68)		(2.34)
Class size		0.120		-0.0551		-0.0102
		(0.92)		(-0.24)		(-0.05)
_cons	3.039***	0.685	3.888***	-0.396	2.937***	2.183*
	(5.13)	(1.22)	(4.72)	(-0.53)	(4.42)	(2.40)
Observation	1,338		706		632	
Selected	475		284		191	
non selected	863		422		441	
Wald $chi^2(9)$	195.22		102.45		17.50	
Prob >chi^2	0.0000		0.0000			
Log pseudo likelihood	-1238.455		-719.4324		-467.7805	
LR test of indep. eqns. (rho = 0)						
$Chi^2(1)$	42.28		36.46		1.67	
Prob>chi^2	0.0000		0.0000		0.1959	

Source: Author calculations

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

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Contact Us
African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@aercafrica.org