# Education, Marriage, and Fertility: Long-Term Evidence from a Female Stipend Program in Bangladesh

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## I. Introduction

Educating girls and young women is an important development objective, reflected, for example, in the United Nations Millennium Development Goals. Motivated by the potential long-term benefits of improving education levels, a number of developing countries have abolished school tuition fees, experimented with compulsory education laws, and/or introduced stipend programs designed to increase educational attainment, particularly for girls. In this study we examine the long-term effects of the Female Secondary School Stipend Program (FSSSP), which was introduced in Bangladesh in 1994 with the objective of improving rural girls' education. The program made secondary education free for girls residing in rural areas and provided a cash stipend for them.

Improved level of female education has been shown to have several positive socioeconomic outcomes. It increases the age of marriage and reduces fertility (Currie and Moretti 2003; Breierova and Duflo 2004). Higher female education increases the opportunity cost of getting married early and having large families, leading women to have fewer children of higher "quality" (Becker and Lewis 1973). Increasing women's education also reduces child mortality and enhances other markers of child health (Strauss and Thomas 1995; Breierova and

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Duflo 2004). It improves knowledge of fertility choices such as contraception use (Kim 2010; Ashraf, Field, and Lee 2014) and leads to better pregnancy behaviors (Grossman 1972).

In addition, higher human capital improves women's labor market options and opportunities outside the household. It provides women with an income stream that is a source of independence from their husbands. Interacting outside the home may also provide additional sources of information on issues such as family planning. Higher level of female education also enhances female autonomy and intrahousehold bargaining power, including contraception use (Anderson and Eswaran 2009; Ashraf 2009; Ashraf et al. 2014). Tipping bargaining power in favor of women has important positive spillovers in that it changes household spending in ways that improve the health outcomes of children (Thomas 1990).

A woman's education is also related to her partner's education through assortative mating (Behrman and Rosenzweig 2002; Lefgren and McIntyre 2006; McCrary and Royer 2011). Given assortative mating, women with more education marry more educated men. Assortative mating, in turn, influences choices about fertility outcomes and infant mortality. For example, assortative mating reduces fertility rates and improves reproductive success (Strauss and Thomas 1995; Lavy and Zablotsky 2011). In this sense, there is general consensus that female education, through broadening labor market opportunities and enhancing female empowerment, promotes economic development (Duflo 2012).

Previous studies have examined the positive long-term effects of an increase in female education on marriage market outcomes (Agüero and Bharadwaj 2014). There is a rich literature in US labor history, in particular, on the role of female education in postponing marriage and improving the socioeconomic position of many women (e.g., see Goldin and Katz 2002). We extend this literature through focusing on a developing country, Bangladesh, that has experienced important demographic changes over the course of the last few decades. The total fertility rate in Bangladesh declined from 3.67 in 1991 to 2.1 children in 2011. There has also been a significant increase in age at marriage of girls. The mean age at marriage of girls increased from 16.2 years old in 1991 to 17.5 years old by 2011 (Bangladesh Bureau of Statistics 2012). The percentage of women aged 20–24 who were married by age 18 decreased from 73.3% in 1994 to 52.3% in 2013. Use of contraception among married women aged 15–49 increased from 40% in 1991 to 61% in 2011. Over the same period, the adolescent fertility rate (births per 1,000 women aged 15–19) decreased from 149 to 87.[1] By examining

[1] Source: World Development Indicators, World Bank (http://data.worldbank.org/data-catalog/world-development-indicators).

the link between the FSSSP and fertility, marriage, and employment outcomes for the woman as well as the characteristics of the men that they marry, this paper aids in understanding these demographic changes.

We compare rural girls who missed the stipend program marginally to those who participated in the program because they met the cut-off age. We define three cohorts with differential levels of treatment intensity. The first cohort is eligible to receive a stipend for 5 years, the second cohort is eligible for 2 years, and the third cohort is ineligible. Since the differences between younger and (slightly) older girls could still drive the results, we use girls of the same age in urban areas, all of whom were ineligible for the stipend program, to control for the cohort effect. We focus on intent-to-treat effects, which rely on a difference-in-differences method, exploiting variation in the geographic concentration and timing of the introduction of the program. We also perform various robustness checks as well as a placebo test to provide further justification for our identification strategy.

Our results show that girls who were eligible for the stipend received 1.2 years additional schooling, representing an average increase of 25% on the mean. Those girls who were eligible for the FSSSP got married on average between 0.11 and 0.17 years later for each year of exposure, desired 3% fewer children, and had fertility rates that were 8%–12% lower than the baseline. We find that eligible girls experienced greater autonomy and better labor market outcomes. In particular, eligible girls were able to make their own decisions about their health care, visit relatives outside of the home, and make their own purchases of household goods. They were more likely to later work in the formal sector rather than in agriculture or the informal sector. In addition, those eligible for the stipend program were more likely to marry highly educated men working in the formal sector, whose ages were closer to their own. Last, the children of eligible women were taller and weighed more for their age than children of ineligible women, which is desirable given that more than 40% of children under the age of 5 years in Bangladesh are stunted and underweight (UNICEF 2009).

