Long-term Impacts of the Free Tuition and Female Stipend Programs on Education Attainment, Age of Marriage, and Married Women's Labor Market Participation of in Bangladesh

Seo Yeon Hong and Leopold Remi Sarr

Abstract

In 1990, the Government of Bangladesh introduced a free tuition policy for female secondary school students and, in 1994, it implemented the Female Secondary School Assistance Program (FSSAP). These policies were designed to improve access and retention in secondary school among girls through the reduction of tuition fee and the provision of stipend. Over the past two decades, there has been substantial improvement in female school enrollment in Bangladesh that has led to the reversal the gender ratio in both primary and secondary education. However, to date, no rigorous analysis of the long-term impacts of these policies has been undertaken. This study evaluates the impacts of these policies on education attainment, age of marriage and labor force participation of married women by exploiting variation in birth cohort and geographical coverage of the programs. We find that, the FSSAP has contributed to raising women's years of education by 1.6 to 2 years while the free tuition policy did not lead to any significant impact on their educational attainment. Moreover, the stipend program has led to an increase in the age of marriage of women by 1.4 to 2.3 years with some evidence suggesting that the age of marriage of men has also gone up. Finally, one additional year of education leads to between 2.4 and 5.3 percent increase in the labor force participation of married women. The policy implications of these findings are significant in that education policies targeted towards women have not only substantially raised female education attainment with its inherent positive externalities on child and household welfare, but they have also improved the economic prospects of low income families through increased female labor force participation.

Long-term Impacts of the Free Tuition and Female Stipend Programs on Education Attainment, Age of Marriage, and Married Women's Labor Market Participation in Bangladesh

Seo Yeon Hong and Leopold Remi Sarr[1]

Keywords: Tuition, Conditional Cash Transfer, Education, Female Labor Force Participation, Bangladesh, FSSAP

JEL Code: C25, C26, C90, D31, D60

[1] Seo Yeon Hong is a *Consultant* at the World Bank and Leopold R. Sarr, a *Senior Economist* at the World Bank, South Asia Human Development Education Sector. We would like to express our gratitude to WorldBank colleagues, Amit Dar, Dhushyanth Raju, Dilip Parajuli, Quynh Nguyen, and Shinsaku Nomura, for their useful feedbacks on earlier drafts of this paper. We are also thankful to Krishna Kumar, Peter Glick, and Paco Matorell for insightful guidance. This paper reflects the authors' views and not necessarily those of the World Bank, its Executive Directors or the countries they represent. All errors are our own. Author contact: lsarr2@worldbank.org.

1. Introduction

In many developing countries, household's investments in children's education have been historically often made in favor of boys, especially when economic resources are limited. Although significant progress has been made toward gender equality in education, there is still pronounced gender disparity, particularly, at the secondary and higher levels of education. These gender disparities appear to be more acute in South Asia and North and West Africa regions (World Development Report, Gender, 2012; Sahn and Glick, 2000; Glick, 2008). Furthermore, the gender gap is exacerbated among the poorest households who are faced with the drastic choice of sending one child or none to school (Filmer, 2008). In South Asia in particular, cultural norms and economic factors collude to prevent girls from attending school. Furthermore, women's mobility and social interactions are often bounded inside the household making it difficult for most girls to achieve higher levels of education.

The labor market in South Asia is also generally marked by wage discrimination and fewer employment opportunities for women, leading to lower returns to schooling for girls compared to boys, which, in turn, induce lower investments in girls' education (Das and Desal, 2003). Economic literatures have shown that, with increasing employment or economic opportunities for women, investment in girls' education can also rise (Qian, 2005; Munshi and Rosenzweig, 2004; and Jensen, 2012, and Heath and Mobarak, 2012).

In light of this multidimensional problem, narrowing the gender gap in education has become a primary goal for the international development community (UN Millennium Development Goal). In response, policies raising girls' schooling, either through demand side (e.g. stipend to girls) or supply side (e.g., more girls' school), have been implemented across the developing world. Examples of such demand side interventions are the free tuition policy for secondary school girls and the Female Secondary School Assistance Program (FSSAP) in Bangladesh. These programs constitute the first conditional cash transfer (CCT) implemented in the developing countries. A handful of studies have described the upward trend in girl's secondary school enrollment rate and shown the positive impacts of the FSSAP. There is also evidence that FSSAP did not only narrow the gender gap in secondary school enrollment, but it also reversed it (Fuwa, 2001; Asadullah and

Chaudhury, 2009; Patrinos, 2008).[2] The success story of the Bangladesh female stipend program has caught the attention of the international development community and induced number of countries to adopt similar approaches (Khandker et al, 2003; Arends-Kuenning and Amin, 2004; Raynor and Wesson, 2006; Schurmann, 2009). However, prior to the FSSAP, the Bangladesh government had introduced another major gender-targeted education policy. Such program offers free tuition to female students enrolled in grade 6 to 8 in 1990, and ignoring this policy could lead to biased estimation of the impact of FSSAP. In addition to narrowing the gender gap in education, the FSSAP purported to delay marriage by providing stipend to girls so long as they remained unmarried. Early marriage is found to be associated with adverse health outcome for the mother and the child, higher fertility rate and possibly correlated with domestic violence (Raj et al, 2010; Jensen and Thornton, 2003). Early marriage is a widespread social phenomenon in Bangladesh with 50 percent of women getting married by the time they reached 15 years of age (Demographic and Health Survey 1999/2000).

Besides achieving gender equality, the goal of educating girls is to increase female labor force participation, which, in turn, contributes to the country's economic growth. A large body of literature focusing on the returns to education around the world sees the benefit of education through the lens of economic returns (Angrist, 1995; Card, 1999; Duflo, 2001). While the benefit of education is universally recognized, studies have shown that the returns to education in developing countries are higher than those in developed countries (Pscharopoulos, 1994). Economic returns to education, however, become questionable when there are limited employment opportunities for women, which could be due to social and/or economic barriers. In South Asia, female labor force participation is the second lowest (35 percent) in the world, after Middle East and Northern Africa (26 percent). On the other hand, men's labor force participation is almost universal (World Development Report, Gender, 2012). Furthermore, the relationship between education and women's labor market participation is shown to be non-linear. In India, a U-shaped relationship is found where education is negatively associated with labor force participation for women at the lower end of the education spectrum. However, the relationship is reversed for women with higher than middle school education, which would potentially explain the observed higher returns to education for highly educated women (Kingdon and Unni, 2001, Das and Desal, 2003). Therefore, there is heterogeneity in returns to girls' education, and it is an

[2] Boys' schooling would have been displaced by girls' schooling if households needed additional labor to help with household's work which had been traditionally girls' work.

empirical question as to what extent the gender targeted education policies could translate into actual increase in female labor force participation.

