Intergenerational Transfers of Human Capital: Evidence on Two Types of Education Externalities

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Abstract Low enrolment and educational wastage are serious problems in sub-Saharan Africa, particularly in rural areas of Ethiopia where participation in formal education is extremely poor. An aspect of both problems is late entry to primary school, which has dire consequences for educational attainment, most notably for girls. This paper provides evidence on the extent of low enrolment and late entry for a sample of rural households and examines the determinants of each. In particular, the importance of parental and neighbourhood education are considered. We find that the education of both parents is important to enrolment and starting time. Furthermore, education of women in the neighbourhood increases the probability of enrolment. This suggests that there are two types of external benefit of schooling in terms of intergenerational transfers of human capital. Given the large gender bias in enrolments in rural Ethiopia, these findings have important implications for educational policy.

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1. Introduction

A strikingly low percentage of school-aged children in Ethiopia participate in formal education, even when compared with other low-income African countries. In 1994, for example, the primary gross enrolment ratio (GER) for Ethiopia was 31 percent, while the average primary GER for Sub-Saharan Africa as a whole was 74 percent (UNESCO 1997). The 1984 Population and Housing Census shows that this poor performance is attributable to very low enrolment in rural areas, as universal primary education appears to have been achieved in the urban centres (Office of the Population and Housing Census Commission 1989). Compounding this problem is the prevalence of delayed entry to primary school and other aspects of educational wastage.

There are a number of potential consequences of low enrolment and educational wastage. Children who start school late may have more difficulty learning than younger children. For various reasons, they may be unable to progress as far in school as would have been possible had they started on time. This is particularly true for girls, who may be forced to leave school at the onset of puberty or upon marriage (Rose, et al. 1997). Education is often a prerequisite for skilled, off-farm employment. Moreover, Weir (1999) finds significant benefits of primary schooling in terms of household farm production and efficiency in rural Ethiopia. Consequently, uneducated or under-educated individuals not only lack the skills and qualifications necessary to obtain formal sector wage employment but are also at a disadvantage as farmers when faced with changing agricultural technologies and markets.

There is a small but growing literature on the determinants of enrolment and late entry in Ethiopia and other parts of Africa (see Weir 1998). Both enrolment and late entry are hypothesised to depend upon a combination of supply and demand factors, including quality and availability of schools, direct and opportunity costs of schooling under conditions of severely constrained credit, and perceived benefits of schooling. Family background, including the education of the mother and father, is also likely to play an important role, since the decision whether and when to enrol in school is usually made by a child's parents. However, parents are not the principal or sole beneficiaries of a child's education. Indeed, the child and the child's future family may benefit most from his or her education, and not the parents. This is particularly the case for girls, who are usually expected to marry and confer the benefits of their schooling upon their husband's family, rather than their own. There are two related consequences of this imperfect correspondence between investors and beneficiaries. Firstly, too little education may be provided from the point of view of the child and the other beneficiaries. Secondly, if parental education is an input into children's schooling, there are externality benefits inherent in the intergenerational transfer of human capital. This is one type of externality benefit. A second possible externality benefit of schooling occurs when enrolment decisions are influenced by the education of friends and neighbours. The absolute and relative importance of human capital within and outside the household to enrolment decisions is an area which has not received attention in the literature on the determinants of enrolment and late entry in the developing world.

Mothers and fathers may make different contributions to a child's human capital. There is much evidence from the developing world literature to suggest the importance of women's education to the health and well-being of her family (see, for example, Behrman and Stacey 1997). This may also be true in the case of schooling. Given the extremely low rates of school participation, the prevalence of late entry, and the striking gender gap in enrolments in rural

Ethiopia, missed opportunities to benefit from the education of girls must not be ignored by policy-makers. Such social benefits of schooling may complement the production externalities documented by Weir and Knight (2000a and 2000b) in terms of farm productivity and the adoption and spread of agricultural innovations. Educated parents will not only be more productive in their own activities, they will raise more educated children who can expect to enjoy greater productivity themselves.

The purpose of this paper is to use data on parental education, attitudes and skills to illuminate the size and extent of external benefits of parents' education in terms of better schooling outcomes of the current cohort of school-age children. We will also attempt to explain the source of schooling externalities in terms of women's power in the home versus skills and attitudes acquired in school. The paper is organised as follows. Section 2 discusses our definition of externality benefits of schooling. Section 3 describes the household survey data used. Section 4 investigates the extent of school participation and educational wastage in the sample. In sections 5 and 6, the determinants of enrolment and of delayed starting are estimated. Section 7 concludes.

2. Externality Benefits of Education Defined

Externalities are usually defined simply as the effects of the actions of one economic agent upon another agent (Mas-Colell, Whinston and Green 1995, 352). An externality benefit occurs when one agent creates a benefit for another agent but is not paid for it (Koutsoyiannis 1979, 541-42). We refine this definition somewhat to include all the effects of an economic action which are not fully taken into account by the actor: these are the potential benefits and costs that accrue beyond those internalised by the decision-taker. The externality benefits of education may be various and considerable. Parents who invest in the education of their children may fail to take into account a number of benefits. There will then be too little investment in education from a social point of view.

First, parents may not recognise the economic benefits that will accrue to the person being educated - although researchers, in estimating these benefits, normally assume that they are perceived and internalised. For example, education increases farm productivity and efficiency (Weir 1999), but some households may view the benefits of schooling only in terms of access to off-farm employment. Hence, too little education will be provided because the full private benefits of schooling are not recognised. Second, the investor may discount the benefit accruing to the investee, particularly if the investee is expected to leave the household. This may be especially true for a girl insofar as the benefits of her education will be transferred to her husband's household.

Benefits may be transferred from one generation to another in the same household or between households in the same neighbourhood. Altruism is possible within the household but rather less likely between households. Thus, even if parents realise that by investing in schooling they will create a role model for other households, they are not expected to increase their educational investment on that basis. Once again, there will be too little education from a social standpoint.

3. Data

The data for this study are drawn from the Ethiopia Rural Household Survey (ERHS), conducted by the Department of Economics, Addis Ababa University, in collaboration with the Centre for the Study of African Economies, Oxford, and the International Food Policy Research Institute (IFPRI), Washington, in 1994, and Education Sub-Sample Survey (ES-SS), conducted by the author, in 1995.

The ERHS covered 1477 households in 18 Peasant Associations (villages) spanning 15 *woredas* (districts) in six regions. Six of the sites, primarily located in drought-prone areas, had previously been surveyed by IFPRI in 1989. The remaining nine were chosen by the Department of Economics with the assistance of Ministry of Agriculture officials in 1993 to reflect most of the important agro-economic variations found in rural Ethiopia. Together, the 15 sites provide a realistic mix of cultivation categories and standard of living strata. Brief site descriptions are given in Croppenstedt and Demeke (1997); Bevan and Pankhurst (1996) provide more detailed information.

