Is Child Work a deterrent to School Attendance and School Attainment? Evidence from Bangladesh.

R. Khanam[i] and R. Ross[ii]

ABSTRACT

The paper examines the linkages between child work and both school attendance and school attainment of children aged 5–17 years using data from a survey based in rural Bangladesh. This paper first looks at school attendance as an indicator of a child's time input in schooling; then it measures the "schooling-for-age" as a learning achievement or schooling outcome. The results from this paper show that school attendance and grade attainment are lower for children who are working. The gender-disaggregated estimates show that probability of grade attainment is lower for girls than that of boys. Our results reveal that child work has the highest impact on schooling of Bangladeshi children, followed by supply side correlates (presence of a school in the community), parental education and household income respectively.

Keywords: Schooling, Child Labor, Bangladesh

JEL Classification: C25, I21, J13, O12

[i] Corresponding author: Rasheda Khanam, School of Accounting, Economics and Finance, Faculty of Business, University of Southern Queensland; Email: khanam@usq.edu.au; Phone: 61-7-4631 1256; Fax:61-7- 4631 5594

[ii] Russell Ross, Department of Economics, University of Sydney, NSW 2006, Australia. Email; r.ross@econ.usyd.edu.au.

The authors are grateful for comments on earlier versions from participants at conferences in Sydney, Leuven, Tokyo and Goldcoast.

Introduction

The attainment of universal primary education has been one of the main policy priorities of its government since Bangladesh gained independence in 1971. Although there has been an upward trend in school enrolment rates in Bangladesh since the 1970s, the enrolment rate is still relatively low in Bangladesh compared to many other low-income countries. This has serious implications for the economy, particularly as the illiteracy rate will remain high until universal education is attained. The labor force participation of young children (hereafter referred to as 'child labor') is believed to be the main reasons for the low education participation. The most recent evidence from the Bangladeshi National Child Labor Survey 2002–2003, indicates that the labor force participation rate of children aged 5–14 was about 14 per cent. This is a strikingly high rate compared to other countries in the region (for example, India and Pakistan).

In developing countries, children are often expected to make significant economic contributions to their families through their labor market activities, especially in rural areas. Therefore, the opportunity cost of school attendance is expected to be substantial to the parents in rural areas. This suggests that the return associated with time spent at school might not justify the loss of a child's economic contribution in a rural setting. In this case, parents may be reluctant to send a child to school. It is also argued that there is a trade-off between child labor (current income) and accumulation of human capital through education. Putting a child in productive activities may increase current income but will seriously undermine his/her human capital development. Therefore, the failure of parents to internalize the trade-off between current child labor and future earnings ability will result in a continued high incidence of child labor. In addition, child labor will impede school attendance and the quality of learning achievements of children.

The main focus of this paper is to examine the linkages between child work, school attendance and school attainment of children aged 5–17 years using survey data from rural Bangladesh. This paper contributes to the limited empirical literature that has explored the impact of child work on schooling on Bangladesh in two ways. First, the inclusion of several important variables excluded in previous studies on child labor and schooling. In particular, supply side variables on schooling (such as presence of a primary and/or secondary school) that have been ignored by the previous literature on Bangladesh (see for example, Amin, Quayes, and Rives 2006; Maitra 2003). Omitting these factors is likely to lead to biased results; including these factors allows the extent of any bias to be estimated. The second point of departure of this study from existing evidence is that unpaid work, such as household work and agricultural work, is taken into account and the impacts on a child's school attendance and school attainment are directly estimated. The results show that child work is the single most significant variable in terms of the impact on schooling of Bangladeshi children, followed by supply side correlates (presence of a school in the community), parental education and household income respectively. The results reported here confirm previous research that the presence of a school in the community has a stronger effect on school outcomes compared to factors such as household income and parental education.

The structure of the paper is as follows. The next section presents a brief overview of the literature. This is followed by a discussion of the data set, including some estimation problems, and then the main results are presented.

Literature Review

The literature that has examined the association between child labor and schooling in Bangladesh is very limited. Using the 1995-96 Household Expenditure Survey of

Bangladesh, Ravallion and Wodon (2000) examined the effectiveness of a targeted enrolment subsidy (Food-For-Education Program) to increase school attendance and to reduce child labor in rural Bangladesh. Arends-Kuenning and Amin (2004) evaluated school incentive programs in two Bangladeshi villages. They found that school incentive programs increased school attendance for children and reduced time spent on work activities. Using a regional survey, the 1996-1997 Micronutrient and Gender Study in Bangladesh, Khanam (2008) estimated the determinants of schooling and working, combining schooling and work, or doing neither for Bangladeshi children. Amin et al's (2006) study was the first that examined the linkage between child labor and schooling in Bangladesh. However, they did not control for the supply side variables/cost of schooling which are assumed to be important factors for schooling outcome. Therefore, the association between child labor and schooling found by Amin et al is anticipated to be upward biased due to the omission of supply side correlates of schooling.