Given this background, this study first evaluates the primary impacts of two policies: impacts of the 1990 free tuition policy and the 1994 female secondary school assistance program on women's educational attainment and their age of marriage. Then, we focus on estimating the impact of education on the labor market participation of women who were affected by the free tuition policy and the FSSAP. We find that FSSAP has led to a significant positive impact on the number of years of education of women and to a delay in their age of marriage while the free tuition policy did not lead to any significant impact on their educational attainment. The impact of education on female labor force participation is sensitive to sample selection (age range and education level of women), and it corresponds to an increase of 2.4 to 5.3 percent in participation rate with one additional year of education.

This paper is structured as follows: in section 2, we provide a background of the female secondary education policies in Bangladesh; in section 3, we examine the impact of the free tuition and FSSAP policies on educational attainment before laying out the identification strategy; in section 4, we estimate the returns to schooling for women affected by these policies; and lastly we discuss the policy implications of our findings before providing some concluding remarks in section 5.

2. Background – Free Tuition Policy and Female Secondary School Assistance Project (FSSAP) in Bangladesh

In order to raise the female educational attainment and thereby increase women's economic participation and social status, the Government of Bangladesh (GOB) introduced the free tuition policy for female students of grade 6 to 8 in 1990. Four years after the implementation of the free tuition policy, in 1994, the World Bank and the GOB jointly initiated the Female Secondary School Assistance Program (FSSAP) and the free tuition policy was carried by the FSSAP through tuition subsidy to the school in which the participating FSSAP students were enrolled. Both policies were implemented in rural areas nationwide.[3]

[3] The programs cover all 460 rural upazilas in the country.

While the FSSAP has several components, the primary component was the Female Secondary School Stipend Program (FSSP), which provides monthly stipends to female students from Grade 6 to Grade 10, that is, students 11 to 15 years old.[4] Stipends were provided as long as the students meet the following conditions: i) maintain at least 75% attendance, ii) secure at least 45% marks in the annual examinations, and iii) remain unmarried. A detailed description of FSSAP is shown in Table 1. The stipend covered a portion of direct costs of schooling and was given directly to female students who withdraw the cash from their personal bank account. Annual direct cost of secondary education per student was about US$ 54 in 1998. This includes tuition and other direct costs such as uniform, textbooks, and examination fee, and 42 percent of the direct educational cost was spent on tuition. US$ equivalent of the total annual stipend for a girl ranges US$12 for grade 6 to 30.25 for grade 10. Besides the stipend, tuition subsidy was provided to the school in which the eligible female students enrolled (Liang, 1994).

The FSSAP program has been credited with narrowing the gender gap in secondary school enrollment (Schurmann, 2009). According to the Household Income and Expenditure Survey (HIES), the gross enrollment rate for girls aged 11-15 has increased from 43.7 percent in 1995 to 60.4 percent in 2005 whereas, that for boys has only gone up from 47.9 percent to 52.2 percent over the same period. Fuwa (2001) provides evidence that FSSAP resulted in a decline in boy's enrollment rate; hence the program was able to narrow the gender gap in education by not only increasing enrollment rate for girls but also lowering enrollment rate for boys. However, there is some evidence presenting increasing trend in female enrollment before the implementation of FSSAP in 1994. For example, according to the Bangladesh Educational Statistics, the share of girls enrolled in junior secondary school (grade 6 to 8) grew from 35 %, in 1990, to 51 %, in 1994, and to 58 % in 2005 (Bangladesh Educational Statistics, 2006). The narrowing of the gender disparity in secondary schooling was also prevalent before 1994; between 1983 and 1993, girl's secondary school enrollment rate increased by 9.4 percent annually while boy's enrollment rate increased only by 3.4 percent (World Bank Project Performance Assessment Report). This could be attributed to the free tuition policy introduced in 1990.

[4] The following components of the project were implemented: (i) the stipend program provided to the female secondary school students, (ii) extensive information campaign to raise public awareness on the importance of female education and the ensuing social and financial benefits, (iii) enhancing the school infrastructure, recruiting female teachers and providing occupational training to girls leaving school, and (iv) encouraging community participation through parent-teacher associations. However, the implementation of the latter three components (ii-iv) was limited due to the budget shortage and the expansion of the stipend program (World Bank Project Performance Assessment Report, 2003).

Although a great deal of attention has been devoted to the success of FSSAP in narrowing the gender disparity in secondary school enrollment, to date, there exists no rigorous study which attempts to separate the impact of the free tuition policy from that of the FSSAP on educational attainment nor is there any study that looks at the impact of both policies on the age of marriage and on female labor market participation. Furthermore, taking into account the potential spillover effects of FFSAP on boys' schooling, comparing the enrollment or educational attainment of men and women would not be the best strategy that most of the existing literatures on the impact of FSSAP on female education employ. In contrast, this study uses an identification strategy that exploits geographical variation in FSSAP coverage.

This paper aims to answer three questions; i) what are the impacts of these two policies on women's educational attainment?; ii) what impacts do they have on their age of marriage?; and iii) what is their impact on the labor force participation of married women? We use the Demographic and Health Surveys (DHS, 2007) to investigate these questions. Since DHS covers only married women, we focus our analysis on the impacts of these policies for married women. Although the estimates of this study are applicable to only married women, the external validity of our estimates is quite robust, given that the majority of women get married by their early 20s. In fact, 84 percent of 23 years old women are married and 93 percent of women aged 23 to 34 are married, according to the 2010 HIES. However, it should be noted the potential bias arising from the married women sample if more educated women or working women marry late. Under these conditions, the impacts would be underestimated.

3. Impact of Free Tuition and FSSAP on Years of Education

3.1 Trend in Educational Attainment and Age of Marriage

We first present descriptive statistics on the years of education and the age of marriage across age cohorts and by rural and urban categories. Note that rural and urban are categorized based on the hometown of respondents, not on their current residence. Because both the free tuition and the FSSAP have been implemented in rural areas, we would expect the years of education for the eligible rural age cohorts to increase more than those of their urban counterparts. Women born in 1976 and who lived in rural areas are the oldest cohort eligible for the free tuition whereas women who were born in 1979 and lived in rural areas are the oldest cohort eligible for the FSSAP. As we can see in Figure 1, the average number of years of education of women who were born in 1976 or later and lived in urban areas (post control group) has been declining for the

younger cohort while women who were born in 1976 or later but lived in rural areas (post treatment group) exhibit an upward trend in years of education. In the meantime, for both urban and rural cohorts, the average number of years of education of the age cohorts born before 1976 (pre control and treatment groups) had been increasing. Similarly, a graph is shown for the age of marriage, in Figure 1. Before we draw any implication from this graph, caution should be exercised because the sample is restricted to married women or men. We would then expect to see the age of marriage declines as the cohort becomes younger, even if the trend is in fact going in the opposite direction. The age of marriage, for the post control group, has declined while the age of marriage, for the post treatment group has, overall, remained constant except for the far right tale of the age distribution (between 18 and 20).

