

# New Evidence on Outcomes of Primary Education Stipend Programme in Bangladesh

MOHAMMAD YUNUS\*  
SIBAN SHAHANA\*\*

Primary Education Stipend Project, a conditional cash transfer programme, has been in operations since 2003 to increase attendance rate and stem the dropout rate of children from poor and vulnerable households in the rural areas of Bangladesh. This paper evaluates the behavioural impact of conditionality and gender targeting of transfer of fund on the direct and latent outcomes using propensity score estimation method based on a sample of 2,500 households with primary school going children from 125 primary education institutions. Results reveal that the transfer entails an income effect on the share of educational expenses and channeling the stipend through mothers of the students does not directly empower them as women but does empower them as mothers. It appears that two different but mutually reinforcing stimuli—income effect and women educational empowerment effect—lead to favourable educational outcomes of the recipient students.

**Keywords:** Conditional Cash Transfer, Primary Education, Educational Outcome, Bangladesh

**JEL Classification:** I38, O15, H53

## I. INTRODUCTION

Bangladesh is one of the pioneer countries to implement conditional cash transfer (CCT) programmes for primary education through Primary Education Stipend Project (PESP) preceded by Food-for-Education (FFE), a conditional transfer in kind introduced in 1997. Only two such programmes existed at that

---

\*Senior Research Fellow, Bangladesh Institute of Development Studies (BIDS), Dhaka, Bangladesh.

\*\*Research Associate, Bangladesh Institute of Development Studies (BIDS), Dhaka, Bangladesh.

The authors gratefully acknowledge valuable comments from an anonymous referee which helped improve the quality of the paper. *All remaining errors and omissions are the sole responsibility of the authors.* Finally, the views expressed in this *paper* are those of the *authors* and do not necessarily reflect the views of the institution to which the authors are affiliated.

time around the world – *Progresa* (rebranded as *Oportunidades* in 2002 and then *Prospera* in 2004) in Mexico and *Bolsa Escola* (rebranded as *Bolsa Familia* in 2003 after amalgamating with two other similar programmes) in Brazil. These programmes are continually evaluated; while some put more emphasis on educational outcomes such as enrolment, dropout rates, etc., others focused on outcomes like nutrition, or household consumption and expenditures (Rawlings and Rubio 2005, Attanasio *et al.* 2005, Freije *et al.* 2006, Attanasio *et al.* 2010 and the references cited therein). A qualitative review of CCT evaluation studies concluded that, on the whole, these programmes have positive effects on schooling outcomes such as enrolment, attendance, dropout rates, etc. (see Garcia and Saavedra 2007 and the references cited therein). However, these assessments are inadequate as low completion rate of grade makes enrolment success murky. Instead, increasing the grade completion rate coupled with completing the full cycle of primary education should be a more effective policy goal. Despite niceties of the results, these studies ignore roundabout impacts of women empowerment on the outcomes.

There are mixed evidences on the outcomes of the PESP and its predecessor, the FFE. While there were concerns about higher costs, poor targeting, geographic selectivity, together with high level of leakages in the FFE programme (Ahmed 2005, Ahmed and Babu 2007), the PESP intervention has been lauded as it achieved many of its objectives. However, the positive impacts should be viewed within the perspective that there is potential for not selecting the truly needy or the poorest pupils (Tietjen 2003). Baulch (2011) reported that PESP has limited impact on outcomes at the household level such as school enrolments, household expenditures, calorie and protein intakes, etc. Even though grade progression came out to be statistically significant, it was lower among the PESP students than the non-PESP ones. Thus, he concluded that the medium-term impacts were remarkably small for a programme of its size and expanse. However, Tietjen (2003), Ahmed (2005), and Baulch (2011) are variance of the general conclusions that, on the whole, the CCT/FFE programmes in Bangladesh have positive effects on schooling outcomes such as enrolment, attendance, dropout, etc. While Baulch (2011) reports that errors of inclusion were greater than that of exclusion in the PESP programme, World Bank estimates, quoted in DPE, PPRC and UNICEF (2013), report inclusion error of 6 per cent (the proportion of ineligible students in the total number of receiving students).

While both the studies are concordant about the outcomes despite their disagreement about the inclusion errors, they ignore if and how the women empowerment channel affects student outcomes. Insofar as the PESP fund is channeled through mothers of the students, one cannot ignore that the cash transfer is likely to have impact on women empowerment, which, in turn, is likely to affect the student outcomes.<sup>1</sup> Further, achievement in student outcomes are usually affected by duration of study after school hours, additional expenditures in tuition, educational paraphernalia, etc. These aspects are also missing in the above evaluations. Besides, these studies are either based on small sample size compared to the programme coverage, or mostly rely on descriptive analysis and checks on limited aspects of the overall programme.

Following standard literature on CCT, one can discern two design features embedded in the PESP. The motivation for the *first design feature*—transfer of fund conditioned on beneficiary “co-responsibilities” such as school attendance and grade progression—is to ensure that poor households have the money to invest in their children’s human capital development lest households should otherwise under-invest, or demand less of education than is socially desirable. The motivation for the *second design feature*—the cash benefit directly delivered to mother of the child—is the presumption that money in the hands of a responsible female household member is more likely to be spent in a “family-friendly” manner (Handa *et al.* 2009).

The existing literature does not address the pathways to student performance. Parker, Rubalcava and Teruel (2007), with intertemporal utility maximisation, show that school subsidy such as the PESP has both substitution and income effects. While substitution effect decreases the amount of time spent in leisure and working at home or in the market as a child and increases the amount of time spent in school, income effect works in the opposite direction making the net effect on time spent working and hence time spent in school ambiguous. However, if substitution effect on leisure dominates income effect, time spent in school will go up and consequently time spent working will go down. Given the heterogeneity of preferences and constraints, the extent to which the programme has a significant impact on the human capital and work of children can only be determined through empirical analysis. This paper fills in the gap by examining

---

<sup>1</sup>Unlike the gender-targeted female secondary stipend programme (FSSP), the PESP is, in principle, gender neutral: both boys and girls from poor and vulnerable households are equally eligible to receive the stipend. Therefore, gender differentiated impacts are not assessed for the PESP. Interested readers are referred to Asadullah and Chowdhury (2009) for a detailed analysis of gender differentiated impact of FSSP.

not only the direct outcomes such as school attendance, grades in final examinations, study hours out of school arising out of income and substitution effects à la Parker, Rubalcava and Teruel (2007) and but also other latent outcomes and channels, such as women empowerment, consumption expenditure, education expenditure, etc. that infringe on the direct outcomes à la Handa *et al.* (2009) based on a unique and nationally representative primary data at a gender disaggregate level covering II-V grade students of major types of primary education institutions.<sup>2</sup> The empirical strategy uses the propensity score matching method to compare the outcomes. One expects that if programme conditions are binding, and transfer income is used to support investment in human capital, higher share of income will be spent on education, which, in turn, is likely to enhance educational attainments. Whether participation in the programme affects women's decision-making within the household, and how differences in women's decision-making authority affect the marginal propensity to spend on education are also assessed. If channeling fund through women enhances their bargaining power, one expects their decision-making authority to increase, which, in turn, is likely to increase the share of expenditure on child development.