Our study extends the literature on the impact of conditional cash transfers (CCT) and stipend programs. Although there have been well-identified studies that show positive effects of CCT programs on education, long-term evidence beyond direct effects on education is still scarce (see Schultz 2004; De Janvry et al. 2006; Attanasio et al. 2010; and Filmer and Schady 2011 for evaluation of CCT programs on education). Short-term evaluation of programs targeting adolescent girls finds large gains associated with improved schooling outcomes. For example, Baird et al. (2010) and Baird, McIntosh, and Özler (2011) examine the effect of cash transfers in Malawi, designed to provide incentives to girls to remain in school, on early marriage, teenage pregnancy, and self-reported

sexual activity.[2] Muralidharan and Prakash (2014) study the impact of providing school-aged girls with funds to purchase a bicycle to ride to school and find a large increase in female enrollment rates in the Indian state of Bihar. We study the effect of the FSSSP almost 2 decades after it was introduced. The FSSSP makes an interesting extension to the literature on CCT and stipend programs. Compared to the CCT programs in Latin America, where they have become common after Mexico's PROGRESA, the FSSSP has been running longer and has been implemented in a poorer context; there were larger gender disparities in enrollment rates at the baseline; and the actual transfers under the FSSSP were smaller than what occurred in Latin America.[3]

There are few studies that have examined the effectiveness of the FSSSP. Khandker, Pitt, and Fuwa (2003) and Schurmann (2009) found a marked pattern of increased enrollments in secondary schools among girls, relative to boys, following the introduction of the program. Hong and Sarr (2012) and Shamsuddin (2015) examined the impact of the FSSSP on age at marriage and various labor market outcomes. These studies found that for girls exposed to the program, age at marriage increased, but labor market outcomes have been mixed. We differ from these studies in important respects. Khandker et al. (2003) and Schurmann (2009) used administrative data on school enrollment with no information about individual and household characteristics. In contrast, we use household survey data with a wealth of information on individuals and households that allow us to examine the program's effect on various outcomes. The survey data enable us to better identify the children eligible for the program and control for socioeconomic characteristics that could influence the outcomes of interest such as education, marriage, fertility, and labor market outcomes of women. With administrative data, it is difficult to identify the effects of the program on these outcomes except education.

We also differ from Hong and Sarr (2012) and Shamsuddin (2015) in that we examine a much wider range of outcomes for girls exposed to the FSSSP.[4] In

[2] Baird et al. (2010, 2011) administer their follow-up survey 12–24 months after the program was introduced.

[3] Cash transfer given to secondary school students was about US$12 per child per month in Colombia, US$25–$32 per child per month in Mexico, and US$17 every 2 months per household in Nicaragua (Rawlings and Rubio 2005). The monthly stipend paid by the FSSSP was less than US$2 in 2001 (World Bank 2003).

[4] Shamsuddin (2015) used the Bangladesh Household Income and Expenditure Survey, while Hong and Sarr (2012) used the 2007 Bangladesh Demographic and Health Surveys (BDHS). In contrast, we use 2004, 2007, and 2011 BDHS data sets. This has the advantage that it enables us to examine a number of outcome variables based on different ages of the cohorts exposed and not exposed to the FSSSP. In addition, in contrast to existing studies, we offer extensive robustness checks as well as a placebo test that checks the assumption of the parallel trend in difference-in-differences methodology.

addition to age at marriage and labor market outcomes, we examine other outcome variables such as fertility, contraception, women's empowerment, spousal outcomes, and child health outcomes. We use more recent data than existing studies on the FSSSP. Use of additional years of data is valuable for examining the long-term implications of the stipend, in particular on fertility and child health outcomes. None of these outcome variables has been examined previously, but each has important implications for understanding demographic changes in Bangladesh. Hence, compared to the existing limited literature for Bangladesh, we provide a more comprehensive evaluation of the medium and long-term implications of the FSSSP.

Overall, our estimates for the effect of the stipend program indicate that an increase in female education can have a significant impact on improving family planning and enhancing gender equality in developing countries. Our results are important given that key indicators of gender inequality such as health are persistent across generations (Bhalotra and Rawlings 2011) and that gender inequality is reinforced by females marrying at a young age, which leads to high rates of fertility and infant mortality (Bhalotra and van Soest 2008). Our findings suggest that a stipend program in a developing country can have large positive socioeconomic outcomes for individuals exposed to the program later in life.

## II. Background and the FSSSP

Primary school in Bangladesh, which spans grades 1 to 5, is free for all and has been compulsory since 1990. Secondary education in Bangladesh begins in grade 6 and ends in grade 10. Higher secondary education consists of grades 11 and 12. While primary school education in rural Bangladesh is dominated by public and NGO-run schools, secondary schools are largely nongovernment or private. At the primary level, about 80% of children in rural areas are enrolled in either public or NGO-run private schools. Nongovernment secondary schools, which are privately managed, receive most of their funding from the government. The government is responsible for meeting 90% of the salary cost of teachers in registered nongovernment schools and also allocates funds for maintenance and improvement of school infrastructure. Students in these secondary schools are required to pay a tuition fee as well as other school fees such as examination fees.

The gender gap in schooling in the early 1990s was large. In 1991, the enrollment rate in primary school was 75% for girls and 85% for boys, while it was only 14% for girls and 25% for boys in secondary school (World Bank 2003). In 1991, only 5% of girls residing in rural areas completed the tenth grade, compared to 12% of boys (Khandker 1996). In secondary schools, the dropout rate

in the early 1990s was more than 60%, with girls faring worse than boys (World Bank 2002).

In order to address the gender inequality in secondary education, the Bangladesh government introduced the FSSSP for rural girls enrolled in secondary schools in 1994.[5] The FSSSP was intended to cover the bulk of the direct costs of education of all girls in rural areas who enter secondary school. Girls, but not boys, of secondary school age were eligible for a monthly sum and additional payments for new books. In order to receive the stipend, a girl needed to satisfy three conditions: (i) a minimum of 75% attendance rate in school, (ii) at least a 45% test score in annual school exams, and (iii) remaining unmarried. The stipend varied between grades. In 1994, the annual stipends were equivalent to US$18 in grade 6, US$20 in grade 7, US$22 in grade 8, US$36 in grade 9, and US$45 in grade 10. The stipends covered the tuition fees that were directly paid to the school in which the student was enrolled. In addition, a book allowance in grade 9 and examination fee in grade 10 were included. The rest of the stipend was paid directly to the girls in two annual installments in the form of deposits into savings accounts in the nearest state bank, called the Agrani Bank, branches of which are common in rural Bangladesh.[6] The main objectives of the FSSSP were (i) to increase female enrollment and retention rates in secondary school, (ii) to enhance female employment opportunities, and (iii) to delay the age at which girls married (Khandker et al. 2003; World Bank 2003).