We provide the same statistics for men, as shown, in Figure 2. There has been a marginally declining trend in years of education, for the urban male cohort, compared to the rural male cohort. However, the gap between urban and rural cohorts does not seem to decrease dramatically, except for the very young cohorts (age18-20). There are spikes in the trend for very young cohorts because of the small sample size originating from the fact that men marry at an older age compared to women. In terms of age of marriage, there is a declining trend, perhaps due to sample selection; however, there is little difference in trend between urban and rural cohorts.

In the next subsection, we discuss the identification strategy for the impact of both the free tuition and the FSSAP policies on the years of education and the age of marriage.

3.2 Identification Strategy

We estimate the impact of the free tuition policy and the FSSAP on educational attainment through difference-in-difference based on geographical and birth cohort using the eligibility rule described in Table 2. The eligibility rule is based on birth year corresponding grade in 1990 and 1994. Four different birth cohorts have been defined: the pre-policy cohort comprises women born before 1976; the free tuition policy cohort is made of women born between 1976 and 1978; the grade 9-10 stipend cohort includes women born between 1979 and 1981; and finally, the grade 6-10 stipend cohort is composed of women born after 1981. Using the following specification, we identify the effect of each policy on women's years of education as well as their age of marriage.

$$Y_i = \delta_1 1(FreeTuition) \times Rural_i + \delta_2 1(Stipend, Gr9-10) \times Rural_i + \delta_3 1(Stipend, Gr6-10) \times Rural_i + \delta_4 1(FreeTuition) + \delta_5 1(Stipend, Gr9-10) + \delta_6 1(Stipend, Gr6-10) + \delta_7 Rural_i + \phi g(age_i) + v_i$$

--- Equation 1

The outcome variables are the years of education and the age of marriage. $1(FreeTuition)$ indicates whether a woman belongs to the free tuition policy birth cohort, $1(Stipend, Gr9-10)$ a dummy for whether a woman is the grade 9-10 stipend birth cohort, and $1(Stipend, Gr6-10)$ is the indicator for grade 6-10 stipend birth cohort. These birth cohort indicator variables are interacted with $Rural_i$ variable, indicating whether a woman lived in rural areas, at least up to the secondary school entry age (age of 10).[5] The coefficients of these interaction terms show the effect of each policy: δ_1 captures the effect of the free tuition policy, δ_2 that of the grade 9-10 stipend, and δ_3 that of the grade 6-10 stipend program. The comparison group is the birth cohort born before the implementation of any gender targeted policy. Eligible age cohorts for each policy are determined according to the schooling age in the Bangladesh education system. We assume one year delay in school entry, based on the mean age of children in each grade in the 1990s (Appendix Table 2). Since the analysis is based on the eligibility criteria to treatment (policy) rather than actual treatment, the effects are interpreted as intent-to-treatment (ITT) effects. The age function ($g(age_i)$) is included in the regression to capture the trend in educational attainment or age of marriage, which could have existed even without any policy interventions, due to, for instance, the overall improvement of the education system. We assume that, however, there is no exogenous factor affecting the urban and rural cohorts differentially other than the free tuition policy and the FSSAP. We estimate Equation 1 using three different functional forms ($g(age_i)$): a linear function, a quadratic age function, and a piece-wise linear function.[6]

In addition, sensitivity analysis using regression discontinuity (RD) is conducted by restricting the analysis sample to women aged 23 to 34. This assumes the age cohorts near the age cut-off of each policy are similar in most characteristics, so that any difference in outcomes can be

[5] Two variables are used to create this dummy. One is the duration of current residence and the other is the place where the sampled women migrated from, prior to their current residence.

[6] $g(age_i) = \rho_0(age_i - 34) \times 1(age_i <= 34) + \rho_1 age_i \times 1(age_i > 34)$

attributed to the policy. The estimates would be more precise when the treatment group (e.g., younger cohorts) is comparable to the control group (e.g., older cohorts), which would minimize the potential bias arising from time-varying factors correlated with urban and rural difference in outcomes other than the policy of interest. It is a fuzzy regression discontinuity in that some older cohorts were treated by the policies due to delayed school entry or grade repetition. We use the age of the cohort which lies between the age of the cohort almost definitely treated and the age of the cohort most unlikely to be treated by the policies, as the age eligibility cut-off in the regression discontinuity design. Being a specific age, at the year of policy change, increases the chance of receiving free tuition or stipend, hence leads to a jump in educational attainment between non-eligible cohorts and eligible cohorts. In this sense, the estimate captures an intent-to-treatment effect.

Finally, since the primary effects of both programs would lie at the secondary level of education, we restrict the sample to the women who completed at least primary education.[7] If there is any positive spill-over effect of these programs on primary education (e.g., female students are more likely to finish primary education anticipating the given opportunity to continue their education in secondary school), then restricting the sample may introduce a selection bias. It is, however, shown that this is not the case: there is no effect of these programs on primary level education (Table 5). Next, we discuss the results using the restricted sample, and then present them using the full sample.

3.3 Result

Table 3 shows the impact of the policy on the years of education using birth cohorts ineligible for both the free tuition policy and the FSSAP, as a control group. The first group includes women of all educational levels. Panel A uses a sample of married women born between 1989 and 1968 (aged 18 to 39 in 2007), and Panel B uses a sample of women born between 1984 and 1973 (aged 23 to 34 in 2007) in order to make more comparable the control and treatment age cohorts and to remove potential bias originating from time-varying omitted variables. The coefficient of the first row measures the impact of the free tuition policy whereas the second and the third row measure the impact of the grade 9-10 stipend program and that of the grade 6-10 stipend program, respectively. The results from Panel A indicate that the free tuition policy did not significantly

[7] Black, Devereux, and Salvanes (2005) also restrict their sample to more policy relevant population whom the reform might have affected the most.

raise the education level of women. The grade 9-10 stipend program, on the other hand, raised women's education by 1.7 years while the grade 6-10 stipend program increased women's education by 2 years compared to a no policy case. The effects are statistically significant and robust regardless of the functional form of age that controls for the underlying educational trend over time. The estimates using Panel B show similar results, however, the sizes of the coefficients are slightly smaller. They correspond to about 1.8 years increase due to the stipend programs. Since both the free tuition and stipend programs only targeted secondary school female students, there should be little impact of the programs on women who had not finished primary education. With the sample of women who completed more than 5 years of education, the results confirm the earlier findings that the female stipend programs have contributed to raising women's education level but the free tuition program did not.

Table 4 shows the impact of both programs on women's age of marriage. Similar to their impacts on the years of education, the free tuition program has not significantly increased the age of marriage while the stipend programs have led to an increase in the age of marriage by about 1.5 years. It is interesting to note that the size of the effect on the age of marriage is almost the same as that on the years of education. This is a sensible result given that marriage is one of the main reasons for girls dropping out of school (Mahmud and Amin, 2006) while the female stipend programs intended for girls to stay in school and remain unmarried. The results are again robust to various model specifications and the size of the impacts is slightly larger for women with more than 5 years of education completed.