## II. PESP INTERVENTION

Bangladesh has a five-year primary education system, which is compulsory by law and free of costs. In terms of quantity, the country has made remarkable progress in primary education in the last decade. According to the latest statistics, the net enrolment rate has reached 98 per cent, gender parity in net enrolment has been achieved, and primary education cycle completion rate has risen to 81 per cent in 2018 (DPE 2018). However, the scenario was not so bright even in the 1990s. Even after enactment of the *Primary Education (Compulsory) Act, 1990*, the expected results were not achieved: net enrolment rate and cycle completion rate hovered around 61 per cent and 43 per cent respectively in 1991. Many children continued to remain out of primary schooling system. Besides, dropout and cycle completion rates remained issues of concern. This had been a common problem owing to, inter alia, high incidence of poverty and staggered benefits of education. Therefore, the government started to compensate financially vulnerable parents for sending their children to primary school since 1993. Initially, it was a conditional transfer in-kind known as the FFE that gradually turned into a CCT programme since 1997 and is currently referred to as the PESP. Even though the amount of transfer was small, it purports to enhance human capital and hence forestall intergenerational transmission of poverty.

---

<sup>2</sup>Government primary school and ebtedayee madrasah are the two major types of primary education institutions in Bangladesh.

Selected students from poor and vulnerable parents (day labourers, female-headed households, fishers, potters, weavers, blacksmiths, cobblers, etc.) and physically handicapped students as well as those from poor tribal households enrolled in primary education institutions except those under municipalities and city corporations are eligible for conditional cash assistance under the PESP. Since 2010, PESP's targeting policy was changed from uniform coverage of 40 per cent to geographic targeting, wherein poorer areas are given disproportionately higher coverage up to a limit of 90 per cent of poor students. This policy change might have caused exclusion and inclusion errors to decline over time (DPE, PPRC and UNICEF 2013). Under the PESP programme, selected household with one qualifying student received Tk.100 per month and those with more than one qualifying student received Tk.125 per month for all twelve months of the school year. The qualification criteria require beneficiary student(s) to attend at least 85 per cent of school days and secure at least 33 per cent average percentage score in the final examination to progress grade and be considered for continuation of the stipend.

The PESP intervention sought to increase (i) enrolment rate, (ii) attendance rate, (iii) cycle completion rate, and hence (iv) to reduce dropout rate among primary school-age children from poor and vulnerable households. An indirect but not less important target was women empowerment by channeling the cash benefit through mother of the student as the authorised recipient. Although the fund was to be channeled through bank to motivate financial inclusion, this is yet to happen. As a result, funds were disbursed quarterly at a convenient location within the respective union parishad.<sup>3</sup>

### III. DATA AND METHODOLOGY

#### 3.1 Sampling and Data

The primary completion rate was 50 per cent in 2008, which increased to more than 79 per cent in 2014 (DPE 2014). As the second phase of PESP started its journey since 2008, it can be safely assumed that the primary completion rate would have hovered around the 2008 level in the absence of continuous intervention. By the same token it can be extended that the graduation of cycle completion rate to 79 per cent was largely due to the intervention. With these historical estimates one can safely set  $p_1 = 0.50$  and  $p_2 = 0.79$ . At 5 per cent error probability level and 80 per cent power of test, the estimated sample size

---

<sup>3</sup>From June 2017, the government decided to transfer the stipends directly to the mobile banking accounts of their mothers through the G2P (Govt. to Person) mobile financial service programme.

becomes  $41 \approx 50$  (with non-response adjustment) for each operational unit, which is a district in the present case.

The two main data collection instruments used in structured interviews include: (i) household level questionnaire and (ii) school level questionnaire. The household level questionnaire was administered both at school and at home of the student: number of days student attended school and average scores obtained in the final examination were collected from the school registers; the other sets of information were collected from the student her/himself and an adult member at home. The school level questionnaire was administered with head teacher of the school/madrasah.

The survey was based on a multi-stage random sampling method. The survey was conducted in 25 districts across 6 administrative divisions of the country. From each district one upazila (sub-district) was chosen at random. In each upazila, 5 qualifying schools/madrasahs were randomly selected. From each school/madrasah 10 students (3 from grade II, 3 from grade III, 2 from grade IV and 2 from grade V) were randomly selected from the roll call register as PESP group. Equal numbers of students were randomly selected for the non-PESP group who were otherwise similar to the recipient students in their respective grades. Thus, the aggregate sample turned out at 2,500 households and 125 schools.

The impact was assessed at the school level, household level, and student level outcomes. The school level outcomes compare attendance, promotion, repetition, and dropout rates of PESP and non-PESP students across grades. The household level outcomes include self-assessment of food security and poverty (to gauge targeting), and total and specific household expenditures. Besides, the impact was assessed on several proxy indicators of women empowerment with the specific focus on “women educational empowerment” as the fund is usually channeled through mothers of the students. Finally, the student level outcomes include number of days the student attended school, number of hours students studied after school, and the percentage of scores obtained in the final examination.

### **3.2 Descriptive Statistics of the Data**

#### ***School Level Statistics***

School level data were collected to assess attendance rates, grade progression rates, repetition rates, and dropout rates for PESP vis-à-vis non-PESP students. The estimates presented in Table I reveal that PESP has played an important role in improving key indicators of the participants. The consequent attendance rates across grades imply that average absenteeism in the year 2014 was less than 10 per cent for the PESP recipients compared with close to 30 per cent for the non-

PESP students. Higher promotion rates<sup>4</sup> for the PESP students than the non-PESP students may suggest that financial incentive plays a crucial role in improving student education performances in terms of grade progression. Our survey results show that the repetition rates<sup>5</sup> are less than 2 per cent for PESP students across five grades in contrast to non-PESP students where the rate is not less than 10 per cent at any grade that tend to increase in the higher grades. Finally, dropout rates<sup>6</sup> are significantly lower for the PESP students compared to the non-PESP students.

TABLE I  
PROMOTION RATES, REPETITION RATES AND DROPOUT RATES IN 2014

Grades	PESP students	Difference between PESP and non-PESP students (S.E.)
Attendance rate in		
I	90.846	22.841*** (2.971)
II	90.875	23.137*** (2.886)
III	90.986	20.834*** (2.748)
IV	90.923	21.509*** (2.905)
V	90.896	17.345*** (2.763)
Promotion rate from		
I to II	85.690	23.591*** (3.622)
II to III	84.188	21.298*** (3.709)
III to IV	79.946	21.204*** (3.968)
IV to V	81.371	21.426*** (3.979)
Repetition rate in		
In II	0.319	-10.214*** (2.004)
In III	2.045	-8.587*** (1.802)
In IV	1.985	-13.189*** (2.412)
In V	1.736	-11.081*** (2.343)
Dropout rate from		
I to II	13.878	-24.232*** (3.586)
II to III	22.264	-20.619*** (5.192)
III to IV	21.814	-19.934*** (5.072)
IV to V	26.625	-15.531*** (5.128)

Source: BIDS Survey, 2015.