Each household was surveyed three times within approximately twelve months (early in 1994, later in 1994 and early in 1995), providing a picture of both current activities and the household's historical background (Dercon and Krishnan 1994). Questions were asked on a wide range of issues affecting rural Ethiopian households, including production (crop output, land, labour and other inputs, and prices), consumption, assets, credit, migration, anthropometric measures and health. The first round also included a few key questions on educational status and attainment. Further information on education was provided in the second round of the survey conducted in 1994/95.

Owing to the scope of the ERHS, the volume and breadth of questions asked on education-related issues was necessarily limited. Information on investment in human capital from the ERHS was supplemented by a purpose-designed survey of household human resources in four of the 15 sites (Weir 1995). This sub-sample survey was conducted in one round during August 1995. The ES-SS provides in-depth educational histories of all household members, as well as information on current student time use, expenditures on schooling, parental attitudes toward education, reasoning ability, and cognitive skills accumulation and retention.

Within the four sites selected, all households covered by the ERHS were surveyed. No further selection took place. Since the same households were visited for the ES-SS as during the three rounds of the ERHS, it has been possible to match information from this smaller, focused survey of human resources with that from the broader survey. Together, these surveys provide sufficient data with which to investigate factors influencing enrolment and late school entry in rural Ethiopia.

4. Scope and Scale of Low Enrolment and Educational Wastage

Gross vs. Net Enrolment in the ERHS

The first and second rounds of the Ethiopia Rural Household Survey contained questions on educational status which have been used to construct gross and net enrolment ratios by sex and level of schooling. The gross enrolment ratio (GER) is the number of children of all ages who are currently enrolled in school divided by the total number of children who are of school-going age in the sample. The net enrolment ratio (NER) is the number of school-aged children who are currently enrolled in school divided by the total number of children of school-going age. The primary school-aged population is defined to include children aged from 7 to 12, and the secondary school-aged population is comprised of those aged 13 to 18.

Comparing gross and net enrolment ratios provides some information on the prevalence of older children in the student population. When the numerator includes children who are older (or younger) than the school-age population included in the denominator, GERs are artificially inflated and offer an upwardly-biased picture of participation. NERs offer a more realistic assessment of participation among the school-age cohort.

Table 1 shows GERs for primary (grades 1-6) and secondary (grades 7-12) school. The average GERs for all 15 sites together are very low at both levels of schooling and indicate a serious gender bias in favour of boys. Enrolment in primary school as a percentage of the school-aged population was only 24 percent in the sites surveyed. The overall participation rate for primary school-aged boys is approximately twice that of girls. Secondary school participation is less than half that at the primary level.

NERs provide an indication of the extent of over-aging of enrolment in the sample. Only those students who are of the appropriate age group for their level of schooling are included in the calculations. Evidence from the ERHS shows that this is a serious problem (Table 2). Only 11 percent of primary school-aged children and just over five percent of secondary school-aged children are enrolled in the appropriate level of schooling.[1]

Taking the ratio of net to gross enrolment ratios gives the percentage of those enrolled who are in the appropriate age cohort for their level of schooling. On average for all sites, less than 50 percent of students are between 7 and 18 years of age. Clearly, the problem over over-age enrolment is considerable. The analysis of NERs suggests that in a country such as Ethiopia, where primary education is not mandatory, gross enrolment ratios may provide a misleading, overly optimistic, picture of school participation.

To summarise, gross and net enrolment ratios calculated for households in the ERHS reflect those for the country as a whole and are low in comparison with other countries in sub-Saharan Africa. However, the overall figures mask a large difference by sex. The figures reveal a substantial gap in enrolment in favour of boys. The difference between gross and net enrolment rates indicates that there is a serious problem of over-ageing of enrolment for children of both sexes.

[1] Children younger than the usual school-going age are also omitted from calculations of net enrolment ratios. Re-calculation of the NERs for all 15 sites to include younger enrolled children give NERs which are very close to the figures presented in Table 6.2, suggesting that most of the difference between NERs and GERs is owing to the enrolment of children who are older than usual for their level of schooling.

Evidence from the ES-SS

Detailed education histories were obtained from 636 respondents of the ES-SS who are either currently attending school or who have been to school in the past.[2] Information was gathered on the extent of late entry to school, absences of one year or more from school, grade repetition and premature exit. Respondents were also asked to give the most important reasons for late entry, extended absences and dropping out.

Over 45 percent of respondents said that they had delayed starting primary school by one year or more after their peers entered school. Delays of two to four years were the most common, accounting for almost half of those who reported having postponed entry. Several respondents reported starting school more than 10 years later than their peers. The average length of time by which entry was delayed was five years beyond the peer group. It is useful to ask respondents whether they started later than their peers, since there may be different conventions for starting school in different places and at different times. However, the problem of delayed entry appears to be more serious when the benchmark used is the official government starting age, seven, rather than the typical peer group starting age. Over 90 percent of our sample started school after age seven. If, as some recent research on early childhood development suggests, there is a critical period for learning (for a review see: Bruer 1997), actual years delayed may be more relevant than years delayed in relation to the peer group. Table 3 provides a comparison of descriptive statistics for actual and perceived delays in starting school.

There is some variation in the tendency to delay entry to primary school by site. Over 60 percent of respondents in Sirbaban Godeti (located in Aada District, near Debre Zeit and Mojo) and almost 60 percent of respondents in Turufe Kechema (located in Shashemene District near the town of Shashemene) had delayed entry by one year or more after their peers started school, whereas only 30 and just over 40 percent, respectively, had delayed in Imdibir Haya Gasha (a Gurage village in Cheha District) and Aze Deboa (a Kembata village in Kedida Gamila District). Average years that respondents reported delaying beyond their peers were also higher in Sirbana Godeti and Turufe Ketchema than in Imdibir and Aze Deboa. However, the proportion who actually delayed beyond age seven is above 80 percent for all sites.

The most common first reason given for delaying entry was that the child was needed on the farm or for other household activities. Distance to school was also an important consideration. Direct cost of schooling was an important second reason for delaying, along with the need to work for wages or care for sick or elderly household members.

Table 4 summarises the descriptive statistics on long term absenteeism. Overall, fewer than 20 percent of respondents were ever absent from school for one year or more. The majority of those who did experience an absence from school were out for just one year, though a few were away from formal schooling for five years or more. Illness was the most common reason

[2] In total, 996 household members from the four sites covered by the ES-SS have been to school. Unfortunately, 360 of these respondents were not available to answer questions on their education histories at the time of the survey. Of the 636 respondents for whom information is available, 263 have attended junior secondary school and 156 of these have been to senior secondary school.

for extended absence from school. The need to work on the farm or other household activities was also important. Poverty and the expense of schooling featured prominently as well. In a bad harvest year, some parents may not be able to afford the cost of schooling and their children may be forced to withdraw temporarily.