In order to test whether these increases in education attainment or in age of marriage are actually induced by the female secondary education policies during this period rather than by an overall improvement of the educational system or/and by the change in perception about women's role in society or by female emancipation movements, we estimate the impact of the policies on the years of education for women with less than grade 5 level of education. If there were differential improvement in the education system in rural areas, primary schooling would also have gone up, however, there is no evidence suggesting this. There is no significant increase in primary schooling years for the free tuition eligible women and there is slight but not significant decrease in primary schooling years for the stipend program eligible women (Table 5). In terms of age of marriage, there is little change in the age of marriage, for the free tuition eligible women, while we observe insignificant increase in the age of marriage, for the grade 9-10 stipend eligible

women, and insignificant decrease in the age of marriage, for the grade 6-10 stipend eligible women.

The educational trend of men is another counterfactual that would not have been affected by the female education policies. There is, however, evidence suggesting that the female stipend programs may have adversely affected boy's education (Fuwa, 2001; Asadullah and Chaudhury, 2009). Moreover, men are not subject to the cultural barriers facing women regarding education or marriage. Therefore, we did not use men as a comparison group; instead, we investigate whether these programs have indeed adversely affected men's educational attainment. Table 6 shows that this is not the case; the number of years of education of male corresponding cohort of female stipend programs did not decrease, rather, it increased but insignificantly. In terms of marriage, the result from Panel A indicates that the grade 6-10 stipend program has increased the age of marriage for men. Unlike the years of education, the age of marriage, for men, would have been indirectly affected. Given that marriage involves both men and women, increasing the age of marriage of women would lead to increased age of marriage, for men. However, the restricted sample, in Panel B, does not show any significant effects of these programs.

In the next section, we estimate the effect of education on women's labor market outcomes through the female secondary school policies in Bangladesh.

4. Effect of Education on Women's Labor Force Participation

4.1. Education and Women's Labor Force Participation

Labor force participation is likely to increase as the level of education rises, due to the increased opportunity cost of not working. However, the relationship between labor force participation and education for women can be U-shaped. At much lower levels of education, women's labor force participation decreases with additional years of education since they have to work to meet the subsistence level of consumption. Above the subsistence level of consumption, the low returns to upper low to middle levels of education do not compensate for the opportunity cost of working. Therefore, it would be optimal not to work if the returns to schooling do not exceed the opportunity cost of working, for women engaged in household work. However, after reaching the educational attainment for which the returns to schooling are higher than the opportunity cost of working, the likelihood of working becomes an increasing function of the education level as the returns to schooling are increasing with higher levels of education (Kingdon and Unni). This

pattern is shown in Figure 3 and the threshold of increasing labor force participation with higher education is shown to be around 10 years of schooling completed. For women with less than 10 years of education (secondary education), the probability of working is negatively associated with years of education. However, after having acquired some years of education, women's probability of working rises as their education level increases. This suggests that education is likely to have a significant influence on the employment status of women only after a certain level of education has been achieved (e.g. grade 10 completion). Nevertheless, it is worth observing that, this slope could be biased. Specifically, it could be biased upward if more active women in society tend to invest more in education. Alternatively, it could be biased downward if families value women's education more as a vehicle for better assortative mating; therefore, inducing women not to work outside home.

Ordinary Least Square (OLS) estimates are presented in Table 7. They show that labor force participation of all married women aged 18 to 49 would decrease with the number of years of schooling and this negative relationship is stronger for women aged 23 - 34. This pattern has been documented in existing literatures that look at the relationship between education and labor force participation of South Asian women (Kingdon and Unni, 2001; Das and Desal, 2003). On the other hand, when we restrict the sample to women with at least 5 years of education completed, the negative relationship between years of education and women's probability of working vanishes. Notably, when we exclude women of lower levels of education from the sample, the relationship is no longer negative. However, OLS results could be biased if there are unobserved characteristics correlated with both education attainment and labor force participation, such as, ability, women's family background, and traditional values regarding women's roles in society. In the next sub-section, we discuss the identification strategy to estimate the impact of education on women's labor force participation by employing the FSSAP and free tuition policies as IVs.

4.2. Identification Strategy

The focus of this study is to estimate the effect of the years of education on labor force participation of married women who were affected by the two policies described in the earlier section. The impact of education (S_i) on labor market outcome (Y_i) can be estimated using the following specification.

$Y_i = \alpha + \beta S_i + \gamma' X_i + \varepsilon_i$ --- Equation 2

Y_i is the probability of working, S_i represents the number of years of education and X_i is a vector of individual characteristics such as age, wealth quintile, and rural dummy of residence. The equation is estimated based on the linear probability regression, and β shows the impact of the years of education on labor market outcome. As we discussed earlier, in the OLS results section, if there is unobserved individual heterogeneity correlated with labor market outcome (e.g., ability, family background, societal value on women's education, and ($cov(S_i, \varepsilon_i) \neq 0$), then the estimates will be biased.

We use the free tuition policy and the FSSAP as instrumental variables (IV) to identify the effects of education. The first stage regression for IV estimates is based on the regression estimating the impact of these policies on years of education from the earlier section (Equation 1). In order to evaluate the long-term impacts of the free tuition and FSSAP on labor market outcome through education, we estimate Equation 2 using four different sets of sample, as described in the earlier section.

$$Y_i = \beta_0 + \theta S_i + \beta_1 1(FreeTuition) + \beta_2 1(Stipend, Gr9-10) + \beta_3 1(Stipend, Gr6-10) + \beta_4 Rural_i + \tau g(age_i) + \pi' X_i + \varepsilon_i$$

- Second Stage Regression

$$S_i = \delta_1 1(FreeTuition) \times Rural_i + \delta_2 1(Stipend, Gr9-10) \times Rural_i + \delta_3 1(Stipend, Gr6-10) \times Rural_i + \delta_4 1(FreeTuition) + \delta_5 1(Stipend, Gr9-10) + \delta_6 1(Stipend, Gr6-10) + \delta_7 Rural_i + \phi g(age_i) + \lambda' X_i + v_i$$

- First Stage Regression

The instruments (Z_i) that are excluded in the second stage regression are the first three terms of the first stage regression, indicating that the eligibility of each policy is based on age and geographical region where a person grew up. Instrumental variables should affect the labor market outcome only through influencing the level of education (orthogonality condition, $E[\varepsilon_i \mid Z_i, X_i] = E[\varepsilon_i \mid X_i] = 0$). In case there are both rural specific time trend in education and non-linear age effects on labor market outcomes, this orthogonality condition is likely to be violated, therefore, we include an age function ($g(age_i)$) in the regressions. In addition, other

characteristics that might affect women's labor force participation decision such as wealth quintile and rural residency are controlled for in the regressions.

This IV estimator ($\widehat{\theta}$) can be interpreted as the impact of education on married women's labor market outcome, among those individuals who changed their schooling behavior as a result of the free tuition and FSSAP policies (policy compliers, *heterogeneous return*, Blundell et al, 2005; *local average treatment effect* (LATE), Imbens and Angrist, 1994).