Previous studies of the consequences of child labor on schooling in developing countries have paid attention to the impact of child labor on school attendance or enrolments ignoring school achievements. More recent empirical studies argue that school enrolment or attendance are not ideal measures of the potential negative effects of child labor on learning because these are only indicators of the time input into schooling, not schooling outcomes; see Heady (2003), Gunnarsson et al. (2006) and Rosati and Rossi (2003). For example, Gunnarsson et al (2006) argued from Latin American experience that an employed child may be enrolled at the same time and could even attend school by sacrificing his or her leisure. Child work still has the potential to harm a child's school outcomes by limiting the time spent on study, or leaving the child too tired to make efficient use of the time in school (Orazem and Gunnarsson 2004). Therefore, it is important to measure school outcomes – such as test scores and/or schooling-for-age - instead of simply measuring a child's time in school (such

as school attendance) to explore the real impact of child work on schooling. In a developing country like Bangladesh, schooling/learning outcome (such as test scores, schooling-for-age) does not always reflect the complete picture of learning achievements; because enrolling all school-aged children in school is still a major development challenge for the Bangladesh government. School attendance is still regarded as an important measure of educational performance in the context of Bangladesh. This paper therefore first looks at school attendance as an indicator of a child's time input in schooling; then it measures the "schooling-for-age" as a learning achievement or schooling outcome

Data and Estimation Issues

The data set used in this analysis is drawn from an International Food Policy Research Institute (IFPRI) survey The survey, titled 'Micronutrient and Gender Study (MNGS) in Bangladesh', collected data in 1996-1997 from three rural regions: Saturia, Mymensingh and Jessore. The MNGS sampled a total of 957 households from 47 villages and collected data on 5,541 individuals residing in the sample households. It provided economic, demographic, agricultural, and gender information. The survey also contained information about the schooling, and employment status of each child in the household.

The survey was a four round survey. However, the present analysis restricts the sample only to the children of the first round of the survey. This is necessary because in Rounds Two to Four no demographic or household composition data was collected on these children. The present analysis is based on data for children aged 5–17 years living in rural households in which the mother and father are both present. There are 1,713 children in this age group, although 95 were discarded as they were in one-parent households, and a further 187 had to be omitted due to missing information on their schooling. These restrictions result in a usable sample size of 1,441 children.

This study focuses on two dependent variables: (i) school attendance; (ii) school attainment. School attendance is treated as a dichotomous variable taking the value 1 if the child is reported to be enrolled in school and 0 otherwise. A commonly used measure of school attainment is "schooling-for-age" (SAGE). This measures schooling attainment relative to age. Patrinos and Psacharopoulos (1997) and Ray and Lancaster (2005) used "grade-for-age" or "schooling-for-age" (SAGE) to measure schooling outcome.[1] It is given by

$$SAGE = (\text{Years of Schooling}/(\text{Age}-E)) * 100 \qquad (1)$$

where E represents the country-specific usual school entry age. SAGE will therefore take values in the range 100 (indicating attended school for the maximum number of years possible to date) to 0 (i.e. never attended school). A score of less than 100 indicates that the child is 'falling behind' in their education. Consequently, all those with a score under 100 are considered as having below normal progress in the school system. Following Patrinos and Psacharopoulos (1997) and Ray and Lancaster (2005), SAGE is converted to a dichotomous variable that takes the value 1 if a child has below normal progress (that is, SAGE < 100), i.e. is falling behind in the schooling system, and 0 otherwise.

The formula for SAGE presented in (1) above highlights several issues when using data on very young children. For children who are in their first year of schooling, a strict interpretation of SAGE will give an infinite value since the denominator is zero (since Age – E = 0). Further, if a child starts school before they reach the minimum age, then SAGE potentially can be greater than 100. Therefore, we restrict our sample to children aged 7-17 for SAGE specifications.

[1] Illahi (2000), Psacharopoulos and Yang (1991), Patrinos and Psacharopoulos (1995) also used grade-for-age for schooling attainment.

Both of the dependent variables of interest are measured by the logistic estimation procedure. The model is of the following form.

The model expresses the probability (*P*) of a child being enrolled in school/falling behind in grade attainment as a function of a set of regressors as

$$P_j = \frac{1}{1+e^{-\sum \beta_i x_i}} \qquad (2)$$

Where 'j' is either 'enrolled in school' or 'falling behind'. The set of regressors cover a range of child-specific, parental, household and community characteristics. The coefficients are partial derivatives that indicate the direction of change in the probability of enrolment (or falling behind in grade attainment) relative to a unit increase in the independent variable. The magnitude of the marginal effect is

$$\frac{\delta P_j}{\partial X_i} = \beta_i P_j (1 - P_j) \qquad (3)$$

where P_j refers to the dependent variable probability of the event, X_i to the i^{th} independent variable and β_i to the logit coefficient for that variable.

The Issue of Endogeneity of Child Work

Child work and school attendance might be jointly determined outcomes of the child's time allocation process. If, so, treating child work as exogenous could result in biased estimates. However, child labour has been treated as both exogenous (see for example, Patrinos and Psacharopoulas (1997), Psacharopolos (1997), Sánchez et al. (2003), Heady (2003) and Amin et al (2006) and endogenous in previous studies. A small number of studies (among them are Bhalotra, 1999, Gunnarson et al. 2003,; Ray and Lancaster 2003, 2005) have tried to control for endogenous child labor, mainly because of unavailability of valid instruments in their data

set. To obtain unbiased estimates of the coefficients, there needs to be a valid instrument for child labor that affects child labor without directly affecting schooling. According to Ray and Lancaster (2003, p. 23) "such variables are difficult to think of, let alone find, in the data set". One valid instrument is the child's own current wage rate as this affects the probability of child labor but not the child's current schooling. Unfortunately, data on child wage rates is unavailable in the vast majority of studies, and in those where it is reported it is only available for those children actually working. The studies that have tried to control for endogeneity of child labor have relied on some strong and rather arbitrary identification restrictions, such as community agricultural wages (Bhalotra (1999) and cross-country variations in the legal system affecting child labor (Gunnarson et al. 2004). Ray and Lancaster (2005) used household's income status and its portfolio of assets and community facilities such as radio, telephone, and access to water and electricity as instruments. However, none of these studies has tested the validity of instruments used in their studies. Therefore, the validity of these instruments is not beyond question. This present study does not try to test for endogeneity of child work because of such doubts about this validity, and, pragmatically, because in the data set analyzed there is no valid instrument that will affect child labor without directly affecting schooling. We caution our readers about the potential endogeneity of our results if child labor is actually the results of poor academic performance in the school.