Repetition of one or more grades is also relatively uncommon (Table 5). Less than 15 percent of respondents repeated a grade in primary school. The vast majority of these students repeated only once, and very few needed to repeat more than two years. The figures for junior and senior secondary school are somewhat higher at about 20 percent and 30 percent, respectively (not shown). It may be that students who have made it to post-primary education have more to gain by staying in school and trying to improve their performance when they do poorly. Students in primary school may be likely to quit school if they do not do well, rather than repeat a grade.

Drop-out is a major problem facing Ethiopian educators (Table 6). Of the 636 students for whom there is information, 263 (41.3 percent) passed primary school and enrolled in the next level. The remainder dropped out of school between first and sixth grade. Of those who responded, the most important reason given for dropping out was the need to work on the farm. Other household activities and wage employment were also commonly cited, as was marriage. Marriage was frequently given as a secondary reason for quitting. Not enjoying school or failing were other important secondary reasons to drop out of school.

5. Results: Determinants of Enrolment

Table 7 provides probit estimates of the probability of enrolment in the four sites covered by the Education Sub-Sample Survey of children aged 7 to 18 who were not listed as head or spouse of the household and for whom the relevant data were available. The dependent variable is binomial with current enrolment status (student = 1; non-student = 0) as the dependent variable. Variable definitions and mean values for the relevant sample are also shown. Overall, 37 percent of children in the sample are currently enrolled. The enrolment rate for girls is 33 percent and for boys 42 percent. We control for a number of individual and household characteristics as well as site fixed effects. The latter are expected to be particularly important, since the site dummy variables include the effects of supply constraints (e.g., distance to school and quality of schooling available).

The probability of being enrolled increases with age and decreases slightly with its square. This implies an inverse U-shaped relationship, which supports the dual descriptive hypotheses that: (1) the journey to school (which can be considerable) is often too dangerous or too long for young children; and (2) the value of older children to household production (e.g., opportunity cost) is often too great for them to be spared for schooling. Additional problems for older girls are the danger of abduction for marriage and embarrassment caused by the not uncommon lack of separate lavatories (Rose, et al. 1997). As discussed earlier, both late entry to primary school and early drop out are frequent occurrences.

The coefficient on the dummy for being female indicates that the probability of enrolment is 11 percent lower for girls than for boys, although it is significant only at the 20 percent level on a two-tailed t-test. Calculation of gross enrolment ratios (Table 1) indicates that the gross schooling participation rate for girls is only three-quarters of that for boys at the primary

level, and 60 percent as high at the secondary level, for the four sites surveyed in the ES-SS. The rather weak significance of the female dummy variable indicates that at least some of this striking gender bias in enrolments may be explained by the variables included in our estimation. However, this statement cannot be interpreted to mean that the difference between enrolment rates for boys and girls is fair, merely that there are observable reasons which help to explain the disparity.

Whether or not a particular child is enrolled may depend upon the ages and activities of his or her siblings. The coefficient on birth order is negative and weakly significant, suggesting that children born earlier are more likely to be enrolled than children born later. Since we have controlled for age in the regression, this suggests that there is a preference for earlier born children to be educated. It may indicate a household time preference, since early born children who are educated may be expected to enjoy the returns to their schooling sooner than later born children.[3] Children are significantly more likely to be enrolled if they have siblings who are in school. This variable probably picks up a number of household specific fixed effects which may not be completely incorporated into the equation, including preferences for education and access to cash income.

The number of dependants under the age of seven has a surprisingly positive and significant effect upon enrolment, whereas the number of dependants aged over 65 has no effect at all. This finding is somewhat unexpected, since children (particularly girls) may be needed to help care for dependants in the household, increasing the opportunity cost of their time. However, the inclusion of data on both boys and girls in the estimation may confound our results. We will return to this later when we disaggregate our findings by sex (Table 9).

Children are significantly less likely to participate in schooling if they are not considered to be members of the household. The result is not surprising in that household members are expected to be weighted more heavily in the household utility function than non-members. Duties to remit to the household are also expected to be greater for members.

The probability of enrolment rises with both consumption per adult equivalent (our proxy for income) and land per household member (a proxy for opportunity cost). The significant coefficient on the income variable suggests that credit is constrained in our sample, since income should not be an important constraint if households are able to borrow to pay school fees and other costs (Glewwe and Jacoby 1994; Glewwe and Ilias 1996). The opportunity cost variable is expected to be negative, since households with more land per member face greater requirements for labour. However, the positive and highly significant coefficient suggests that the land variable may actually reflect wealth, supporting the previous conclusion. The site primary school enrolment fee as a percentage of consumption per adult equivalent is included to approximate the financial burden to the household of sending a child to school. The coefficient is negative, as predicted, but not significant.

[3] Hypotheses and results from the applied literature on birth order as a determinant of enrolment are mixed. Lloyd and Gage-Brandon (1994) predict that first-born children in Ghana have an educational advantage over middle children. However, they also predict that younger children may receive cash from their older siblings to pay for school expenses. Gomes (1984) found evidence of educational advantages of being first-born in Kenya. However, Parish and Willis (1993) find that late-born children are more educationally advantaged in Taiwan.

The dummy for being Muslim is negative and significant, indicating that Muslim children are less likely than either Orthodox or Other Christians to be enrolled. However, Weir (2000) showed that Muslim households demonstrated more positive attitudes toward education than others, suggesting that factors other than the pure utility of schooling (e.g., the lack of Muslim schools and lack of sex-segregated schools) may prevent Muslim children from attending school.

As expected, the coefficients on the site variables are large and highly significant. The omitted site is Sirbana Godeti, an area with rich and relatively abundant farm land. Children are significantly more likely to attend school if they live in either of the three sites shown than if they live in Sirbana Godeti. This may reflect the higher opportunity costs of schooling in this site, since it is an area rich in farmland and near to urban centres.

The most interesting finding for the purposes of this paper is that the coefficients on both mothers' and fathers' years of education are positive and significant. This indicates that for rural Ethiopia, the education of both parents matters and is important in creating educational benefits for their children. However, the coefficient on mother's education was slightly higher and more significant. The intergenerational transfer of human capital in the form of schooling may have enormous and far-reaching consequences for the health, education and well-being of the household's descendants. It is worth exploring in greater detail the mechanisms by which benefits may be passed from parents to their children.

Education may have cognitive and non-cognitive effects. To understand better the importance of each, years of education of the mother and father are replaced with cognitive skill[4] and attitudes[5] (two possible outputs of education for which data are available) of each parent in the second equation of Table 8.[6] The results show that cognitive skill is not important and, whereas the mother's attitudes have an influence, the father's do not matter. Thus, we have been able to explain part of the mechanism by which mother's education increases the likelihood of a child being enrolled. However, the particular way in which father's schooling influences enrolment remains a mystery.