The FSSSP, which covered more than 2 million girls each year, was the flagship school program of the Bangladesh government in the 1990s and 2000s, and it represented a major share of the government's outlay for the secondary education of Bangladesh.[7] Anecdotal evidence also suggests that there has been a

[5] The FSSSP had been piloted as early as 1982 in a single thana (administrative district). However, it is important to note that only eight thanas out of about 500 thanas in Bangladesh received the stipend program before 1994. Moreover, as these were mostly specific pilot projects, the stipend was not available across all schools within these thanas and for all time periods before 1994. We treat girls who benefited from these pilot projects as part of our "nonexposed" group in the analysis below. Because our focus is on the nationwide program that was available for girls who were in secondary school in 1994, we do not think that these pilot programs undermine our results. However, to the extent that girls in our "nonexposed" group did indeed benefit from these pilot projects, one can view our results as conservative estimates of the effects of the FSSSP.

[6] The annual amount of the stipend, including tuition paid to the school, ranged from 420 Taka (grade 6) to 1,375 Taka (grade 10). This was about 2% to 6% of GDP per capita in 1994.

[7] To encourage poor rural families to enroll their children in primary school, the Bangladesh government also introduced the Food for Education (FFE) program in 1993. The FFE program provided a monthly ration of food grains to poor households in rural areas if they sent their children to primary school (Ravallion and Wodon 2000; Ahmed and del Ninno 2002; Meng and Ryan 2010). Unlike the FSSSP, the FFE was only available to students enrolled in primary school, targeting both boys and

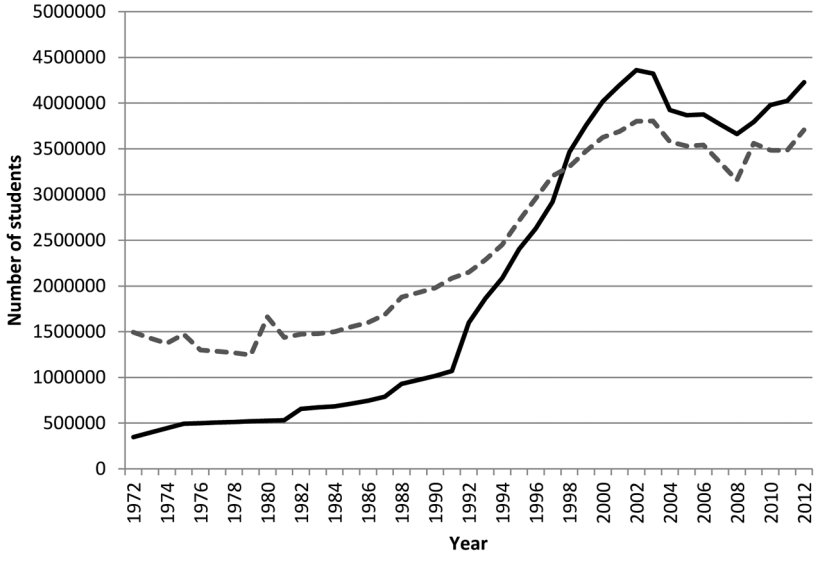


**Figure 1.** Secondary enrollment by gender, 1972–2012. Solid line = secondary female; dashed line = secondary male. Source: BANBEIS, Ministry of Education, Dhaka, BANBEIS-Educational database, 2012.

marked increase in secondary school enrollment among girls in recent years. As can be seen from figure 1, the growth of enrollment of girls in secondary schools has been considerably higher since the introduction of the FSSSP.[8] The number of girls enrolled in secondary schools has exceeded the number of boys. According to the Bangladesh Bureau of Educational Information and Statistics (BANBEIS 2013), at the secondary level the male to female ratio in 1990 was 66:34, but by 2012 it was 46:54. Khandker et al. (2003) show that in 1994 only 36% of female students who had been enrolled in grade 6 remained in grade 10. By 1998 this proportion had increased to 59.2%. They find that girls' school enrollments in each of grades 6 to 10 increased since 1994, while the data did not show any such matching trend for boys' enrollments over the same period.

girls in economically disadvantaged areas (in about one-quarter of rural villages in Bangladesh) and poorest families (40% of children enrolled in FFE schools).

[8] Programs that seek to expand school enrollment may impose asignificant burden on the education infrastructure (such as teachers and buildings) with an adverse effect on school quality. If school quality is reduced, the program's impact may be limited. To ensure availability of sufficient teachers in response to the increase in enrollment, the government planned to support the recruitment of additional teachers and to hire more female teachers to reduce the nonmonetary costs of sending girls to school. Progress, however, was far from satisfactory (Mahmud 2003). According to BANBEIS (2014), in 1997 the student-teacher ratio was 39, which increased to 44 by 2000 and fell to 39 by 2014. The student-teacher ratio in 2014 was 41 in rural areas and 36 in urban areas (BANBEIS 2014).

## III. Empirical Strategy

The FSSSP was introduced in 1994 to reduce the cost of secondary education (grades 6–10) for rural girls across the country. The timing of the introduction of the program generated exogenous variation in terms of the duration of exposure to the program for eligible girls, which is a key source of variation in our identification strategy. Girls enrolled in grades 6–10 were the target recipients of the stipend. However, the program was not introduced for all grades from its beginning. In 1994 only girls enrolled in grades 6 and 9 received a stipend; in 1995 girls enrolled in all grades except grade 8 received a stipend, and since 1996 girls in all grades have received a stipend. Thus, girls who were enrolled in secondary school in grades 7–9 in 1994 received a stipend for 2 years only. The staggered introduction of the program, therefore, means that some girls received the full stipend for 5 years, some girls received a partial stipend for 2 years, and yet others, who were in grade 10 and above in 1994, received no stipend at all. There are no cohorts exposed to the program for 1, 3, or 4 years. We define three age cohorts based on their eligibility for receiving the stipend:

*Cohort 1*. Girls who were born in or after 1983 were eligible to receive a stipend for the full 5 years of their secondary school education (grades 6 to 10). They were 6–11 years old, enrolled in primary school or in grade 6 of secondary school in 1994.