Choice of Variables

Table 1 presents the definitions and descriptive statistics of the explanatory variables used in the estimation. The log of household per capita expenditure is used to proxy household permanent income as suggested and used by Maitra (2003). In contrast to Amin et al (2006) and Maitra (2003) we include supply-side correlates of schooling such as presence

of primary (grade 1-5) and secondary (grade 6-10) school in the village to capture the cost of schooling. In the absence of such supply variables of schooling the results might be biased.

To measure child work, this study focuses on only the primary activity of a child. "Work" is a discrete variable that takes the value 1 if the child is reported to be working (work includes housework, agricultural work and non-agricultural work[2]) as his or her primary activity or main activity, and 0 otherwise.

{{ insert Table 1 here }}

Results

The final sample is stratified by gender, and separate models are estimated for boys and girls. The sample is also stratified into separate demographic groups, and separate estimates are computed for the younger age group, ages 5–11 (ages 7-11 in SAGE equation), and for the older age group, ages 12–17. The motivation behind this disaggregation by age is to look at the differential effect of work on the schooling progress of these two groups. The ILO's Convention No. 138, Article 7(b) stipulates that only light work may be permitted for children aged 12 or 13 if work does not hamper their school attendance and learning. One of the motivations here is to look at the schooling outcomes of the children ages 12-17 in particular. As the children in this study come from a primarily rural-based household survey, most of the working children in this age group are either engaged in household work or agricultural work, which are presumably light work. Two additional models are estimated in order to see the association between different types of child work, for example, household work, agricultural work, and non-agricultural work and schooling of children: one for all

[2] Non-agricultural work: all income-generating activities, except agricultural work and housework, are included, as well as service, business, self-employment and permanent labour.

children and the other for the children ages 12-17. The estimated results are reported in Table 6.

School Attendance

The results from Table 2 and 3 support the main hypothesis that work is negatively associated with a child's current school enrolment and schooling progress. Column 3 of Table 2 reveals that relative to a non-working child, a working child is 88 percentage points less likely to be enrolled in school. The gender-disaggregated estimates show that working girls are 75 per cent less likely to be enrolled (Column 7, Table 2); on the other hand, working boys are 88 per cent less likely to be enrolled in school (Column 5, Table 2).

{{ insert Tables 2 and 3 about here }}

Though the main focus of this study is to examine the association between child work and schooling, there are some important results emerging from this study that deserve special attention. For example, being a son/daughter of the household head, age of the child, parents' education, household's permanent income and presence of a school in the village appear to be significant determinants of school attendance in Bangladesh. Being a child of the household head significantly increases the likelihood of current school attendance with the exception of the younger sample (children aged 5–11).

The estimated coefficients of age are always very significant. The significant and positive coefficients of age indicate that the probability of school attendance/enrolment increases with the age of the child. This is consistent with Maitra's (2003) study on Bangladesh using Matlab Health and Socio-Economic Survey (MHSS). All the estimated coefficients of female variables, in school enrolment equations show positive signs, implying that female children are more likely to be enrolled. The coefficient is, however, statistically significant only in the older children's sample (aged 12–17).

The coefficient of household expenditure is always positive indicating a higher probability of enrolment if household's permanent income increases. The probability of school enrolment increases by 6 percentage points in the combined sample (Table 2, Column 3) and nearly by 5 percentage points in the young sample (ages 5-11) (Table 3, Column 3). The father's education appears to be more important for school enrolment than the mother's education. The marginal effects (Column 3 of Table 2) show that, relative to the reference category (illiterate father), the probability of current school enrolment is higher by 4.0 percentage points if the father can sign only, is higher by almost 6.0 percentage points if the father can sign and read. Surprisingly, mother's education does not appear to have a significant role in the enrolment decision of the children. Mother's education starts to affect child's schooling after a certain threshold of education. For example, mother education is statistically significant when a mother can read and write, and only for boys and younger children. The estimated coefficients from older children reveal that parents' education has no effect to increase the enrolment probability among older children. [3]

The combined sample shows that relative to the children from farming households, the probability of current school enrolment is lower by 4.7 percentage points for children, whose fathers are day laborers/wage laborers, is lower by 5.8 percentage points, if father's occupation is trade. The similar trend is also observed for younger children (Table 3, Column 3). The boys' sample reveals that the probability of school attendance decreases by 9.1 percentage points for male children, whose father's occupation is trade. The father's occupation has no significant effect on the probability of enrolment for girls. Similar to the father's education, the father's occupation also has no impact on the probability of the current school enrolment of older children (aged 12–17). Parental occupation may also reflect their

[3] If household's permanent income and presence of a school in the village are not controlled for, parental education becomes more significant and the magnitude of the variable also increases in the school enrolment equations. These results are not shown here but can be obtained from the authors on request.

earnings potentiality, which can be considered as the income effect in the standard economic tradition. Therefore, day or wage laborers fathers indicate lower income potentiality that deprives children from schooling.