To explore the role of attitudes further, we consider separately attitudes pertaining to the economic effects of schooling and attitudes pertaining to the social effects. Years of schooling are reintroduced, since there may be other relevant effects of schooling apart from attitudes. We find that the only important aspect of attitudes are mother's attitudes regarding the economic effects of schooling. When we include attitudes along with years of schooling, mother's education becomes insignificant, reinforcing our conclusion that the entire effect of

[4] Cognitive skill was measured as the total score on a test of basic literacy (reading comprehension and writing) and numeracy (addition and subtraction), which was conducted alongside the survey questionnaire for those household heads and spouses who had ever acquired cognitive skill whether or not they had been to school. Weir (1998) provides a more detailed discussion of the survey instruments.

[5] Attitudes toward schooling were measured by constructing a Likert index based on responses to a set of agree/disagree and hypothetical situation questions designed to elicit opinions of the household head and spouse on the benefits of formal schooling. Negative responses received a score of -1, positive responses a score of +1 (or up to 3 for the hypothetical situation questions where stronger opinions were expressed), and non-responses a score of zero. Responses were aggregated across questions to provide a single index score. Weir (1998) and Weir (2000) provide more information on the questions asked and methodology used to construct the index.

[6] Since the size and significance of the individual, household and site control variables do not vary much with different specifications of the parental education variables, we show only the results pertaining to parental human capital in Table 8. The other variables were all included in the estimation.

mother's education upon the probability a child will be enrolled is in terms of creating more positive attitudes regarding the economic benefits of schooling. Father's education continues to be significant even after the introduction of the attitude variables. Father's attitudes regarding the social benefits of schooling are weakly significant in explaining the probability of enrolment. However, the continued significance of father's schooling after controlling for attitudes once again indicates that there is some other effect of father's education at work in raising the probability of enrolment. Educated fathers, by being more efficient in production (Weir 1999), may be able to overcome income and credit constraints upon schooling better than uneducated fathers.

Replacing years of education of the mother with the ratio of years of mother's education to total education of the mother and father provides a measure of women's bargaining power within the household (equation 4).[7,8] The coefficient on mother's power is large and highly significant, dwarfing the effect of father's years of schooling. The coefficient on mother's attitudes toward the economic benefits of schooling maintains its size and significance. Thus, it appears that if the mother has more education than the father, the shift in the balance of power in their favour empowers women within the household and they use this power to send their children to school.

Table 9 shows that the results discussed above differ somewhat between the sexes. For girls, mother's power in the household does not increase the probability of enrolment.[9] Moreover, it is the father's education and attitudes toward the economic benefits of schooling which matter for girls, not the mother's. Instead, mother's attitudes towards the social effects of education are weakly significant (equation 5). By contrast, mother's power and attitudes towards economic effects of schooling appear to be highly favourable to the probability that a boy will go to school (equation 6). These results may seem surprising. If mothers recognise the value of education for girls, they are expected to use their power in the household to increase the chances that their female children will go to school. However, if mothers with schooling feel that there are few benefits which will flow back to the household (or indeed to the girl herself) as a result of educating a daughter, there will be no such incentive. Rather, since girls provide a substitute for female labour in the household, women with more power in the household may be more inclined to use that power to keep their female children at home and send their sons to school.

There are other differences between the two equations. While age has no effect on the likelihood of a girl's enrolment, it is positive and significant for a boy, with the probability of school participation increasing at a decreasing rate with age. On the other hand, birth order

[7] When both parents have no education, the power ratio is constructed to be 50-50. If the mother has some education and the father has none, the power ratio is 1. If the father has some education and the mother has none, the power ratio is 0.

[8] This measure of women's power in the household is chosen in preference to a measure such as women's income in relation to men's income because it is quite difficult to measure individual incomes in rural areas, where men and women each contribute to total household production. Of course, the precise mechanism by which women's education in relation to men's education gives them additional bargaining power is unknown. It is possible that women who are educated are able to make greater contributions to total household income. Alternatively, they may command greater respect from their husbands than uneducated women either because of their family background or because of their cognitive skill and attitudes acquired in school.

[9] This confirms the finding of Knight and Song (2000) for rural China. Appleton, Chessa and Hoddinott (1999) found discrimination in favour of boys in terms of consumption expenditure in households without men in Uganda.

has no impact upon schooling for boys. However, girls born early are significantly more likely than those born late to attend school. Girls have a greater chance of being enrolled the more dependants younger than seven and the fewer dependants over the age of 65 are in the household. These results are somewhat surprising, suggesting that girls are less needed at home to look after younger siblings and more needed at home to help care for older household members. Land is not important to the enrolment decisions regarding girls, but has a strong, unexpectedly positive, impact upon boys' enrolment probabilities, indicating that land reflects wealth rather than the opportunity cost of boys' time. The enrolment probabilities of children of both sexes were strongly influenced by the presence of siblings who are enrolled. Muslim children of both sexes were each less likely to participate than their Orthodox or other Christian peers. The site dummy variables are insignificant in the girls' enrolment equation, indicating that the probability of girls' enrolment does not vary between the omitted site and the included sites. However, site dummies are all positive in the boys' equation, showing that boys are less likely to be enrolled in the omitted site than in either of the three included sites. The omitted site, Sirbana Godeti, is unique in having higher participation rates for girls than for boys, though the rates for both sexes are quite low.

Beyond the externality effects of parents' education (within-household externalities), there are also externality effects of schooling in the neighbourhood. The neighbourhood education variables are average years of schooling of women (and men) in the neighbourhood aged 19-39 (the age cohort of role models for the current cohort of school-age children), excluding education in the household. See Table 10.

Equation 7 illustrates the case for boys and girls together. Here, education of women in the neighbourhood has a very strong and significant effect upon the probability of enrolment, whereas education of men in the neighbourhood has no significant impact. However, the situation is somewhat different for boys than for girls. The effect for boys is again clear: women's education in the neighbourhood has a strong, significant impact and men's neighbourhood-level education has no effect upon the probability of a boy being enrolled (equation 9). For girls, the effect of women's education is much smaller and less significant, and men's education in the neighbourhood also has a small, weakly significant effect (equation 8).

Our findings on education at the neighbourhood level may be overstated if the neighbourhood education variables act as a proxy for unobserved determinants of enrolment which are common to everyone in the neighbourhood. However, as well as controlling for site-level fixed effects, equations 7-9 include several other neighbourhood variables which are intended to pick up neighbourhood-level income and endowments (e.g., the neighbourhood gross enrolment ratio, mean consumption per adult equivalent and percentage of households headed by a woman). The inclusion of these variables does not reduce the significance of the results on women's education in the neighbourhood. In the girls' enrolment equation, consumption (income) in the neighbourhood has a significantly positive effect, whereas the percentage of female-headed households has a significantly negative effect. There is no effect of living in a neighbourhood where the gross enrolment ratio is high. For boys, none of the neighbourhood-level control variables is significant (results not shown).

6. Results: Delayed Entry to Primary School

Current enrolment is only one part of the human capital story. For children who have ever been enrolled, the age at which they began school and whether they delayed starting in relation to their peers or beyond the government-mandated starting age may be important considerations. In this section we will estimate the determinants of the probability and duration of delayed entry to primary school. We will focus on the importance of mother's and father's schooling to the timing of initial enrolment.

