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Do extra hours of tutoring payoff? Evaluation of a community education programme in Bangladesh

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Primary school dropout rate in Bangladesh is very high. Both the government and the NGOs have taken many initiatives to raise the quality of education and reduce the dropout rate. In this study we explore the impacts of supplementary tutoring provided to primary school students in different districts of Bangladesh. The goal of this programme is to reduce dropouts and to improve the class performance of the primary school students. We find that after-hour tutoring, offered to Grade 2 students, helped them to continue up to Grade 5. However, it did not exhibit any significant impact on test scores.

Keywords: supplementary tutoring; dropout; primary education; test scores

1. Introduction

In developing countries both the private and public (or social) returns to education are high (Psacharopoulos 1985, 1994; Duflo 2001). It helps to improve health, reduce fertility (Schultz 1997, 2002; Strauss and Thomas 1995) and adopt new technologies (Foster and Rosenzweig 1995). Policymakers have also put a lot of emphasis on education. Two of the eight Millennium Development Goals (MDGs) are focused on education – completion of primary schools by all children and gender equality at all levels of education by 2015 (GoB 2011).

Enrolment in primary schools in Bangladesh (92%) has almost doubled in the last two decades. However, the dropout rates from the primary cycle has remained high and according to official statistics more than 40 per cent of the enrollees do not finish the primary education (World Bank 2014) and this rate has remained fairly constant over the past decade. This is below the Grade 4 survival rate of 67 per cent for the world and is almost at par with such rate of 54 per cent for the low-income countries (see Glewwe and Cremer 2006). The government has also recognised the increasing end-of-grade-V dropout rate as a policy concern and addressed it in the latest policy document (see Directorate of Primary Education 2011).

It is also widely believed that the achievement in enrolment has not been accompanied by a similar impressive increment in the quality of primary school education (which sometimes contributes to school dropout). The basic competency tests in different subjects have revealed a dismal picture in terms of a very low level of achievements in basic competency (Uddin 2005). Greaney, Khandker, and Alam (1999) found that 58 per cent of a sample of 5235 rural children of age 11 and older failed to identify seven of the eight letters presented to them. In a test comprising of reading passages of simple texts, writing

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short messages and carrying out simple arithmetic tasks orally and in writing, only 10 per cent of the students achieved the minimal level in each subject area while 29 per cent failed to show any level of competency in these four subjects.

The low competency is likely to contribute towards high dropout rates visible in many developing countries including Bangladesh (Lewin and Sabates 2012). The poor quality of education provision (and associated low expectations of future returns from investing on children and their education) also contributes in high absenteeism and dropout rates especially at the primary level of education (Alexander 2008). There has been a strong consensus that policies targeted to get children to schools (for example, through school feeding programme) must be accompanied by policies to improve the quality of schools and the students' test scores. It has also been recognised that education provision at the community level and the roles played by the household are also associated with low aspirations and eventual dropping out. As Sabates, Hossain, and Lewin (2013) show students seeking help but not getting any are almost twice as much likely to drop out compared to students who got some help in their studies from the household or community. The parental endowment (education or any other skills) is likely to contribute towards a student doing better at school and such endowment can further widen the intergenerational gap in achievement (Mulligan 1998).

The government of Bangladesh took many initiatives throughout the 1990s. These initiatives include programmes such as the Compulsory Primary Education Act, Female Stipend programme, Food for Education programme, Primary Education Development Programs, among others. These efforts have contributed towards increasing access, quality and efficiency in the primary education sector and reducing the gender gap in primary school attendance. The NGOs have also increased their involvement in helping the government to reach its primary education goals.

There has been much debate on the policies and methods to improve test scores, net enrolment and retention. A number of studies show that providing more resources like textbooks (Glewwe, Kremer, and Moulin 2002, 2009), flip charts (Glewwe et al. 2004), or additional teachers (Banerjee, Jacob, and Kremer 2004) has no impact on children's test scores. However, providing supplementary tutoring outside the classroom (the Balsakhi Programme in Mumbai, India) improves test scores (Banerjee et al. 2007), at least in the short run. Additionally, a number of other studies suggest that supplementary tutoring has only modest and mixed outcomes on measurable student outcomes (see Zhang (2013) for a recent review). However, there hasn't been any such exercise for supplementary tutoring (community or otherwise) as an effective educational policy for Bangladesh.

In this paper we investigate the effectiveness of such an NGO initiative that provides supplementary tuition (about 10 hours per week) to primary school students in different districts of Bangladesh through a programme called Education Support Programme (ESP) run by the Centre for Development Innovation and Practices (CDIP). The goal of this programme is to reduce the number of dropouts from primary schools and to improve the class performance of the targeted students.

Using the difference-in-difference estimation method, we find that the ESP did not have any significant effect on test scores. Only the score in Bengali in Grade 2 improved and the improvement is marginal. The treatment group in Grade 2 didn't perform better in the school final compared to the control group. This is true for Grades 3, 4 and 5 as well. However, the effect of the ESP on dropout is statistically significant. In fact, the dropout rate in the treatment group reduced by almost 59 per cent compared to the control group.

The rest of the paper proceeds as follows. Section 2 provides a brief description of the education policy of the government and the ESP run by the CDIP. Section 3 describes the sampling plan, methodology and econometric model, the data used for estimating the impact of supplementary tuition on test scores and dropout rates. Section 4 presents the results and policy implications. Finally, Section 5 draws concluding remarks.

2. Background

2.1. *Primary school education in Bangladesh: a snapshot*

Bangladesh has already eliminated gender gap in primary education (see Figure 1). However, Bangladesh has been facing challenges in reducing primary school dropout, making access to primary school equitable and improving the quality of primary education (Ahmed and Nath 2005). A large portion of children complete primary schooling without learning functional level of literacy, and numeracy skills due to low average attendance of class by enrolled students, crowded classrooms, lack of adequate learning materials, and untrained and unenthusiastic teachers (all of which can further contribute towards low attendance and high dropout rates, see Sabates, Hossain, and Lewin 2013). This experience of primary schooling system indicates that an effective access to primary education must fulfil three elements: (1) enrolment, (2) completion without dropout and (3) acquiring knowledge and competencies (appropriate for the primary level of education).