4.3. Result

Contrary to the OLS estimates of the same samples, the years of education and the probability of working are no longer negatively related, for women of all education levels (cf. Panels A and B of Table 8). This may be due to the fact that the target groups of the policy interventions used for the identification of the schooling impacts are primarily secondary school students, as the variation of IV estimates mainly originates from the sample of women with at least some secondary education or who completed grade 10. In Figure 3, it is shown that, at some secondary or higher level of education, there is a non-negative relationship between years of education and labor force participation. The Panel B estimates, compared to Panel A estimates, have coefficients larger in magnitude, with large standard errors. This may be due to the smaller sample size, which could lead to weaker IVs (F-stat of 5.3 for Panel B vs. 13.94 for Panel A). In order to improve the efficiency of the IV estimates[8], we restrict the sample to women who would most likely have been affected by the policies, i.e., women with at least 5 years of education.

Results from Panel A, for women with at least 5 years of education, show that one additional year of schooling does increase the probability of working by 5 percent (Table 8). This is a substantial impact, in the Bangladesh context, where only 27 percentage of married women work outside of home. These IV estimates are specific to the compliers of the policies (i.e., women who attended secondary school because of the free tuition and stipend programs). When we restrict the sample to women of age 23-34, however, the estimates become imprecise while the magnitude of the coefficients slightly decreases. Likewise, the large standard errors may be due to the small sample size and weaker IVs. To sum up, one additional year of education leads to between 2.4 and 5.3

[8] Black, Devereux, Salvanes (2005) employed similar strategy in order to estimate intergenerational education transmission.

percent increase in women's labor force participation. Based on these results, the policy impact of FSSAP on women's labor force participation rate falls between 3.6 and 10.6 percent, considering that the FSSAP led to an increase in women's education attainment by 1.5 to 2 years of schooling.

5. Conclusion and Discussion

This study finds that the gender targeted conditional cash transfer program implemented in 1994 in Bangladesh has contributed to raising women's years of education by 1.6 to 2 years while the free tuition policy did not lead to any significant impact on their education attainment. However, unlike existing literatures, which suggest negative effect of female secondary stipend program on boys' school enrollment, we do not find any decrease in boys' years of education due to the program. Furthermore, the stipend program has led to an increase in the age of marriage of women by 1.4 to 2.3 years whereas some evidence suggests that the age of marriage of men has gone up as a result of the stipend program. We have also provided evidence that increased female education through gender targeted education policy leads to an increase in the labor force participation of married women. In particular, one additional year of education leads to between 2.4 and 5.3 percent increase in labor force participation of married women.

This study contributes to the existing literatures by documenting, for the first time, the long term impacts of gender targeted education policies. Furthermore, this paper evaluates, not only the impacts of these policies on years of education and women's labor force participation, but it also investigates the extent to which they have led to delayed marriage for women, with potentially non negligible benefits for educated women as well as for the Bangladesh economy and society at large. The third contribution of the paper lies in the identification strategy which goes beyond correlation studies to establish the causal impacts of these programs by exploiting variations in birth cohorts and geographical coverage of FSSAP program. In South Asia, it is well documented that there is a negative relationship between education and female labor force participation, especially at lower levels of education. This paper suggest that, in order to improve the economic participation of women in society, policies promoting higher level of education for girls should be implemented, as they would generate the intended impacts. However, policies focusing exclusively on providing basic education would not produce the direct economic benefits for households and society at large, although some indirect benefits such as better child health and education could stem from them. While the impacts of demand side interventions such

as the female tuition and stipend policies on female labor force participation are solidly established, through our study, it is worth bearing in mind that, this increased female labor participation would unlikely occur, in the absence of growing economic opportunities in the country. In particular, the needs of a rapidly growing garment industry in which over 85 percent of the workers are female, are being met by the increased supply of educated female workers whose returns to education and opportunity cost of not working have substantially increased due to the gender targeted education policies of the 1990s. One area of future research would be to combine supply and demand side interventions to unpack their relative impacts on education and labor market outcomes.

References

Angrist D. and Bettinger E., and Kremer M. "Long-Term Educational Consequences of Secondary School Vouchers: Evidence from Administrative Records in Colombia", *American Economic Review*, 2006, 96(3)

Angrist, D. "The Economic Returns to Schooling in the West Bank and Gaza Strip." *American Economic Review*, 1995, 85(5), pp. 1065–87.

Arends-Kuenning M and Amin S. "Women's capabilities and the right to education in Bangladesh." *Int J Pol Cult Soc*, 2001,15, pp.125-42.

Asadullah N. and Chaudhury N., "Reverse Gender Gap in Schooling in Bangladesh: Insights from Urban and Rural Households", *Journal of Development Studies*, 2009, 45(8), pp. 1360–1380.

Barrera-Osorio F., Linden L., and Urquiola M., "The Effects of User Fee Reductions on Enrollment, Evidence from a quasi-experiment", The World Bank, 2007.

Black S.E., Devereux P.J, and Salvanes K.G. "Why the Apple Doesn't Fall Far: Understanding Intergenerational Transmission of Human Capital", *American Economic Review*, 2005, 95(1), pp. 437-449

Card D. "The Causal Effect of Education on Earnings", *Handbook of labor Economics.* Amsterdam: North-Holland, 1999, pp. 1802– 63.

Das M. and Desai S., "Why are educated women less likely to be employed in India? Testing Competing Hypotheses", The World Bank, 2003, Social Protection Discussion Papers No. 0313

Duflo E. "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment", *American Economic Review*, 2001, 91(4).

Filmer D., "Equity in Education: What is holding countries back? Girl's education in 21st Century", The World Bank, 2008.

Fuwa N. "The Net Impact of the Female Secondary School Stipend Program in Bangladesh", MPRA working Paper, 2001, No. 23402.

Glick P., "What Policies will Reduce Gender Schooling Gaps in Developing Countries: Evidence and Interpretation," *World Development*, 2008, 36(9): 1623-1646

Heath R. and Mobarak M., "Supply and Demand Constraints on Educational Investment: Evidence from Garment Sector Jobs and the Female Stipend Program in Bangladesh", Working Paper, 2012

Jensen R. "Do Labor Market Opportunities after Young Women's Work and Family Decisions? Experimental Evidence from India", *The Quarterly Journal of Economics*, 2012

Jensen R. and Thornton R. "Early female marriage in the developing world", In Gender, Development and Marriage, Caroline Sweetman, ed. Oxfam GB, Oxford, UK, 2003

Kingdon G. and Theopold N. "Do returns to education matter to schooling participation", Global Poverty Research Group, 2008, Working Paper Series-052.

Kingdon G.G. and Unni J. "Education and Women's Labour Market Outcomes in India", *Education Economics*, 2001, 9:2, 173-195

Khandker, S. R., Pitt, M. M., and Fuwa, N. "Subsidy to Promote Girls' Secondary Education: The Female Stipend Program in Bangladesh". Washington, DC: The World Bank, 2003.