Notes: 1. Figures in the parentheses are robust standard errors. 2. Figures with \*\*\* are significant at 1% probability levels.

<sup>4</sup>Promotion rate in a school year (t) is the number of new enrolments of a cohort in the current grade to the number of pupils from the same cohort enrolled in the preceding grade in the previous school year (t-1).

<sup>5</sup>Repetition rate in a school year (t) is the number of repeaters of a cohort in the current grade to the number of pupils from the same cohort enrolled in the same grade in the previous school year (t-1).

<sup>6</sup>Dropout rate in a school year (t) is the proportion of pupils from a cohort enrolled in a given grade that is no longer enrolled in the following school year (t+1).

Thus, the DPE (2014) conclusion that students' attendance rate is gradually increasing has much to do with the positive impacts of the PESP. Since the national repetition rate was 6.4 per cent in 2014, it can be inferred that the financial incentive has positively contributed to low repetition rate and therefore reduced the time of cycle completion. Given that the national dropout rate was 21 per cent in 2014, the lower dropout rates of the PESP students are encouraging. On the contrary, half of the non-PESP students were found to be dropped out of the system. This underscores the importance of the financial incentive programme to improve the educational performance indicators of students.

#### ***Student and Household Level Statistics***

Since the PESP and non-PESP students are sampled from the same educational institutions, the observed differences in favour of the former are likely to be driven either by student attributes and household level factors or mistargeting in terms of poverty and vulnerability. To that end, Table II presents demographic and socio-economic characteristics of households of the PESP and non-PESP students. The average PESP and non-PESP households are not very similar in terms of broad demographic and socio-economic characteristics. About 36 per cent of fathers of the PESP students do not appear to fulfil the occupational criterion set in the design of the programme compared to 43 per cent in the non-PESP households. However, only a paltry 4 per cent of the mothers violate the occupational criterion in the selection of PESP beneficiaries. There is, thus, 36 per cent probability of inclusion error of non-eligible students as PESP beneficiaries if selection is exclusively done by invoking occupational criterion of the fathers. Due to change in PESP's policy from uniform coverage of 40 per cent to geographic targeting, poorer areas are given disproportionately higher advantage up to a limit of 90 per cent of poor students. As a result, exclusion error, even if it were present, would be trivial. Both the parents in the PESP and non-PESP households have about 4 years of schooling with little difference.

It may be noted that average household size of the PESP students is significantly lower than that of the non-PESP students. Similar observations can be made about the demographic, and economic dependency rates. It is not surprising that the demographic dependency ratios in the PESP and non-PESP households are higher than 78 per cent found in the rural areas of the country. Similarly, the economic dependency ratios of the households are higher than 67 per cent found in the country.

TABLE II  
STUDENT AND HOUSEHOLD CHARACTERISTICS

Indicators	PESP household/student	Difference between PESP and non-PESP
Student in the grade	3.289	0.005 (0.898)
Gender of the student (male=1)	0.505	0.000 (0.019)
Religion of the student (non-Muslim=1)	0.121	-0.025** (0.012)
Father's occupation (non-poor=1)	0.364	-0.070*** (0.019)
Mother's occupation (non-poor=1)	0.038	-0.011 (0.008)
Father's years of schooling	3.978	-0.663*** (0.155)
Mother's years of schooling	4.422	-0.214* (0.132)
Household size	4.641	-0.134** (0.053)
Demographic dependency rate (%)	97.036	-6.248*** (2.152)
Economic dependency rate (%)	132.628	-5.386 (3.478)
House quality index	1.565	-0.161*** (0.030)
Household has sanitary latrine (=1)	0.096	-0.116 *** (0.014)
Household has access to electricity (=1)	0.614	-0.020 (0.019)
Total quantity of land (decimal)	18.611	-19.962*** (2.728)
Total household asset (Tk.)	94,415.440	-66367.26*** (8068.723)
Total household debt (Tk.)	31,141.450	-10786.98*** (3063.014)
Annual household income (Tk.)	100,193.700	-32,776.98*** (3765.96)

**Source:** BIDS Survey, 2015.

**Notes:** 1. Non-poor-occupational groups of father and mother consist of employment other than wage employment in farm and non-farm sectors, contractual employment in farm and non-farm sectors, domestic help, disable, old-age and unemployed. 2. Figures in the parentheses are robust standard errors. 3. Figures with \*\*\*, \*\*, and \* are significant at 1%, 5%, and 10% probability levels respectively.

The structure of house, wherein the household lives, is an important indicator of poverty status. As houses are difficult to compare owing to three dimensions, a common index is warranted for comparison. Accordingly, a house quality is defined as a composite index where wall/roof/floor is 1 when materials used for wall or floor or roof are brick or tally or tin and 0 otherwise. Consequently, the aggregate index ranges between 0 and 3. It may be noted that house quality index is significantly lower for the PESP households. Similarly, the PESP households have significantly lower access to sanitary latrine. The PESP households also lag behind the non-PESP households in most indicators of the economic well-being, such as land, non-land assets and financial assets. So, it is not surprising that total annual income of the PESP households is significantly lower than that of the non-PESP households. This suggests that, in spite of the careful selection of non-PESP households aimed at minimising programme placement bias, the two groups are not directly comparable. This justifies the use of propensity score matching estimators.

### 3.3 Methodology

Insofar as this paper evaluates impact using observational data for PESP and non-PESP students, selection bias is a major concern. There are two sources of selection bias. The *first* source is self-selection bias, which occurs when students with favourable characteristics self-select themselves into the programme. This was not an issue in this study because neither the individual students nor their families but the project implementers decide whom to select for the stipend. The *second* source of selection bias is programme placement. This was an issue in this study despite the programme is ubiquitous in the rural areas of the country. Students selected for the stipend are, therefore, likely to have characteristics that could allow them to be more successful in poorer areas than the average students. It would, therefore, be incorrect to directly compare PESP recipients to a randomly selected group of non-recipients. The effect of programme placement bias was minimised through use of propensity score matching (PSM) estimators. The PSM constructs a statistical comparison group based on probability of participating in the treatment using observed characteristics. Participants are then matched on the basis of this probability, or *propensity score*, to non-participants. The average treatment effect of the treated is then calculated as the mean difference in outcomes across these two groups.