Inequity has been a major challenge towards effective access to primary schooling in Bangladesh (Ahmed and Nath 2005). Rural children do not have effective access to primary education in terms of school and related infrastructure and quality of teachers. On the other hand, within the rural community children from poor households are the ones who either do not come to school or are very poor achievers as their illiterate parents neither can help or guide them, nor can afford private tutoring for their children at home (lack of guidance at home has been associated with high dropouts, see Sabates, Hossain, and Lewin 2013). Moreover, as poor households lack food security, they send their children to school without a proper breakfast, resulting in malnutrition and under-performance in school (which are again strong determinants of low school attendance, see Hunt 2008).

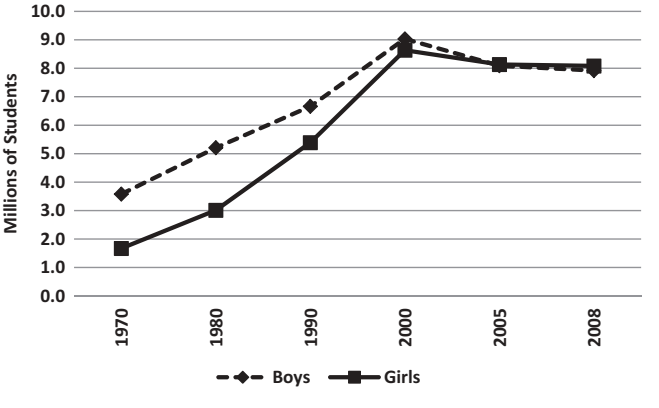

Figure 1. Enrolments to primary schools by gender, million students.
Source: BANBEIS website (http://www.banbeis.gov.bd/trend_analysis1.htm). Reproduced from Adams et al. (2012).

2.2. Community tutoring in perspective

In both developing and developed countries, it is fairly common for students at almost any levels of education to receive supplementary support in learning from persons who are not professional teachers or within settings outside mainstream learning environment (Bray 2003). Such support (usually by non-professional 'teachers') is defined as tutoring and such activities can take place between one tutor and one or more tutees[1] (see Topping 2000). As Bray (2003) points out such tutoring usually takes place for the private financial gains and is a very pervasive phenomenon in a number of countries. He further points out adverse impacts of such practice may have on the students and the overall educational infrastructure. Topping (2000) also points out that while such tutoring can add quantity of educational care for the student, the quality of such extra hours of tutoring remains a question. However, an improved pedagogy can make tutoring more effective in the developing country context where public education system for the mass still remains weak and unequal for the children from the lower socio-economic strata (Banerjee, Jacob, and Kremer 2004).

Supplementary tutoring, at its best, has been able to exhibit only a modest effectiveness in improving students' observable achievements such as test outcomes and retention. Zhang (2013) points out that one should be 'conservative' about the published studies addressing the impacts of supplementary tutoring as the results are often mixed and many a times statistically insignificant. Furthermore, in the context of cost-effectiveness analysis of various programmes in South Asia (including other areas), Dhaliwal et al. (2012) show that out of five (reviewed) programmes, only one (iron fortification and deworming in primary school setting) had significant impact in increasing students' total number of years of schooling.

Other studies evaluating different methods of keeping children in schools find varying results. Duflo (2001) finds that the school expansion programme in Indonesia increases the average years of education of primary school students by 0.12 years. Chin (2005) uses a natural experiment in India and finds that providing a second teacher in primary schools reduces the dropout rate of girls by 3 to 4 percentage points but has no impact on boys' dropout. Conditional cash transfer programmes (PROGRESA) have been successful in increasing the elementary school completion rate of girls by 14.8 per cent (Schultz 2004). Dreze and Kingdon (2001) find that providing mid-day meals increases the school completion rate for girls but not for boys. Randomised intervention in Kenya (deworming programme) has shown that health intervention can also increase years of schooling (Miguel and Kremer 2004). However, Glewwe, Kremer, and Moulin (2002, 2004) find that providing textbooks or incentives to teachers has no impact on the dropout rates in Kenya.

Community tutoring is perhaps even a newer innovation within the development ecosystem in the developing countries and there is only a limited number of studies that has explicitly evaluated such programmes in the context of low-income countries. One exception is Banerjee et al. (2007) which addressed measuring the educational impacts of supplementary tutoring primarily within school setting (but not necessarily classrooms). They identified an impact on average test scores by 0.28 SD (faded to 0.1 SD over a year). Now we turn our attention to CDIP's *Education Support Program* which is very similar to the programme evaluated by Banerjee et al. (2007) albeit designed quite independently by CDIP.

2.3. The ESP of CDIP

CDIP was established in 1995 with the objectives of improving the quality of life of the rural poor by offering them financial as well as non-financial services. While working

with micro-credit programme with its poor members for improving their lives, CDIP observed the limitation of micro-credit programme in poverty reduction without other supplementary assistance programmes like education support. Poverty transmits over generations as the poor illiterate households cannot educate their children. CDIP observed that around 75 per cent children of its members drop out in Grades 1 and 2 from the primary schools due to (1) inability of illiterate parents to assist their children to prepare their school assignments, (2) general lack of educational environment at the household level of poor and illiterate families, and (3) deficiencies of teaching in oversize classes in government run/funded primary schools.

As a result children of poor households go to school unprepared, get punishment for not preparing homework, fall behind in class performance, lose interest in schooling and ultimately drop out. In this context CDIP initiated its ESP in 2005 to assist the children of its members who are poor and mostly illiterate. It started with 50 learning centres (LCs) in *Brahmanbaria* and *Gazipur* districts to provide supplementary after-school tuition to pre-primary, Grade 1 and Grade 2 students belonging predominantly to poor and illiterate households (usually two hours each day). The (stated) specific objectives of the CDIP's ESP have been:

- To improve class performance (that is test scores) of Grade 1 and Grade 2 students from poor and illiterate households.
- To strengthen the educational foundation of the students belonging to poor and illiterate households at the entry level.
- To reduce the primary school dropout rate in its geographic areas of operation.