Kremer M., Miguel E., and Thornton R. "Incentives to Learn", NBER Working Paper, 2004, No. 10971.

Liang X. "Bangladesh: Female Secondary School Assistance Program", Washington, DC: The World Bank, 1996.

Mahmud S. and Amin S., "Girls' Schooling and Marriage in Rural Bangladesh", in Emily Hannum, Bruce Fuller (ed.) Children's Lives and Schooling across Societies (Research in the Sociology of Education, Volume 15), Emerald Group Publishing Limited, 2006, pp.71-99

Munshi K. and Rosenzweig M., "Traditional Institutions Meet the Modern World: Caste, Gender, and Schooling Choice in a Globalizing Economy", *American Economic Review*, 2006, 96(4): 1225–1252

Patrinos H. “Chapter 3: Returns to Education: The Gender Perspective”, World Bank: Girls’ Education in the 21st Century, 2008.

Psacharopoulos G. “Returns to Investments in Education: A Global Update.”, *World Development*, 1994, 22(9), pp. 1325-43

Qian N. “Missing Women and the Price of Tea in China: The Effect of Sex-Specific Earnings on Sex Imbalance”, *The Quarterly Journal of Economics*, 2008, 123(3): 1251-1285

Raj A., Saggurti N., Winter M., Labonte A., Decker M.R, Balaiah D., and Silverman J.G. “The effect of maternal child marriage on morbidity and mortality of children under 5 in India: cross sectional study of a nationally representative sample”, BMJ 2010;340:b4258

Raynor J. and Wesson K. “The Girls’ Stipend Program in Bangladesh.” *Journal of Education for International Development*, 2006, 2:2.

Sahn D. and Glick P., “Schooling of Girls and Boys in a West African Country: The Effects of Parental Education, Income, and Household Structure”, *Economics of Education Review*, 2000, 19(1):63–87.

Schurmann A. “Review of the Bangladesh Female Secondary School Stipend Project Using a Social Exclusion Framework”, *Health Popul Nutr*, 2009, 27(4), pp. 505-517

World Bank. “Bangladesh Female Secondary School Assistance Project (Credit 2649)”, World Bank Project Performance Assessment Report, Washington DC, 2003.

--- “Whispers to Voices: Gender and Social Transformation in Bangladesh”, Washington DC, 2007

--- World Development Report, Gender, 2012

Figure 1. Years of Education and Age of Marriage across age cohorts by urban and rural, Women

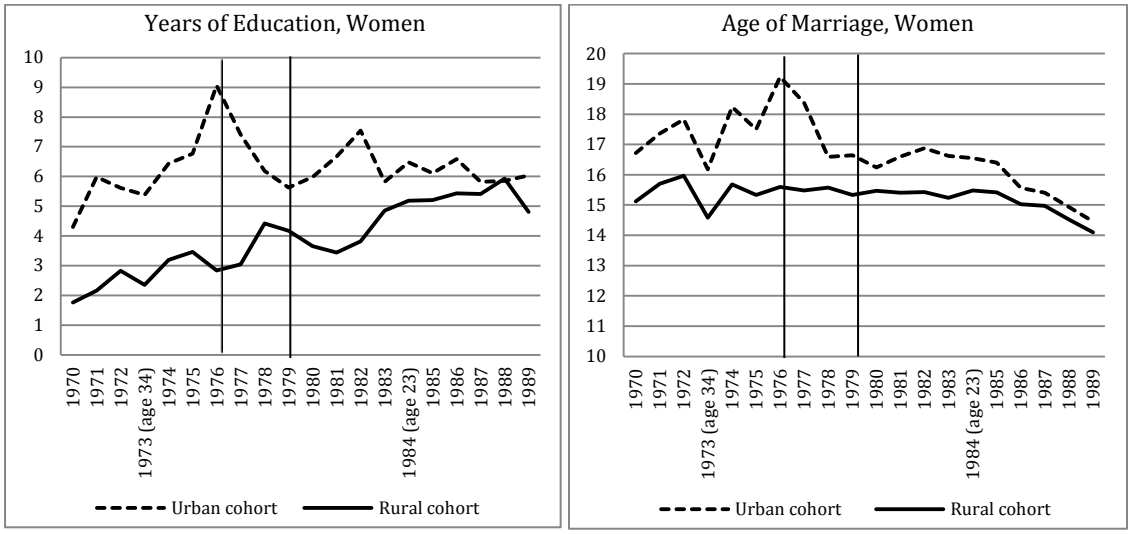


Figure 2. Years of Education and Age of Marriage across age cohorts by urban and rural, Men

