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The Impact of After-School Programme on Student Achievement: Empirical Evidence from the ASA Education Programme in Bangladesh

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Abstract This study examines the effectiveness of an after-school tutoring programme that was implemented throughout Bangladesh. The exam results for three distinct classes (Bengali, English and Mathematics) were collected over three consecutive periods during 2015. The total sample of 1353 students was separated into a treatment group of 900 students that were enrolled in the programme, and a control group of 453 students that were not enrolled in the programme. Using a difference-in-difference setup, the results show that the treatment group significantly improved their grades over time compared to the control group. This difference was found to be significant for all three classes and ranged from 2.3 percentage points in English to 3.4 percentage points in Mathematics. To check the robustness of this finding, student-fixed effects were included that control for any time-invariant differences between individual students and the results remained unchanged. The overall results indicate that the after-school tutoring programme had a significant and positive effect on the school performance of students.

Keywords: After-School Programme. Student Achievement. ASA Education. Bangladesh

Introduction

Bangladesh has achieved significant success in fulfilling the major millennium development goals (MDG), particularly with regard to the enrolment of children in primary schools (MoPME, 2016). However, families living in poverty do not see education as a high priority and rarely have any budget to spend on private tuition that provide major obstacles to school attendance. This problem has been exacerbated because of the high incidence of poverty in Bangladesh and in 2014, this situation led to around 20 per cent of poor families taking their children out of school (Khan and Samadder, 2010; MoPME, 2016). Even if children are able to attend school, they are often unable to concentrate on their lessons and fail to complete their homework leading to many students dropping-out before completing primary education. A number of studies claim that several factors contribute to this dropout rate including, for example, household income, grade repetition, and level of parental education (Nath et al, 2008; Hadley, 2010; Ananga, 2011). Other studies have further argued that parents with low levels of education are likely to have more children and that some will drop out of school (Blick and Sahn, 2000; Zhao and Glewwe, 2010) in order to engage in income generating activities (Duryea, 2003; Ersado, 2005).

Individual factors such as poor health, malnutrition and lack of motivation as well as household factors such as child labour, migration and poverty are all associated with children dropping out from primary schools (Sabates et al., 2013; CREATE, 2011). Supply driven factors such as teacher absenteeism, school location and poor-quality educational provision are also playing an increasing part in prompting rises in the dropout rate. Khan and Samadder (2010) found that dropping out was higher among female students and in urban areas such as Dhaka. This could be explained by the fact that the cost of education is higher in urban areas than it is in rural areas where children from poorer households are more likely to be engaged in economic activities in order to contribute to household income. Khan and Samadder (2010) found that school related factors or poor infrastructure such as inadequate sitting benches plus the absence of fans, drinking water and toilet facilities were also contributing factors in the dropout rate. These findings are confirmed by Glewwe et al. (2011) who carried out a meta-analysis and concluded that the availability of desks, teacher subject knowledge and teacher absence significantly affected the school performance of students.

In 2011, ASA (formerly known as the Association for Social Advancement), one of the largest microfinance institutions in the world, introduced the Primary Education Strengthening Programme (henceforth PESP) to provide tuition to children from poor families in Bangladesh. The programme targets students who are enrolled into government primary schools in pre-primary level, grade 1 and grade 2 only. Due to private education being significantly more expensive, it is believed that children from poor families only manage to go to government schools. Poor parents are typically unable to assist their children's education since they may not have had an education themselves as well as being unable to hire a private tutor due to the cost.

There is a growing demand for private tuition of children in poor households, but this is rarely filled by the government. ASA believed that if they could provide supplementary private tuition in line with mainstream education, this might encourage students from poor families to graduate at least up to primary level and/or help reduce the drop-out rate at this level. Using their PESP programme, ASA began establishing education centres in the poorest regions and as they gained in popularity and acceptance from lower-income and poor families, the number of centres was gradually increased across the country. The programme mainly assists children to accomplish everyday homework and prepare for examinations with tutoring provided on six days a week lasting for about two hours each day.