Variable definitions and means are provided in Table 11. The sample includes household members aged 12 to 24 who have ever attended school.[10] The official government starting age is seven. However, late entry is extremely common, and in many areas, older starting ages may be considered normal. Respondents were asked whether they had started school later than their peers. Data on the age at enrolment is also available. While only 49 percent of the sample perceived that they had entered school late, 91 percent were older than seven when they started. Two different dummy variables defining late entry are created. The first is set to one if the respondent started later than the peer group. The second is set to one if the respondent started after the age of seven. The determinants of each are compared. Finally, actual years delayed is calculated and regressed on a set of explanatory variables.[11]

Table 12 provides estimation results for three different dependent variables: the probability of starting later than the peer group (Delay: Perceived); the probability of starting later than the government starting age (Delay: Actual); and the number of years delayed beyond the government starting age (start age less seven, Delay: Years). Several control variables are included. Since the decision to enrol late was taken many years in the past in most cases, we do not have data on several potentially relevant variables, including household income at the time of the enrolment choice. It is also not possible to include education of the cohort of 19-39 year old men and women in the neighbourhood, since the relevant groups will differ for older versus younger respondents.

Age is included to determine whether there is a cohort effect. The probability of late entry decreases with age and increases slightly with its square in the actual delay probit, indicating that older respondents are less likely to have delayed entry than younger respondents over the entire range of the sample used. This suggests that the prevalence of late entry has risen for the recent cohort. There is no significant cohort effect on perceived delays or the number of years actually delayed. Whether or not girls are more likely to delay entry than boys depends upon the opportunity cost of their time. Were young girls' labour more valuable to the household than that of young boys, girls would be more likely than boys to start school late. However, the dummy variable for sex is negative in the actual delay probit, indicating that girls are less likely than boys to delay entry to school. The coefficient is positive, though only weakly significant, in both the perceived delay probit and the years delayed regression. Birth order has a consistently negative, but insignificant effect. Thus, children born later may be less likely to delay school entry than their earlier-born siblings, but not significantly so.

[10] Children younger than 12 were not included, since many younger children who have never been to school may enrol later. Including children from this age-group in the sample would result in the problem of censoring on the dependent variable. The majority of children in our sample who ever enrolled had done so by age 12.

[11] Years delayed are negative if the child started school early and zero if the child started on time.

A dummy indicating that the respondent lives in a house with a metal roof is included as a crude indicator of permanent household wealth. Respondents living in better quality housing are less likely to say that they started school later than their peers, but the difference is not significant at the ten percent level on a two-tailed t-test. The probability of actually delaying enrolment is not affected by household wealth. However, the number of years delayed is a significantly negative function of our proxy for wealth. No attempt has been made to include current household income in the equation, since current income may not accurately reflect income at the time of school entry, particularly for the older respondents in the sample. Endogeneity may exist if respondents who start school on time tend to be more successful subsequently, bringing greater wealth to the household. Since all respondents are either children or young adults living in the same home with both parents, house construction was most likely to have been completed before these children finished school, reducing the likelihood of this being an issue.

Both Muslim and Christian respondents were more likely than Orthodox Christians to report starting school later than their peers. However, Muslim respondents were not found to be more likely to actually start late, though the number of years delayed was found to be significantly higher for Muslims than for Orthodox Christians. Other Christians were significantly less likely to actually start late and the number of years delayed was significantly lower than for Orthodox Christians.

Respondents in Sirbana Godeit were more likely to report enrolling later than their peers than respondents in the other three sites. However, there were no differences between the sites in terms of the probability of actually enrolling late, although the number of years delayed was significantly lower in Imdibir than Sirbana Godeti.

The most relevant finding from the point of view of the paper is that years of schooling of both the mother and father significantly reduce the probability that a respondent will report starting school later than his or her peers. Although mother's education has an insignificantly positive effect upon the probability of actually delaying enrolment, it has a strong and highly significant effect to reduce the number of years actually delayed. Father's education has a consistently negative effect, significantly reducing both the probability of actually delaying entry and the number of years delayed. Thus, parental education not only increases the probability of a child being enrolled (see Section 4) but it also increases the chances of initially enrolling on time. This has implications for potential educational attainment, particularly for girls, who may leave school earlier than boys because of early marriage or other factors (Rose, et al. 1997).

Mothers' education is replaced by mother's power in the household (mothers years of schooling as a proportion of total education of the mother and father) in Table 13. Mothers' power has no influence upon self-reported late starting, actual late starting or the number of years enrolment was delayed. However, the coefficient on mothers' power in the equation including both boys and girls may not reflect differences in the importance of mothers' educational power for boys versus girls.

In Table 14, the interaction between being female and having a mother with power in the household is considered. Here, there are positive, significant coefficients on mother's power in the household and significantly negative coefficients on the interaction between respondent's sex and mother's power. In households where the mother has more education

than the father, children face a greater likelihood of delayed entry. However, girls benefit from mothers' educational power. Girls are less likely to delay entry than boys when their mother is more educated than their father, ceteris paribus.

The dummy for being female tends to increase the likelihood of starting school later than ones' peers but to lower the probability of starting after age seven. Girls delay entry by 2.4 years longer than boys, ceteris paribus. However, the overall effect of being a girl in a household where the mother has some schooling and the father none is to reduce the delay by nearly three months. By contrast, the delay in enrolment for boys in a household where the mother has some education and the father has none is 1.2 years longer than in a household where the mother has no education and the father has some. The delay in enrolment for girls in a household where the father has some education and the mother has none is more than two and a half years longer than in a household where the mother has some education and the father has none. Perhaps this is a case of 'like mother, like daughter' and 'like father, like son'. If so, future generations of girls will benefit from the education acquired by their mothers in relation to that acquired by their fathers. This suggests the possibility of a virtuous circle to reduce the gender gap in educational attainment.

7. Summary and Conclusions

Descriptive data from the Ethiopia Rural Household Survey and Education Sub-Sample Survey were presented to indicate the magnitude of the problems of low enrolment and late entry to primary school in rural Ethiopia. For the current cohort of children and young adults, the probability of being enrolled and of having enrolled late were estimated as functions of various characteristics of the child and of the village. The relatively low pseudo R^2 on each equation estimated in Sections 4 and 5 indicates that it was not possible to predict the probability of current enrolment or delayed enrolment accurately in many cases using the variables available. However, certain key characteristics were found to be important.