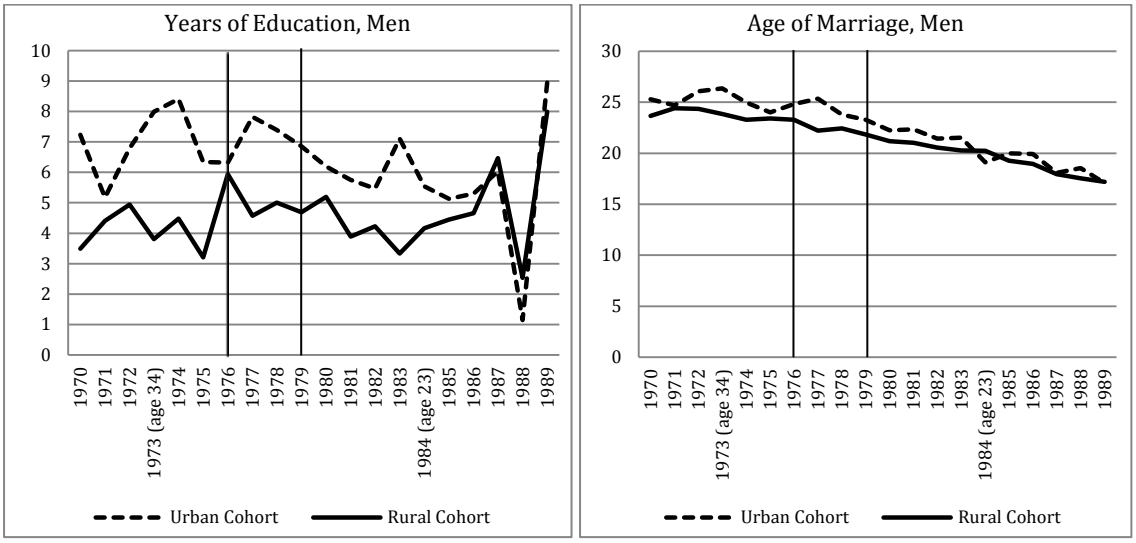
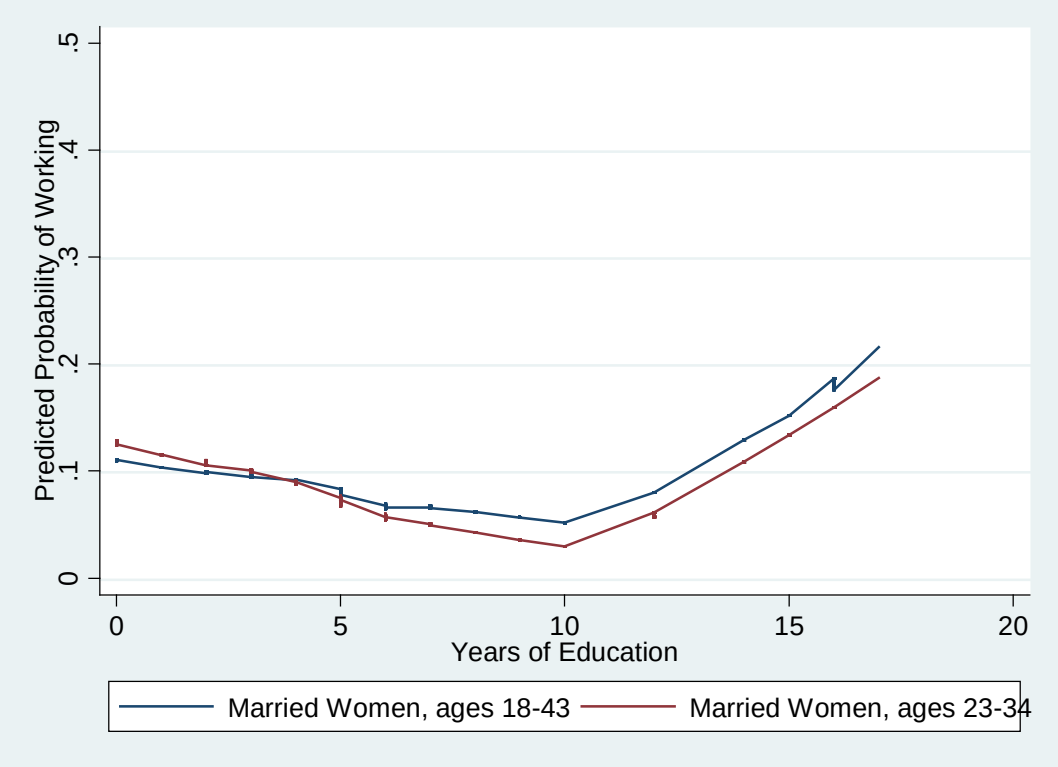


Figure 3. Years of Education and Probability of Working



Note: Age, age squared, wealth quintile and geographical residence are controlled.

Table 1. Stipend and Tuition Rate in Taka

Grade in 1994	Monthly Stipend	Book Allowance	Monthly Tuition Subsidy to school	Exam Fee	Starting year
6	25	15	10		Jan, 94
7	30	15	12		Jan, 95
8	35	15	12		Jan, 96
9	60	20	15	250	Jan, 94
10	60	20	15	250	Jan, 95

Source: World Bank Project Performance Assessment Report, 2003 (Credit 2469).

Table 2. Eligibility Cohort for Female Tuition and Stipend Program

Grade		Age		Eligible cohort for free tuition,	Eligible cohort for stipend program,	
in 1990	in 1994	in 2007	Birth year	Grade 6 to 8	Grade 6 to 8	Grade 9 to 10
11		34	1973	NE	NE	NE
10		33	1974	NE	NE	NE
9		32	1975	NE	NE	NE
8	**12**	**31**	**1976**	**E**	**NE**	**NE**
7	11	30	1977	E	NE	NE
6	10	29	1978	E	NE	NE
5	**9**	**28**	**1979**	**E**	**NE**	**E**
4	8	27	1980	E	NE	E
3	7	26	1981	E	NE	E
2	**6**	**25**	**1982**	**E**	**E**	**E**
1	5	24	1983	E	E	E
	4	23	1984	E	E	E

Note: E stands for eligible cohort and NE refers to the non-eligible cohort.

Table 3. Impact of free tuition and FSSAP on years of education

	Panel A: Age 18-49			Panel B: Age 23-34		
	(1)	(2)	(3)	(4)	(5)	(6)
Women of all education level						
Free tuition x rural cohort	0.520	0.487	0.465	0.738	0.803	0.822
	(0.621)	(0.621)	(0.621)	(0.749)	(0.747)	(0.746)
Stipend (grade 9-10) x rural cohort	1.678***	1.599***	1.578***	1.870***	1.873***	1.884***
	(0.495)	(0.492)	(0.491)	(0.611)	(0.610)	(0.610)
Stipend (grade 6-10) x rural cohort	2.042***	1.985***	1.965***	1.831***	1.884***	1.889***
	(0.388)	(0.388)	(0.388)	(0.604)	(0.604)	(0.604)
Age function	no	linear	quadratic	no	linear	quadratic
N	5860	5860	5860	3290	3290	3290
Women with at least 5 years of education						
Free tuition x rural cohort	0.450	0.439	0.535	0.666	0.659	0.674
	(0.621)	(0.622)	(0.618)	(0.674)	(0.673)	(0.675)
Stipend (grade 9-10) x rural cohort	1.565***	1.554***	1.649***	1.830***	1.823***	1.838***
	(0.484)	(0.485)	(0.475)	(0.561)	(0.562)	(0.563)
Stipend (grade 6-10) x rural cohort	1.859***	1.852***	1.970***	1.999***	1.992***	2.007***
	(0.403)	(0.403)	(0.398)	(0.548)	(0.547)	(0.551)
Age function	no	linear	quadratic	no	linear	quadratic
N	2946	2946	2946	1568	1568	1568

Sample: Variables included in the regression but not shown are age cohort dummies of each policy, rural hometown dummy, rural residence dummy, and wealth quintile dummies. Standard errors are clustered at the primary sampling unit. Standard errors are clustered at the primary sampling unit. Significant at 1% level (***), significant at 5% level (**), significant at 10% level (*)

Table 4. . Impacts of free tuition and FSSAP on age of marriage

	Panel A: Age 18-49			Panel B: Age 23-34		
	(1)	(2)	(3)	(4)	(5)	(6)
Women of all education level						
Free tuition x rural cohort	0.304	0.324	0.262	0.346	0.345	0.365
	(0.578)	(0.577)	(0.578)	(0.655)	(0.656)	(0.655)
Stipend (grade 9-10) x rural cohort	1.532***	1.582***	1.522***	1.554***	1.553***	1.566***
	(0.451)	(0.453)	(0.450)	(0.531)	(0.531)	(0.530)
Stipend (grade 6-10) x rural cohort	1.432***	1.468***	1.413***	1.105**	1.104**	1.110**
	(0.375)	(0.375)	(0.371)	(0.519)	(0.518)	(0.518)
Age function	no	linear	quadratic	no	linear	quadratic
N	5882	5882	5882	3303	3303	3303
Women with at least 5 years of education						
Free tuition x rural cohort	0.433	0.336	0.476	0.296	0.280	0.338
	(0.837)	(0.838)	(0.834)	(0.906)	(0.905)	(0.902)
Stipend (grade 9-10) x rural cohort	2.108***	2.010***	2.148***	1.991***	1.977***	2.034***
	(0.644)	(0.650)	(0.635)	(0.725)	(0.724)	(0.717)
Stipend (grade 6-10) x rural cohort	2.170***	2.112***	2.284***	1.926***	1.910***	1.970***
	(0.570)	(0.574)	(0.561)	(0.680)	(0.678)	(0.674)
Age function	no	linear	quadratic	no	linear	quadratic
N	2968	2968	2968	1581	1581	1581

Note: Variables included in the regression but not shown are age cohort dummies of each policy, rural hometown dummy, rural residence dummy, and wealth quintile dummies. Standard errors are clustered at the primary sampling unit. Significant at 1% level (***), significant at 5% level (**), significant at 10% level (*).