Another important result to emerge from this paper is the availability of schools in the village, which is a good proxy for cost of schooling. Our results show that presence of a primary school in the village increases the probability of school enrolment for girls and younger children (5-11). This is an important policy related finding, which could motivate the policy makers to focus on the availability of primary school as this would increase the enrolments of girls and young children, and also reduce the probability of late enrolment.

There are some other noteworthy results. For example, the estimated coefficients of the number of children aged 5–17 (school-aged children) are always negative for school attendance (with the exception of boys' sample) but insignificant (with the exception of the girls' sample). The girls' sample suggests that an increase in the number of children aged 5–17 reduces the probability of the enrolment of girls, but that the marginal effect is very negligible.

Schooling-for-Age (SAGE)

The results for SAGE are reported in Tables 4 and 5. The significant and negative coefficients of the "work" variable provide evidence that work has a negative impact on a child's schooling progress (with the exception of the young sample, children aged 5–11), though the detrimental effect of work is relatively lower on schooling progress than on school attendance. For example, relative to a non-working child, a working child is 28 per cent more likely to fall behind in grade attainment (Table 4 Column 3). The gender specific results demonstrate that work has a more harmful effect on girls' grade attainment than that of boys. The corresponding marginal effects suggest that a working girl is 34 per cent more likely to

fall behind in schooling progress (Table 4, Column 7) while a working boy is 25 per cent more likely to fall behind (Table 4, Column 5).

{{ insert Tables 4 and 5 about here }}

The age-disaggregated sample reveals that older working boys (aged 12–17) are 19 per cent more likely to fall behind in their schooling progress. Unexpectedly, the coefficients of the work indicator variables turn out to be insignificant for younger children (aged 7-11). Although work is negatively associated with school attendance or current enrolment for young children (aged 5–11); if they are enrolled once, surprisingly, work has no effect on their school attainment. There are two possible explanations for this result. Firstly, these children might be enrolled in school in due time; so they were not falling behind in the schooling system. Secondly, young children who are enrolled may be less involved with work than older children; therefore, work does not have any negative effect on their schooling progress.

Results from the combined sample for "schooling-for-age" show that sons and daughters of the household head are 10 per cent less likely to fall behind in their school attendance (Table 4, column 3). Negative and statistically significant coefficients of household expenditure confirm that permanent income of the household is a significant determinant of grade attainment for Bangladeshi children. The corresponding marginal effects of this variable show that boys are 16 percentage points, girls are 29 percentage points, younger children are 14 percentage points, and older children are 20 percentage points less likely to fall behind in the school if there is an increase in the household income. These findings on the importance of the level of household income are consistent with Maitra (2003) and Amin et al (2006).

All models of schooling-for-age confirm that the mother's education has a stronger effect on grade attainment than school attendance. The effect of the mother's education is

higher than that of father. For the entire sample, relative to the reference category of an illiterate father, the probability of falling behind is lower by 9 percentage points for children whose father can sign only, and is lower by 11 percentage points for children whose father can read and write. On the other hand, compared to the baseline category (illiterate mother), the probability of falling behind in grade attainment is lower by 20 percentage points if the mother can read only, is lowered by 21 percentage points if the mother can read and write. Hence it can be concluded that the level of parents' education plays an important role in improving a child's schooling progress. All these findings about the impact of parental education are consistent with the finding of Ray and Lancaster (2003).

Another important determinant of schooling in Bangladesh is the presence of a secondary (grade 6-10) school in the village. The coefficients on the variables "presence of secondary boys and girls school" and ""presence of secondary girls' school" are always statistically significant in SAGE specifications, indicating a strong effect of a secondary school on grade attainment. For example, presence of a secondary girls' school lowers the probability of falling behind in grade attainment by 41 percentage points for girls'. On the other hand, presence of a secondary boys' and girls' school lowers the probability of falling behind in grade attainment for boys and girls by 18 percentage points, for young children by 18 percentage points and for older children by 15 percentage points. These results are very much consistent with the prediction about the cost of schooling.

There are some other results that are noteworthy. For example, the positive sign of the variable "school-aged children (aged 5–17 years)" in all samples indicates that an increase in the number of school-aged children increases the probability of falling behind in grade attainment. The coefficient of school-aged children indicates that an increase in the number of school-aged children will decrease school attainment for girls by 5 percentage points (Table 4, Column 7) and for younger children by 8.4 percentage points (Table 5, Column 3). Maitra

(2003) and Amin et al (2006) also found similar results in their studies on Bangladesh. Maitra (2003) found that the probability of current enrolment is significantly lower for the child who has three siblings in the age group 6–17 years compared to a child who has no siblings in this age group. Amin et al (2006) revealed that an increase in the number of children decreases the probability of being continuously in school by about 3 percentage points for older rural boys for market work. This finding may shed light in favour of quantity-quality trade-off and sibling competition effects (Maitra 2003). Further, it is argued that large numbers of school-aged children demand more resources to be put into their education, which, in turn forces them to be employed in case of parental resource constraints, to make school possible for themselves and for their siblings. This may have a negative impact on their schooling outcome. The gender-disaggregated sample suggests that both school enrolment and school attainment of girls will suffer if there are more school-aged children (aged 5–17). This finding supports the earlier evidence that girls are disadvantaged in large households.