*Cohort 2*. Girls who were born between 1980 and 1982 were eligible to receive a stipend for 2 years of their secondary school education (grades 9 and 10). They were 12–14 years old, enrolled in grades 7 to 9 in 1994.

*Cohort 3*. Girls who were born in 1979 or before were 15–23 years old and enrolled in grade 10 and above in 1994, and thus they were not eligible to receive the stipend. We set an upper limit of 23 years old in 1994 for Cohort 3 because we are interested in focusing on girls who just missed out on the stipend.

If we were to compare Cohorts 1 and 2 with Cohort 3, the results could simply reflect differences in age cohorts as well as changes in commensurate educational policies over time. Hence, in addition to using girls in Cohort 3 (who just missed out on being eligible for the program) as a control, we take advantage of the fact that the program was not offered in urban areas and use urban girls corresponding to Cohorts 1–3 inclusive as another control group.[9]

[9] Strictly speaking, the FSSSP was implemented not only in rural areas but, as Shamsuddin (2015) and Schurmann (2009) point out, only metropolitan thanas were excluded from the program. Unfortunately, we do not know the names of those urban nonmetropolitan thanas and hence assume that all thanas in urban areas did not receive the FSSSP. It is important to note that there are very few urban nonmetropolitan thanas compared to the total rural thanas considered here under the program. To the extent that women in nonmetropolitan urban thanas participated in the program, our results are likely to be a lower bound of the effects of the program.

Our identification strategy is thus two pronged. First, it is based on the difference in eligibility between the cohorts of stipend recipients and their immediately older female counterparts residing in rural areas. Second, since there could be other changes happening countrywide, we use the corresponding urban cohorts (females residing in urban areas, aged 6–23 years old in 1994) who did not receive any stipend to factor out any contemporaneous changes. Moreover, we control for the time trend by including age dummies as well as survey year dummies. We estimate the following reduced-form equation to examine the effect of the FSSSP using a difference-in-differences strategy,

$$Y_i = \alpha_0 + \sum_{j=1}^{2} \beta_j \text{Cohort}_{ij} + \delta\ \text{Rural}_i + \sum_{j=1}^{2} \pi_j \text{Cohort}_{ij} \times \text{Rural}_i + \lambda \mathbf{X}_i + v_i, \quad (1)$$

where $Y_i$ is the outcome variable of interest for individual woman $i$, such as years of schooling, fertility, age at marriage, occupation, age gap, spousal education, and child health outcomes.[10] Rural is a dummy variable indicating whether individual $i$ resided in a rural area. $\text{Cohort}_{ij}\{j = 1, 2\}$ represents dummy variables for Cohorts 1 and 2 (base category is Cohort 3). We are interested in estimating $\pi_j$, the coefficient representing interaction effects between Rural and the Cohort dummies. The vector $\mathbf{X}$ includes the following set of controls: religion (Muslim or not), family type (an extended family as opposed to a nuclear family), wealth index (scale of 1–5; 5 is the richest), and an extensive set of fixed effects for (1) age, (2) survey year, and (3) geographic area (division).[11] We use division fixed effects to absorb geographic differences and year fixed effects to capture any factors that are common to all districts within a given year. By including year fixed effects as well as age fixed effects, we control for birth year fixed effects. The standard errors are clustered by birth year × rural/urban level.

The estimate of $\pi_1$ reflects the effect of receiving the stipend for 5 years. Based on the same reasoning, the estimate of $\pi_2$ represents the effect of receiving the stipend for 2 years. If the FSSSP induces eligible girls to remain in school, get married at a later age, and get married to a more highly educated husband, we expect $\pi$ to have a positive sign.

Since the empirical analysis is based on difference-in-differences estimators, the crucial assumption is that the difference in outcomes is constant over time for rural and urban areas in the absence of the FSSSP. That is, the underlying trend in schooling for the treated cohort would have been parallel to that for the control cohort before the introduction of the stipend program. To check

[10] Subscripts indicating survey year and geographic area (division) are omitted for simplicity.

[11] There are six divisions in the Bangladesh Demographic and Health Surveys: Barisal, Chittagong, Dhaka, Khulna, Rajshahi, and Rangpur.

whether there is a differential trend, we regress women's completed years of education on fully interacted rural and birth year dummies. Each dot in figure 2 represents the estimate of the interaction between rural and birth year dummies for women born between 1970 and 1990 (aged 4 to 24 in 1994), that is, the difference in years of education between rural and urban areas over ages. We also fit two separate linear regression lines of the estimates against birth years before and after the birth year 1980, where cohorts born after 1980 were treated. As can be seen in figure 2, there is a no-differential trend between urban and rural until birth year 1980. However, from birth year 1980, rural cohorts start gaining more education compared to urban cohorts, suggesting that urban-rural differences in trends appear only in ages young enough to benefit from the program. The slope before birth year 1980 is $-0.009$ ($p$-value $= .72$), while the slope after birth year 1980 is 0.134 ($p$-value $= .001$). In addition, we test the assumption of parallel trends by creating a placebo group in the robustness section below, which confirms that educational attainment does not show differential trends across ages between rural and urban areas.