As there has been demand for the education service LCs have been providing, CDIP expanded its operation in successive years and by 2011 it opened 1750 LCs in 41 Upazilas of ten districts of greater Comilla, Noakhali and Dhaka (see Figure 2).

Currently, 41,250 students of pre-primary, Grade 1 and Grade 2 are enrolled in 1750 LCs, under 70 CDIP branches in these districts, out of which 52.4 per cent are girls (Table 1). Of the total students, number of Grade 1 students is the highest (42.6%) followed by Grade 2 students (30.9%) and pre-primary (26.4%).

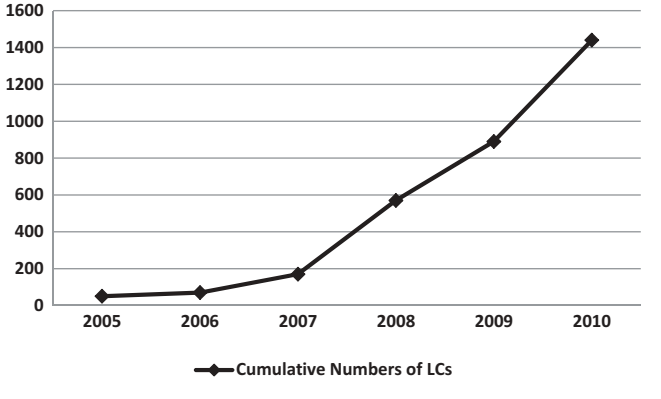

Figure 2. Year-wise cumulative numbers of CDIP LCs.
Source: CDIP (2011).

Table 1. Grade and gender wise number of students at CDIP LCs in 2011.

No. of LCs	No. of teachers		Pre-primary	Grade 1	Grade 2	Total
1750	1750	Girls	5681	9117	5811	21,609
		Boys	5198	8474	5969	19,641
		Total	10,879	17,591	12,780	41,250

Source: CDIP (2011).

The LCs are established in the neighbourhood of rural primary schools. The recommended teacher:student ratio is 1:25, however this varies by LCs. Village communities provide free of cost room space or open yard to carry out LC activities. There are two options for school timing – afternoon shift (3–5 pm) or morning shift (9–11 am). Most of the LCs runs on afternoon shift. LCs work six days a week from Saturday to Thursday. They follow the mainstream primary school curriculum and books supplied by the *National Curriculum and Text Book Board* (NCTB) in preparing students in three subjects which are Bengali, English and Mathematics. No standard book is followed for preschool students as the NCTB does not supply books for preschool students.

An LC is run by a single female teacher who is most vital for its successful operation. Female teachers are selected from the local communities. Most of them hold Secondary School Certificates with few exceptions of having higher degrees.[2] CDIP approaches potential young girls to organise LCs in their communities. It is the responsibility of the female teacher to find out a room space and to select prospective students according to the CDIP criteria. CDIP provides the teachers training, BDT 500.00 per month as honorarium, a blackboard, a box of writing-chalks, a duster and a plastic mat for the students. The teacher is allowed to take BDT 25.00 per month from each student.

The students in the LCs are self-selected. Once an LC is opened in the neighbourhood of primary schools the students from pre-K to Grade 2 from that school are invited to attend the LC (that is, attending formal schools is a prerequisite for participating in the LCs). The tutor helps the students prepare their lesson and homework for the next day. The students of primary grades remain in schools for four hours a day (six days a week). The two-hour tutoring provided by the CDIP increases their total study hours by 50 per cent at a very negligible cost. In 2013, CDIP spent BDT 327 and the parents spent BDT 250 per child (equivalent to USD 7.39 in total).

3. The effect of the ESP

3.1. Methodology

The CDIP programme provides supplementary tutoring to students in Grades pre-K, 1 and 2. Initial field visits by the researchers revealed that dropout from primary schools usually occurs in Grades 4 and 5. Therefore, the evaluation of the programme required tracing the students in Grades 1 and 2 to Grades 4 and/or 5. We set the students who were in Class 2 in 2008 as our sampling population. Out of this population we would randomly select one group of students who attended the CDIP LCs in 2008 and another group who didn't. Since the students attending one particular LC received the treatment in a group, we would first randomly select the LCs and then select all the Grade 2 students attending that LC as the treatment group. Students attending any particular LC came from the same school. We selected the 'control' students from the same schools – from students who

were in Class 2 in 2008 and did not receive the treatment. Essentially, we used a clustered sampling technique and had to take the possibility of intra-cluster (that is, within class) correlation that might exist within any LC/school into consideration while determining the sample size.

3.2. Sampling

In 2010 CDIP collected data on test scores of their students in first and second term exams in the primary schools. Based on the 1421 Grade 2 students who attended some 233 CDIP LCs in 2010 we calculated our sample size. In 2010 the Grade 2 students who attended the CDIP LCs scored on average 55.9 (out of 100) in the first term exam with a standard deviation of 18.1. The intra-class correlation was 0.32.

Our calculation (using the data collected by CDIP) showed that we would require around a total of 1900 observations (950 in each of the treatment and control groups) selected from 159 LCs and the associated primary schools. CDIP had 304 LCs in 2008 operating in 33 unions of 8 Upazilas in Bangladesh. Of these 304 centres only 262 had students from Grade 2. And the average number of Grade 2 students was 8. In order to ensure that neither the control nor the treatment students attended the LCs in Grade 1 we only selected those LCs that came into operation in 2008.

We followed a multistage stratified sampling design. In the first stage we selected 21 unions (unions that had the highest number of LCs in 2008) out of the 33. Then in the second stage we randomly selected 159 centres out of the ones that had students from Grade 2. The treatment group consisted of all the Grade 2 students from the selected centres. Then in the third stage, from the primary schools the CDIP students attended, we selected the same number of Grade 2 students who did not participate in the ESP. They constituted the control group. In order to have control group similar to the treatment group, the control students were selected based on their performance in Grade 1 final exam in 2007, that is, those who had the nearest class ranking to the treated students in 2008 were selected.