The main purpose of the study is to investigate the impact of the PESP on the academic achievements of students. While there is no consensus in the literature about the impact of tutoring on student performance, there is evidence of a significantly positive impact in the cases of Mauritius (Kulpoo, 1998), Kenya (Buchmann, 2002), Vietnam, (Dang, 2007), Mauritius, Malawi and Tanzania (Paviot et al., 2008), Bangladesh (2008; Hamid et al. 2009) and Greece (Guill and Bos, 2014). On the other hand, Paviot et al. (2008) also found insignificant and even significantly negative results in the cases of Kenya and Namibia respectively. Insignificant results were further found in the cases of Egypt (Fergany, 1994), South Korea (Lee et al. 2005), and Jinan, China (Zhang, 2013).

However, such studies should be treated with great caution due to the heterogeneous nature of tuition (Bray, 2006; Hof, 2014). For example, Bray (2006) showed that the impact of tutoring not only depends on the quality of the tutors and orientation of the tutoring but also on the motivation and aptitudes of the students as well as the structures and contexts of the education systems (Bray, 2006). Bray (2006) also argued that some of the tutoring is designed

to help students keep up with their peers, while other tutoring is designed to help students keep ahead of their peers. In some settings, secondary or tertiary level students that did not receive any training are providing tutorials, while in other settings, they are provided by qualified professionals. The achievements of the students could therefore differ when based on the level of qualification and years of experience of the tutors and could also vary depending on the motivations of the students and their parents. In some cases, students often joined a tuition programme because their peers did so and in other cases, parents saw tutoring as a child-minding service to keep their children gainfully occupied due to the short number of schooling hours (Bray, 2006). Such diversity of factors will therefore lead to wide variations in assessing the impact of tutoring. It is also reasonable to assume that relatively wealthy families will tend to invest in tutoring leading to significant improvements in the achievements of their children.

The heterogeneous effect of tutoring is also stressed by Hof (2014) who finds a non-linear effect where private tutoring becomes ineffective or even detrimental after a certain threshold. Such detrimental effects are also found by Jayachandran (2014) and can be explained by "perverse incentives" to teach badly during school, increasing demand for private tutoring.

This study contributes to the literature by providing empirical evidence of the impact of supplementary education programme on students' academic performance in Bangladesh. It could encourage policy-makers, practitioners and education economists to introduce a low-cost group-based private tutoring programme for children in low-income countries. This paper is structured into several sections: firstly, a discussion on the ASA's education programme followed by a brief description of the growth of primary schools in Bangladesh; secondly, the details of the survey data, methodology, and empirical model are provided, and finally, the results and concluding remarks are presented at the end of the paper.

Primary Education Strengthening Programme (PESP) of ASA

ASA is one of the major microfinance providers attempting to alleviate poverty in poor households in Bangladesh (Shahidur and Khandker, 2005; Rahman and Khan, 2013). In addition to microfinance, ASA have introduced a variety of non-financial programmes such as health, education and sanitation. As mentioned earlier, ASA introduced PESP in 2011 with the aim of helping to reduce the dropout rate from primary schools. As the studies suggested, children that drop out from poor families are where parents are not fully aware of how to

support their children's education due to their own lack of education and ignorance plus financial insolvency. The underlying philosophy of ASA is to assist the underprivileged students of pre-primary, grade-1 and grade-2 with tuition support since many students cannot continue their studies due to lack of assistance and guidance at home. It is reasonable to say that students reaching higher levels of education may serve to help poor families ease themselves out of poverty. In recent years, it has been observed that children from poor families in rural areas of Bangladesh were most likely to enroll in government primary schools. In order to be eligible for admission to the PESP, students had to be enrolled in government schools rather than private schools where children from wealthy families were more likely to be attending so making them ineligible.