Of particular interest from the point of view of understanding externalities to schooling were the findings on mother's and father's schooling and neighbourhood schooling. Years of education of both parents was found to influence the probability of enrolment, though the effect of mother's education was slightly stronger than that of father's education. Further analysis revealed that the effect of mother's education works through changes in mother's attitudes toward schooling, and particularly through her attitudes regarding the economic benefits of schooling. The effect of father's education was found to be neither through cognitive changes nor attitudinal changes, suggesting that it has a more indirect effect (e.g., by increasing household income available for school expenses). Mother's power in the household (measured as the ratio of years of schooling of the mother to years of schooling of both parents) had an independent effect upon enrolment. However, the effect was different for boys versus girls. Boys are more likely to be enrolled if their mother has more power in the household, while there is no significant influence of mother's power upon girls' enrolment. This may be because girls are quite useful in the household, freeing their mother for other tasks, or because they are less likely to share the benefits of their education with their parents, owing to the usual practice of living with the family of their husband after marriage. Boys also benefited more from the education of women in their neighbourhood than did girls, though both were significantly more likely to be enrolled if they lived in a neighbourhood with high average levels of women's education.

Years of schooling of both mothers and fathers significantly reduces the likelihood of starting school later than the peer group and reduces the number of years delayed beyond age seven. However, neither has a significant effect (at the ten percent level) upon the probability of starting after age seven. This is probably because most children in the sample who ever went to school started later than the government's official enrolment age. Mothers' power in the household (as measured by the mother's share of total parental education) had no effect on delayed entry for the sample as a whole. However, it was found to interact with the sex of the child, reducing the delay for girls and increasing it for boys. It may be that boys tend to follow the example of their father and girls to follow their mother. Thus, in households where the mother has more schooling than the father, boys will be at a disadvantage relative to girls. If so, gender biases in education will tend to be replicated from one generation to the next.

The evidence that education is transferred from one generation to the next both within and between households indicates that two types of externalities exist: intra-household and inter-household. Evidence of a third type of externality - from a girl's parents to her in-laws - is provided by the finding that women's power in the household influences the probability of enrolment of boys, but not girls. Even when power appears to reside with the mother, who might well be expected to value her daughters no less than her sons, the education of sons is favoured. This result offers indirect support for the hypothesis that parents will discount the value of schooling for children who are expected to leave the household. Thus, too little education will be provided for children when the possibility of internalising the benefits is reduced, as is often the case with investments in girls.

This paper has attempted to contribute to the literature on externalities to schooling by considering two types of educational transfers, within-household and between-household. It appears that having educated parents, and particularly an educated mother, is important both to the probability of being enrolled and to the likelihood of starting school without an extended delay. Interestingly, father's schooling was found to play an important within-household role in the enrolment of both boys and girls, whereas mothers' schooling seems to have a much stronger influence on boys' enrolment than on girls' enrolment. A different effect was found at the neighbourhood level. Here, the probability of enrolment of both boys and girls was found to be positively influenced by the education of women aged 19-39 living in the same neighbourhood, even after controlling for other possible neighbourhood effects. However, no such effect was found for men's schooling. Taking the inter- and intra-household findings together, there is strong evidence to support policies which expand women's schooling, since there are two types of social benefit of doing so.

Another purpose of this paper was to investigate some of the potential mechanisms through which intergenerational transfers of education may operate. In considering the outputs of schooling (i.e., cognitive skill, attitudes toward education and intra-household power) it was possible to show that the influence of mothers' education is through her attitudes toward the economic benefits of schooling and through her power in the household. The influence of father's education upon children's enrolment could not be explained in terms of cognitive skill or attitudes. It may operate indirectly, perhaps by increasing household cash income to pay school fees and other expenses. If so, policies which reduce the costs of schooling may compensate for the low educational attainment of fathers in rural Ethiopia. To compensate for even lower stocks of mother's education, policies are needed which improve mother's attitudes toward schooling and increase mother's bargaining power within the household (for

example, by providing disposable cash income which mothers control). In the long run, society will benefit from an expansion of girls' schooling as a virtuous cycle of intergenerational and inter-household transfers of human capital may be sparked which will benefit children of both sexes. However, biases against girls persist and must be addressed by policy if the full possible externality benefits of girls' schooling are to be realised.

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Table 1
Gross Enrolment Ratios

	Primary (Gr. 1-6)			Secondary (Gr. 7-12)		
Survey Sample	Male	Female	Total	Male	Female	Total
ES-SS (4 Sites)	50.9	38.0	44.4	30.4	18.1	24.1
ERHS (15 Sites)	32.4	16.4	24.3	12.3	7.6	9.9

GER = Number Enrolled/School-Aged Population (percentage)
Source: Ethiopia Rural Household Survey (1994).

Table 2
Net Enrolment Ratios

	Primary (Gr. 1-6)			Secondary (Gr. 7-12)		
Survey Sample	Male	Female	Total	Male	Female	Total
ES-SS (4 Sites)	26.8	20.4	23.6	16.4	10.4	13.3
ERHS (15 Sites)	14.4	7.9	11.1	6.4	4.4	5.4

NER = Number of School-Aged Popn. Enrolled/School-Aged Population (percentage)
Source: Ethiopia Rural Household Survey (1994).

Table 3
Years Delayed Starting Primary School

	Perceived Delay			Actual Delay		
	Percent	Mean Yrs	Mode	Percent	Mean Yrs	Mode
SIRBANA GODETI	60.5	5.3	4.0	81.6	4.9	2.0
TURUFE KETCHEMA	57.1	5.4	3.0	93.6	5.2	4.0
IMDIBIR	29.4	4.4	2.0	89.0	4.3	1.0
AZE DEBOA	42.7	4.7	2.0	93.5	4.7	2.0
ES-SS SITES	45.7	5.0	4.0	90.9	4.8	2.0

Note: Perceived years delayed is a self-reported indicator of having delayed starting school after ones peers. Actual years delayed is the number of years delayed starting school beyond the official starting age, seven. Mean years delayed (actual and perceived) are calculated based on the positive sample.

Table 4
Years Absent from Primary School

	Percent	Mean Years	Mode Years
SIRBANA GODETI	32.1	1.6	1.0
TURUFE KETCHEMA	21.2	1.7	1.0
IMDIBIR	8.8	2.0	1.0
AZE DEBOA	14.8	2.7	1.0
ES-SS SITES	15.9	2.0	1.0

Note: Mean years absent is calculated based on the non-zero sample.

Table 5
Grade Repetition at the Primary Level

	Percent Ever Repeated	Mean Years	Mode Years
SIRBANA GODETI	7.8	1.2	1.0
TURUFE KETCHEMA	18.2	1.4	1.0
IMDIBIR	24.3	1.2	1.0
AZE DEBOA	4.3	1.3	1.0
ES-SS SITES	14.2	1.3	1.0

Note: Mean years repeated is calculated based on the non-zero sample.