Types of Work

In this section further disaggregation of the "work" variable by type of work is reported. The "work" variable is disaggregated into household work, agricultural work, non-agricultural work and household work. Two additional models are estimated; one for all children and the other for older children only. The justification of this disaggregation is to identify if any particular activity of a child, for example, housework, has a stronger affect on child's learning achievements than agricultural or non-agricultural work. The co-efficients on household work, agricultural work and non-agricultural work are shown in Table 6.

{{ insert Table 6 about here }}

The model is estimated for the children aged 12-17 to see whether light work, such as household work, does not hamper schooling of this age group. However, the results indicate a

negative association between all types of work and schooling of these children. The results further indicate that household work has a stronger negative effect on a child's schooling outcome compared to agricultural and non-agricultural work. However, gender specific estimates show that housework is harmful for girls while agricultural and non-agricultural work are harmful for boys. [4] The schooling outcomes of older children (ages 12-17) are worse compared to non-working children in the same age group even though they are engaged in household work, which is considered as light work for older children. Therefore the results suggest that no matter whether it is light work or not, there is a trade-off between child work and schooling.

Conclusions

This study examines the association between child work and schooling of Bangladeshi children by controlling for a wide variety of variables including parental education, household permanent income, and supply side variables for schooling. The results of this study show that child work adversely affects the child's schooling, and this is reflected in lower school attendance/enrolment and lower grade attainment. School attendance, however, suffers more compared to grade attainment. The gender-disaggregated estimates indicate that grade attainment is lower for girls than that of boys. Further, although ILO Convention No. 138, Article 7(b) stipulates that light work may be permitted for children aged 12 or 13 if the work does not hamper their school attendance and learning, the findings of this empirical investigation suggest that the schooling progress of the working children of this age group (12–17) is definitely lower compared to non-working children of the same age group.

The results of the present study further reveal that the presence of a primary school in the local village is important for school enrolment, particularly for girls and young children

[4] Gender specific estimates are not reported here, however, they can be obtained from the authors.

whereas presence of a secondary school significantly increases the probability of school attainment. Parental education has a much greater effect on schooling-for-age than school attendance. An increase in household permanent income increases both school attendance and school attainment, with the effect being stronger for grade attainment. Though the entire sample tends to suggest that girls are more likely to be enrolled relative to boys, the statistically significant coefficient of the variable "school-aged children (aged 5–17)" in the gender-disaggregated samples indicates that both the school enrolment and schooling progress of girls will be lower if there are more school-aged children in the household. This result documents a specific gender gap in large households in Bangladesh.

The results of this study provide some important policy implications. Policies targeted at reducing work involvement by children, adult literacy campaign that increase community or social awareness, employment generation schemes that lead to economic prosperity for the household, and increasing supply of secondary school in the community that will reduce the cost of education provide most effective way of increasing schooling outcome in Bangladesh. Although most of the previous literature on the association between child labor and schooling on Bangladesh has ignored the importance of a secondary school, our results reveal that policy makers should focus more on the availability of a secondary school in the community. These policies could work better if combined with cash and/or in-kind transfers (as has been used in initiatives such as the Food-for-Education in Bangladesh and the Progresa in Mexico) to the household, which send their children to school, thus by reducing the need for work by the children. Our results further show that girls are disadvantaged in large family in terms of schooling. Therefore, a family planning campaign could be another option to increase girls' school attainment.

References

Amin, S., Quayes, M. S. and Rives, J. M. (2006). "Market work and household work as deterrents to schooling in Bangladesh" **World Development,** 34(7):1271-1286.

Arends_Kuenning, M., and Amin, S. (2004). School Incentive Programs and Children's Activities: The Case of Bangladesh, **Comparative Education Review,** 48(3) 295-317.

Bhalotra, S. (1999) **Is Child Work Necessary?** mimeo, Cambridge University.

Gunnarsson, V., Orazem, P. F. and Sedlacek, G. (2003) Changing Patterns of Child Labor Around the World Since 1950: the Role of Poverty, Parental Literacy and Agriculture, in P. F. Orazem and G. Sedlacek (eds.) **Eradicating Child Labor in Latin America in the 90s: The Promise of Demand Side Interventions**, (Washington, D.C., World Bank and IDB).

Gunnarsson, V., Orazem, P. F. and Sánchez, M. (2006) **Child Labor and School Achievement in Latin America**, The World Bank Economic Review, 20(1),pp.31-54.

Heady, C. (2003) The Effect of Child Labor on Learning Achievement, **World Development**, 31(2), pp. 385–398.

Maitra, P. (2003) Schooling and Educational Attainment: Evidence from Bangladesh, **Education Economics**, 11(2), pp.129–153.

Orazem, P. and Gunnarsson, L. V. (2004) **Child Labour, School Attendance and Performance: A Review**, Working Paper #04001, Department of Economics, Iowa State University.

Patrinos, H. A. and Psacharapoulas, G. (1995) Educational Performance and Child Labor in Paraguay, **International Journal of Educational Development**, 15(1), pp.47–60.

Patrinos, H. A. and Psacharopoulos, G. (1997) Family Size, Schooling and Child Labor in Peru – An Empirical Analysis, **Journal of Population Economics**, 10(4), pp.387–405.

