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What determines which children work?
Empirical evidence from Kenya

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Abstract

This paper determines which children work and how much children work in Kenya. The results show that the educational level of the head of household is important, but it does not matter if the head has primary or higher education. Social norms have a strong effect on the child's probability of working and access to the labor market is important. The overall finding is not consistent with the view that it is children from the poorest families who work.

Key words: Child labor, Education, Kenya

JEL classification: O12, D19, J22, J81

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1. Introduction

The problem of child work has several dimensions. Apart from possibly harming the child's physical and mental health, it can negatively affect the child's accumulation of human capital if work comes at the expense of education. This may in turn reduce the child's adult earnings (Emerson and Souza 2007). In a broader perspective it can also damage the national economy itself, since human capital is an important factor in the long-run development of a country.

In order to know which measures should be taken to reduce the rate of working children, we need to know what determines if a child works or not. Even though there is a large literature on working children, there is no consensus on how to eliminate the problem. Different empirical studies have found different determinants of children's work. The different results might to some extent be explained by different definitions and econometric models, but there can also be different explanations for different countries.

This paper contributes to the existing literature by examining the determinants of child work in Kenya. We analyze the working decision in conjunction with the decision to be in school, since work and school compete for the child's limited time. We do this by using a bivariate probit model, which allows the working and schooling decision to depend on each other. To control for how different samples and definitions of the dependent variable affect the result, we run the regression with different definitions and samples. This also gives insights into how results from different studies can be compared.

The literature on working children often neglects the impact of social norms, which are hard to measure but can give important information on why the rate of working children differs between different places. In contrast to most previous papers, we attempt to examine the role of social norms.

Furthermore, using a tobit model, we examine what determines how much the child works, which is important since working long hours is more harmful to the child. Even so, this issue has often been left out in most previous studies.

We use data from the Integrated Labour Force Survey conducted by the Central Bureau of Statistics (CBS) in 1998/1999, and our sample consists of children from the age of 6 to 14. Our main findings show that the educational level of the head of household is important for the decision to let the child work or not. We also find that the social norm has a strong effect on a child's probability of working. Our results are consistent with the view that access to the labor market is important, but does not support the hypothesis that it is children from the poorest families that work.

2. Which children work?

2.1. Poverty and child labor

In their seminal paper Basu and Van (1998) argue that sometimes poverty gives parents no choice but to send their children to work. They build their model on the substitution and the luxury axioms.[1] The substitution axiom states that an employer treats adult labor and child labor as substitutes. The luxury axiom states that parents only send their children to work if the income without child labor is under some subsistence level. The luxury axiom implies that a rise in income does not have any effect on the incidence of child labor when the wage is too low for families to survive without letting the children work. To influence the incidence of child labor the income has to rise above the subsistence level.

The model gives two stable equilibria. In the "good equilibrium", the adult wage is so high that the family can survive on income from adult labor and no children have to work. In the "bad equilibrium", the wage is so low that income from adult labor is not enough to get the family an income over the subsistence level. Hence, parents have to send their children to work.

Even if parents do not get a disutility from sending their children to work, we still expect a negative relationship between family income and the child's probability of working. Decreasing marginal utility of income means that, when the family income increases, the utility from income generated by children is reduced, making it less probable that parents send their children to work. A higher income also makes it possible for the family to afford things that can be substitutes for their children's work. For instance, having access to a water source in the household will no longer make it necessary to walk long distances to get water. A higher income can also be used to purchase items that increase the child's productivity in other activities (Edmonds and Pavcnik 2005). Edmonds (2005) finds that the rate of working

[1] For a summary of the literature on child work see for example Basu and Tzannatos (2003), and Bhalotra and Tzannatos (2003)

children in Vietnam decreased when the expenditures per capita increased. The relationship is nonlinear and does not hold for really poor or really rich families. Admassie (2002) used different macro variables to show that poverty one of the most important reasons for child labor in sub-Saharan Africa.

Even if the luxury axiom seems intuitive, it has not always been supported by empirical studies. For example, when Ray (2000) tested the luxury axiom using data from Peru and Pakistan, it gave no support for the axiom in Pakistan and only some weak support in Peru.[2]

2.2. Work and education

Another subject that has received attention in the literature is the relationship between school and work. We assume that the child divides its time between work and education. Work increases the household's current income. Education, on the other hand, lowers the current income, but gives a higher future income. School also incurs costs in the form of tuition, books, school uniform, transportation and other supplies. Since Kenya lacks an old-age security system the future income is not only important for the child, but for the whole family (Buchmann 2000).

Ravallion and Wodon (2000) find that there is only a small reduction in child labor when the cost of education goes down, but that the school enrolment rate increases. The authors conclude that parents substitute other uses of their child's time. Psacharopoulos (1997) finds that working children in Bolivia and Venezuela spend on average two years less in school than non-working children. Working increases grade repetition, which indicates that time spent on school is substituted by work.

Bonnet (1993) argues that some children in Africa drop out of school and start working, not mainly because they need the income, but because the school does not provide vocational

[2] When he, on the other hand, adds the data from both countries, he finds support for the luxury axiom.

qualifications or prepare them for the life they will face. According to Buchmann (2000) dropping out of school to start wage labor is uncommon in Kenya. According to her data, of the 146 children who dropped out of school, only one did so to start working. The reasons for dropping out were instead poor performance and the inability to bear the expenses.

2.3. Social norms and the decision on child work

The decision to send the child to work can be influenced by social norms. If the norm says that children should not be sent to work then doing so imposes a cost on the parents. López-Calva (2002b) argues that people view child work as bad since they think it is morally unacceptable and that child work might deteriorate the labor market conditions for adult workers. They set up a model where the size of the cost depends on how many others are breaking the norm. A higher rate of working children in the same town gives a lower social cost of sending a child to work. The parents take the norm as given and it is not influenced by a single household's decision. Patrinos and Shafiq (2008) argue that sending a child to work does not have to be seen as bad and in some situations the norm may even approve of child work. Strulik (2008) sets up a model that assumes that social norms affect the work decision only through schooling, where more time for school means less time for work. The norm depends on how many of the others in the neighborhood send their children to school. Strulik argues that the schooling choice is more affected by social norms, since this decision is more visible to others. He allows for the possibility that it may be socially preferable not to send the child to school.