In addition, there are several challenges in establishing causal effects of the FSSSP. One potential problem with our estimates is late enrollment. If some girls started school later than the officially recommended age, cohort 2 might

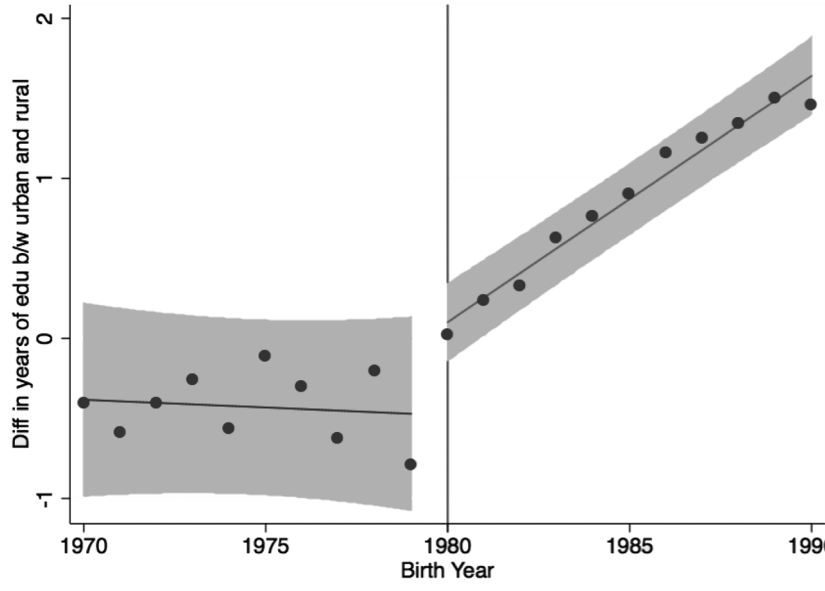


**Figure 2.** Difference in years of education between rural and urban areas. Each dot represents an estimate of the interaction term between rural and birth year dummies (for those born between 1970 and 1990) when the dependent variable is women's completed years of education. We add two separate linear fitted lines of the estimates against birth years before and after the birth year 1980, with 95% confidence interval. In 1994, these women were aged 4 to 24.

be given a stipend for 5 years while cohort 3, who should not have received the stipend, could actually have been in secondary school and entitled to the program. Thus, the effect of the FSSSP would be potentially underestimated for cohort 1. The expected bias, however, is not clear for cohort 2, as both cohort 2 and cohort 3 might have received the stipend for longer if some girls in each cohort enrolled later than otherwise.

Grade repetition might also be affected by the program. For example, one could argue that some girls in rural areas may have repeated a grade in order to receive the stipend. Shamsuddin (2015) shows that grade repetition in secondary education in Bangladesh is very low. The proportion of individuals taking more than 5 years to complete secondary education is low at 0% to 2% for most birth cohorts. The repetition rate would be of concern if we saw differential rates of repetition between rural and urban girls at the onset of the FSSSP compared with previous years. Given that the cost (such as food, clothing, and opportunity cost of remaining an extra year in school) of repeating another year at school is quite high compared to the amount of the stipend, we believe that the incentive to remain an extra year to take advantage of the stipend program is minimal.[12]

Another potential concern is misclassification of rural women as urban women. If some women migrated from rural to urban areas, some of the urban women in the sample might have received the stipend. If so, the estimated effect of the FSSSP is likely to be biased downward. The estimates are also likely to suffer from downward bias if more motivated women choose to migrate from rural to urban areas. The internal migration rate in Bangladesh, however, is very low; according to the Bangladesh Population and Housing Census 2011 (Bangladesh Bureau of Statistics 2012), the rural-to-urban migration rate was 4.29% while the urban-to-rural migration rate was 0.36%.

## IV. Data and Descriptive Statistics

We use the Bangladesh Demographic and Health Surveys (BDHS) data for the years 2004, 2007, and 2011. The BDHS is a nationally representative survey that covers the entire noninstitutionalized population. The data set covers 600 sample points, which are communities that are the primary sampling unit (PSU). These are clustered at the thana level, which is the smallest tier of ad-

[12] Ideally we would like to check whether rural and urban girls of the stipend cohorts have differential repetition using measures such as grade-for-age or education gap (as we do not know whether they have repeated a grade or not). Unfortunately, our data do not allow us to examine grade repetition, as we know only completed years of education.

ministration in Bangladesh, with up to 290 households selected under each cluster in both rural and urban areas throughout Bangladesh.

We limit our sample to females who were ever married and were ages 6–23 when the FSSSP was first introduced in 1994 (16–33 in 2004, 19–36 in 2007, and 23–40 in 2011). Table 1 presents the summary statistics of the variables used in the analysis. The first panel shows that about 37% of women in the