The year-end exams at the primary schools in Bangladesh are not identical across schools, even though they follow the same format following guidelines provided by the Directorate of Primary Education. Class ranks in government primary schools are based on performance in the year-end exam in the previous year. For example, the class ranks of the students in Grade 2 are based on their scores in the final (year-end) exam in Grade 1. So, if a student in a treatment group from a school has rank 4, we select the student ranked 3 or 5 as the control from the same school. If both the students ranked 3 and 5 are already in the treatment group, we select students ranked 1, 2 and 6 as control. Since our selection is based on students' performance in Grade 1 final exam in 2007, it is critical that no one from the treatment and the control groups attended the CDIP LCs in 2007. Otherwise the two groups would not be similar in the pre-intervention phase and the identification strategy would be untenable. In order to ensure that no one in our sample received any tutoring in CDIP LCs while they were in Grade 1 we selected only those CDIP LCs that came into operation only in 2008. The heterogeneity in the exam modalities does not pose a problem for our identification strategy as the treatment and control students are selected from the same school and the identification relies on within school between student comparison between CDIP LC participants and non-participants. They are in the same grade, sit for identical year-end exams, have the same peer group in school and the same set of teachers to teach them at school and also come from very similar neighbourhoods ('para') or villages.

3.3. Data

Data were collected on 2147 students, of whom 1078 students attended 144 (of the targeted 159 LCs) different CDIP LCs in 2008. However, the schools could provide the marks for 2007 when the students were in Class 1 for only 1215 students. Therefore, we will use this subsample for our analysis. We conducted three sets of surveys to collect the following data:

(1) *Performance* of the treatment and control students in Grade 1 (2007), Grade 2 (2008), Grade 3 (2009), Grade 4 (2010) and Grade 5 (2011-upto first term). This information was collected from the primary schools.
(2) *Background* of students in both treatment and control groups, socio-economic conditions and household information were collected from the household key informants.
(3) *School information* (such as average size of the classes) was collected from the schools.

3.4. Identification strategy and analytical framework

For both the treatment and the control groups the performance of the students in Grade 1 can be viewed as the pre-treatment observations. Then their performance in the final exam of Grades 2, 3 and 4 can be viewed as the post-treatment observations. What we are trying to estimate is the 'average treatment effect on the treated'.

The effect of the ESP was estimated on two outcomes: performance in the year-end exam, that is test scores, and dropout rates. First we estimate the average treatment effect (ATT) of the program on test scores. For this we estimate the following regression equation:

$$y_{ijt} = \alpha + \beta D_{ijt} + v_i + \varepsilon_j + \mu_{ijt} \tag{1}$$

where y_{ijt} is the test score of student i in year t corresponding to LC j, α is the intercept, μ_{ijt} represents model error and D_{ijt} is an indicator for participating in the CDIP's ESP. $D_{ijt} = 1$ if student i went to the CDIP LC j in year t and $D_{ijt} = 0$ if he/she did not, v_i is the student fixed effect and ε_j is the CDIP centre fixed effect and β measures the average effect of the programme on the treated. It is expected $\beta > 0$. In the pre-treatment period in 2007, $D_{ijt} = 0$ for both treatment and control students. In 2008 and, when all the students were in Class 2, $D_{ijt} = 1$ for the treatment group and 0 for the control group. Standard errors are clustered at the CDIP centre level. Please note that we do not include any village or school fixed effect in our regression as the control and treatment groups (associated with a particular LC) came from the same village and they attended the same school.

Two methods were used to estimate the above regression equation: OLS (difference in difference) and propensity score using kernel-based matching. In order to see if the programme had any long-run effect on test scores, we estimate similar regression equations for students' test score in Classes 3, 4 and 5.

In order to estimate the effect of the programme on the primary school dropout rate, we estimate the following regression:

$$x_{ij} = \theta + \delta D_{ij} + \mu_{ij} \tag{2}$$

where x_{ij} is an indicator for student i from the school adjacent to CDIP centre j. $x_{ij} = 1$ if student i dropped out, that is he/she is not in school adjacent to the CDIP centre j in 2011

and 0 otherwise. $D_{ij} = 1$ for the student i who went to the CDIP LC j in 2008 and is 0 for the one who did not. Here the parameter δ estimates the effect of the programme on primary school dropout rate and is expected to be negative. Since x_{ij} is an indicator variable we would use logit/probit estimation method. Here we estimate the probability of dropout as a function of the right-hand side variables in Equation (2).

It should be noted that a student who was not attending (not found) the school adjacent to the CDIP LC in 2011 implies a dropout not migration or transfer. This was confirmed from our household survey.

3.5. Summary statistics

Table 2 shows the summary statistics for the students and households in the sample. The treatment and the control groups do not have any significant differences in most of the observable characteristics. This has important implications for the evaluation since our samples were selected after the programme was introduced to the programme schools. The similarities between the students from control and treatment groups based on the observed characteristics suggest that the two groups are comparable for the purpose of this study.

Table 2 shows that the mean age of the household head was 38.1 years and the mean age of the spouse was 31.4 years in 2008. In the treatment households the average age of the household head was 38.5 years and that of the spouse was 31.6 years. The respective figures for the control group are 37.6 and 31.3. There is no significant difference in the ages of the household heads and their spouses across the treatment–control groups. The average household had 5.3 members.

The occupational distribution of households is also similar across the treatment and control groups. In the treatment group, 36.5 per cent of the household heads are farmers, 20.5 per cent are businessman and 9 per cent are service holders. In the control group, the respective shares are 34.5 per cent, 22.5 per cent and 9 per cent. Of the treated households, 13 per cent of the household heads live outside the households and 8.9 per cent of them live abroad. In the control group 16 per cent of the household heads live outside the households and 10.4 per cent of them live abroad.

On average the household head in the treatment group has 4.6 years of education and that in the control group has 4.9 years. The male household head is the father of the student in 95.5 per cent of the treatment households and in 97.2 per cent of the control households. The spouse of the household head has on average 4.1 years of schooling in the treatment group and 4.6 years in the control group. There is no significant difference in the household head's level of education. However, the spouse's level of education across the treatment and the control groups are significantly different at 5 per cent level; 95.5 per cent of the treatment households are Muslims while that share in the control group is 94.4 per cent. Since there are some differences in the level of spouse's education (Duflo 2001) we control for this variable in our regression.