Using data from Mexico, Lopez-Calva (2002a) finds that the rate of working children in a community has a positive and significant effect on a child's probability of working

2.4. Family structure

When analyzing how the child's time is divided, the size of the family is often included as an explanatory variable. A larger family means less resources per child. Becker and Thomes (1976) discuss how the quality and quantity of children come at the expense of each other. If the quality of children increases, the shadow cost of having more children will increase, which will decrease the demand for children. This would reduce the shadow price of quality, which will increase the demand for quality.

If a larger family means fewer resources per child, more siblings reduce the child's probability of being in school and increase the child's probability of working. The empirical results have been mixed though. Patrinos and Psacharpoulos (1997) that we have to take the activities of the siblings into consideration. Having siblings that are too young to be in school means that someone has to take care of and provide for them.

Children from the same household often work different amounts of time. One explanation may be that parents have different preferences for their children. Edmonds (2006) sets up a model that gives different labor supply for siblings even when the parents care equally about them. The child's time is assumed to be divided between work and education. Edmonds shows that if one compares two siblings, the ratio of their marginal product of labor in household production should equal the ratio of their marginal return to education. This can be used to explain differences in labor supply between siblings of different age. If the productivity in household work increases when the child gets older, the older child will have a comparative advantage in household production. This makes the difference in labor supply between siblings increase with age difference. The model also gives implications for the difference in labor supply between genders. If the return to education is higher for boys, they should get more education than girls in order for the equilibrium to hold.

It is important to notice that the use of a child's time is not necessarily determined by the real productivity, but what the parents assume the productivity to be. When Buchmann (2000) interviewed mothers in Kenya, 26 percent stated that boys were smarter than girls and 24 percent thought that the job market was worse for women than for men. Buchmann finds that daughters of parents who think the job opportunities are more limited for women have a lower probability of being enrolled in school. The belief that boys are smarter than girls did not influence the probability for girls to be in school.

Edmonds (2006) tests his model using data from Nepal. The result shows that older siblings work more than younger ones. The effect increases with family size and the difference is larger for girls than for boys.

Using data from Peru, Patrinos and Psacharopoulos (1997) find that having more younger siblings increases a child's probability of working. In an earlier paper (1995), using data from Paraguay, they find that the number of siblings does not have much of an effect on school enrolment, but has a positive impact on the probability of working. They argue that this could be a sign of specialization, where some siblings work and others go to school.

2.5. Characteristics of the parents

The decision on how much the child is going to work can be analyzed as a negotiation between the parents, which makes their characteristics important. Basu (2006) assumes that the household maximizes a weighted sum of the husband's and the wife's utility. How much weight the person gets depends on the balance of power, which is determined by the wage rate for women, cultural factors etc. How much power the respective parties have determines how much influence they have when deciding how to use the income generated by a working child. Both parents consider child labor as bad and they have different opinions regarding how to spend money. Basu (2006) shows that, starting from a situation where the mother has

no power, child labor decreases when the mother's power increases. The negative relationship holds up to a certain point, after which the amount of child labor increases, giving a u-shaped relationship between one parent's power and the amount of child labor. This is because if the parents have different preferences on how to spend money but have equal power, each parent only gets part of the gain from the child labor. Still, both do feel the pain of sending the child to work. In contrast, if one of them has all the power, he/she gets full control over how to spend the extra income and is thereby more prone to send the child to work. If one of the parents regards child work as being worse than the other parent does, the extreme where this parent has all the power leads to less child labor than when the other parent has all the power.

Basu and Ray (2002) use data from Nepal to test the model. To estimate the mother's power they use her educational experience in relation to the total educational experience of the most educated woman and man in the household, and the mother's part of the household income. They conclude that the amount of child labor is minimized when the power between the parents is equal. Subsequently, the policy makers should try to increase the women's power, since the men tend to be more powerful. They also find that the amount of child labor is greater when the husband is fully dominant.

Another important characteristic of the parents is their education. It has been shown that parents with higher education have a lower probability of sending their children to work and a higher probability of sending them to school. Bhalotra and Tzannatos (2003) that we can interpret the coefficient for education as the parents' attitudes to work, aspirations for the child's future, and time preferences.

To investigate the relationship between parents' education and child work Emerson and Souza (2002) use data from Brazil. They conclude that children of higher educated parents have a lower probability of working and a higher probability of being in school.

3. The data

When we analyze working children two things need to clarified: who is counted as a child and how do we define work? Child labor is often distinguished from child work. Child work is an activity that does not have to interfere with the child's schooling and does not need to harm the child's physical and mental development. Child labor on the other hand is considered dangerous to the child's welfare and interferes with schooling (Bhukuth 2008). The International Labour Organization uses a definition where the age of the child decides who is counted as a child laborer. An older child is allowed to do harder work than a younger one. The minimum age for employment is limited by the age at completing school, and should never be less than 15 years. An exception is made for light work that does not hinder the child from attending school and is not considered hazardous (CBS 2001). Children start school at the age of six in Kenya (UNICEF 2008). Our analysis will therefore focus on children 6 -14 years old.

We use data from the Integrated Labor Force Survey conducted by the Central Bureau of Statistics (CBS) in Kenya from December 1998 to January 1999[3]. The CBS randomly selected 12 814 households for interviews. Out of these 11 049 participated, which gave 52 016 individuals.[4] The sample includes 13 991 children aged 6-14 years, but is not representative for the population of Kenya. To control for this, we run the model using weights.

[3] The survey was done with technical and financial assistance from The International Labor Organization (ILO). The author of this rapport has full responsibility for any mistakes and misinterpretations of the data.
[4] The data of the survey is summarized by the Central Bureau of Statistics (2001).

The children were asked whether or not they worked for pay, profit or family gain last week.[5] We define children who answered yes to that question as working children.[6] Table 1 shows the percentage of the working children in each age group.

< Table 1 >

The relationship between age and the probability of working is positive. The difference between genders is small, with slightly higher numbers for boys.

The average rate of working children in the sample is 7.7 percent. The question in the survey was whether the child had worked during the week before the survey. If there were children that did not work this specific week, but who worked during other times of the year, this would give an underestimation of the true rate of working children. For example, more children work during harvest. By asking the children if they worked any time during the previous 12 months, the percentage of working children increased to 17.3 percent[7]. Since we expect that there are different reasons for working a couple of days during a school break, as opposed to working during the school semester, we will continue to use the smaller sample in our estimations.

[5] It is to some extent unclear what is supposed to be included in the definition. If, for example, helping in the household should be included or not is not clear, and can have considerable influence on the results. For more about the definitions see CBS (2001).

[6] It might be the case that some children stated that they did not work even though they did, since working in some situations is illegal.