Table 6
Progress and Attrition

	Percent Start Primary	Percent Complete Primary	Percent Start Junior	Percent Complete Junior	Percent Start Senior	Percent Complete Senior
SIRBANA GODETI	21.4	53.4	78.6	81.3	71.7	48.9
TURUFE KETCHEMA	48.6	51.7	83.0	82.8	75.3	53.4
IMDIBIR	41.8	48.5	78.7	79.7	71.6	43.6
AZE DEBOA	43.9	54.3	78.0	83.2	71.7	50.9
ES-SS SITES	38.8	52.0	79.5	81.7	72.6	49.4

Note: Percent start primary is the percentage of people who have ever been to primary school in our sample. Percent complete primary is the percentage of those who started primary who completed sixth grade. Percent start junior is the percentage of those who completed primary who started junior secondary (at least seventh grade complete). Percent complete junior is the percentage of those who started junior secondary who completed eighth grade. Percent start senior secondary is the percentage of those who completed junior secondary who started senior secondary (at least ninth grade complete). Percent complete senior is the percentage of those who start senior secondary who complete twelfth grade.

Table 7
Probit Estimation: Probability of Current Enrolment (marginal effects)
Dependent Variable: ENROLLED (1 if currently in school; else 0)

	Eqn. 1	Definition of Variable	Mean
Child Attributes			
AGE_YRS	0.166 *	Age in years	12.09
AGE_YRS2	-0.007 *	The square of age (years)	158.81
FEMALE	-0.110 ✔	Dummy: 1 if female	0.51
BIRTH_ORDER	-0.052 ✔	Sibling order: Oldest = 1, …, youngest = n	2.47
SIB_ENROLLED	0.131 ***	Number of siblings currently enrolled	1.24
NOT_MEMBER	-0.096 **	Dummy: 1 if not a household member	0.01
Household Attributes			
NUM_LT7	0.093 ***	Number of children aged under 7	0.24
NUM_GT65	-0.008	Number of adults aged over 65	1.53
CONSAE	0.000 *	Consumption per adult equivalent (Birr)	97.89
LAND_PC	0.667 **	Land per household member (hectares)	0.11
HH_COST	-0.275	School fees as a percentage of consae	0.19
REL_MUSLIM	-0.191 ***	Dummy: 1 if Muslim	0.17
Parental Education			
EDYRS_MOTH	0.016 **	Years of schooling of the mother	0.49
EDYRS_FATH	0.014 *	Years of schooling of the father	1.60
Parental Cognitive Skill			
COGSKILL_M		Total cognitive skills score (0-17) - Mother	1.22
COGSKILL_F		Total cognitive skills score (0-17) - Father	4.10
Parental Attitudes			
ATT_MOTH		Score on likert attitude index - Mother	11.11
ATT_FATH		Score on likert attitude index - Father	12.38
ATTEC_MOTH		Score on attitude index - economic - Moth	2.68
ATTEC_FATH		Score on attitude index - economic - Fath	2.92
ATTSOC_MOTH		Score on attitude index - social - Mother	2.82
ATTSOC_FATH		Score on attitude index - social - Father	3.35
Mother's Power			
ED_POWER_M		Years of schooling of Mother/Total	0.44
Neighbourhood Education			
EDYRS_WOMEN		Average years of schooling of women aged 19-39 in neighbourhood	2.83
EDYRS_MEN		Average years of schooling of men aged 19-39 in neighbourhood	6.35
Site Fixed Effects			
TURUFE KECHEMA	0.492 ***	Dummy: 1 if household lives in site 10	0.27
IMDIBIR	0.384 ***	Dummy: 1 if household lives in site 12	0.21
AZE DEBOA	0.288 ***	Dummy: 1 if household lives in site 13	0.32
Pseudo R^2	0.26		
Chi-Squared (2)	13.06		
Log Likelihood	-214.35		
Num. Observations	439		

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.

Table 8
Probit Estimation: Probability of Current Enrolment (marginal effects)
Dependent Variable: ENROLLED (1 if currently in school; else 0)

	Eqn. 1	Eqn. 2	Eqn. 3	Eqn. 4
Parental Education				
EDYRS_MOTH	0.016 **		0.004	
EDYRS_FATH	0.014 *		0.011 **	0.022 **
Parental Cognitive Skill				
COGSKILL_M		0.004		
COGSKILL_F		0.005		
Parental Attitudes				
ATT_MOTH		0.016 **		
ATT_FATH		0.004		
ATTEC_MOTH			0.056 ***	0.057 **
ATTEC_FATH			0.004	0.003
ATTSOC_MOTH			0.011	0.011
ATTSOC_FATH			0.018 ✔	0.019
Mother's Power				
ED_POWER_M				0.216 ***
Child Attributes?	YES	YES	YES	YES
Household Attributes?	YES	YES	YES	YES
Site Fixed Effects?	YES	YES	YES	YES
Pseudo R^2	0.26	0.27	0.29	0.29
Chi-Squared (2)	13.06	16.82	101.52	71.68
Log Likelihood	-214.35	-210.11	-206.90	-206.09
Num. Observations	439	439	439	439

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.

Table 9
Probit Estimation: Probability of Current Enrolment (marginal effects)
Dependent Variable: ENROLLED (1 if currently in school; else 0)

	Eqn. 5 (Girls)	Mean	Eqn. 6 (Boys)	Mean
Child Attributes				
AGE_YRS	0.090	11.89	0.353 ***	12.30
AGE_YRS2	-0.004	153.35	-0.014 ***	164.59
BIRTH_ORDER	-0.088 **	2.42	-0.012	2.52
SIB_ENROLLED	0.186 ***	1.19	0.098 **	1.30
NOT_MEMBER			0.252	0.01
Household Attributes				
NUM_LT7	0.119 *	0.25	0.007	0.22
NUM_GT59	-0.033 ***	1.59	0.003	1.48
CONSAE	0.000	96.97	-0.000	98.86
LAND_PC	0.253	0.10	2.058 ***	0.11
HH_COST	-0.673	0.13	-0.456	0.26
REL_MUSLIM	-0.138 ***	0.15	-0.226 ***	0.18
Parental Education				
EDYRS_MOTH				
EDYRS_FATH	0.018 ✔	1.63	0.041 ***	1.57
Parental Attitudes				
ATTEC_MOTH	-0.021	2.71	0.153 ***	2.64
ATTEC_FATH	0.034 ***	2.72	-0.024	3.13
ATTSOC_MOTH	0.034 *	2.61	0.005	3.03
ATTSOC_FATH	-0.004	3.08	0.025	3.63
Mother's Power				
ED_POWER_M	0.005	0.42	0.706 ***	0.45
Site Fixed Effects				
TURUFE KECHEMA	0.200 ✔	0.23	0.816 ***	0.31
IMDIBIR	0.049	0.24	0.762 ***	0.18
AZE DEBOA	0.094 ✔	0.32	0.573 ***	0.31
Pseudo R^2	0.31		0.41	
Chi-Squared (2)	0.77		54.62	
Log Likelihood	-99.07		-86.07	
Num. Observations	226		213	

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.