Psacharopolus, G. (1997) Child Labor Versus Educational Attainment: Some Evidence from Latin America, **Journal of Population Economics**, 10(4), pp.377–386.

Psacharopoulos, G and Yang, H. (1991) Educational attainment Among Venezuelan Youth: An Analysis of its Determinants, **International Journal of Educational Development**, 11(4), pp.289-294.

Ravallion, M. and Wodon, Q. (2000) Does Child Labor Displace Schooling? Evidence on Behavioral Responses to an Enrolment Subsidy, **Economic Journal**, 110(462), pp.C158–C175.

Ray, R. and Lancaster, G. (2003) **Does Child Labour Affect School Attendance and School Performance? Multi Country Evidence on SIMPOC Data**, Discussion Paper #2003-04 , School of Economics, University of Tasmania.

Ray, R. and Lancaster, G. (2005) The impacts of Children's Work on Schooling: Multi Country Evidence, International Labour Review, 144(2), pp. 189-210.

Rosati, F. C. and Rossi, M. (2003) Children's Working Hours and School Enrollment: Evidence from Pakistan and Nicaragua, **The World Bank Economic Review**, 17, pp.283-295.

Sánchez, M. A., Orazem, P. F. and Gunnarsson, V. (2003) The Effect of Child Labor on Mathematics and Language Achievement in Latin America, in P. F. Orazem and G. Sedlacek (eds.) **Eradicating Child Labor in Latin America in the 90s: The Promise of Demand Side Interventions**, (Washington, D.C., World Bank and IDB).

Table1: Variable Names and Definitions, Summary Statistics[a].

Variables Name	Definition	Mean
Child Characteristics		
ATSCHOOL	1 if attending school, 0 otherwise	0.79
SAGED	1 if a child has below normal progress [i.e. if SAGE < 100, see equation (1)], 0 otherwise	0.62
Female	Gender of child (1 if female, 0 otherwise)	0.39
Son/daughter	1 if son/daughter of the head, 0 otherwise	0.88
Age	Age of child	11.15(3.46)
Age squared	Age of child, squared	136.39(77.18)
Working	1 if the child works, 0 otherwise	0.13
Housework	1 if the child primary activity is housework, 0 otherwise	0.04
Agricultural work	1 if the child primary activity is agricultural work, 0 otherwise	0.04
Non-Agricultural work	1 if the child primary activity is non-agricultural work, 0 otherwise	0.04
Household Characteristics		
Children (5–17)	Number of children 5–17	2.82(1.26)
Children (0–4)	Number of children 0–4	.51(.71)
Total member	Number of people in the household	6.51(2.77)
Household expenditure	Log of per capita household expenditure	2.95(.35)
Parents Characteristics		
Father's age	Age of father, in years	46.72(10.43)
Father's education (ref: illiterate)	1 if father is illiterate, 0 otherwise	0.26
Can sign only	1 if father can sign only, 0 otherwise	0.27
Can read only	1 if father can read only, 0 otherwise	0.03
Can read and write	1 if father can read and write, 0 otherwise	0.44
Father's occupation (ref: farming)	1 if father's occupation is agriculture, 0 otherwise	0.46
Service	1 if father's occupation is service, 0 otherwise	0.12
Trade	1 if father's occupation is business, 0 otherwise	0.16
Day/wage laborer	1 if father is day labor and wage labor, 0 otherwise	0.21
Other occupation	1 if father is engaged in other occupation than the occupation stated above, 0 otherwise	0.04
Mother's age	Age of mother, in years	37.92(9.02)
Mother's education (ref: Illiterate)	1 if mother is illiterate, 0 otherwise	0.35
Can sign only	1 if mother can sign only, 0 otherwise	0.37
Can read only	1 if mother can read only, 0 otherwise	0.04
Can read and write	1 if mother can read and write, 0 otherwise	0.22
Mother's occupation	1 if mother does housework, 0 otherwise	0.94
Cost of Schooling		
Primary school (grade 1-5)	1if there is a primary school in the village	0.65
Secondary girls School (Grade 6-10)	1if there is a girls secondary school in the village	0.04
Secondary boys and girls School (Grade 6-10)	1if there is a boys and girls secondary school in the village	0.12
Region Dummies (ref: Saturia)	1 if household resides in Saturia, 0 otherwise	0.33
Mymensingh	1 if household resides in Mymensingh, 0 otherwise	0.32
Jessore	1 if household resides in Jessore, 0 otherwise	0.34

a. Main entries are arithmetic means. For continuous variables only, standard deviations are shown in parentheses.

b. Decimal is a land area term used in Bangladesh and India. It is equal to $1/100^{th}$ of an acre.

Table 2: Logit Estimates of School Attendance.