[7] Another thing to notice is that the survey only includes the children that live in a household.

4. Characteristics of the sample

Table 2 presents the main reason for working, according to the child and the parent.

<Table 2>

According to the children the main reason was to help with household chores or to augment household income. The head of household supported this view and stated that the two main reasons were to help in the family business/farm and to augment the household income. There is a large dispersion in the number of hours worked. Figure 1 shows how many hours the children worked.

<Figure 1>

Some children worked so many hours that it would be impossible to be a full-time student at the same time. According to the children who did not work, being a full-time student was the main reason not to work (74.3 percent).

Kenya's school system consists of eight years of primary education, four years of secondary education and four years of college/university studies. The primary education is mandatory and the child is supposed to start at the age of six and continue until the age of thirteen. Table 3 shows how large a proportion of the children were full-time students.

<Table 3>

The relationship between age and school participation is positive between the ages of 6 and 11, but then turns negative. The explanation could be that some children do not start school when they are six, but when they are older, and not all children complete primary education.[8] The rate of working children is lower in the group of full-time students where 5.9 percent of the children were working, in comparison with 13.1 percent in the group of children that did not go to school full-time. This supports the view that school and work come at the expense of each other. Even if work does not make the child drop out of school, it can still have negative effects on the performance in school. 30.4 percent of the students who worked answered that work had a negative effect on school.

According to CBS (2001), poverty was the main reason for child labor in Kenya. If this is the case, working children would generally live in poorer households than those who are not working. Unfortunately, it is problematic to get reliable income information. The respondent may not want to give the true answer due to the sensitive topic and sometimes the respondent may not know. According to Deaton (2000), this can be the case for agricultural households and family businesses where personal and business incomings and outgoings are easily confused. Another problem is that income is often highly volatile, which makes it sensitive to which time period the estimation comes from. A less volatile measurement of poverty is expenditures, which is frequently used instead of income. The data show no statistical difference in the mean expenditures per capita between the households with working children and the households where the children were not working.[9]

[8] For more about what determines school enrollment and education attainment in Kenya see Kabubo-Mariara and Mwabu (2007) or Deolalikar (1997).

[9] Households that answered that they had zero expenditures during the previous month have been considered as measurement errors and have been deleted. Since the numbers are calculated from the children, this means that a family with many children will be included more times. If poorer families have more children they will be counted more times than smaller families.

Since the decision to send the child to work or not is often taken by the parents, we are interested in their characteristics. However, the data do not contain any information about who the parents are, so we will concentrate on the characteristics of the head of household. Table 4 presents the level of education for the head of household.

<Table 4>

In the subsample of working children, a larger proportion of the heads of households have no education.

The decision to send the child to work or not is also influenced by external factors, such as unemployment rate and access to school. We try to capture some of these differences by including province dummies. Kenya is divided into eight provinces: Nairobi, Central, Coast, Eastern, North Eastern, Nyanza, Rift Valley and Western. The variation in poverty and human development is large between provinces and there is also a variation in access to services (World Bank 2008).

Table 5 shows the difference in rate of working children and full time students between provinces.

<Table 5>

The rate of working children is highest in the Coastal, Eastern and Western provinces. These are the areas with the highest incidence of poverty and, together with North Eastern, the lowest rate of full-time students.

Furthermore, there is a difference between urban and rural areas. Geda et al (2001) found that there was more poverty in the rural areas, particularly in the agricultural sectors. In the urban areas the rate of working children was 2.5 percent in comparison to 8.3 percent in the rural areas. The rate of full-time students was 87.4 percent in the urban areas and 72.7 percent in the rural.

5. Model and method

5.1. The general model

Different econometric models can be used to analyze the decision to let the child work. Each model requires different assumptions and comes with some disadvantages. Our main interest is the decision to work or not, which gives a binary dependent variable of one if the child is working and zero otherwise.

Another aspect to take into consideration is that the working decision most likely is linked to the schooling decision. A probit or logit model with school as an explanatory variable for the working decision will lead to simultaneity bias. To take these aspects into account we use a bivarite probit model,[10] which treats the working and schooling decision as two interdependent choices, and gives:

$y^*_1 = x_1\beta'_1 + \varepsilon_1 \qquad y_1=1 \quad \text{if } y^*_1 > 0, \text{ 0 otherwise}$

$y^*_2 = x_2\beta'_2 + \varepsilon_2 \qquad y_2=2 \quad \text{if } y^*_2 > 0, \text{ 0 otherwise}$

$E[\varepsilon_1|x_1,x_2] = E[\varepsilon_2|x_1,x_2] = 0$

$Var[\varepsilon_1|x_1,x_2] = Var[\varepsilon_2|x_1,x_2] = 1$

$Cov[\varepsilon_1, \varepsilon_2|x_1,x_2] = \rho$

y_{1i} takes the value 1 if child *i* is working and 0 otherwise. y_{2i} takes the value 1 if child *i* is a full time student and 0 otherwise. $\mathbf{x}_1$ is a vector of variables that explains the working decision and $\mathbf{x}_2$ is a vector of variables that explains the schooling decision.[11] The explanatory

[10] Two other papers that use this model are Canagarajah and Coulombe (1997) and Nielsen (1998)
[11] Since the data only contains information about whether the child is a full time student or not, children that are in school part time are in the same group as the ones that are not in school at all.

variables are divided into four groups: characteristics of the child, the household, the social norms and geographic characteristics.

ρ is the coefficient of correlation for the error terms, which means that it measures the correlation between the outcomes, after the influences from the explanatory variables are taken into account (Greene 2003).

The model is estimated with maximum likelihood. To get a feeling for how the explanatory variables influence the dependent variable, we calculate the marginal effects.

5.2. Child characteristics

Earlier literature has shown that both age and gender have an impact on the child's probability of working. For age we expect that an older child has a higher probability of working. We also include a variable indicating if the head of household is the biological parent of the child.