Table 10
Probit Estimation: Probability of Current Enrolment (marginal effects)
Dependent Variable: ENROLLED (1 if currently in school; else 0)

	Eqn. 7 (Both Sexes)	Eqn. 8 (Girls)	Eqn. 9 (Boys)
Parental Education			
EDYRS_MOTH			
EDYRS_FATH	0.018 *	0.013	0.036 ***
Parental Attitudes			
ATT_MOTH			
ATT_FATH			
ATTEC_MOTH	0.076 ***	-0.001	0.166 ***
ATTEC_FATH	0.003	0.044 **	-0.024 ✔
ATTSOC_MOTH	0.012	0.039 *	0.001
ATTSOC_FATH	0.023 ✔	-0.005	0.030
Mother's Power			
ED_POWER_M	0.187 *	-0.073	0.689 ***
Neighbourhood Education			
EDYRS_WOMEN	0.143 ***	0.066 *	0.183 ***
EDYRS_MEN	0.020	0.049 ✔	-0.044
Child Attributes?	YES	YES	YES
Household Attributes?	YES	YES	YES
Site Fixed Effects?	YES	YES	YES
Neighbourhood Vars?	YES	YES	YES
Pseudo R^2	0.32	0.35	0.42
Chi-Squared (2)	7.73	6.20	0.78
Log Likelihood	-197.76	-92.25	-83.69
Num. Observations	439	226	213

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.

Table 11
Variable Definitions and Mean Values
Determinants of Late Entry to Primary School (Ages 12-24, Been to School)

	Definition of Variable	Mean
Child Attributes		
AGE_YRS	Age in years	17.07
AGE_YRS2	The square of age (years)	301.97
FEMALE	Dummy: 1 if female	0.45
BIRTH_ORDER	Sibling order: Oldest = 1, …, youngest = n	2.41
Household Attributes		
ROOF	Dummy: 1 if roof made of metal, etc.	0.18
REL_MUSLIM	Dummy: 1 if Muslim	0.13
REL_ORTHODOX	Dummy: 1 if Orthodox Christian	0.32
REL_XIAN	Dummy: 1 if Other Christian	0.55
Parental Education		
EDYRS_MOTHER	Years of schooling of the mother	0.31
EDYRS_FATHER	Years of schooling of the father	1.00
Mother's Power		
ED_POWER_M	Years of schooling of Mother/Total	0.47
Site Fixed Effects		
SIRBANA GODETI	Dummy: 1 if household lives in Sirbana Godeti (Site 7)	0.09
TURUFE KETCHEMA	Dummy: 1 if household lives in Turufe Ketchema (Site 10)	0.30
IMDIBIR	Dummy: 1 if household lives in Imdibir (Site 12)	0.29
AZE DEBOA	Dummy: 1 if household lives in Aze Deboa (Site 13)	0.32

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.

Table 12
Probit Estimation: Probability of Late Entry to Primary School, Marginal Effects, Perceived Delay in Starting versus Actual Delay (Start Age>7)
OLS Estimation: Years Delayed (Start Age-7)

	Delay: Perceived	Delay: Actual	Delay: Years
	Eqn. 10	Eqn. 11	Eqn. 12
CONSTANT			5.280
AGE_YRS	0.007	-0.117 *	-0.130
AGE_YRS2	-0.001	0.003 *	0.005
FEMALE	**0.112** ✔	**-0.033** *	**0.576** ✔
BIRTH_ORDER	-0.034	-0.010	-0.235
ROOF	-0.216 ✔	0.043	-1.74 ***
REL_MUSLIM	0.388 ***	0.041	2.057 ***
REL_XIAN	0.214 **	-0.023 ***	-1.162 **
EDYRS_MOTHER	**-0.045** ***	**0.025**	**-0.188** ***
EDYRS_FATHER	**-0.026** **	**-0.016** ✔	**-0.178** *
TURUFE KETCHEMA	-0.268 ***	0.012	-0.060
IMDIBIR	-0.512 ***	-0.008	-0.739 ***
AZE DEBOA	-0.535 ***	0.042	0.566
Pseudo R^2	0.12	0.10	0.20
Chi-Squared (2)	5.80	2.67	
F-Stat (2,3)			2.42
Number of Observations	174	174	174

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.

Table 13
Probit Estimation: Probability of Late Entry to Primary School, Marginal Effects, Perceived Delay in Starting versus Actual Delay (Start Age>7)
OLS Estimation: Years Delayed (Start Age-7)

	Delay: Perceived	Delay: Actual	Delay: Years
	Eqn. 13	Eqn. 14	Eqn. 15
CONSTANT			5.726
AGE_YRS	0.007	-0.109 **	-0.141
AGE_YRS2	-0.001	0.003 **	0.005
FEMALE	**0.118** ✔	**-0.034** ***	**0.575** ✔
BIRTH_ORDER	-0.034	-0.010	-0.233
ROOF	-0.202	0.045	-1.706 ***
REL_MUSLIM	0.383 ***	0.038	2.040 ***
REL_XIAN	0.215 **	-0.021 ***	-1.167 **
EDYRS_FATHER	**-0.042** ***	**-0.005**	**-0.254** **
ED_POWER	**-0.108**	**0.152**	**-0.772**
TURUFE KETCHEMA	-0.268 ***	0.021	-0.068
IMDIBIR	-0.503 ***	-0.007	-0.707 ***
AZE DEBOA	-0.529 ***	0.040	0.591
Pseudo R^2	0.12	0.10	0.20
Chi-Squared (2)	5.38	1.70	
F-Stat (2,3)			1.18
Number of Observations	174	174	174

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.

Table 14
Probit Estimation: Probability of Late Entry to Primary School, Marginal Effects, Perceived Delay in Starting versus Actual Delay (Start Age>7)
OLS Estimation: Years Delayed (Start Age-7)

	Delay: Perceived	Delay: Actual	Delay: Years
	Eqn. 16	Eqn. 17	Eqn. 18
CONSTANT			4.120
AGE_YRS	0.013	-0.082 **	-0.082
AGE_YRS2	-0.001	0.002 *	0.004
FEMALE	**0.382** ***	**-0.236** ***	**2.408** ***
BIRTH_ORDER	-0.030	-0.008	-0.203
ROOF	-0.215	0.028	-1.784 ***
REL_MUSLIM	0.371 ***	0.017	1.894 ***
REL_XIAN	0.222 **	-0.016 *	-1.125 **
EDYRS_FATHER	**-0.044** ***	**-0.003**	**-0.247** **
ED_POWER	**0.169** ✔	**0.361** ***	**1.239** **
FEMALE*ED_POWER	**-0.589** ***	**-0.543** ***	**-3.874** ***
TURUFE KETCHEMA	-0.265 ***	0.027	-0.048
IMDIBIR	-0.512 ***	-0.025	-0.785 ***
AZE DEBOA	-0.538 ***	0.026	0.539
Pseudo R^2	0.12	0.15	0.21
Chi-Squared (2)	5.02	13.09	
F-Stat (2,3)			10.56
Number of Observations	174	174	174

Note: Standard errors have been adjusted to account for the clustered nature of the data. Stars indicate significance using a two tailed t-test as follows: *** = 0.01; ** = 0.05; * = 0.10; ✔ = 0.20.