The appropriateness of PSM was checked by three methods following Lee (2013). *First*, balancing requirement was verified using a *t* test which purports that there should be no significant differences in mean values of the covariates between treatment and control groups after matching. *Second*, when the pseudo- $R^2$ s are compared before and after matching, the estimate should be fairly low after matching. *Finally*, standardised percentage bias should be less than 20 per cent for each covariate and less than 10 per cent on average over all covariates after matching (Rosenbaum and Rubin 1983). The results reported in Table A.1 in Appendix A justify the use of PSM method as the above conditions are largely satisfied: (i) the sample results indicate that matching on the estimated propensity score balanced the covariates as the standardised differences are all close to zero, and the variance ratios are all close to one;<sup>7</sup> (ii) the pseudo- $R^2$  decreased from 0.064 to 0.005; (iii) the absolute maximum bias of individual covariates was around 7 per cent and mean absolute bias was 3.1 per cent; both of these estimates are far less than the thresholds. The propensity score distributions of the PESP and non-PESP households show that there might be a lack of overlap at the left- and right-hand side of the distributions (Figure B.1 in Appendix B). However, no observation was found off the common support. The average

---

<sup>7</sup>This inference is informal as the standard errors for these statistics are not reported.

treatment effects of the treated were, therefore, estimated without dropping any observation.

#### IV. AVERAGE TREATMENT EFFECTS OF THE TREATED: OLS AND PSM RESULTS

##### 4.1 Poverty Targeting

Since poverty is one of the criteria for PESP intervention, it merits a critical assessment. The issue of poverty was looked into from two different perspectives. If poverty had played any role in the PESP selection process, it would have revealed through the sense of well-being of the households. From this perspective both the PESP and non-PESP households were inquired about self-categorisation<sup>8</sup> on perceived food insecurity, based on their qualitative notion of whether they were always in food deficit, neither in deficit nor in surplus, and always in food surplus.<sup>9</sup> Besides, subjective assessment of poverty gauged through household food security as defined above, self-categorisation of poverty status of the households was also assessed.<sup>10</sup>

Table III shows results from the ordinary least squares (OLS) and PSM methods. OLS results of self-assessments of food security and poverty show that PESP is well targeted. However, the OLS estimates are potentially biased.<sup>11</sup> This justifies the use of PSM estimates that show similar trend. There is significant difference between PESP and non-PESP households with regard to subjective assessment of food security. While 62 per cent of PESP households experience chronic food deficits, the precariousness goes down to 51 per cent in the case of non-PESP households. At the other extreme, only 2 per cent of the PESP households reported to always enjoy food surplus compared with 6 per cent in the case of non-PESP households. Similarly, if non-PESP households belong to

---

<sup>8</sup> Self-categorisation of food security was defined as follows: always deficit = 1, sometimes deficit = 2, neither deficit nor surplus = 3, and surplus = 4.

<sup>9</sup> While this definition of food security takes into account of the availability and access aspects, it ignores the utilisation aspect. Thus, the figures should be treated with caution.

<sup>10</sup> Self-categorisation of poverty was defined as follows: extreme poor = 1, poor = 2, middle-income group = 3, and rich = 4.

<sup>11</sup> To illustrate the bias let  $D_i = 1$  if unit  $i$  received treatment and 0 otherwise.  $Y_{1i}$  is the potential outcome with treatment and  $Y_{0i}$  is the potential outcome without treatment. Observed outcome is realised as  $Y_i = Y_{1i}D_i + Y_{0i}(1-D_i)$ . Now, simple mean difference is  $E(Y|D=1) - E(Y|D=0) = E(Y_{1i}|D=1) - E(Y_{0i}|D=0)$  and average treatment of the treated (ATET) is  $E(Y_{1i}|D=1) - E(Y_{0i}|D=1)$ . It can be shown that  $E(Y_{1i}|D=1) - E(Y_{0i}|D=0) = ATET + E(Y_{0i}|D=1) - E(Y_{0i}|D=0)$ . So, the simple difference in means introduces bias in the estimate that can go up or down.

moderate poverty group, the PESP households are worse. As the PESP households belong to the worse group in terms of food security and poverty, the intervention appears to have targeted children from both the extreme and moderate poverty. In terms of self-assessment of food security, there appears to be 2 per cent of inclusion error, which increases to more than 10 per cent if self-assessment of poverty criterion is invoked.<sup>12</sup> Given the nature of data available at hand, the exclusion error could not be assessed. However, the exclusion error should not be a major concern owing to ubiquitous nature of intervention in recent years.

TABLE III  
FOOD SECURITY AND POVERTY STATUS OF HOUSEHOLDS

Food security and poverty indicators	OLS estimates	PSM estimates	
	Difference between PESP and non-PESP households	PESP households	Difference between PESP and non-PESP households
Self-assessment of food security			
Always deficit	0.084*** (0.019)	0.622	0.104***(0.024)
Neither deficit nor surplus	-0.049** (0.020)	0.355	-0.067*** (0.024)
Always surplus	-0.034*** (0.008)	0.022	-0.037*** (0.012)
Self-assessment of poverty			
Extreme Poor	0.040*** (0.015)	0.200	0.017 (0.019)
Moderate Poor	0.068*** (0.021)	0.686	0.074*** (0.026)
Non-poor	-0.107*** (0.017)	0.113	-0.090*** (0.019)

**Notes:** 1. Figures in parentheses are robust standard errors for OLS estimates that controlled for household level covariates. 2. Figures in parentheses for PSM estimates are Abadie and Imbens (2016) robust standard errors. 3. Figures with \*\*\*, \*\*, and \* are significant at 1%, 5%, and 10% probability levels.

## 4.2 Household Level Outcomes

People in general have both voluntary and involuntary tendencies to under report income. Besides, estimation of income is subject to high degree of measurement and reporting errors. Thus, comparison of expenditures was thought to be more accurate for PESP intervention. With these views in mind, a comparison of expenditures on food items and non-food items was made. Because food consumption is most important in the lives of the poor, it serves as an appropriate indicator of their livelihoods. When there are supplementary funds

<sup>12</sup>The qualitative findings were complemented with differences in quantitative estimates of poverty between the PESP and non-PESP households. When poverty headcount rates along with poverty gaps and square poverty gaps following Foster, Greer and Thorbecke (1984) are estimated from the expenditure data, the incidence of poverty goes down to 40 per cent. The groups are similar in terms of depth and severity of poverty. Consequently, the headcount estimates imply that 60 per cent of the students are non-eligible. If one takes subjective assessment of poverty as the lower bound and the quantitative estimates as the upper bound, the inclusion error ranges between 2 per cent and 60 per cent.

after meeting the food expenditures, households use it for non-food expenditures such as acquisition of capital goods, consumer durables, etc.