Growth of the PESP

In 2011, ASA initiated the PESP programme in 20 districts across the country. ASA has currently established 10,624 education centres in 61 out of a total of 64 districts. The number of participants increased from 10,000 in 2011 to 300,000 in 2016 indicating a growing popularity for the after-school programme. The number of education supervisors has increased 35 times since 2011 and the average number of students per education centre stands at 28 (highest number of students is 35 and the lowest is 10) that has remained constant over the last three years. ASA charges each student a nominal fee of 20 TAKA per month (USD. $0.25). The minimum fee that is charged for after-school studies or private tuition in the regions of Bangladesh is much higher and potentially ranges from 500 TAKA per month to 1,000 TAKA per month (USD $6.25-$12.5). The total cost of the PESP increased from TAKA 4.2 million (USD $. 0.053 million) in 2012 to TAKA 1,353 million (USD $16.9 million) in 2016 (TABLE 1

TABLE 1 ABOUT HERE

Growth of Primary Schools in Bangladesh

Table 2 provides information on the number of primary schools, teachers and student enrolment covering the years 2005 to 2014. The number of government primary schools increased from 37,672 in 2010 to 63,041 in 2014 while schools operated by NGOs increased by over 4,000 in the same period. The number of teachers increased from 162,084 in 2005 to 482,884 in 2014. The total number of children enrolled in primary schools increased by about 3 million over the same period. Interestingly, the number of students per teacher reduced from 100 in 2005 to 40 in 2014 while the dropout rate reduced from 47 per cent to 20.4 per cent during the same period. This is a big achievement towards the sustainable development goal of universal primary education for all but a lot more work is still needed to fully achieve it. According to the Bangladesh Ministry of Primary and Mass Education (MoPME), around 97.9 per cent children are enrolled in primary schools leaving around 2 per cent still to go (MoPME, 2016).

The government of Bangladesh has been providing leadership training, ICT training and other teaching related training to public school teachers under the Primary Education Development Project III (PEDP-III). In order to modernise the classroom experience, the government has provided laptops, internet connection and multimedia projectors to 9,000 primary schools. Through the school-feeding project, the government has made efforts to reduce the dropout rate by providing special biscuits to malnourished students in poverty-stricken areas. It is believed that malnourished students are very likely to underperform in school or be unable to concentrate in lessons during school hours because their parents are unable to provide them with three decent meals a day. The project has involved 15,700 primary schools in 93 sub-districts and served over 3 million students (MoPME, 2016).

TABLE 2 ABOUT HERE

Methods

The Data

This study administers four waves of data collection in 14-districts in Bangladesh conducted between January 2015 and January 2016 by means of a structured questionnaire. The first wave of the survey (baseline survey) was carried out during January and February 2015 and collected

baseline information such as parents' age, education and household income through face-to-face interviews. Following this baseline survey, two midline surveys were conducted in June and September 2015 as well as an end line survey in January 2016. The sole purpose of these follow up surveys was to collect exam results from the schools. Typically, there are three exams that take place per grade in order to monitor students' progress. However, the first two exams do not carry any value towards the final exam's grade. Thus, students are being promoted to the next grade based on the performance of the final exam only. We collected all three exams' results from the schools in order to investigate the impact of the PESP programme on students' achievement. Furthermore, the information on students' grades development allows us to greatly reduce bias in the empirical estimation, as will be explained later.

Note that both the PESP students (treatment group) and the non-PESP students (control group) were attending government primary schools. It is worthwhile to mention that this study collected data from students who were in pre-school, grade 1 and grade 2 only, because the PESP programme only targets students who are enrolled in government primary school in these three grades. With respect to the pre-primary students, this study collected the rate of attendance from the schools because there is no assessment exam in place for this particular grade in primary schools. From Grade 1 and onwards, there are exams that take place three times a year for each of the three subjects (Bengali, English and Mathematics) that are taught at school. Therefore, we collected the average scores as well as the subject-wise grades for both the treatment and control group students from the schools.

Sampling Design

A three-stage sampling design was used to collect the data for this study. In the first stage, of the 64 districts in Bangladesh, 14 were selected based on poverty indicators such as the literacy rate and poverty head count ratio. This study mostly selected the districts where literacy rates were low, and the ratio of poverty was high. For example, we selected the districts from far north such as Bagura and south such as Khulna and Jessore that are known as poverty-stricken regions. In addition, Gopalganj, Shariatpur, Narail, Sathkira, Bhola, Kishoreganj, Shirajganj, Magura, Bagerhat, Mymensingh and Habiganj districts were also selected.