5.3. Household characteristics

The poverty measurements are used to test if poorer households are more likely to send their children to work than richer ones. A methodological problem arises since the household income and expenditures go up when the child works for pay, i.e. we get reversed causality and the variable is endogenous. This gives a positive bias in the coefficient. Bhalotra and Tzannatos (2003) argue that this can explain the insignificant and sometimes positive income effects that have been found. This problem could be solved by removing the income generated by children, but this is difficult in practice, since surveys seldom provide a good measurement of how much the child earns.[12] In our sample 90 percent of the working children stated that they were not getting paid for their work. This indicates that the endogeneity problem is not that grave in our data. Another source of endogeneity is the wealth paradox,

[12] Since the income of the child can be assumed to be low this might not be such a big problem.

which means that children from land-rich families have more wealth and are more likely to work than children from land-poor families.[13] Grootaert (1998) suggests that since household income is endogenous, it should not be included as an explanatory variable. To capture, in some way, the special constraints that face the poorest part of the population, he includes a categorical variable that indicates if the household belongs to the lowest income quintile. We follow his example, but use expenditures per capita to identify the poverty level of the family. Since the poverty level differs between geographic areas we create the variable based on regional data.[14]

A larger household gives fewer resources per individual, which we expect increases the child's probability of working. With a large number of younger siblings, the probability that an older child has to work to support them might increase.[15] We expect the child's probability of working to increase if the head of household is too sick to work. The age of the head of household will also be included.

The variable indicating if the head of household has an own business or if the family has its own farm is intended to catch the marginal utility of letting the child work and the child's possibility of finding somewhere to work. The probability of finding a job is also expected to be influenced by the employment status of the head of household. To capture this, we include a variable indicating if the head of household is unemployed. This has two impacts on the child's probability of working. There can be a negative effect, since an unemployed head of household means that it might be harder for the child to find somewhere to work. There can be a positive effect since, if the head of household does not work, this means that there is a higher incentive to send the child to work to increase the household income.

[13] For more about the wealth paradox see Bhalotra and Heady (2003).
[14] We will also run regressions with different measurements of poverty to see how this influences the results.
[15] There might also be the case that the parents select one (or some) child(ren) that they invest more in. If this is the case, it does not have to be older siblings that support younger ones, but it might be the other way around.

We expect heads of household with a higher level of education to have a preference for education, which reduces the probability that they will send their children to work. We also expect a decreased probability for the child to work if the mother's power increases. Since our data do not state who the mother is, we use the head of household if that person is a woman, or the woman who is reportedly the spouse of the head of household. The woman's power is measured with a dummy variable indicating whether she is a wage worker or not. We expect a lower rate of working children when the woman has full control. To measure this, the model includes a variable that indicates if the head of household is a woman. We also control for whether the household is run by a single parent.

5.4. Social norm

The social norm is measured as the share of the working children in the same town. We expect a positive relationship between the percentage of children working and the probability of a certain child working. If child *i* is working or not is not assumed to influence the norm.[16]

5.5. Geography

Dummy variables indicating if the child lives in Nairobi, Central, Coast, Eastern, North Eastern, Nyanza or the Rift Valley are used to capture the different provinces' characteristics, such as school quality and work opportunities. Western is used as the reference category. We also include a dummy variable indicating if the child lives in the urban or the rural parts of the country.

The variables are summarized in the appendix along with descriptive statistics.

[16] To reduce the influence of child *i*, we take away the specific child when measuring the norm, thereby reducing the possible endogeneity problem.

6. Results

Table 6 presents the results from the bivariate probit regression.

<Table 6>

The probabilities of working and attending school increase with age. The working decision can be explained by the marginal productivity since the child's work productivity increases with age. The positive coefficient in the schooling decision is consistent with the fact that some children start school later than the age of six. The gender of the child does not influence the probability of working.

If the head of household is unemployed, the child's probability of working is reduced and the effect becomes larger if the household is poor. One explanation for this could be that the possibility of finding a job gets more limited if the head is not working. In the sample 41 percent of the working children stated that they had obtained their job through a parent or relative. The result is also consistent with the view that the labor market is more limited for the poorest households, which could explain some of the positive income effect.

Another result indicating that the possibility of finding a job is important is the positive and significant coefficients for family business and having a farm. An alternative explanation could be that parents regard training of the child as a good investment if the child is expected to work in the family business in the future.

When the size of the household increases, the child's probability of working decreases. The number of young siblings increases the probability of the child working and decreases the probability of the child being a full time student, which supports the view that older children have to provide for younger ones. Being a biological child of the head of household decreases

the probability of working and increases the probability of being a full-time student, indicating that the head gives priority to his/her own children.

As expected, the education of the head of household has a negative impact on the child's probability of working and a positive impact on the probability of being a full time student. We interpret the coefficient as a measurement of the parents' taste for education, but it might also include an income effect. If the head of household has a primary education, instead of no education, the probability of the child working is reduced by approximately 1.4 percent. There does not seem to be any difference between having primary or higher education.

A female head of household does not influence the working or schooling decision, but if the woman is a wage worker, this increases the probability of the child working and lowers the probability of the child being a full-time student.

The probability of the parents sending their children to work increases if more children in the same town are working. Hence, the social norm influences the parents' decision.[17] The correlation coefficient for the error terms is significant and negative, which shows that there are unobserved factors that increase the probability of the child working and decrease the probability of being a full-time student.

We find no evidence to support the hypothesis that poorer families are more prone to send their children to work. Instead, there is a negative and significant coefficient for the variable indicating that a child lives in one of the poorest households. This could be due to the endogeneity of the variable. To test how our definition of the poverty measurement influences the result, we run the model with different measurements of poverty. Table 7 presents the results.

[17] We also run the regression with two different norm variables (not included in the paper), one for the working decision included in the first equation, and one for the school decision included in the second equation. Both coefficients become positive and significant. The coefficient for the norm variable in the working equation does not change significantly.

<Table 7>

The only time we obtain a result that supports the hypothesis that children from poorer families have a higher probability of working is when we us a dummy variable that shows if the family has a toilet and a variable that shows if they have a kitchen. Not having a toilet has a positive effect on the probability of working. All other specifications reject the hypothesis that being poor increases the probability of working. Living in one of the poorest households has a negative and significant effect. If we instead use expenditures for the last month, we get a positive and significant relationship with the probability of working. We refrain from giving the result too much weight, since it is not robust and the variables suffer from endogeneity

Since the working decision is linked to the schooling decision it is relevant to investigate the conditional probabilities. These are presented in Table 8.

<Table 8>

Given that the child is a full time student, the probability of working, evaluated at the mean, is 2.3 percent, as opposed to 6.0 percent when the child is not a full-time student. The variables that determine the probability of working for full-time students also apply to other children. However, the magnitude of the marginal effect differs, where the effects in most cases get stronger for children who are not in school full-time.

We are aware that the data design ends up in a sample that it is not representative for Kenya's population. To control for this we run a weighted regression. Table 9 presents the results for the model with weights[18].

[18] From this point on the tables only include the results from the working equation since this is where our main interest lies.