Weekly per capita expenditures on food items were found at Tk. 291 among the PESP households compared with Tk. 301 among non-PESP households. Annual per capita non-food expenditures were found at Tk. 9,584 among the PESP households compared with Tk. 9,975 among non-PESP households. Finally, annual per student expenditures on educational expenses were found at Tk. 1,541 among PESP households compared with Tk. 1,445 among non-PESP households. Insofar as comparison at levels with cross-section data may be misleading, the types of expenditures were converted into shares of total expenditures. Table IV presents estimated impacts on the shares based on three types of per capita expenditures of PESP and non-PESP households: food expenditures, non-food expenditures, and education expenditures based on both OLS and PSM estimates. Apparently, the impact estimates may suggest that the programme failed to make it possible for its beneficiaries to increase their expenditures on food and non-food items. This is particularly true of both the PSM and the OLS estimates, which are likely to be biased. However, based on the both estimates, the PESP does appear to have a discernible, albeit small, impact on share of education expenditures, which may have an impact on building human capital of the students.

TABLE IV  
HOUSEHOLD LEVEL AND WOMEN EMPOWERMENT OUTCOMES

Household level outcomes	OLS estimates		PSM estimates	
	Difference between PESP and non-PESP households	PESP households	Difference between PESP and non-PESP students	
Household Expenditure Shares				
Share of food expenditure	-0.004 (0.005)	0.650	-0.001 (0.006)	
Share of non-food expenditure	0.004 (0.005)	0.350	0.001 (0.006)	
Share of per student education expenditure	0.001 (0.001)	0.015	0.002** (0.001)	
Women Empowerment Outcomes				
Decision regarding children's education	0.010 (0.009)	0.572	0.018* (0.011)	
Decision regarding children's health	0.016** (0.008)	0.570	0.024** (0.010)	
Decision regarding purchase of children's clothes	0.012 (0.009)	0.561	0.000 (0.010)	
Decision regarding children's education expenses	0.017* (0.009)	0.523	0.011 (0.009)	
WEI for child development	0.013** (0.007)	0.556	0.013* (0.008)	
Overall WEI	0.005 (0.004)	0.504	0.000 (0.006)	

Notes: As in Table III.

### 4.3 Women Empowerment

The most general outcome, albeit most difficult to measure, of the PESP intervention is the extent of women empowerment. As mothers of the students receive the stipend on behalf of their children, it connects the poor women to the community and inculcates in them ideas on various rights and awareness. Thus, women empowerment is expected to increase with the participation of mothers in the PESP activities. Participation of women in different types of decision making within the household has been enquired in terms of women's freedom of mobility, and participation in household and economic decision making. Personal autonomy and awareness and other rights have also been assessed in terms of legal and other aspects. Accordingly, the women empowerment module comprised 23 questions in 4 categories. Responses to these questions typically included either: (a) she herself, (b) jointly with husband, and (c) by others. Following Handa *et al.* (2009), each of the three responses was assigned a value 1, 0.5, or 0, where a higher value indicates more bargaining power of the mother. The questions were then summed to create a women empowerment index (WEI). In addition to this overall index, another index was specifically constructed by focusing on four questions related to child health and education on the degree to which a mother has control over how to spend the transferred fund since the programme in fact specifically delivers it to the mother. Each of the indices was normalised by the number of questions included so that it lies within the unit simplex.

When the indicators are considered separately, women in households enjoy equal levels of women empowerment irrespective of the PESP status: majority of them appear to take these decisions in consultation with their husbands, despite that they are aware of the opportunities and challenges to voice their participation in household and social affairs. However, it was found that mothers of PESP students are significantly more empowered in terms of taking decision for their children's education expenditure compared to mothers of students who did not receive the stipend. This mismatch (equality of overall WEI and higher education related WEI) implies that providing the stipend to mothers of the students does not directly empower them as *women* but as *mothers* and provide them a voice only on issues related to their children's education expenditures.

### 4.4 Student Level Outcomes

One of the channels through which PESP educational benefits is expected to transpire is the attendance at school by the recipients for certain minimum

number of days in the year in order to continue to receive the stipend in the same year. It may be noted that PESP recipient students attended about 204 days of school compared to about 193 days of attendance by the non-PESP students (Table V). The PESP students attended about 12 more days than the non-PESP students. Given the age of the students, it is hard for many of them to be employed in paid work or any other income-generating activity. This difference may be attributed to income effect of the transfer because substitution effect is marginal if it exists at all. In fact, it was found that only a few of them are engaged in income-generating activities in addition to study and there is hardly any difference between the groups.

TABLE V  
STUDENT LEVEL OUTCOMES THROUGH TRANSFER AND WOMEN  
EMPOWERMENT EFFECTS

Student level outcomes	OLS estimates	PSM estimates	
	Difference between PESP and non-PESP students	PESP students	Difference between PESP and non-PESP students
Due to transfer effect			
Number of days attended school	6.760*** (0.745)	204.172	11.764*** (1.147)
Number of hours studied out of school	0.019 (0.036)	3.135	0.042 (0.052)
Scores obtained in final examination (%)	11.315*** (1.240)	59.471	8.447*** (1.196)
Due to women educational empowerment effect			
Number of days attended school	8.664*** (1.397)	113.716	8.974*** (1.678)
Number of hours studied out of school	0.052* (0.030)	1.741	0.074** (0.038)
Scores obtained in final examination (%)	4.398*** (0.589)	32.95	5.22*** (0.695)

**Notes:** As in Table III.

As mentioned earlier, in households where mothers have their voice in economic decision-making issues (spending for children's clothing, education, valuable items, etc.) spend Tk. 95 more for education of their children. Whether the higher share of educational expenditures and higher level of women educational empowerment may be independent of each other is an empirical issue. One thus needs to establish that the variables are not orthogonal to other.

To that end, OLS regression was run of the share of educational expenditure on women educational empowerment controlling for other proximate covariates. The estimates reveal that mother's empowerment to make child development decision is positively related to the educational expenditure made in the household.<sup>13</sup> When the mother is fully empowered with regard to the educational development, the student appears to attend school additional 8 days. Thus, the total effect of the PESP on attendance at school ranges between 12 and 21 days depending on the level of mothers' educational empowerment. Similarly, when only income and substitution effects are considered, both categories of students devote about 3 hours daily for study out of school, and the difference is not statistically significant. However, the students study an additional 2 hours if their mothers are empowered in child's educational development. The difference, albeit small, is statistically significant in favour of the PESP students.