Households in both groups have similar housing characteristics. There are no statistically significant differences in the area and number of rooms occupied by the household, ownership status, types of roof and wall, toilet facilities, access to electricity, source of drinking water, ownership of different types of assets and distance to various facilities (primary school, hospital, paved road and microfinance institution).

Table 3 shows the students' characteristics. On average the treatment student was 7.8 years old and the control student was 7.7 years old in 2008. Among the treatment students, 43.4 per cent are boys and 56.6 per cent are girls and the respective shares among the control students are 44.19 per cent and 55.81 per cent.

Table 2. Treatment–control balance: household level characteristics.

Variables	*N*	All		Treat		Control		*P* value
		Mean	SD	Mean	SD	Mean	SD	
Age of head	1200	38.07	7.96	38.52	10.05	37.63	10.12	0.11
Education of head	1158	4.73	3.97	4.59	5.65	4.86	5.77	0.28
Age of spouse	1157	31.44	6.77	31.63	8.42	31.25	8.53	0.43
Education of spouse	1111	4.36	3.35	4.10	4.54	4.60	4.68	0.03
Head father of the student	1159	96.3	0.5	95.5	0.8	97.2	0.7	0.115
Head's occupation								
Farming	1200	35.00	1.9	36.5	1.96	34.5	1.92	0.45
Business	1200	21.5	1.1	20.5	1.6	22.5	1.7	0.38
Religion (Muslim %)	1215	94.9	6.2	95.5	8.4	94.4	9.2	0.38
1, if owns house	1215	0.93	0.26	0.93	0.37	0.93	0.37	0.75
No. of rooms	1198	2.10	1.22	2.08	2.23	2.11	2.25	0.71
Area of house	1196	6.09	5.07	5.82	9.18	6.36	9.26	0.07
Type of roof								
Tin	1215	0.95	0.23	0.95	0.27	0.94	0.27	0.41
Wall type								
Mud	1215	0.10	0.31	0.12	0.38	0.09	0.38	0.10
Tin	1215	0.69	0.46	0.70	0.72	0.67	0.72	0.20
Cement	1215	0.13	0.33	0.10	0.48	0.15	0.48	0.05
Type of latrine								
Pit	1215	0.13	0.34	0.14	0.60	0.12	0.60	0.20
Sanitary	1215	0.75	0.44	0.74	0.81	0.75	0.81	0.69
Commode	1215	0.11	0.31	0.10	0.69	0.11	0.70	0.38
Has access to electricity	1190	0.15	0.36	0.15	0.54	0.15	0.55	0.91
Source of drinking water – tube well	1215	0.96	0.20	0.96	0.23	0.96	0.23	0.97
Have savings	1215	0.32	0.46	0.30	0.92	0.33	0.93	0.40
Ownership of assets								
No. of cows	891	1.03	1.34	0.99	1.78	1.07	1.79	0.47
No. of bullock	789	0.00	0.04	0.00	0.00	0.00	0.00	0.33
No. of goats	818	0.28	0.84	0.29	1.32	0.26	1.31	0.73
No. of ducks	883	2.47	3.07	2.44	3.32	2.49	3.28	0.79
No. of hens	921	2.74	3.42	2.63	4.92	2.85	4.97	0.39
Radio/ TV	1006	8.57	252.21	0.65	355.10	16.40	357.22	0.32
Tube well	1215	0.68	0.47	0.67	0.93	0.68	0.94	0.83
Distance to facilities								
Paved road	1198	0.14	0.53	0.16	1.22	0.13	1.23	0.58
Primary school	1199	0.11	0.34	0.12	0.60	0.10	0.60	0.47
MFI	1197	2.09	2.35	2.15	5.46	2.02	5.49	0.15
Hospital	1190	3.22	3.06	3.19	0.12	3.14	0.13	0.39

MFI: microfinance institution.
Source: Authors' calculations using survey data.

On average students in the treatment group scored 66.6 in Bengali, 66.8 in English and 70.06 in Math when they were in Grade 1, while students in the control group scored 68.0, 69.0 and 70.3, respectively. There is no significant difference in the marks obtained by treatment and control students in different subjects in the pre-treatment period.

The marks obtained in different subjects in 2008 (Grade 2), 2009 (Grade 3) are presented Table 3. In 2008 the treatment students received 56.0 in Bengali, 56.9 in English and 63.05 in Math, while the control students received 54.3, 57.3 and 61.8 in the three subjects,

Table 3. Students' characteristics.

			All	Treatment	Control	*P*
		N	Mean (SD)	Mean (SD)	Mean (SD)	value
Age		1198	7.7 (0.8)	7.8 (0.8)	7.7 (0.8)	0.11
Female, %		1215	56.2	56.6	55.8	0.82
Dropout rate, %		1215	4.7	2.8	6.6	0.03
Grade 1	Total	1215	204.7 (56.5)	203.3 (57.3)	206.0 (55.8)	0.45
	Bengali	1215	67.3 (21.5)	66.6 (21.5)	68.0 (21.4)	0.37
	English	1214	67.4 (21.6)	66.8 (22.0)	68.0 (21.3)	0.35
	Math	1215	70.2 (22.2)	70.1 (22.4)	70.2 (22.1)	0.90
Grade 2	Total	1186	174.8 (53.9)	175.8 (54.2)	173.8 (53.6)	0.59
	Bengali	1168	55.2 (20.4)	56.0 (20.7)	54.3 (20.0)	0.17
	English	1168	57.4 (20.8)	56.9 (20.8)	57.9 (20.8)	0.49
	Math	1187	62.4 (21.4)	63.1 (21.5)	61.8 (21.4)	0.34
Grade 3	Total	986	147.2 (52.9)	146.2 (53.1)	148.1 (52.6)	0.84
	Bengali	794	51.5 (18.4)	51.3 (17.6)	51.7 (19.1)	0.64
	English	969	47.2 (19.4)	47.4 (19.3)	47.0 (19.6)	0.83
	Math	973	48.2 (23.6)	47.1 (25.6)	49.4 (21.5)	0.86
Grade 4	Total	986	147.2 (52.9)	146.2 (53.1)	148.1 (52.6)	0.57
	Bengali	794	51.5 (18.4)	51.3 (17.6)	51.7 (19.1)	0.74
	English	969	47.2 (19.4)	47.4 (19.3)	47.0 (19.6)	0.74
	Math	973	48.2 (23.6)	47.1 (25.6)	49.4 (21.5)	0.14
Grade 5	Total	991	136.2 (49.7)	132.9 (48.3)	139.5 (50.9)	0.05
	Bengali	1008	48.6 (16.7)	47.5 (16.1)	49.7 (17.3)	0.04
	English	1009	43.0 (17.9)	41.6 (16.7)	44.3 (18.9)	0.02
	Math	994	44.7 (23.6)	43.7 (23.6)	45.7 (23.6)	0.20