<Table 9>

Using weights does not change our conclusions. From now on we run our model without using weights.

As previously mentioned, how one defines child work/labor differs in the literature and there is also a diversion in the age groups included. We control for this by running the regressions with different definitions. This is important not only for the robustness but also for understanding differences between earlier papers. Table 10 presents the results.

<Table 10>

When we change the sample to children aged 10-14, none of the coefficients change sign. The results are still robust when we define the dependent variable as children working at least 20 hours a week. The coefficients for family business decrease to some extent in comparison with the base line specification, indicating that these factors might be more important for short-time work. It seems like the educational level of the head of household is less important when deciding if the child should work long hours or not.

The last alteration is to change the dependent variable to children that did work at some time during the 12 months preceding the survey. This change has the largest effect on the results, indicating that the decision to work at some time during a year is different from the decision to work on a more regular basis. The coefficient for having a farm is still positive but increases in magnitude, which is consistent with the view that many children work during harvest. This explanation is also supported by the fact that the coefficient for living in an urban area becomes negative and significant.

We run two separate regressions to see if there are different factors that determine if a boy or a girl is working. Table 11 shows the results.

<Table 11>

That a working woman lives in the household has a positive and significant effect for girls, but does not have any impact on the boys' working decision. This could indicate that if the mother works, the daughter might work with her. Living in an urban area has a negative and significant effect for boys, but no effect for girls.

We would also like to know what determines how much the child works. To analyze this we run a tobit regression where the dependent variable is the number of hours the child worked the week before the survey. The data are censored, excluding children that did not work. The results are presented in Table 12.

<Table 12>

The result shows that the decision to work and time spent working are determined by the same factors. It seems like children living in poorer households work fewer hours than children from richer households. The older the child is, the more it works. Having a farm or a family business increases the number of hours worked, and the same is true for having a sick head of household. Being the biological child of the head of household reduces the number of hours worked. If the head of household is unemployed the number of hours is reduced, while a working woman increases the number of hours worked. When the head of household has an education, the number of hours worked is reduced.

7. Conclusions

One of the main determinants of working children is the educational status of the head of household. This result is robust over all different specifications and has been supported in earlier research. If the head of household has attained primary education, in comparison with no education at all, the child's probability of working is reduced by approximately 1.4 percent. Moreover, if the child is working, having a head of household with at least primary education reduces the hours spent working. It does not seem to matter if the head of household has primary or secondary level of education. Primary education has been made free of charge in Kenya since the time period used in this paper. Investigating how this policy has influenced the rate of working children would be an interesting topic for further research.

Norms influence the probability that a child is working. In order to reduce the rate of working children, we need to identify the factors that determine the norm. This can sometimes be hard and more research is needed.

Our results do not support the hypothesis that poorer children have a higher probability of working. Instead, the results show that living in a poor household reduces the child's probability of working. One possible explanation is the endogeneity problem. The result is not robust but makes us at least question the common view that it is the poorest children that work.

The probability of working increases with age, which supports the view that productivity influences the probability of working, since older children tend to be more productive than younger ones. The probability of working and the amount of hours spent working also increase when the child has younger siblings.

There do not seem to be any large differences between the genders; having a working mother has a positive effect on the probability of a girl working, but has no impact on boys. Boys seem more likely to work when the family lives in the rural parts of the country.

The robust and positive effects of having a family business or farm on the probability of working indicate that the rate of working children is influenced by the possibility of finding work. This view is also supported by the negative effect of having a head of the household who is unemployed and the sometimes positive effect of having a working woman in the household.

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Tables

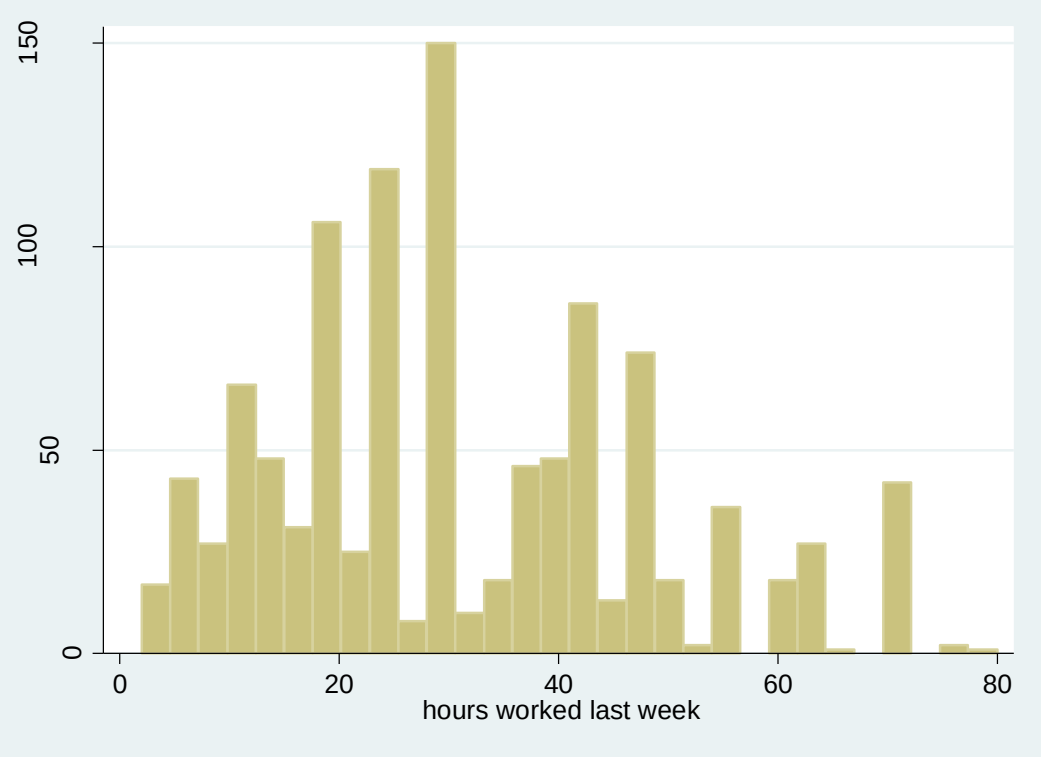
Table 1: *Rate of working children in each age category*

Age of child	Girls n = 6 783	Boys n =7 208	Total n = 13 991
6	5.3	5.4	5.4
7	4.6	6.0	5.4
8	7.1	6.0	6.5
9	5.2	5.4	5.3
10	7.3	8.3	7.8
11	7.4	8.4	7.9
12	8.2	8.6	8.4
13	8.2	11.1	9.7
14	12.7	13.2	13.0
Total	7.4	8.0	7.7

Table 2: *Why the child works*

Why the child works according to the child n = 1076	Percent	*Why the child works according to the parent* n = 718	Percent
Augment household income	21	Augment household income	39
Assist in household enterprises/business	6	Help in family business/farm	56
Help in household chores	27	Child to be self-reliant	5
Suggestion of parents	17	Education/training environment not suit	0
Support self	21	Other	1
Other	8		

Figure 1: *Hours worked*



Children reporting that they worked more than 80 hours per week are assumed to be errors and have been deleted.