In the second stage, the PESP program was assigned to 3 schools per district, except for Habiganj where 6 schools were chosen. In all 45 PESP centres, the survey team had a meeting with the school teachers to explain the purpose of the study and seek their cooperation. Then, all the District Managers, Branch Managers, tutors and education supervisors were notified about the study and trained on how to conduct the baseline survey interview and subsequently collect the exam results.

In the third stage, students were assigned to treatment and control groups with 30 students to be tracked per each education centre. It was decided that 20 students would become part of the treatment by a first-come-first-served system while 10 other students were chosen randomly for the control group. Ultimately, 900 PESP students from the selected PESP education centres were involved and 453 randomly selected non-PESP students.

Empirical Model

We were interested to see whether PESP students improved their grades over time compared to the non-PESP students. The following regression formulation of a simple difference-in-difference model was used to try and empirically determine the effect of a treatment on an outcome variable *Y* for an individual *i* at time *t*.

$$Y_{it} = \alpha\, Treat_i + \gamma\, Time_t + \delta\, (Treat_i * Time_t)_{it} + \varepsilon_{it} \qquad (1)$$

In the equation above, $Treat_i$ controls for time-invariant differences between individuals while $Time_t$ controls for common trends amongst individuals affecting Y_{it}. The main variable of interest identifies the additive effect of the treatment and can be constructed with an interaction term between $Treat_i$ and $Time_t$. This set-up isolates the effect of the treatment under δ_{it} while controlling for pre-treatment differences between the control ($Treat_i = 0$) and treatment ($Treat_i = 1$) group as well as common trends affecting both groups over time.

Unfortunately, equation (1) cannot be directly applied to the data at hand as the PESP-treatment variable is time invariant. That is, students were selected into PESP-treatment and non-PESP-control groups in January 2015 while their first grade was received in May 2015. Therefore, during all observed grades, the treatment group already received the treatment and

controlling for differences between the control and treatment effect with $Treat_i$ would absorb all the differences between them, including the actual PESP-treatment effect of interest.

We therefore introduced time variation into the treatment effect by assuming that at the time of the first exam (*t=1*), the effect of the PESP-treatment effect is zero. In other words, the first exam is used as the baseline point which allows controlling for differences between the two groups, assuming they are not due to the first few months of the PESP. While this will likely lead to an underestimation of the PESP effect, it allowed for application of equation (1). In line with the explanation above, $Treat_i$ controls for time invariant differences between PESP and non-PESP students, while $time_t$ controls for common trends, such as the fact that the final exam counts crucially for students' progression to the next year. Finally, besides such unobserved differences across observations and across time, the baseline information collected at the outset of the survey is used to control a range of time-invariant observed differences between students. Based on the literature review discussed at the beginning of this paper, control is provided by students' school attendance in the respective year 2015, their age, gender, whether they received family assistance in doing their homework, the age and education level of the mother, household size, whether their parents are involved in microfinance and whether their family lives below the poverty line of $1.51 income per capita per day. Including those variables in the regression function leads to:

$$\begin{aligned} Grade_{it} = {} & \beta_1 Treat_i + \beta_2 Time_t + \beta_3 (Treat_i * Time_t)_{it} \\ & + \beta_4 Attendance_i + \beta_5 Age_i + \beta_6 Gender_i + \beta_7 hw\_help_i \\ & + \beta_8 Mother\_age_i + \beta_9 Mother\_edu_i + \beta_{10} HH\_size_i \\ & + \beta_{11} MF_i + \beta_{12} Poor_i + \varepsilon_{it} \end{aligned} \quad (2)$$

Equation (2) will be used first to estimate the effect of the PESP treatment. As a robustness check, a second function that uses stricter controls will also be used. Namely, besides controlling for unobserved differences between PESP and non-PESP students at the start of the programme with $Treat_i$,unobserved differences between individual students are controlled for by including student fixed effects, α_i.

$$Grade_{it} = \alpha_i + \gamma Time_t + \delta (Treat_i * Time_t)_{it} + \varepsilon_{it} \quad (3)$$

While this adds robustness to the results, it loses information on all time invariant explanatory variables, such as those from the baseline data collection, since they will be absorbed by the individual fixed effects. Therefore, the results of both equation (2), as well as equation (3) will

be reported. Finally, following Bertrand et al. (2004), standard errors were clustered at the individual level to control for serial correlation in the treatment effect.