Table 5. Falsification Test 1: Women with less than 5 years of education

	Years of Education			Age of Marriage		
	(1)	(2)	(3)	(4)	(5)	(6)
Free tuition x rural cohort	0.345	0.346	0.325	0.006	-0.003	-0.026
	(0.376)	(0.376)	(0.373)	(0.729)	(0.727)	(0.723)
Stipend (grade 9-10) x rural cohort	-0.160	-0.160	-0.171	0.081	0.082	0.071
	(0.356)	(0.357)	(0.354)	(0.697)	(0.697)	(0.694)
Stipend (grade 6-10) x rural cohort	-0.110	-0.108	-0.103	-0.789	-0.797	-0.792
	(0.357)	(0.358)	(0.355)	(0.656)	(0.654)	(0.654)
Age function	no	linear	quadratic	no	linear	quadratic
N	1722	1722	1722	1722	1722	1722

Note: Regression uses Panel A sample. Variables included in the regression but not shown are age cohort dummies of each policy, rural hometown dummy, rural residence dummy, and wealth quintile dummies. Standard errors are clustered at the primary sampling unit. Significant at 1% level (***), significant at 5% level (**), significant at 10% level (*).

Table 6. Falsification Test 2: Impacts on Men's education and age of marriage

	Panel A: Age 18-49			Panel B: Age 23-34		
	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.: Years of Education						
Free tuition x rural cohort	0.043	0.016	0.016	0.519	0.527	0.547
	(0.620)	(0.620)	(0.620)	(0.779)	(0.779)	(0.779)
Stipend (grade 9-10) x rural cohort	0.103	0.077	0.077	0.558	0.569	0.597
	(0.512)	(0.511)	(0.510)	(0.688)	(0.685)	(0.686)
Stipend (grade 6-10) x rural cohort	0.472	0.447	0.447	0.394	0.403	0.443
	(0.437)	(0.438)	(0.438)	(0.678)	(0.678)	(0.682)
Age function	no	linear	quadratic	no	linear	quadratic
N	3765	3765	3765	1248	1248	1248
Dep. Var.: Age of Marriage						
Free tuition x rural cohort	0.036	0.013	0.018	-0.669	-0.646	-0.637
	(0.453)	(0.454)	(0.452)	(0.583)	(0.582)	(0.582)
Stipend (grade 9-10) x rural cohort	0.428	0.405	0.415	-0.311	-0.276	-0.263
	(0.411)	(0.411)	(0.404)	(0.587)	(0.578)	(0.579)
Stipend (grade 6-10) x rural cohort	1.029***	1.006***	0.968***	0.210	0.245	0.262
	(0.367)	(0.371)	(0.346)	(0.570)	(0.569)	(0.570)
Age function	no	linear	quadratic	no	linear	quadratic
N	3770	3770	3770	1251	1251	1251

Note: Variables included in the regression but not shown are age cohort dummies of each policy, rural hometown dummy, rural residence dummy, and wealth quintile dummies. Standard errors are clustered at the primary sampling unit. Significant at 1% level (***), significant at 5% level (**), significant at 10% level (*).

Table 7. OLS: Education and Labor Force Participation

	All Sample		Women with at least 5 years of education	
	Age 18-49	Age 23-34	Age 18-49	Age 23-34
Years of Education	-0.003**	-0.006***	0.004	0.003
	(0.002)	(0.002)	(0.003)	(0.003)
N	5860	3290	3392	1805

Note: Variables included in the regression but not shown are age, age squared, rural hometown dummy, rural residence dummy, and wealth quintile dummies. Standard errors are clustered at the primary sampling unit. Significant at 1% level (***), significant at 5% level (**), significant at 10% level (*).

Table 8. IV: Impact of education on married women's labor force participation, full sample

	Panel A: Age 18-49			Panel B: Age 23-34		
	(1)	(2)	(3)	(4)	(5)	(6)
Women of all education level						
years of education (IV)	0.024	0.025	0.024	0.031	0.031	0.030
	(0.016)	(0.016)	(0.016)	(0.025)	(0.025)	(0.025)
Age function	no	linear	quadratic	no	linear	quadratic
F-stat (excluded variables)	13.94	13.45	13.28	5.30	5.34	5.34
N	5860	5860	5860	3290	3290	3290
Women with at least 5 years of education						
years of education (IV)	0.053**	0.053**	0.052**	0.044	0.045	0.045
	(0.024)	(0.024)	(0.023)	(0.030)	(0.030)	(0.030)
Age function	no	linear	quadratic	no	linear	quadratic
F-stat (excluded variables)	11.76	11.68	13.44	6.89	6.88	6.95
N	2946	2946	2946	1568	1568	1568

Note: Variables included in the regression but not shown are age cohort dummies of each policy, rural hometown dummy, rural residence dummy, and wealth quintile dummies. Standard errors are clustered at the primary sampling unit. Significant at 1% level (***), significant at 5% level (**), significant at 10% level (*).

Appendix B: Table

Appendix Table 1. Coverage of Female Stipend Program

Year	Total No. Secondary School (excl. Madrasah)	No. of Institution received stipend (incl. Madrasah)	No. of female students received stipend
1994	11,488	12,713	70,886
1995	12,012	14,119	1,409,382
1996	12,978	16,722	2,300,062
1997	13,778	17,847	2,825,350
1998	14,518	18,721	3,198,559
1999	15,460	18,788	3,564,404
2000	15,720	19,919	3,961,194
2001	16,166	21,027	4,191,058
2002	16,562	22,893	4,193,352
2003	17,386	23,719	3,467,123
2004	18,267	24,950	2,356,856
2005	18,500	25,425	2,270,343

Source: Bangladesh Educational Statistics, 2006

Appendix Table 2. Mean Age by grade in 1995

	Age	
Grade	Mean	Std dev.
1	7.3	2.7
2	8.5	1.8
3	9.7	1.9
4	10.6	2.4
5	11.4	1.7
6	12.3	1.8
7	13.1	1.6
8	14.1	1.7
9	15.3	3.0
10	16.4	2.5

Data source: HIES 1995