**TABLE 1**
**SUMMARY STATISTICS**

| Variables | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| Cohort 1 | .37 | .48 | 0 | 1 |
| Cohort 2 | .18 | .38 | 0 | 1 |
| Cohort 1 × Rural | .24 | .43 | 0 | 1 |
| Cohort 2 × Rural | .11 | .32 | 0 | 1 |
| Rural | .64 | .48 | 0 | 1 |
| Wealth index (scale of 1–5; 5 is the richest) | 3.17 | 1.45 | 1 | 5 |
| Extended family (vs. nuclear family) | .49 | .50 | 0 | 1 |
| Individual characteristics: | | | | |
| Age (years) | 27.89 | 5.77 | 16 | 40 |
| Religion (Muslim = 1) | .89 | .31 | 0 | 1 |
| Wife's education (years) | 4.83 | 4.23 | 0 | 18 |
| Marital and fertility outcomes: | | | | |
| Age at first marriage (years) | 15.69 | 2.99 | 9 | 39 |
| Age at first child born (years) | 17.74 | 3.13 | 12 | 40 |
| Fertility (number of children) | 2.42 | 1.55 | 0 | 14 |
| Desired number of children | 2.25 | .69 | 0 | 10 |
| Contraceptive use (yes = 1) | .59 | .49 | 0 | 1 |
| Use of contraception observable by husband | .14 | .35 | 0 | 1 |
| Wife's employment variables: | | | | |
| Whether wife works | .22 | .42 | 0 | 1 |
| Whether wife works in agricultural sector | .07 | .25 | 0 | 1 |
| Whether wife works in informal sector | .06 | .23 | 0 | 1 |
| Whether wife works in formal sector | .10 | .30 | 0 | 1 |
| Whether wife has a bank account | .33 | .47 | 0 | 1 |
| Husband's characteristics and employment variables: | | | | |
| Husband's education (years) | 5.20 | 4.89 | 0 | 19 |
| Husband age | 37.10 | 7.79 | 16 | 95 |
| Age gap (husband age − wife age) | 9.21 | 5.41 | −11 | 63 |
| Whether husband works in agricultural sector | .26 | .44 | 0 | 1 |
| Whether husband works in informal sector | .36 | .48 | 0 | 1 |
| Whether husband works in formal sector | .38 | .49 | 0 | 1 |
| Child's health outcomes: | | | | |
| Height for age (SD) | −1.51 | 1.32 | −6 | 5.09 |
| Weight for age (SD) | −1.72 | 1.14 | −5.95 | 5.51 |
| Hemoglobin (g/dL) | 107.31 | 12.61 | 47 | 147 |
| Anemia | .54 | .50 | 0 | 1 |

**Note.** Bangladesh Demographic and Health Surveys, 2004, 2007, and 2011. Samples are restricted to ever married women. Number of observation is 24,329 except "desired number of children" ($N$ = 23,958), "age at first child born" ($N$ = 22,397), "whether wife has a bank account" ($N$ = 10,425, available in BDHS 2011 only), child's height and weight for age ($N$ = 15,714), child's hemoglobin level and whether a child has anemia ($N$ = 1,921, available in BDHS 2011 only). SD = standard deviation.

sample were in cohort 1 and 24% would have received the stipend for 5 years because they resided in rural areas; 18% of women were in cohort 2 and 11% would have received the stipend for 2 years, and 64% of women lived in rural areas. The second panel shows statistics for individual characteristics, including individual's age, religion (Muslim or not), and education. The majority of women are Muslim (89%), and their average completed years of schooling were 4.83 years, which indicates that their average education level is slightly less than completion of primary school.

The third panel presents marital and fertility variables. One notable statistic is the age at first marriage, which is one of our main outcomes of interest. The average age at first marriage among married women is 15.69 and by the age of 17.74, these women had their first child. The interval between marriage and birth of the first child was 2.1 years among the sample of women who were ever married. We break down marriage outcomes for each age at marriage to see what proportions of women were engaged in early marriage. About half of the women included in the sample were married by age 15, and by the age of 18, close to 80% of them were married. Considering that the average age at grade 12 in higher secondary school is 17, it is likely that the educational opportunities for these women (who married early and experienced childbearing before age 18) would have been impeded as the women incurred family responsibilities at a relatively young age. The average number of children for each household is 2.42. Just under 60% of women had used contraception, while only 14% of women used contraception observable by their husbands.

The next panel shows husbands' characteristics. Husbands' education is slightly higher than that of the wives in the sample, and their age is on average 9.2 years older than that of the wives. Just over one-fifth of married women worked, while 98% of the husbands in the sample worked. More than half of working women and their husbands engaged in the agricultural or informal sectors as semiskilled workers, such as rickshaw drivers, carpenters, domestic servants, and factory workers.[13]

The last panel presents summary statistics for child health outcomes, where the child here refers to the oldest child who was born within 5 years of the survey. On average, children's height and weight for age are 1.51 and 1.72 standard deviations below zero. Their hemoglobin level is 10.73 g/dL, and more than half of them have anemia, indicating poor health status.

[13] The agricultural sector includes farmers, agricultural workers, fishermen, and poultry growers. Formal sector occupations include accountants, businessmen, dentists, doctors, lawyers, traders, and imam/religious leaders. On average, a formal sector worker earns 22% more than an informal or agricultural sector worker (World Bank 2013).

## V. Results

### A. Women's Education

Table 2 reports the results for the effect of the FSSSP on education based on equation (1). The first column reports baseline results without including control variables and fixed effects. The last column adds a full set of controls including religion, wealth, and family type as well as age, survey year, and division fixed effects. While we find that these controls are significant predictors of outcome variables, their inclusion has little effect on our key regressors of interest, that is, treatment effects of Cohort 1 × Rural and Cohort 2 × Rural. In column 5, for girls in Cohort 1, exposure to the stipend program increases years of schooling by 1.21 years. This corresponds to 0.24 years for each year of exposure to the program or about 25% of the average years of schooling. For girls in Cohort 2, participation in the FSSSP increases years of education by 0.66 years, corresponding to 0.33 years for each year of exposure or a 13.6% increase in the mean years of schooling. On an annualized basis, the effects of the

**TABLE 2**
EFFECT OF THE FSSSP ON WOMEN'S EDUCATION (YEAR)

| | Education | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Cohort 1 × Rural | 1.431 | 1.209 | 1.214 | 1.215 | 1.210 |
| | (.275)*** | (.287)*** | (.239)*** | (.091)*** | (.089)*** |
| Cohort 2 × Rural | .655 | .681 | .676 | .681 | .666 |
| | (.266)** | (.267)** | (.207)*** | (.080)*** | (.078)*** |
| Cohort 1 | .852 | .925 | 1.102 | −.836 | −.814 |
| | (.181)*** | (.194)*** | (.185)*** | (.125)*** | (.129)*** |
| Cohort 2 | .561 | .472 | .475 | −.532 | −.507 |
| | (.178)*** | (.183)** | (.169)*** | (.094)*** | (.096)*** |
| Rural | −2.528 | −.443 | −.433 | −.429 | −.424 |
| | (.237)*** | (.254)* | (.202)** | (.065)*** | (.068)*** |
| Muslim | | −.504 | −.498 | −.509 | −.581 |
| | | (.105)*** | (.106)*** | (.104)*** | (.097)*** |
| Wealth index | | 1.506 | 1.505 | 1.508 | 1.527 |
| | | (.040)*** | (.040)*** | (.040)*** | (.041)*** |
| Extended family | | .490 | .518 | .508 | .503 |
| | | (.067)*** | (.070)*** | (.072)*** | (.070)*** |
| Age FE | No | No | Yes | Yes | Yes |
| Year FE | No | No | No | Yes | Yes |
| Division FE | No | No | No | No | Yes |
| Observations | 24,329 | 24,329 | 24,329 | 24,329 | 24,329 |
| $R^2$ | .086 | .317 | .321 | .330 | .344 |