However, going to school regularly should not be an end in it itself. Attendance becomes meaningful when it translates into better performance in examinations. As a performance indicator, total scores obtained out of 300 in final examinations are considered for assessing eligibility of continuation in the next year for students in grades I-II, which is raised to 600 for students in grades III-IV. Next, total scores secured were expressed as percentage of total eligible scores in the grade to make them comparable across grades. It is evident that the PESP students performed better than the non-PESP students in the final examinations. While PESP students obtained 60 per cent average scores in the subjects considered, the non-PESP students could manage only 51 per cent. Thus, the PESP student obtained 9 percentage points of scores more than the non-PESP students. In addition to contribution of the above income and substitution effects, the women educational empowerment effect boosts scores by another 5 percentage points. Thus, the total effect of the PESP on average scores obtained in the final examination at different grades ranges between 9 and 14 percentage points depending on the level of mothers' educational empowerment. Besides these three channels, several other factors may also drive these results. For instance, the stipend receiving students can afford the service of a private tutor,

---

<sup>13</sup>An OLS regression was run of the share of educational expenditure (student adjusted) on women's educational empowerment. The regression controlled for mother's occupation, education, age, student's gender and grade, etc. For households with empowered women, the share of education expenditure is significantly higher by 0.5 per cent for their children's education compared to mothers with little educational empowerment. Only the variable of interest is reported for brevity.

which may be reflected in the form of better performance in school examinations. Another reason that may work behind PESP students obtaining higher percentage of scores in examinations is their mothers' contribution. Literature suggests that children's chances of educational attainment increase significantly when their mothers are educated or are able to contribute financially to their household (see for instance, Carneiro, Meghir and Pary 2013). In other words, educational performance of the children may improve if the mothers are empowered in terms of taking financial decision. Both the conditions are applicable in this case. It may be noted that households with educated mothers spend more for their children's education. OLS regression estimates show that a one-year increase in mother's education increases the educational spending by 0.1 per cent after controlling for other proximate factors. The third channel through which children might secure higher scores is by spending more hours on study. It was found that a one per cent increase in study hours enables students to obtain 0.05 percentage point higher score in the examination.

As both the PESP and non-PESP students are in the same grade at the same school, the latter may derive benefit from the former through peer effects channel as they are sampled from the same grade. Therefore, the desirable outcomes of PESP intervention are likely to subsume the spillover effects, particularly through the transfer effect. However, the spillover effects tend to narrow down the differences in outcomes between the PESP and non-PESP students. Therefore, the overall observed differences in effects are likely to be the lower bounds of the actual effects of intervention.<sup>14</sup> Given that Asadullah and Chowdhury (2015) found a statistically significant but a relatively flat positive correlation between schooling attained and basic mathematics competence above and beyond primary school completion, higher quantitative outcomes of the PESP students may actually translate little to difference in quality of learning.

Despite the niceties, the above results may be contaminated by school level human and physical capital attributes. To assess if school factors have any bearing on the above findings, seemingly unrelated regression equations (SURE) of average difference of each of promotion rate, repetition rate, and dropout rate between PESP and non-PESP students were estimated projecting on the attributes of school such as the type of school, number of students per teacher, number of students per class room, average number of teaching days per month, etc. The

---

<sup>14</sup>The authors are grateful to the anonymous referee for pointing out the case of spillover effect.

results of the SURE estimates are reported in Table A.2, where standard errors accounted for small sample. The significance of  $\chi^2_{(3)}$  statistics of the Breusch-Pagan test (1980) justifies SURE as a preferred method as one fails to reject independence of error terms across equations. The results show that most of the coefficients are not systematically robust to the school level attributes. The non-significance of the school attributes, therefore, implies that the observed differences in direct and latent outcomes between the PESP recipient and non-recipient students do not originate at the school level but at the household level through the PESP.

## V. SENSITIVITY OF THE PSM RESULTS

Two aspects may contaminate the PSM results found above. *First*, the results may be subject to hidden bias. It occurs when factors not observable to the researcher may affect the observed outcome. *Second*, the results may be driven by the particular matching method applied in the estimation. In what follows is a succinct assessment of each of these factors.

### 5.1 Hidden Bias

Observational studies attempt to estimate the difference between participant outcome and non-participant outcome, the average treatment effect of the treated, which cannot be observed at the same time for a single entity. Matching methods is used to deal with the selection problem based on the conditional independence or un-confoundedness assumption. If there are unobserved variables that affect assignment into treatment and the outcome variable simultaneously, a *hidden bias* might arise to which matching estimators are not robust (Rosenbaum 2002). To address the issue, the existence and extent of hidden biases in the PSM estimates were assessed using *mhbounds* and *rbounds* respectively for binary and continuous variables.<sup>15</sup> Under the assumption of no hidden bias, i.e., when  $\Gamma$  (gamma) equals unity, the *mhbounds* (for binary outcome variables)/*rbounds* (for continuous outcome variables) test statistic gives a similar result, indicating the true effect of treatment. Given the positive (negative) estimated treatment effect, the bounds assume that the true treatment effect has been underestimated (overestimated) and becomes even more significant for increasing values of  $\Gamma$ .

---

<sup>15</sup>The Stata program codes for continuous and binary variables are developed by DiPrete and Gangl (2004) and Becker and Caliendo (2007) respectively.

The results presented in Table A.3 establish that there is moderate hidden bias in the PSM estimates of food security and poverty. While all lower bounds had significance levels of  $p < 0.05$ , the upper bounds became insignificant ( $p > 0.10$ ) if the gamma was increased by a factor 1.2 for self-assessment of food security and self-assessment of poverty. While the shares of food- and non-food household expenditures are subject to hidden bias, that of the per student education expenditure is subject to hidden bias only when  $\Gamma$  is 1.2. While overall women empowerment index is subject to hidden bias, that of the child development becomes biased only when  $\Gamma$  is 1.2. However, a critical value of  $\Gamma = 1.2$  does not mean that unobserved heterogeneity exists and that there are no effects of treatment on the outcome variables. These results state only that the confidence intervals for the effects would include zero if an unobserved variable caused the odds ratio of treatment assignment to differ between the treatment and comparison groups by 1.2. This test cannot directly justify the unconfoundedness assumption. Therefore, the mixed results of hidden bias do not prove that any of the assumptions are violated but some caution is needed in interpreting the results.

## 5.2 Alternative Matching Methods

The PSM estimates reported above were based on only one neighbour at the minimum distance when the distance itself is variable. Further, it is a parametric matching. The robustness of the estimates was assessed from three alternative perspectives. *First*, kernel matching -- a non-parametric matching that uses weighted averages of all individuals in the control group to construct counterfactual outcome, was used. *Second*, caliper matching that sets the maximum tolerance between treatment and control in a non-perfect matching was used. *Third*, instead of PSM nearest neighbour matching method with 1, 3, and 5, neighbours were used. The results presented in Table A.4 show similar nature and direction of the impacts, which corroborates that the PSM results are robust to parametric choice, distance, and alternative matching methods.

## VI. CONCLUSIONS

The short- and medium-term impacts on major indicators of educational attainment, share of educational expenses, and women educational empowerment reveal that the programme achieved most of its objectives. The assessment of the

behavioural impact of two key design elements of the PESP programme reveals several key results. *First*, the transfer is so small relative to household expenditures that it failed to exert income or substitution effect on total food and non-food expenditures both in levels or shares. However, it appears to have increased share of educational expenses due solely to an income effect rather than any substitution effect associated with programme rules. The lack of a substitution effect seems surprising since the transfer is explicitly linked to the program condition of school enrolment and minimum attendance. *Second*, gender targeting of the transfer as opposed to gender targeting of intervention has not appreciably increased the overall decision-making power of women: in all indicators considered together, women in households enjoy equal levels of empowerment irrespective of the PESP status. The only solace is that PESP mothers are more empowered with regard to child development. This mismatch implies that providing the stipend amount to mothers of the students does not directly empower them as women but as mothers. However, this mother-empowerment appears to change spending behaviour on child development positively as reflected by higher share of educational expenditures. *Third*, it appears that two different but mutually reinforcing stimuli lead to favourable educational outcomes of the recipient students: the income effect increases the number of days the recipient attended school and scores received in the final examination. Both of these outcomes are reinforced by women educational empowerment effect.