	All		Boys		Girls	
Variable	**Coefficient**	**marginal effects**	**coefficient**	**marginal effects**	**coefficient**	**marginal effects**
Constant	-13.873***		-13.055***		-17.992***	
Child Characteristics						
Female	0.386	0.285				
Son/daughter	0.881**	0.089	1.071**	0.152	1.140*	0.012
Age	2.096***	0.159	2.035***	0.212	2.727***	0.017
Age^2	-0.086***	-0.007	-0.086***	-0.009	-0.110***	-0.001
Working	-5.684***	-0.885	-5.548***	-0.882	-6.860***	-0.748
Household Characteristics						
Children (5–17)	-0.204	-0.015	0.004	0.000	-0.612**	-0.004
Children (0–4)	0.212	0.016	0.366	0.038	-0.220	-0.001
Total member	0.074	0.006	0.054	0.006	0.159	0.001
Household expenditure	0.820**	0.062	0.628	0.066	1.238*	0.008
Parents Characteristics						
Father's age	0.009	0.001	0.015	0.002	-0.016	0.000
Father Education (ref: Illiterate)						
Can sign only	0.579**	0.040	0.419	0.041	1.029*	0.005
Can read only	0.647	0.038	0.158	0.016	1.209	0.005
Can read and write	0.796**	0.059	0.553	0.056	1.271**	0.008
Father's Occupation (ref: Farming)						
Service	-0.415	-0.036	-0.450	-0.054	-0.897	-0.008
Trade	-0.640**	-0.058	-0.728*	-0.091	-0.630	-0.005
Day/wage laborer	-0.541*	-0.047	-0.582	-0.070	-0.746	-0.006
Other occupation	-0.104	-0.008	0.005	0.001	-0.483	-0.391
Mother's age	0.017	0.001	0.013	0.001	0.034	-0.001
Mother's Education (ref: Illiterate)						
Can sign only	-0.168	-0.013	-0.244	-0.026	-0.093	-0.001
Can read only	-0.127	-0.010	-0.111	-0.012	-0.379	-0.003
Can read and write	0.622	0.041	0.828*	0.073	0.185	0.001
Mother's housework	-0.028	-0.002	0.030	0.003	0.072	0.000
Cost of Schooling						
Primary school	0.287	0.023	-0.150	-0.015	0.981**	0.008
Secondary girls' school	0.635	0.038	0.363	0.033	27.771	0.029
Secondary boys' and girls' school	0.232	0.016	0.609	0.054	-0.624	-0.005
Region Dummies (ref: Saturia)						
Mymensingh	0.702**	0.049	0.345	0.034	1.531**	0.009
Jessore	0.804***	0.056	0.272	0.027	2.002***	0.013
Number of observations	1441		875		566	
Chi squared	831.827		527.614		323.505	
Pseudo R2	0.563		0.552		0.632	
Log likelihood function	-322.559		-213.726		-94.334	

Dependent variable is ATSCHOOL. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and * indicates coefficients are significant at 10% level.

Table 3: Logit Estimates of School Attendance for Children Aged 5–11 and Children Aged 12–17.

	Children Aged 5–11		Children Aged 12–17	
	Coefficient	**Marginal Effects**	**Coefficient**	**Marginal Effects**
Constant	-11.888	-0.683	-19.681	-1.510
Child Characteristics				
Female	0.151	0.009	1.526***	0.105
Son/daughter	0.748	0.055	1.857**	0.254
Age	1.440**	0.083	3.113	0.239
Age^2	-0.041	-0.002	-0.119	-0.009
Working	-4.278***	-0.758	-6.372***	-0.891
Household Characteristics				
Children (5–17)	-0.283*	-0.016	-0.165	-0.013
Children (0–4)	0.357	0.021	-0.021	-0.002
Total member	0.008	0.000	0.214*	0.016
Household expenditure	0.848**	0.049	0.668	0.051
Parents Characteristics				
Father's age	0.003	0.000	0.006	0.000
Father Education (ref: Illiterate)				
Can sign only	0.655	0.034	0.553	0.038
Can read only	0.722	0.031	-0.559	-0.054
Can read and write	1.074***	0.059	0.369	0.028
Father's Occupation (ref: Farming)				
Service	-0.778	-0.059	0.619	0.040
Trade	-0.848**	-0.063	-0.005	0.000
Day/wage laborer	-0.680*	-0.046	-0.818	-0.079
Other occupation	-0.670	-0.050	0.991	0.052
Mother's age	0.047	0.003	-0.042	-0.003
Mother's Education (ref: Illiterate)				
Can sign only	0.126	0.007	-0.882	-0.077
Can read only	-0.091	-0.005	-0.489	-0.045
Can read and write	0.859*	0.041	-0.228	-0.018
Mother's housework	-0.375	-0.019	0.368	0.032
Cost of Schooling				
Primary school	0.596*	0.037	-0.392	-0.029
Secondary girls' school	1.097	0.042	-0.232	-0.019
Secondary boys' and girls' school	-0.173	-0.011	1.417	0.072
Region Dummies (ref: Saturia)				
Mymensingh	0.925	0.047	-0.045	-0.003
Jessore	1.088***	0.056	0.317	0.023
Number of observations	747		694	
Chi squared	237.314		608.327	
Pseudo R2	0.362		0.762	
Log likelihood function	-208.912		-95.16	

Dependent variable is ATSCHOOL. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level.

Table 4: Logit Estimates of Schooling-for-Age.