**Note.** Standard errors are clustered by birth year × rural/urban level and are reported in parentheses. FE = fixed effects.
*** $p < .01$.
** $p < .05$.
* $p < .1$.

FSSSP on additional schooling are similar across both cohorts of girls exposed to the program.[14]

Table 3 presents evidence that the FSSSP increased the likelihood of eligible women completing secondary school or beyond. Moving from column 1 to 3, the result is robust to the inclusion of various fixed effects. Column 3 indicates that the probability of completing secondary school increases by 5 percentage points for Cohort 1 and 2.5 percentage points for Cohort 2 if they reside in rural areas. Overall, the results in tables 2 and 3 show that there is a large and statistically significant increase in educational attainment among eligible females resulting from the stipend program.

In tables 2 and 3, we also report coefficient estimates for other control variables, although we avoid offering causal interpretations since these variables are likely to be endogenous to education. Among a few key variables, the results indicate that rural girls are, on average, less likely to attend school than their urban counterparts. The results also indicate that Muslim girls, on average, receive fewer years of education than non-Muslim girls, most of whom are Hindu. There is some survey evidence from India to suggest that Muslims place less value on education than Hindus, although one possible reason for this result is that Muslims expect lower rates of return to schooling (Bhalotra et al. 2008). The coefficient on the wealth index is positive and significant, indicating that richer families are more likely to send girls to school as they can better afford school tuition fees. But it can also reflect reverse causality in that women with higher education currently have greater family wealth, possibly due to assortative matching or reflecting higher productivity in the labor market due to increased human capital.[15]

### *B. Women's Marriage, Fertility, Empowerment, and Employment Outcomes*

Table 4 presents the results for the effect of the FSSSP on age at marriage, fertility, and self-reported empowerment, evaluating the overall impact of the stipend program on various long-term outcomes. Column 1 shows that exposure to the FSSSP delays age at first marriage by 0.57 years (3.6%) or on average 0.11 years for each year of exposure for those in Cohort 1, who received the sti-

[14] As noted above, the sample in the paper consists of ever married women who were 6–23 years old in 1994. If educated women tend to marry later, then the dropout from the sample among the educated would be more common for younger cohorts. If we use all females rather than the ever married group, the coefficient for Cohort 1 × Rural declines slightly, from 1.21 to 1.03 years, when we estimate equation (1) using women's completed years of education as a dependent variable.

[15] We also estimated the main results without the wealth index, given that it is endogenous. The estimated effects of the FSSSP on outcome variables are similar to those when the wealth index is included as a control.

**TABLE 3**
**EFFECT OF THE FSSSP ON WOMEN'S COMPLETION OF SECONDARY SCHOOL**

| | Completion of Secondary School | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Cohort 1 × Rural | .051 | .051 | .050 |
| | (.013)*** | (.011)*** | (.011)*** |
| Cohort 2 × Rural | .025 | .025 | .025 |
| | (.015) | (.013)* | (.013)* |
| Cohort 1 | .012 | −.057 | −.057 |
| | (.012) | (.017)*** | (.017)*** |
| Cohort 2 | .017 | −.019 | −.019 |
| | (.014) | (.014) | (.014) |
| Rural | −.067 | −.067 | −.067 |
| | (.013)*** | (.009)*** | (.009)*** |
| Muslim | −.029 | −.029 | −.033 |
| | (.008)*** | (.008)*** | (.008)*** |
| Wealth index | .079 | .079 | .080 |
| | (.005)*** | (.005)*** | (.005)*** |
| Extended family | .035 | .034 | .035 |
| | (.006)*** | (.006)*** | (.006)*** |
| Age FE | Yes | Yes | Yes |
| Year FE | No | Yes | Yes |
| Division FE | No | No | Yes |
| Observations | 24,329 | 24,329 | 24,329 |
| $R^2$ | .155 | .156 | .160 |

**Note.** Mean secondary school completion rate is .135. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses. FE = fixed effects.
*** $p < .01$.
** $p < .05$.
* $p < .1$.

pend for 5 years. For girls in Cohort 2, who received the stipend for 2 years, exposure to the FSSSP increases age at first marriage by 0.34 years (2.1%), or 0.17 years for each year of exposure.[16] The results presented from columns 2 to 6 in table 4 show fertility-related outcomes, including the use of contraceptives. Columns 2 and 3 indicate that participating in the stipend program leads to a reduction in fertility, both in the actual number and desired number of children regardless of whether eligible girls received full or partial stipends.[17] These findings are broadly consistent with previous studies that have exploited exogenous

[16] Delayed marriage might also affect women's education. Field and Ambrus (2008) study the effect of early marriage on female education in Bangladesh and find that each additional year of delayed marriage is associated with 0.22 additional years of schooling.

[17] There might be a censoring issue regarding fertility behavior. Compared to Cohort 3, younger cohorts (Cohorts 1 and 2) might not have completed their childbearing, especially when we use 2004 and 2007 data. Thus, the estimate for the number of children in table 4 may overestimate the true treatment effect. As a robustness check, we use 2011 data only, in which the youngest cohort (Cohort 1) was 23 to 28 years old. The coefficients on Cohort 1 × Rural and Cohort 2 × Rural decrease to −0.205 and −0.164, respectively, but continue to be significant at the 1% level.