There are concerns about the quality of learning in primary education. It is alleged that current surge in stellar results in Primary School Certificate Examinations masks the quality of learning. Despite the niceties of quantitative results, difference in quality of learning could not be assessed due to lack of data. Thus, the observed better outcomes at the student level quantitative indicators should not be interpreted as better cognitive ability of the PESP students.

## REFERENCES

- Abadie, A. and G. W. Imbens. 2016. "Matching on the Estimated Propensity Score." *Econometrica*, 84(2): 781-807.
- Ahmed, A. 2005. "Comparing Food and Cash Incentives for School in Bangladesh." Mimeo. Washington, DC: International Food Policy Research Institute, Tokyo: United Nations University.
- Ahmed, A. U. and S. C. Babu. 2007. "The Impacts of Food for Education Programs in Bangladesh, Case Study # 3-8 of the Programs." In: Per Pinstrip-Anderson and Fuzhi Cheng (eds.) *Food Policy for Developing Countries: The Role of Government in the Global Food System*. Ithaca, New York: Cornell University Press.
- Attanasio, O., E. Battistin, E. Fitzsimons, A. Mesnard and M. Vera-Hernandez. 2005. *How Effective Are Conditional Cash Transfers? Evidence from Colombia*. Briefing Note No. 54, Institute for Fiscal Studies.
- Attanasio, O., E. Fitzsimons, A. Gomez, M. I. Gutierrez, C. Meghir and A. Mesnard. 2010. "Children's Schooling and Work in the Presence of a Conditional Cash Transfer Program in Rural Colombia." *Economic Development and Cultural Change*, 58(2): 181-210.
- Baulch, B. 2011. "The Medium-term Impact of the Primary Education Stipend in Rural Bangladesh." *Journal of Development Effectiveness*, 3(2): 243-262.
- Becker, S. O. and M. Caliendo. 2007. "Sensitivity Analysis for Average Treatment Effects." *Stata Journal*, 7(1): 71-83.
- DiPrete, T. A. and M. Gangl. 2004. "Assessing Bias in the Estimation of Causal Effects: Rosenbaum Bounds on Matching Estimators and Instrumental Variables Estimation with Imperfect instruments." *Sociological Methodology*, 34(1): 271-310.
- DPE, 2018. *Annual Primary School Census 2018*. Monitoring and Evaluation Division, Directorate of Primary Education, Ministry of Primary and Mass Education, GoB.
- \_\_\_\_\_. 2014. *Annual Primary School Census 2014*. Monitoring and Evaluation Division, Directorate of Primary Education, Ministry of Primary and Mass Education, GoB.
- DPE, PPRC, and UNICEF. 2013. *Bangladesh Primary Education Stipends: A Qualitative Assessment*. Directorate of Primary Education, Ministry of Primary and Mass Education, Power and Participation Research Centre, and UNICEF Bangladesh.
- Foster, J., J. Greer and E. Thorbecke. 1984. "A Class of Decomposable Poverty Measures." *Econometrica*, 52(3): 761-766.
- Freije, S., R. Bando, F. Arce, C. Medina and R. Bernal. 2006. "Conditional Transfers, Labor Supply, and Poverty: Microsimulating Oportunidades." *Economia*, 7(1): 73-124.

- Handa, S., A. Peterman, B. Davis and M. Stampini. 2009. "Opening Up Pandora's Box: The Effect of Gender Targeting and Conditionality on Household Spending Behavior in Mexico's Progresas Program." *World Development*, 37(6): 1129-1142.
- Garcia, S. and J. Saavedra. 2017. "Educational Impacts and Cost-Effectiveness of Conditional Cash Transfer Programs in Developing Countries: A Meta-analysis." *Working Paper 23594*, National Bureau of Economic Research.
- Lee, W.-S. 2013. "Propensity Score Matching and Variations on the Balancing Test." *Empirical Economics*, 44(1): 47-80.
- Parker, S. W., L. Rubalcava and G. Teruel. 2007. "Evaluating Conditional Schooling and Health Programs." Chapter 62, Volume 4, *Handbook of Development Economics*. Elsevier, pp. 3963-4035.
- Rawlings, L. B. and G. M. Rubio. 2005. "Evaluating the Impact of Conditional Cash Transfer Programs." *World Bank Research Observer*, 20(1): 29-55.
- Rosenbaum, P. R. 2002. *Observational Studies*. Second edition. New York: Springer.
- Rosenbaum, P. R. and D. B. Rubin. 1983. "The Central Role of the Propensity Score in Observational Studies for Causal Effects." *Biometrika*, 70(1): 41-55.
- Tietjen, K. 2003. "The Bangladesh Primary Education Stipend Project: A Descriptive Analysis." *Girls' Education Working Paper Series*, Washington, DC: World Bank.

## APPENDIX A

TABLE A.1  
**PROBIT ESTIMATES AND RESULTS OF BALANCING TEST AFTER  
 MATCHING**

Variables	Probit Results	Results of Balancing Tests		
		Bias (%)	p-value	V(T)/V(C)
Grade	0.015 (0.024)	-4.1	0.31	1.04
Gender of the student	0.004 (0.052)	-2.1	0.60	.
Father's occupation (=1)	-0.071 (0.062)	4.3	0.28	.
Mother's occupation (=1)	-0.144 (0.142)	-4.7	0.23	.
Education of the father	-0.025** (0.010)	-0.6	0.87	0.93
Education of the mother	0.031*** (0.011)	-0.4	0.91	0.96
Demographic dependency rate	-0.002*** (0.001)	-2.6	0.50	1.15*
Household size	-0.030 (0.024)	-2.5	0.51	1.21*
House quality index	-0.095* (0.045)	7.0	0.08	0.80*
Household has sanitary latrine (=1)	-0.664*** (0.095)	-2.2	0.51	.
Household has access to electricity (=1)	0.130* (0.067)	-2.0	0.62	.
Total quantity of land	-0.223*** (0.060)	-2.5	0.34	1.19*
Asset (Tk.)	-0.107*** (0.023)	1.2	0.62	0.94
Household head is non-Muslim (=1)	0.262** (0.112)	-7.2	0.09	0.81*
Constant	0.741 (0.347)			
School Fixed Effect	Yes			
Observations	2,500			
Pseudo R <sup>2</sup>	0.064		0.005	
Mean absolute bias		3.1		

**Notes:** Balancing of covariates was checked following Rosenbaum and Rubin (1985). Figures in the parentheses are cluster robust standard errors. Asterisk in the V(T)/V(C) indicates if variance ratio is outside [0.89; 1.12]. Cell in the V(T)/V(C) column with – indicates that the variable is binary.