	All		Boys		Girls	
	Coefficient	Marginal Effects	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Constant	0.064		-1.535		2.865	
Child Characteristics						
Female	-0.001	0.000				
Son/daughter	-0.547**	-0.101	-0.676*	-0.113	-0.302	-0.062
Age	0.887***	0.181	1.047***	0.202	0.582	0.125
Age^2	-0.026***	-0.005	-0.032***	-0.006	-0.012	-0.003
Working	1.918***	0.276	1.738***	0.246	2.545***	0.336
Household Characteristics						
Children (5–17)	0.194**	0.040	0.155	0.030	0.230*	0.050
Children (0–4)	0.094	0.019	0.133	0.026	0.025	0.005
Total member	-0.083*	-0.017	-0.07	-0.014	-0.09	-0.019
Household expenditure	-1.056***	-0.216	-0.843***	-0.163	-1.361***	-0.293
Parents Characteristics						
Father's age	-0.019	-0.004	-0.012	-0.002	-0.025	-0.005
Father Education (ref: Illiterate)						
Can sign only	-0.425**	-0.090	-0.587**	-0.120	-0.205	-0.045
Can read only	-0.234	-0.050	0.411	0.072	-1.221	-0.293
Can read and write	-0.519**	-0.107	-0.487*	-0.096	-0.697**	-0.150
Father's Occupation (ref: Farming)						
Service	-0.662***	-0.147	-0.864***	-0.189	-0.335	-0.075
Trade	0.32	0.062	0.253	0.047	0.407	0.083
Day/wage laborer	0.068	0.014	0.243	0.045	-0.157	-0.034
Other occupation	-0.299	-0.064	-0.869*	-0.194	1.46	0.222
Mother's age	-0.007	-0.001	-0.018	-0.003	0.004	0.001
Mother's Education (ref: Illiterate)						
Can sign only	-0.006	-0.001	0.02	0.004	-0.008	-0.002
Can read only	-0.863**	-0.199	-0.819	-0.183	-0.965*	-0.230
Can read and write	-0.969***	-0.215	-1.128***	-0.244	-0.773**	-0.176
Mother's housework	-0.241	-0.047	0.059	0.012	-0.948*	-0.168
Cost of Schooling						
Primary school	0.311*	0.065	0.285	0.056	0.318	0.070
Secondary girls' school	-1.260***	-0.297	-0.850*	-0.190	-1.766***	-0.415
secondary boys' and girls' school	-0.793***	-0.179	-0.857***	-0.187	-0.803**	-0.188
Region Dummies (ref: Saturia)						
Mymensingh	-0.245	-0.051	-0.308	-0.061	-0.136	-0.029
Jessore	-1.424***	-0.308	-1.282***	-0.271	-1.650***	-0.359
Number of observations	1282		784		498	
Chi squared	430.400		188.090		262.890	
Pseudo R2	0.258		0.283		0.264	
Log likelihood function	-618.058		-238.437		-367.351	

Dependent variable is SAGED. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level.

Table 5: Logit Estimates of Schooling-for-Age for Children Aged 7–11and Children Aged 12–17.

	Children Aged 7–11		Children Aged 12–17	
	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Constant	-7.551		22.833**	
Child Characteristics				
Female	-0.106	-0.026	0.217	0.027
Son/daughter	-1.089***	-0.255	-0.094	-0.012
Age	2.576**	0.644	-2.276*	-0.288
Age^2	-0.115*	-0.029	0.086*	0.011
Working	1.397	0.304	2.058***	0.194
Household Characteristics				
Children (5–17)	0.338***	0.084	0.038	0.005
Children (0–4)	0.108	0.027	0.065	0.008
Total member	-0.158**	-0.039	0.009	0.001
Household expenditure	-0.578*	-0.145	-1.618***	-0.205
Parents Characteristics				
Father's age	-0.042*	-0.010	0.002	0.000
Father Education (ref: Illiterate)				
Can sign only	-0.489*	-0.121	-0.314	-0.042
Can read only	-0.085	-0.021	-0.614	-0.095
Can read and write	-0.786***	-0.194	-0.163	-0.021
Father's Occupation (ref: Farming)				
Service	-0.521	-0.128	-0.774**	-0.119
Trade	0.272	0.068	0.43	0.049
Day/wage laborer	0.101	0.025	0.13	0.016
Other occupation	-0.459	-0.113	-0.08	-0.010
Mother's age	0.009	0.002	-0.034	-0.004
Mother's Education (ref: Illiterate)				
Can sign only	0.088	0.022	-0.265	-0.034
Can read only	-1.006*	-0.235	-0.927	-0.155
Can read and write	-0.899***	-0.218	-1.106***	-0.170
Mother's housework	-0.781*	-0.187	0.108	0.014
Cost of Schooling				
Primary school	0.282	0.070	0.415	0.055
Secondary girls' school	-1.648***	-0.348	-1.120**	-0.195
secondary boys' and girls' school	-0.748**	-0.182	-0.943***	-0.151
Region Dummies (ref: Saturia)				
Mymensingh	0.074	0.019	-0.584*	-0.079
Jessore	-1.518***	-0.358	-1.477***	-0.221
Number of observations	588		694	
Chi squared	178.32		192.91	
Pseudo R2	0.2188		0.2542	
Log likelihood function	-318.3545		-283.017	

Dependent variable is SAGED. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level.

Table 6: Logit estimates for different types of work performed by the children.

	All Children				Older Children			
	School Attendance		Schooling-for-Age		School Attendance		Schooling-for-Age	
Variable	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects
Household work	-5.764***	-0.892	2.708**	0.306	-7.059***	-0.939	2.961***	0.159
Agricultural work	-5.587***	-0.884	1.166**	0.194	-5.792***	-0.895	1.147***	0.094
Non-agricultural work	-5.721***	-0.890	2.246***	0.283	-6.550***	-0.925	3.521***	0.165

Dependent variable is ATSCHOOL and SAGED. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level. Estimates for the different types of work only are reported here, although the same controls have been used in these two models - the full set of results are available on request from the authors.