Description of the Dependent and Independent Variables

Table 3 shows a summary of the main dependent and independent variables used in the empirical analysis. This section will discuss summary statistics for those variables and also discuss any significant differences, based on a two-tailed t-test, between PESP and non-PESP students.

The average grade for all three courses across the three time periods is higher for the treatment group (67.0) than the control group (59.0) and the mean difference (mean equally t-test) is statistically significant at 1 per cent level. Similarly, the average grades achieved in the three subjects are higher for the treatment group and the mean differences are statistically significant at 1 per cent level (Table 3).

Interestingly, Figure 1 shows the development of these average grades over time, where period 1 represents the score of the first exam that took place in May 2015, period 2 the score of the exam that took place in September 2015 and period 3 that shows the final exam that took place in December 2015. It shows that for all the subjects, students have improved their scores over time. Especially period 3 shows significant increases in the score, particularly in Bengali and mathematics. This can possibly be explained by the fact that the final exam counts crucially for students' progression to the next year. As explained in the previous section, in order to apply a difference-in-difference estimation, it was assumed that the PESP treatment effect starts after the first exam.

Figure 1 also shows that PESP students consistently have a higher score than non-PESP students. With the assumption that the PESP treatment kicks in after the first exam period, we were interested to see whether the difference between PESP and non-PESP students in their grades in exam period 2 and 3 and exam period 1 was significant. The graphs in Figure 1 suggests that this might be the case for mathematics, but whether that is the case will depend on equations (2) and (3), whose output we will discuss in the next section.

FIGURE 1 ABOUT HERE

Students' average age was 7 years old and 52% of them were female. Also, on average, the mothers of the students were 30 years old and had themselves received 4.7 years of schooling. Households consisted of an average 5 household members with around three-quarters of students receiving help with their homework either from their parents or siblings. Although the average number of students receiving such help was higher for the control group, the difference was not statistically significant.

School attendance was higher for the PESP students (89.0%) than for the non-PESP students (85.9%). This difference is statistically significant on the basis of a t-test. Similarly, 58% of the students had parents that were involved in various micro-credit programmes, such as ASA, Grameen, BRAC and others. It was therefore important to control for these variables in the empirical exercise.

With respect to the calculation of a household's poverty status, this study adopted the Asian Development Bank poverty line i.e., $1.51 per day per person income (ADB, 2014). The students were considered to be poor where the household per capita income was less than USD $1.51 a day. This study discovered that 86% of students were in the treatment group with 85% of students in the control group living under the poverty line but the difference was not statistically significant.

TABLE 3 ABOUT HERE

Empirical Results

The empirical output of equation (2) is shown in Table 4. Starting with the main variables of interest, we see significant and positive correlations of the variables $Treat_{i=yes}$, $Time_t$, and the interaction term. The coefficient on $Treat_{i=yes}$ indicates that, at the start of the program, PESP students already achieved about 6 percentage points higher grades than non-PESP students, something we saw already in Figure 1, and that this difference is statistically significant. Furthermore, the significantly positive coefficient for $Time_{t=3}$ indicates that students achieved significantly higher grades in the final exam, independent of whether these students were included in the programme or not. This can most likely be explained by the fact that the final exam is the crucial one for students' progression to the next year and is empirically controlled for with the time fixed effects. The main variable of interest is the interaction

between the treatment effect and the time variable at *t=3,* i.e. $Treat_{i=yes} * Time_{t=3}$. This can be interpreted as the difference in grades between the control and treatment group. PESP students improved their grades by almost 3 percentage points *more* than non-PESP students that improved their grades between the first and final exam. This effect is lowest for English (+2.3 percentage points) and largest for mathematics (+3.4 percentage points) and statistically significantly positive for all courses indicating that the PESP had a significantly positive effect on students' performances. Furthermore, due to the fact that we took period 1 as the baseline case, despite the fact that the PESP already started 3 months before that, these results are likely to be a lower bound.