Table 3: *Rate of children working, rate of children at school full time*

Age	At school full time (%) n = 13 991	At school full time if the child was working (%) n = 1 082
6	60.8	38.1
7	72.2	50.0
8	77.5	57.1
9	78.1	68.4
10	79.4	66.2
11	79.9	71.4
12	74.7	60.6
13	74.2	60.3
14	71.0	42.0
Total	74.2	56.4

Table 4: *Education of head of household*

	Total sample n = 13 991	Working children n = 1 082
None	25.9	42.6
Primary	49.2	41.8
Secondary and above	24.9	15.6

Note: When looking at the subsample of working children some households will be counted more than once since they can have more than one child.

Table 5: *Difference in rate of working children and full time students between provinces.*

	Working children (%)	Full time student (%)	n
Nairobi	0.0	77.6	152
Central	3.8	78.4	1 799
Coast	13.2	66.6	1 413
Eastern	12.9	74.8	2 067
North Eastern	0.0	56.4	39
Nyanza	2.6	77.6	2 614
Rift Valley	7.9	73.4	4 253
Western	9.3	71.7	1 654
Total	7.7	74.2	13 991

Table 6: *Bivariate probit*

	Working decision n = 13 606		Schooling decision n = 13 606	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Constant	-2.648***		-0.219*	
	(0.167)		(0.113)	
Age	0.074***	0.005***	0.014***	0.004***
	(0.007)	(0.001)	(0.005)	(0.002)
Boy	0.037	0.003	-0.016	-0.005
	(0.036)	(0.003)	(0.024)	(0.008)
Poor	-0.746***	-0.036***	0.004	0.001
	(0.065)	(0.002)	(0.033)	(0.010)
Farm	0.520***	0.036***	-0.071**	-0.022**
	(0.050)	(0.003)	(0.029)	(0.009)
Familybusiness	0.253***	0.018***	0.053*	0.017*
	(0.051)	(0.003)	(0.031)	(0.010)
Size of household	-0.018**	-0.001**	0.039***	0.012***
	(0.009)	(0.001)	(0.006)	(0.002)
Young siblings	0.089***	0.006***	-0.100***	-0.032***
	(0.021)	(0.002)	(0.014)	(0.005)
Biological child	-0.260***	-0.023***	0.158***	0.052***
	(0.058)	(0.006)	(0.040)	(0.014)
Working mother	0.185**	0.016*	-0.122**	-0.040**
	(0.091)	(0.009)	(0.051)	(0.017)
Age of head	0.003	0.000	0.002	0.001
	(0.002)	(0.000)	(0.001)	(0.000)
Head unemployed	-0.335**	-0.019***	-0.010	-0.003
	(0.140)	(0.006)	(0.062)	(0.020)
Poor and unemployed	-4.528***	-0.036***	-0.055	-0.018
	(0.181)	(0.002)	(0.125)	(0.041)
Head sick	0.289**	0.027**	-0.170**	-0.057**
	(0.113)	(0.013)	(0.075)	(0.026)
Female head	-0.065	-0.005	0.026	0.008
	(0.102)	(0.007)	(0.064)	(0.020)
Single parent	0.117	0.009	0.049	0.015
	(0.101)	(0.008)	(0.063)	(0.020)
Educprimary	-0.194***	-0.014***	0.291***	0.092***
	(0.045)	(0.003)	(0.031)	(0.010)
Educsecondaryplus	-0.181***	-0.012***	0.411***	0.121***
	(0.061)	(0.004)	(0.040)	(0.011)
Norm	4.854***	0.353***	-0.433***	-0.138***
	(0.203)	(0.018)	(0.159)	(0.050)
Urban	-0.015	-0.001	0.602***	0.157***
	(0.098)	(0.007)	(0.056)	(0.011)
Nairobi	-4.240***	-0.036***	-0.422***	-0.150***
	(0.131)	(0.002)	(0.134)	(0.052)
Central	-0.411***	-0.023***	0.200***	0.060***
	(0.080)	(0.003)	(0.050)	(0.014)
Coast	-0.325***	-0.019***	-0.081	-0.026
	(0.077)	(0.003)	(0.052)	(0.017)
Eastern	-0.220***	-0.014***	0.135***	0.041***
	(0.064)	(0.003)	(0.047)	(0.014)
NorthEasterna	-4.564***	-0.033***	-0.767***	-0.286***
	(0.197)	(0.002)	(0.232)	(0.092)
Nyanza	-0.384***	-0.023***	0.147***	0.045***
	(0.077)	(0.004)	(0.045)	(0.013)
RiftValley	-0.280***	-0.019***	0.122***	0.038***
	(0.059)	(0.004)	(0.041)	(0.012)
ρ	-0.267***			
	(0.024)			

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level.
Robust standard errors in parentheses. Reference province is Western. Marginal effects at the mean.