**TABLE A.2**  
**SURE RESULTS ACROSS DIFFERENCES IN PROMOTION RATE,**  
**REPETITION RATE, AND DROPOUT RATE**

Progression to Grade	(A) Difference in Promotion Rate			
	I→II	II→III	III→IV	IV→V
Government Primary School (=1)	0.072 (0.086)	0.081 (0.092)	0.160 (0.098)	0.122(0.098)
Number of Student per Teacher	0.010 (0.007)	0.005 (0.007)	0.000 (0.008)	0.001(0.008)
Number of Student per Room	-0.007 (0.006)	-0.001 (0.006)	0.001 (0.007)	0.007 (0.007)
Average Number of Teaching Day per month	0.158*** (0.048)	0.091* (0.051)	0.052 (0.054)	0.015 (0.054)
Constant	-2.874***(0.952)	-1.639 (1.014)	-0.914 (1.087)	-0.255 (1.088)
R-squared	0.103	0.028	0.024	0.029
Repetition in Grade	(B) Difference in Repetition Rate			
	II	III	IV	V
Government Primary School (=1)	-0.019 (0.050)	-0.037 (0.044)	0.042 (0.059)	0.005 (0.058)
Number of Student per Teacher	0.001 (0.004)	0.002 (0.004)	0.005 (0.005)	0.005 (0.005)
Number of Student per Room	-0.002 (0.003)	-0.005 (0.003)	-0.009** (0.004)	-0.003(0.004)
Average Number of Teaching Day per month	-0.003 (0.028)	0.001 (0.025)	0.006 (0.033)	0.001 (0.032)
Constant	-0.015 (0.554)	-0.049 (0.492)	-0.229 (0.656)	-0.152 (0.647)
R-squared	0.005	0.033	0.038	0.011
Dropout between Grade	(C) Difference in Dropout Rate			
	I→II	II→III	III→IV	IV→V
Government Primary School (=1)	-0.082 (0.086)	-0.188 (0.126)	-0.154 (0.125)	-0.245** (0.124)
Number of Student per Teacher	-0.009 (0.007)	-0.013 (0.010)	-0.006 (0.010)	-0.010 (0.010)
Number of Student per Room	0.007 (0.006)	0.012 (0.009)	0.012 (0.008)	0.018** (0.008)
Average Number of Teaching Day per month	-0.139*** (0.048)	-0.159** (0.070)	-0.106 (0.069)	-0.092 (0.069)
Constant	2.496*** (0.954)	2.980** (1.399)	1.861 (1.380)	1.655 (1.375)
R-squared	0.08	0.057	0.038	0.067
Observations	125	125	125	125
Correlation between A and B	0.1226	0.0950	0.1299	0.0321
Correlation between A and C	-0.8811	-0.4420	-0.3129	-0.1802
Correlation between B and C	0.1324	0.2507	0.2526	0.2410
Breusch-Pagan Test of Independence $\chi^2_{(3)}$	101.107 [0.00]	33.409 [0.00]	22.322 [0.00]	11.447 [0.00]

TABLE A. 3  
**SENSITIVITY OF THE ATET TO HIDDEN BIAS BASED ON  
P-VALUES OF THE BOUNDS TESTS**

Target Outcomes/Gamma	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
Self-assessment of food security											
Always deficit	0.00	0.02	0.33	0.21	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Neither deficit nor surplus	0.03	0.46	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Always surplus	0.00	0.00	0.00	0.00	0.01	0.03	0.07	0.13	0.21	0.30	0.41
Self-assessment of poverty											
Extreme poor	0.01	0.15	0.50	0.15	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Moderate poor	0.00	0.15	0.37	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-poor	0.00	0.00	0.00	0.00	0.04	0.16	0.39	0.40	0.19	0.08	0.02
Household expenditure shares											
Share of food expenditure	0.20	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Share of non-food expenditure	0.20	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Share of per student education expenditure	0.00	0.16	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Women empowerment outcomes: Decision regarding											
Children's education	0.02	0.35	0.86	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Children's health	0.00	0.19	0.73	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Purchase of children's clothes	0.47	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Children's educational expenses	0.12	0.71	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
WEI for child development	0.05	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Overall WEI	0.40	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Student level outcomes											
(a) Due to transfer effect											
Number of days attended school	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.29	0.71	0.94	0.99
Number of hours studied out of school daily	0.17	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Scores obtained in final examination (%)	0.00	0.00	0.00	0.00	0.10	0.61	0.95	1.00	1.00	1.00	1.00
(b) Due to women empowerment effect											
Number of days attended school	0.00	0.00	0.05	0.64	0.98	1.00	1.00	1.00	1.00	1.00	1.00
Number of hours studied out of school daily	0.04	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Scores obtained in final examination (%)	0.00	0.00	0.00	0.05	0.54	0.95	1.00	1.00	1.00	1.00	1.00

**TABLE A. 4**  
**SENSITIVITY TESTS FOR ATET TO ALTERNATIVE MATCHING METHODS**

Outcomes/Methods	Kernel	Caliper (0.2)	NN, n=1	NN, n=3	NN, n=5
Self-assessment of food security					
Always deficit	0.081	0.098	0.074	0.096	0.107
Neither deficit nor surplus	-0.049	-0.059	-0.044	-0.057	-0.058
Always surplus	-0.032	-0.038	-0.030	-0.039	-0.049
Self-assessment of poverty					
Extreme poor	0.043	0.043	0.050	0.051	0.050
Moderate poor	0.058	0.057	0.060	0.072	0.085
Non-poor	-0.102	-0.100	-0.110	-0.123	-0.136
Household Expenditure shares					
Share of food expenditure (%)	-0.005	-0.003	-0.004	-0.005	-0.004
Share of non-food expenditure (%)	0.005	0.003	0.004	0.005	0.004
Share of per student education expenditure (%)	0.001	0.001	0.002	0.001	0.001
Women Empowerment Outcomes					
WEI for child development	0.013	0.013	0.012	0.015	0.015
Overall WEI	0.004	0.005	0.002	0.004	0.003
Student Level Outcomes					
(a) Due to transfer effect					
Number of days attended school	11.195	11.707	11.851	11.895	10.675
Number of hours studied out of school	0.033	0.057	0.061	0.064	0.057
Scores obtained in final examination (%)	6.767	6.725	6.774	6.607	6.117
(b) Due to women educational empowerment effect					
Number of days attended school	8.355	8.717	8.483	9.041	8.445
Number of hours studied out of school	0.057	0.073	0.071	0.083	0.081
Scores obtained in final examination (%)	4.178	3.901	3.895	3.999	3.828

## Appendix B

**Figure B.1**  
**Kernel Density Distribution Showing Overlap between PESP and Non-PESP Households**