Regarding the control variables, as expected, there were significantly positive correlations for attendance at school and the mother's education levels (Kulpoo, 1998; Dang, 2007; Zhao and Glewwe, 2010). On the other hand, students from poor households, i.e. whose per capita income was less than $1.51 a day, performed significantly worse than non-poor students. This was particularly true for mathematics and less for Bengali and English. This could be explained by the lack of motivation, inadequate teaching and learning materials and poor attitudes displayed by teachers and students (Gegbe et al., 2015). Similarly, student ages had a negative effect on their scores in mathematics.

Surprisingly, there was no significant effect from students' gender, their household sizes, whether their family was engaged in microfinance or whether they received help in doing their homework.

TABLE 4 ABOUT HERE

As a robustness check, individual student-level fixed effects were included, as per equation (3). This stricter control can be observed, for example, from the R-squared in Table 5. Whereas Table 4 recorded R-squares of roughly 10%, Table 5 records an R-squared of 70-80 %. More interestingly, the main variables of interest, that is, the treatment effect measured at the final exam is still significantly positive for all the different courses. These results reaffirm the hypothesis that the PESP significantly improves students' grades.

TABLE 5 ABOUT HERE

Conclusion

This study investigated the impact of the PESP on the academic performance of students by measuring their grades in exams. The study collected data from 900 students who attended the programme and 453 students who did not attend the programme with PESP students and their peers assessed by the same class teacher at school. The control group of students was randomly selected from school lists and both the treatment and control groups were followed up in 2015.

The results revealed that students attending PESP achieved higher grades in the three subjects (Bengali, English and Mathematics) taught at school compared to their peers that did not attend PESP. More importantly, the results also showed that the PESP students increased their performance over time more so than the non-PESP students meaning that the difference-in-difference for all 3 courses was statistically significant. After specifically controlling for various other observed and unobserved variables that can affect students' grades, students attending PESP improved their grades in Bengali, English and mathematics by 2.7, 2.3, and 3.2 percentage points respectively and were higher than the non PESP students. It can therefore be concluded that the main objective of PESP to improve the school performance of students was achieved. The overall findings of the study reinforce the idea that ASA should continue to deliver its education services to children from poor backgrounds to further enable the general betterment of underprivileged people. This kind of education intervention could be replicated in other low-income countries where the rate of dropout is high or where parents are unable to hire private tutors or provide educational support to their children.

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Compliance with Ethical Standards