Source: Authors' calculations using survey data.

respectively. On average the treatment group received 27.2 marks less in 2008 than in 2007, while the difference for the control group was 31.2. The marks obtained in different subjects in 2010 (Grade 4) and 2011 (Grade 5) are also presented in Table 3. There is no significant difference in these marks between treatment and control groups except in 2011.

4. Results

4.1. The effect on test scores

The estimates of regression equation (Equation (1)) are presented in Panel A of Table 4. For the regression we use normalised test scores. Column (1) shows that the ESP improved the total test score of the treatment students by 0.07 standard deviation. However, this estimate is not statistically significant. Columns (2), (3) and (4) show the results of the same regression equation for Bengali, English and Math. The ESP improved the test scores in Bengali, English and Math by 0.11, −0.01 and 0.062 standard deviations, respectively. Of these three only the effect on Bengali test score is statistically significant.

The students who dropped out are treated as missing in the regression looking at exam scores. The dropped out students had lower average scores in all the exams compared to the students who retained and the dropped out students from the treatment group had higher average scores than those from the control groups. Given the small number of students dropped out in each grade (13 in Grade 3, 14 in Grade 4 and 23 in Grade 5) the possible bias from such dropouts is considered negligible in the paper.[3]

Table 4. The effect of the ESP on test scores.

	Dependent variable – difference in test score in Class 2[a]							
	OLS estimates				ATTK estimates			
	Total	Bengali	English	Math	Total	Bengali	English	Math
Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.07	0.11*	−0.01	0.06	0.056	0.112**	−0.021	0.039
	(0.06)	(0.06)	(0.06)	(0.07)	(.061)	(0.056)	(0.063)	(0.056)
No. of observations	1168	1169	1169	1169	1168	1169	1169	1169
	Dependent variable – difference in test score in Class 3							
Panel B	OLS estimates				ATTK estimates			
Treatment	0.01	0.00	0.04	−0.00	−0.016	−0.005	0.022	−0.048
	(0.06)	(0.05)	(0.06)	(0.06)	(0.066)	(0.067)	(0.068)	(0.066)
No. of observations	1093	1095	1094	1096	1093	1095	1094	1096
	Dependent variable – difference in test score in Class 4							
Panel C	OLS estimates				ATTK estimates			
Treatment	0.04	0.05	0.09	−0.05	0.042	0.033	0.088	−0.043
	(0.07)	(0.06)	(0.06)	(0.07)	(0.061)	(0.076)	(0.075)	(0.068)
No. of observations	968	973	969	972	968	973	969	972
	Dependent variable – difference in test score in Class 5							
Panel D	OLS estimates				ATTK estimates			
Treatment	−0.03	−0.01	−0.02	−0.05	−0.015	−0.002	−0.010	−0.035
	(0.06)	(0.06)	(0.06)	(0.06)	(0.061)	(0.064)	(0.070)	(0.072)
No. of observations	991	1007	1009	993	991	1007	1009	993

[a] The tests scores are normalised.
Standard errors are in the parentheses.
*** significant at 1 per cent, ** significant at 5 per cent and * significant at 10 per cent.

Columns (5), (6), (7) and (8) show the results of similar estimates obtained by propensity score matching. Propensity scores are estimated based on the household head's age, years of education; household head's spouse's age and years of education; sex of the household head and the student. The results reported in Table 4 use the kernel-based matching method (a bandwidth of 0.06) and estimate the average treatment effect for observations for which the propensity scores are balanced. Bootstrap method was used to calculate the standard errors. The point estimates are similar to those produced by the OLS method. The ESP has no significant effect on total test scores. However, the score in Bengali improved significantly – by 0.12 standard deviation. This translates into a difference of 2.57 marks out of 100.

The estimates are robust to changes in the matching method. We estimated the average treatment effect with smaller bandwidth (0.04) and using nearest neighbour matching. The results remained the same. Using a different set of variables to calculate the propensity

scores also produces similar results. We used housing characteristics – access to electricity, type of wall, source of drinking water in addition to age and education of household head and spouse, sex of the student to match to treatment and control students. The results do not change in any significant way.[4]

Panels B, C and D of Table 4 show the results for test scores in Classes 3, 4 and 5, respectively. None of the coefficients is statistically significant implying that the ESP had no significant effect on test scores after the students left the programme. Figure 3 shows the difference in total marks obtained by the treatment and control groups in years 2007–2011, and Figure 4 shows the difference in the test scores in the pre (2007) and post (2008–2011) treatment periods for these two groups.

4.2. *Effect on primary school dropout rate*

Table 5 shows the results of *logit* and *probit* regression estimation of Equation (2). Column (1) shows that the estimated coefficient for D_{it} is −0.88 and it is statistically significant at 5 per cent level. Column (2) shows the average marginal effects. Results

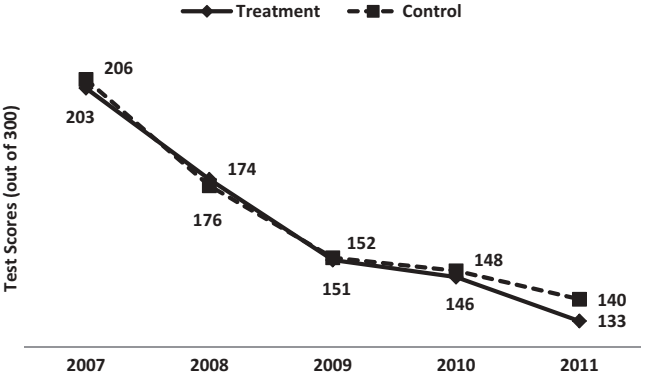

Figure 3. Total marks obtained by treatment and control groups.
Source: Authors' calculations.