Table 7: *Bivariate probit. Different ways to measure poverty.*

	Working decision Bivariate probit, marginal effects n = 13 606			
Age	0.005***	0.005***	0.005***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Boy	0.003	0.003	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Poor1	-0.036***	-0.039***		
	(0.002)	(0.002)		
Poor2		-0.020***		
		(0.003)		
Poo3		-0.004		
		(0.003)		
Log(exp)			0.022***	
			(0.001)	
No toilet				0.015***
				(0.005)
No kitchen				0.004
				(0.004)
Farm	0.036***	0.037***	0.038***	0.036***
	(0.003)	(0.003)	(0.003)	(0.004)
Familybusiness	0.018***	0.018***	0.017***	0.017***
	(0.003)	(0.003)	(0.003)	(0.004)
Size of household	-0.001**	-0.002***	-0.003***	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Youngsiblings	0.006***	0.007***	0.007***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)
Biological child	-0.023***	-0.022***	-0.021***	-0.024***
	(0.006)	(0.006)	(0.006)	(0.006)
Working mother	0.016*	0.014	0.008	0.015
	(0.009)	(0.009)	(0.008)	(0.009)
Age of head	0.000	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Head unemployed	-0.019***	-0.018***	-0.017***	-0.018***
	(0.006)	(0.006)	(0.006)	(0.006)
Poor and unemployed	-0.036***	-0.035***	-0.035***	-0.040***
	(0.002)	(0.002)	(0.002)	(0.002)
Head sick	0.027**	0.028**	0.033**	0.022*
	(0.013)	(0.013)	(0.014)	(0.013)
Female head	-0.005	-0.004	-0.003	-0.002
	(0.007)	(0.007)	(0.007)	(0.007)
Single parent	0.009	0.009	0.008	0.006
	(0.008)	(0.008)	(0.008)	(0.008)
Educprimary	-0.014***	-0.015***	-0.014***	-0.007**
	(0.003)	(0.003)	(0.003)	(0.004)
Educsecondaryplus	-0.012***	-0.016***	-0.018***	-0.001
	(0.004)	(0.004)	(0.004)	(0.005)
Norm	0.353***	0.343***	0.342***	0.350***
	(0.018)	(0.018)	(0.018)	(0.019)
Urban	-0.001	-0.004	-0.008	0.003
	(0.007)	(0.006)	(0.006)	(0.008)

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level.
Robust standard errors in parentheses. Province dummies not reported. Marginal effects at the mean.

Table 8: *Conditional marginal effect after bivariate probit*

	Pr(child is working | student) Pr(b02=1|a06=1) = .023 n = 13 606	Pr(child is working | not student) Pr(b02=1|a06=0) = .060 n = 13 606
Age	0.004***	0.009***
	(0.000)	(0.001)
Boy	0.002	0.004
	(0.002)	(0.004)
Poor	-0.027***	-0.063***
	(0.002)	(0.004)
Farm	0.027***	0.059***
	(0.003)	(0.006)
Family business	0.014***	0.031***
	(0.003)	(0.006)
Size of household	-0.001	-0.001
	(0.000)	(0.001)
Youngsiblings	0.004***	0.009***
	(0.001)	(0.003)
Biological child	-0.016***	-0.032***
	(0.004)	(0.009)
Working mother	0.011	0.022
	(0.007)	(0.014)
Age of head	0.000*	0.000*
	(0.000)	(0.000)
Head unemployed	-0.014***	-0.032***
	(0.004)	(0.010)
Poor and unemployed	-0.026***	-0.067***
	(0.002)	(0.004)
Head sick	0.019*	0.038*
	(0.010)	(0.020)
Female head	-0.003	-0.007
	(0.005)	(0.012)
Single parent	0.007	0.016
	(0.006)	(0.013)
Educprimary	-0.009***	-0.017***
	(0.003)	(0.005)
Educsecondaryplus	-0.007**	-0.012*
	(0.003)	(0.007)
Norm	0.270***	0.584***
	(0.017)	(0.036)
Urban	0.003	0.014
	(0.006)	(0.014)

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level.
Robust standard errors in parentheses. Province dummies not reported.

Table 9: *Bivariate probit, weighted*

	Bivariate probit n = 13 606
Age	0.003***
	(0.000)
Boy	0.002***
	(0.000)
Poor	-0.015***
	(0.000)
farm	0.019***
	(0.000)
Familybusiness	0.009***
	(0.000)
Size of household	-0.001***
	(0.000)
Youngsiblings	0.003***
	(0.000)
Biological child	-0.018***
	(0.000)
Workingmother	0.010***
	(0.000)
Age of head	-0.000
	(0.000)
Head unemployed	-0.009***
	(0.000)
Poor and unemployed	-0.015***
	(0.000)
Head sick	0.007***
	(0.000)
Female head	-0.001***
	(0.000)
Single parent	0.002***
	(0.000)
Educprimary	-0.006***
	(0.000)
Educsecondaryplus	-0.006***
	(0.000)
Norm	0.155***
	(0.000)
Urban	-0.004***
	(0.000)

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level.
Robust standard errors in parentheses. Province dummies not reported. Marginal effects at the mean.

Table 10: *Bivariat probit with different groups, unconditional marginal effects*

	Child worked last week Aged 6-14	Child worked last week Aged 10-14	Did child work at least 20H/week Aged 6-14	Did child work last year? Aged 6-14
	n = 13 606	n = 7 629	n = 13 606	n = 13 606
Age	0.005***	0.008***	0.004***	0.012***
	(0.001)	(0.002)	(0.000)	(0.001)
Boy	0.003	0.005	0.002	0.005
	(0.003)	(0.004)	(0.002)	(0.006)
Poor	-0.036***	-0.050***	-0.023***	-0.062***
	(0.002)	(0.004)	(0.002)	(0.007)
farm	0.036***	0.041***	0.024***	0.059***
	(0.003)	(0.005)	(0.003)	(0.007)
Familybusiness	0.018***	0.021***	0.009***	0.027***
	(0.003)	(0.006)	(0.003)	(0.008)
Size of household	-0.001**	-0.001	-0.001	-0.003**
	(0.001)	(0.001)	(0.000)	(0.001)
Youngsiblings	0.006***	0.007***	0.005***	0.014***
	(0.002)	(0.003)	(0.001)	(0.004)
Biological child	-0.023***	-0.044***	-0.018***	-0.032***
	(0.006)	(0.010)	(0.005)	(0.011)
Workingmother	0.016*	0.018	0.008	0.043***
	(0.009)	(0.014)	(0.006)	(0.016)
Age of head	0.000	-0.000	0.000**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
Head unemployed	-0.019***	-0.026***	-0.010**	-0.011
	(0.006)	(0.010)	(0.005)	(0.017)
Poor and unemployed	-0.036***	-0.053***	-0.024***	0.103**
	(0.002)	(0.003)	(0.002)	(0.046)
Head sick	0.027**	0.037*	0.012	0.066***
	(0.013)	(0.021)	(0.009)	(0.024)
Female head	-0.005	-0.002	-0.004	-0.006
	(0.007)	(0.013)	(0.006)	(0.016)
Single parent	0.009	0.004	0.002	0.020
	(0.008)	(0.013)	(0.006)	(0.017)
Educprimary	-0.014***	-0.022***	-0.008***	-0.007
	(0.003)	(0.006)	(0.003)	(0.008)
Educsecondaryplus	-0.012***	-0.022***	-0.005	-0.014
	(0.004)	(0.006)	(0.003)	(0.010)
Norm	0.353***	0.454***	0.244***	0.837***
	(0.018)	(0.030)	(0.015)	(0.038)
Urban	-0.001	-0.003	0.003	-0.092***
	(0.007)	(0.011)	(0.006)	(0.010)

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level.
Robust standard errors in parentheses. Province dummies not reported. Marginal effects at the mean.