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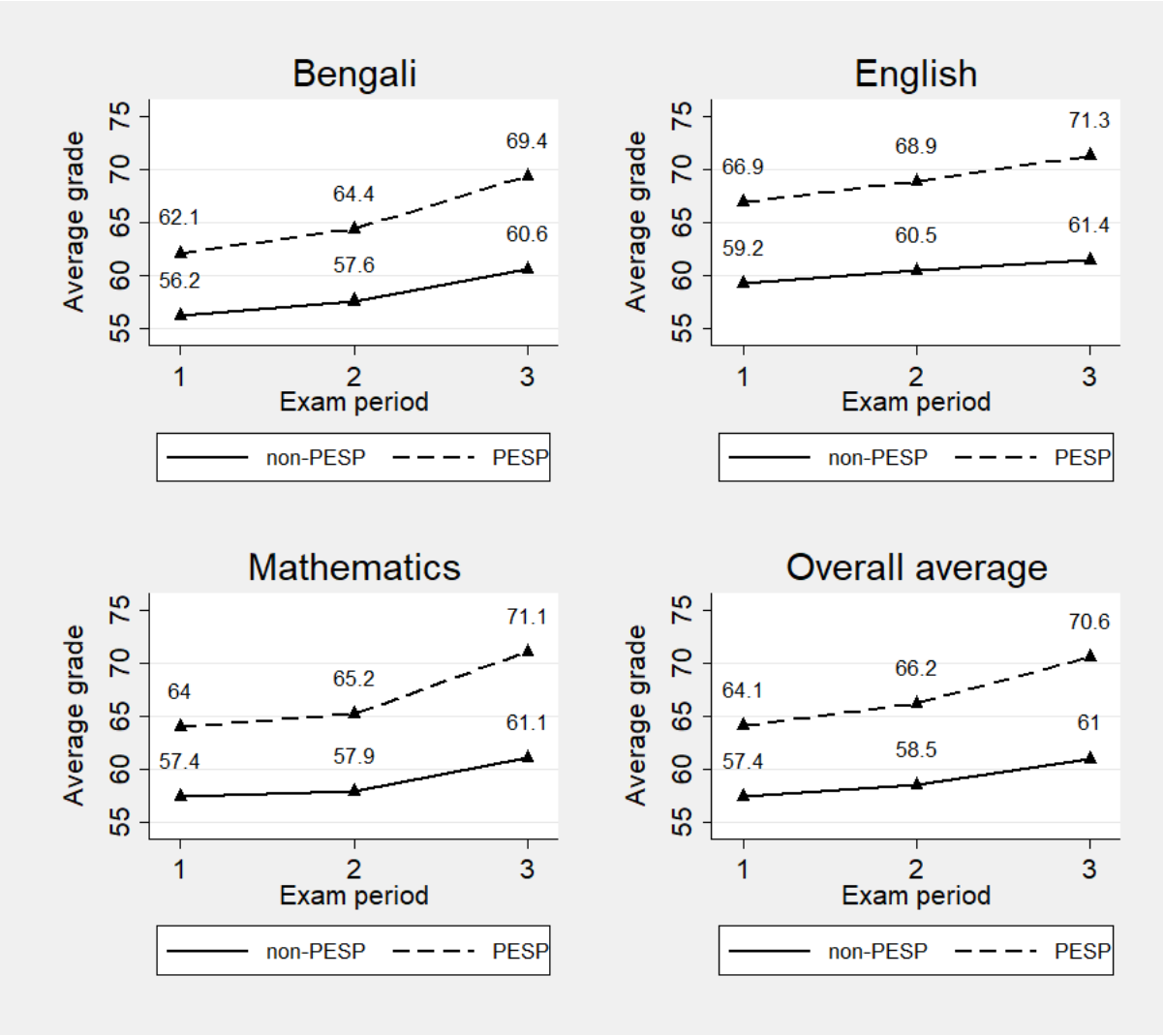

Fig. 1 The development of average exam scores for PESP and non-PESP students

Table 1 Growth of the PESP since its inception in 2011

	2011	2012	2013	2014	2015	2016
Total number of students	8,358	23,621	50,715	119,206	201,151	299,043
Boys		11,349	24,270	57,048	95,425	140,782
Girls		12,272	26,445	62,158	105,726	158,261
Education centres	295	893	1905	4262	7273	10,624
Tutors	295	893	1905	4262	7273	10,624
Students per centre / Tutor	28	26	27	28	28	28
Education supervisors	20	57	126	280	479	692
District	20	57	58	58	61	61
Service charge (Taka)/ month	20	20	20	20	20	20
Cost Per Student/month		15	15	25	30	38
Total yearly Cost (Taka)		4,235,000	9,003,824	36,239,320	73,230,761	135,329,625

(Source: ASA Head Office, 2016; USD. $1 = 80 TAKA)

Table 2 The growth of primary schools in Bangladesh

	2005	2010	2014
No. of Govt. Primary Schools	37,672	37,672	63,041
Others	42,729	41,013	45,496
Total Primary School	80,401	78,685	108,537
No. of Teachers	162,084	395,281	482,884
No. of female students	8,134,437	8,563,133	9,913,884
Number of Male students	8,091,221	8,394,731	9,639,095
Total No. of Students Enrolled	16,225,658	16,957,864	19,552,979
No. of Students Per Teacher	100	43	40
Drop-out Rate	47.2	39.8	20.4

Source: MoPME, 2016

Table 3 Description of the dependent and independent variables and mean equality t-test

	Full sample	PESP-students only	Non PESP-students only	T-test Equality of means
Bengali average grade	63.0	65.4	58.2	7.2***
English average grade	66.2	69.1	60.3	8.8***
Mathematics average grade	64.3	66.9	58.8	8.1***
Total (i.e. of Bengali, English and Mathematics) average grade	64.4	67.0	59.0	8.0***
	Control variables			
School attendance (%)	87.9	89.0	85.9	3.1***
Student age (years)	7.0	7.0	6.9	0.1
Gender (% female)	52.2	52.3	51.9	NA
Family support in doing homework (%)	75.8	75.2	77.0	1.8
Mother's age (years)	30.3	30.2	30.5	0.3
Mother's education (years)	4.7	4.7	4.9	0.2**
Household size (family members)	5.0	5.0	4.9	0.1**
Involvement in microfinance (%)	57.9	59.6	54.4	5.2***
Poor (%)	85.4	85.7	84.7	1.0

The output of the t-test is based on a two tailed t-test with significance levels at *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Poor = the respondents whose household's per person income is less than $1.51 per day (The Asian Development Bank's Poverty Line).