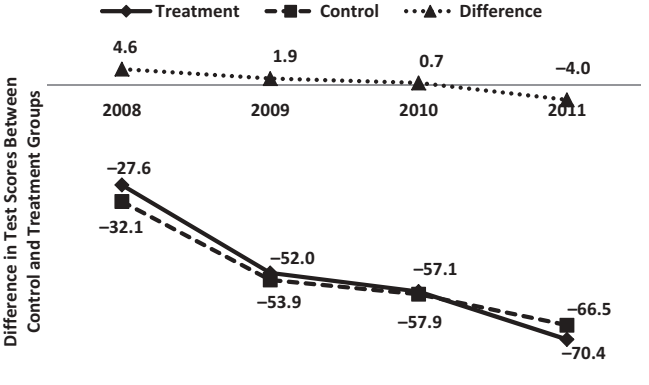

Figure 4. Difference in total marks between pre- and post-treatment year.
Source: Authors' calculations.

Table 5. The effect of the ESP on primary school dropout rate.

	Dependent variable – probability of dropout							
	Logit regression model				Probit regression model			
	Coefficient	Average marginal effects	Coefficient	Average marginal effects	Coefficient	Average marginal effects	Coefficient	Average marginal effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	−0.88**	−0.039**	−0.947**	−0.040**	−0.40***	−0.038***	−0.427**	−0.039**
	(0.31)	(0.018)	(0.386)	(0.020)	(0.145)	(0.145)	(0.169)	(0.018)
Father's education			−0.080	−0.003			−0.034	−0.003
			(0.079)	(0.004)			(0.034)	(0.003)
Mother's education			−0.036	−0.002			−0.021	−0.002
			(0.079)	(0.003)			(0.034)	(0.003)
Father's age			0.010	0.000			0.004	0.000
			(0.020)	(0.001)			(0.010)	(0.001)
Mother's age			−0.036	−0.002			−0.017	−0.002
			(0.023)	(0.001)			(0.011)	(0.001)
Sex of the student			−0.499**	−0.021**			−0.258**	−0.023**
			(0.241)	(0.011)			(0.100)	(0.010)
Sex of the HH head			−1.164	−0.049			−0.632	−0.057
			(1.337)	(0.056)			(0.656)	(0.059)
Pseudo R^2	0.021		0.05		0.021		0.0516	
No. of observations	1215	1215	1100	1100	1215	1215	1100	1100

Standard errors are in the parentheses.
*** significant at 1 per cent, ** significant at 5 per cent and * significant at 10 per cent.

show that participation in the ESP reduces the probability of dropout by 0.039. Columns (5) and (6) of Table 5 show similar results for the probit model. According to the probit estimation method the ESP reduces the probability of primary school dropout by 0.038.

The probit estimates are also statistically significant at 5 per cent. These results imply that out of 1000 students the treatment group would have 39 less dropouts compared to the control group. If we consider the dropout rate for control group as the benchmark figure then a decline in the dropout rate of 3.9 percentage point would amount to a substantial decline.

One should note that the rate of dropout was very low in our sample for both the control and treatment groups (6.6% and 2.8%, respectively). The dropout rates vary across different districts of Bangladesh. One study by BRAC finds that the dropout rate in the districts of Dhaka, Chittagong, Rangamati and Bandarban was 6.13 per cent in 2008 which was close to the dropout rate in our control group (6.6%, see Khan and Samddar 2010). The schools in our sample come from four districts that are close to Dhaka and Chittagong. Another reason for the low dropout rate in our sample is the low poverty rates in these areas. Studies have found that completion rates are lowest for children from poor households (see, for example, Birdshall, Levine, and Ibrahim 2005; Blick and Sahn 2000). The schools in our sample are located in three of the least poor areas of Bangladesh. The poverty rates in the Noakhali (less than 15%), Lakshmipur and Brahmanbaria (15–27%) districts are less than the national average (31%).[5]

4.3. Robustness

4.3.1. The effect on test scores. In order to check that our regression result is robust we run the same regression adding a few covariates. We use the household head and the spouse's age, years of education, the student's gender and the sex of the household head as additional covariates in Equation (1). These results are presented in Table 6. The point estimates remain almost the same even after adding these covariates. However, the R^2 increases significantly after adding the covariates. It is also notable that none of these additional covariates has any significant effect on the test scores in Class 2.

However, the effects of the covariates on test score in Classes 3, 4 and 5 are mixed. The effect of gender of the student is negative in most of the cases (though they are not always statistically significant). This means that girls on average scored lower in the exams. This could be due to the fact that on average the girls in our sample received fewer hours of additional tutoring help.

4.3.2. The effect on dropout. Columns (3) and (4) of Table 5 show the results for the *logit* regression model while columns (7) and (8) show the results for the *probit* regression model with these additional covariates. Adding these covariates does not change the point estimates much. Both the *logit* and the *probit* models show that the ESP reduces the probability of primary school dropout by 0.04 and both are statistically significant. Moreover, the gender of the student has a significant effect on the probability of dropout. On average a girl is 0.022 less likely to drop out than a boy.

Table 6. Effect of the ESP on test scores[a] (with covariates).