Table 11: *Bivariate probit is there a difference between gender*

	Girls n = 6 599	Boys n = 7 007
Age	0.005***	0.005***
	(0.001)	(0.001)
Poor	-0.036***	-0.035***
	(0.003)	(0.003)
farm	0.036***	0.035***
	(0.005)	(0.005)
Familybusiness	0.016***	0.019***
	(0.005)	(0.005)
Size of household	-0.001	-0.002*
	(0.001)	(0.001)
Youngsiblings	0.007***	0.005**
	(0.002)	(0.002)
Biological child	-0.028***	-0.015**
	(0.009)	(0.007)
Workingmother	0.037**	-0.005
	(0.015)	(0.009)
Age of head	0.000	0.000**
	(0.000)	(0.000)
Head unemployed	-0.018**	-0.018**
	(0.007)	(0.008)
Poor and unemployed	-0.034***	-0.036***
	(0.002)	(0.003)
Head sick	0.020	0.031
	(0.017)	(0.019)
Female head	0.000	-0.006
	(0.009)	(0.010)
Single parent	0.003	0.012
	(0.010)	(0.012)
Educprimary	-0.012***	-0.015***
	(0.005)	(0.004)
Educsecondaryplus	-0.015***	-0.010*
	(0.005)	(0.005)
Norm	0.355***	0.340***
	(0.027)	(0.025)
Urban	0.017	-0.019***
	(0.012)	(0.007)

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level.
Robust standard errors in parentheses. Province dummies not reported.

Table 12: *Tobit*

Tobit Left censored at 0 12 574 left-censored observations 1032 uncensored observations	
Constant	52.902***
	(1.040)
Age	4.064***
	(0.382)
Boy	2.123
	(1.821)
Poor	-36.513***
	(3.223)
Farm	26.327***
	(2.512)
Familybusiness	11.695***
	(2.577)
Size of household	-0.738
	(0.483)
Youngsiblings	4.831***
	(1.047)
Biological child	-16.474***
	(3.104)
Workingmother	8.861*
	(4.764)
Age of head	0.160
	(0.101)
Head unemployed	-16.221**
	(7.850)
Poor and unemployed	-261.060
	(0.000)
Head sick	10.940*
	(5.735)
Female head	-4.512
	(5.301)
Single parent	4.703
	(5.270)
Educprimary	-10.415***
	(2.242)
Educsecondaryplus	-9.659***
	(3.090)
Norm	239.751***
	(9.974)
Urban	5.009
	(5.054)

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level.
Robust standard errors in parentheses. Province dummies not reported.

Appendix

A1: *The variables and definitions*

Variable	**Definition**
Child	
Age	Age in completed years
Gender	Female = 0 Male = 1
Household	
Poor	Dummy variables indicating if the family belongs to the poorest quartile of the households in the region. Based on expenditures per capita.
Farm	Dummy variable indicating if the head of household works on a farm.
Family business	Dummy variable indicating if the head of household has his own business or works as an unpaid family worker.
Size	Number of members in household
Number of young siblings	Number of children in the household that are younger than 6.
Female head	Dummy variable indicating if the head of household is female.
Working woman	If woman works for wage =1 Otherwise = 0
Education of head of household	Highest academic level reached. None Primary Secondary and above A dummy variable is created for each level where no education is the reference alternative.
Age of head of household	Age of head of household.
Head Unemployed	Dummy variable indicating if the head of household is unemployed.
Head of household sick	Dummy variable indicating if the head of household is too sick to work.
Poor and unemployed	Dummy variable indicating if the household is poor and the head of household is unemployed.
Single parent	Dummy variable indicating if the head of household is a single parent.

Social

Rate of working children in same area	Rate of working children in same town

Geo

Province	Nairobi Central Coast Eastern North Eastern Nyanza Rift Valley Western A dummy variable is created for each province.
Urban/rural	Urban = 1 Rural = 0

A2: *Descriptive statistics*

	Children aged 6-14 n = 13 991		Children aged 10-14 n = 7 827	
	Mean (Standard deviation)	Min ; Max	Mean (Standard deviation)	Min ; Max
Working	.077 (.267)	0;1	.094 (.291)	0;1
Student	.742 (.438)	0;1	.757 (.429)	0;1
Age	9.991 (2.577)	6;14	11.963 (1.442)	10;14
Male	.515 (.500)	0;1	.510 (.500)	0;1
P1	.166 (.372)	0;1	.158 (.365)	0;1
Farm	.569 (.495)	0;1	.577 (.494)	0;1
Family business	.615 (.487)	0;1	.622 (.485)	0;1
Size	6.973 (2.614)	2;30	7.007 (2.547)	2;30
Young siblings	.858 (1.001)	0;9	.734 (.951)	0;9
Biological	.868 (.338)	0;1	.870 (.336)	0;1
Primary education	.492 (.500)	0;1	.493 (.500)	0;1
Secondary education plus	.249 (.432)	0;1	.238 (.426)	0;1
Working woman	.073 (.259)	0;1	.069 (.254)	0;1
Female head	.270 (.444)	0;1	.279 (.449)	0;1
Age of head	45.058 (11.704)	9;99	46.331 (11.451)	15;99
Head Unemployed	.056 (.229)	0;1	.055 (.228)	0;1
Poor and Unemployed	.011 (.103)	0;1	.010 (.097)	0;1
Head sick	.025 (.156)	0;1	.025 (.157)	0;1
Single parent	.314 (.464)	0;1	.322 (.467)	0;1
Working child rate (norm)	.074 (.083)	0; .440	.073 (.083)	0; .440
Urban	.098 (.298)	0;1	.095 (.294)	0;1
Nairobi	.011 (.104)	0;1	.010 (.099)	0;1
Central	.129 (.335)	0;1	.136 (.343)	0;1
Coast	.101 (.301)	0;1	.096 (.294)	0;1
Eastern	.148 (.355)	0;1	.152 (.359)	0;1
North Eastern	.003 (.053)	0;1	.003 (.056)	0;1
Nyanza	.187 (.390)	0;1	.194 (.396)	0;1
Rift Valley	.304 (.460)	0;1	.295 (.456)	0;1