Table 4 Empirical output from equation (2)

VARIABLES	(1) Bengali	(2) English	(3) Mathematics	(4) Average
$Treat_{i=yes}$	5.159***	6.703***	5.804***	5.792***
	(1.308)	(1.318)	(1.248)	(1.161)
$Time_{t=2}$	1.373	1.206	0.421	0.997
	(0.837)	(0.964)	(0.929)	(0.676)
$Time_{t=3}$	4.440***	2.143**	3.595***	3.513***
	(0.935)	(1.044)	(1.043)	(0.803)
$Treat_{i=yes} * Time_{t=2}$ (Treatment effect at t=2)	0.863	0.768	0.719	1.015
	(1.004)	(1.167)	(1.118)	(0.809)
$Treat_{i=yes} * Time_{t=3}$ (Treatment effect at t=3)	2.845**	2.274*	3.407***	2.905***
	(1.144)	(1.298)	(1.268)	(0.997)
Attendance at schools as on December 31, 2015	0.333***	0.377***	0.353***	0.354***
	(0.0469)	(0.0440)	(0.0426)	(0.0406)
Student's Age	-0.768	-0.388	-1.093**	-0.788*
	(0.508)	(0.484)	(0.493)	(0.468)
Gender (Female)	1.082	0.494	0.169	0.458
	(1.006)	(0.947)	(0.941)	(0.905)
Family assists with homework (Yes)	1.231	-0.725	1.141	0.569
	(1.256)	(1.203)	(1.184)	(1.143)
Mother age	-0.113	-0.153*	-0.115	-0.131
	(0.0877)	(0.0846)	(0.0851)	(0.0805)
Mother education	0.473***	0.548***	0.517***	0.495***
	(0.159)	(0.144)	(0.150)	(0.141)
HH size	0.165	0.243	0.445	0.234
	(0.418)	(0.391)	(0.400)	(0.381)
Are the parents involved in micro-credit? = 1, Yes	1.034	1.207	1.405	1.314
	(1.035)	(0.977)	(0.974)	(0.937)
Below poverty line = 1, Yes	-2.957*	-2.162	-4.759***	-3.249**
	(1.561)	(1.508)	(1.445)	(1.415)
Constant	33.54***	31.63***	35.67***	34.17***
	(6.382)	(6.076)	(6.047)	(5.724)
Observations	3,678	3,674	3,676	3,691
R-squared	0.085	0.089	0.104	0.110

Robust standard errors in parentheses, clustered by individual student

*** p<0.01, ** p<0.05, * p<0.1

Table 5 Empirical output from equation (3)

VARIABLES	(1) Bengali	(2) English	(3) mathematics	(4) average
$Time_{t=2}$	1.280	1.005	-0.00674	0.644
	(0.804)	(0.949)	(0.909)	(0.664)
$Time_{t=3}$	4.634***	2.306**	3.914***	3.621***
	(0.913)	(1.042)	(1.047)	(0.805)
$Treat_{i=1} * time_{t=2}$ (Treatment effect at t=2)	1.109	1.157	1.419	1.480*
	(0.968)	(1.151)	(1.094)	(0.793)
$Treat_{i=1} * time_{t=3}$ (Treatment effect at t=3)	2.685**	2.324*	3.294***	2.863***
	(1.119)	(1.289)	(1.267)	(0.988)
Observations	3,598	3,590	3,596	3,611
R-squared	0.782	0.709	0.725	0.803

Robust standard errors in parentheses, clustered by individual students

*** p<0.01, ** p<0.05, * p<0.1

Regression results include individual student fixed effects