	Dependent variable – difference in test score in Class 2				Dependent variable – difference in test score in Class 3			
	OLS estimates							
Panel A	(1) Total	(2) Bengali	(3) English	(4) Math	(5) Total	(6) Bengali	(7) English	(8) Math
Treat	0.07	0.12**	−0.01	0.05	0.01	0.01	0.04	−0.02
	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)	(0.05)	(0.07)	(0.07)
HH head's education	−0.01	−0.00	−0.01	−0.01	−0.01	0.00	−0.01	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Head's spouse's education	0.03	0.01	0.03*	0.02	0.02	0.02	0.01	0.02
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
HH head's age	−0.00	−0.01	0.01	−0.01	−0.01	−0.02*	−0.01	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
HH head's spouse's age	0.00	0.02	−0.01	0.01	0.02*	0.02*	0.00	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Sex of the student	−0.06	−0.06	−0.05	−0.04	−0.13*	−0.08	−0.07	−0.17**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.06)	(0.07)
Sex of the HH head	0.29	0.38	0.08	0.20	0.03	−0.26	0.19	0.14
	(0.31)	(0.32)	(0.40)	(0.24)	(0.20)	(0.27)	(0.43)	(0.19)
R^2	0.0063	0.0074	0.0087	0.0045	0.012	0.012	0.003	0.02
No. of observations	1060	1061	1061	1061	995	996	996	997

	Dependent variable – difference in test score in Class 4				Dependent variable – difference in test score in Class 5			
	OLS estimates							
Panel B	(1) Total	(2) Bengali	(3) English	(4) Math	(5) Total	(6) Bengali	(7) English	(8) Math
Treat	0.06	0.06	0.09	−0.02	0.01	0.03	0.00	−0.01
	(0.07)	(0.06)	(0.07)	(0.08)	(0.06)	(0.06)	(0.06)	(0.06)
Father's education	−0.01	0.00	−0.01	−0.02	−0.01	0.00	−0.00	−0.01
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Mother's education	0.03	0.02	0.01	0.02	0.01	0.02	0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)
Father's age	−0.02*	−0.02**	−0.01	−0.01	−0.03***	−0.02**	−0.02*	−0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Mother's age	0.02*	0.03**	−0.00	0.02**	0.02**	0.02**	0.01	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Sex of the student	−0.05	−0.05	0.04	−0.11	−0.03	−0.00	0.01	−0.09
	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
Sex of the HH head	−0.43**	−0.35**	−0.39	−0.33	0.05	0.32	−0.27	−0.05
	(0.17)	(0.15)	(0.28)	(0.24)	(0.43)	(0.29)	(0.40)	(0.35)
	0.009	0.0178	0.008	0.0126	0.015	0.0123	0.0118	0.0135
No. of observations	879	883	880	882	889	915	917	901

Notes: [a] The tests scores are normalised.
Standard errors are in the parentheses.
*** significant at 1 per cent, **significant at 5 per cent and *significant at 10 per cent.

5. Conclusion

To attain a higher growth trajectory, Bangladesh needs to invest heavily on the human capital for her citizen especially addressing the issue of quality education for children in the primary level. Lack of proper education has received its due attention and over the years many different strategies have been followed (involving both government and private sectors such as local development agencies) to increase the primary school attendance. While this goal has been achieved so far (along with gender parity) the quality of education and low rate of completion have remained a cause of concern. CDIP's ESP addressed this issue because poor performance in the class was perceived to further deter students from continuing with their studies.

This study found that after-hour tuitions offered to students did manage to retain students through Grade 5 once they received the interventions during Grade 2. However, the mechanism through which it works has not yet been identified. The LCs helped the students to prepare their homework. This may motivate them to stay in schools as they were no longer embarrassed in classes for not doing their homework. It may also have improved their self-confidence and self-esteem and foster creativity which indirectly lowered the probability of grade retention and dropout (Cooper et al. 2010). Or the LCs may have changed the parents' perspective regarding primary education and they therefore are more likely to keep their children at school. One study conducted by BRAC shows that the dropped out students found it difficult to follow the textbooks where it cites 'difficulties in following textbooks started particularly when the dropped out students were promoted to third grade' (see Khan and Samddar 2010). The special care received in the CDIP LCs when they were in the second grade might have motivated and helped the students to understand the textbooks in Grade 3 better and reduced their probability of dropping out in Grade 3 and later. It should be mentioned that the benchmark dropout rates were lower than national average in our selected sample schools. Yet the intervention lowered the dropout rates significantly. While it is possible that such interventions can have a higher average treatment effect in the population and scaling up of the programme can further give opportunity to understand this.

However, the ESP did not exhibit any significant (statistically or point-wise) impact on test scores both in the short and the long run. Only the test scores of the treated students in one particular subject (Bengali) in Grade 2 were significantly higher than the control students. Nevertheless, this effect also disappeared in later grades. This finding, however, is not surprising. Cooper et al. (2010) find that attending a full-day kindergarten improves the academic achievement at the end of the kindergarten year by about 0.25 standard deviation compared to that of a half-day kindergarten and this difference actually disappears by third grade. However, it is curious to find that the programme studied in this paper was associated with a reduction in dropout rates among the participants without any discernible impact on test scores. While speculative and based on largely anecdotal evidence from the field, it is possible that the after-hour community tutoring programme raised confidence among the participating children and their parents leading to higher retention rates. This possible path-way to better school experience has been recognised before in the literature (see Cooper et al. 2010,). It is also possible to have a spillover effect within the classroom (please note we have chosen both the treatment and comparison students from the same classroom). The regular teachers may allocate more time to the non-participants within the classroom and such possible strategic decisions can further bias the positive impacts on the test scores downward. Since, these spillovers are plausible only when the students, who would drop out in the absence of the programme (the counterfactual effect), remain in the classroom, our results of lower dropout rates are consistent with no impact of the programme on the test scores. One

should also note that it is also difficult to make a proper evaluation ex post and even after carefully selecting a sample our study was seriously constrained by availability of data. However, our results suggest after-hour community tutoring can potentially lower the dropout rates among the primary school students in a resource-constraint country like Bangladesh.

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Notes

1. The word 'tutee' is used by Topping (2000) to identify the learner who is tutored or who receives supplementary learning support.
2. Secondary School Certificate examination is major nationally administered public examination in Bangladesh which the students appear at the completion of 10 years of formal schooling. Most of the community tutors had such certificates. There were few cases where the community tutors had schooling with high number of years. However, rarely they had schooling less than 10 years (that is, without the SSC degree).
3. The attrition of the lower-scoring students will allow an upward bias in our estimates hence estimating an upper bound of the impact. However, even then, we did not find any discernible positive impacts of the programme.
4. These results are not presented in the paper as they do not add any additional insight but can be provided to interested readers upon request.
5. Source: Bangladesh Poverty Map 2010 (World Bank 2014).

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