## TABLE 4

EFFECT OF THE FSSSP ON WOMEN'S MARRIAGE AND FERTILITY OUTCOMES

| | Age at First Marriage | Number of Children | Desired Number of Children | Age at First Birth | Use of Contraception | Contraception Observable by Husband | Women's Empowerment |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Cohort 1 × Rural | .574 | −.285 | −.067 | .476 | −.007 | .027 | .039 |
| | (.082)*** | (.039)*** | (.014)*** | (.097)*** | (.011) | (.009)*** | (.021)* |
| Cohort 2 × Rural | .340 | −.195 | −.049 | .304 | −.013 | −.005 | −.029 |
| | (.081)*** | (.032)*** | (.020)** | (.077)*** | (.013) | (.011) | (.030) |
| Cohort 1 | −.421 | .234 | .043 | −.415 | .007 | −.020 | .045 |
| | (.105)*** | (.062)*** | (.024)* | (.151)*** | (.018) | (.012)* | (.036) |
| Cohort 2 | −.194 | .132 | .033 | −.216 | .016 | .012 | .046 |
| | (.086)** | (.041)*** | (.023) | (.086)** | (.015) | (.010) | (.031) |
| Rural | −.544 | .271 | .141 | −.384 | −.045 | −.042 | −.054 |
| | (.072)*** | (.032)*** | (.010)*** | (.075)*** | (.010)*** | (.006)*** | (.019)*** |
| Muslim | −.991 | .437 | .225 | −.868 | −.091 | −.004 | .157 |
| | (.082)*** | (.042)*** | (.011)*** | (.067)*** | (.011)*** | (.009) | (.020)*** |
| Wealth index | .503 | −.229 | −.050 | .421 | .013 | .028 | .011 |
| | (.028)*** | (.011)*** | (.003)*** | (.029)*** | (.002)*** | (.002)*** | (.005)** |
| Extended family | .654 | −.187 | −.009 | .640 | −.090 | −.008 | −.008 |
| | (.059)*** | (.018)*** | (.009) | (.073)*** | (.008)*** | (.005) | (.011) |
| Observations | 24,329 | 24,329 | 23,958 | 22,397 | 24,329 | 24,329 | 23,792 |
| $R^2$ | .138 | .384 | .102 | .112 | .060 | .034 | .031 |

**Note.** Women's age, year, and division fixed effects are controlled for. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

variation in the implementation of compulsory education laws to identify the effect of education on fertility (e.g., see Osli and Long 2008; Günes 2015). The reduction in fertility is about 12% of the baseline for the full-stipend cohort and 8% for the partial-stipend cohort. In evaluating a more direct reproductive health intervention in Matlab, Bangladesh, Joshi and Schultz (2013) find that the treated villages in which better maternal and child health care and family planning programs were available experienced a decline in fertility of about 17%. Thus, the FSSSP appears to have smaller effects than programs directly targeted at lowering fertility, but the effects are still sizable.

Exposure to the FSSSP increases age at first birth by 0.47 years, corresponding to 0.1 years for each year of exposure for Cohort 1, and 0.3 years, corresponding to 0.15 years for each year of exposure for girls in Cohort 2 (col. 4). The effect on age at first birth is slightly lower but is similar to the effect on age at first marriage, indicating that delayed first birth is likely due to delayed marriage rather than to delayed birth after getting married. Given that the average return for each year is higher for those who had 2 years of exposure than for those who had 5 years of exposure to the stipend program, the program appears to exhibit decreasing returns to scale. Alternatively, the evidence could indicate that the stipend program was more effective for grades 9 and 10 than for grades 6 to 8.

Following Black, Devereux, and Salvanes (2008), we consider two mechanisms in explaining delayed age at first marriage and age at first birth, namely, the "incarceration effect" and the "human capital effect." The incarceration effect indicates that girls in school are likely to delay their first pregnancy because attending school reduces time available to engage in nonschool activities, such as marriage and sexual activity.[18] However, more educated women might have different perceptions about marriage compared to less educated women and delay their marriage and decrease their fertility due to increased human capital. If the results in table 4 reflect the incarceration effect, the stipend program should have little impact on behavior at ages beyond secondary education as the program targeted girls in secondary schools. To examine this issue, we run a series of regressions in which the dependent variable is a binary variable equal to 1 if the woman was married and had her first child by age $x$, where $x = 14$, 16, 18, and 20. The results in table A1 suggest that the stipend delayed marriage and first birth beyond age 16, the age at which one completes secondary schooling.

Another indication that the estimates for the stipend program do not merely reflect the incarceration effect is the fact that participating in the FSSSP has a

[18] Jacob and Lefgren (2003) discuss the incarceration effect in the context of education. Black et al. (2008) use the term in the context of teen fertility.

small, but statistically significant, impact on the reduction in the desired number of children (col. 3 in table 4). The reduction in desired number of children is about 3% for females in both treatment groups. If the impact of the stipend program is solely due to the incarceration effect, we should not see any change in women's perception of marital outcomes. Our findings indicate that the stipend program plays a role in shaping women's perception due to increased human capital.

About 59% of women in the sample reported using some form of contraception.[19] Among those who currently use contraceptive methods, the pill was the most common method (49%), followed by injection (17%) and condom (9.7%). The pill and injection represent concealable methods while condom use is not. The FSSSP has little or no impact on the overall likelihood of using any contraceptive methods (col. 5 in table 4). However, treated women who received the full 5 years of the stipend were 2.7 percentage points more likely to use contraception that is observable by their husband, namely, condoms or male sterilization as well as abstinence or withdrawal.[20] This result implies that the FSSSP allows women to use more observable actions to control their fertility, facilitating female empowerment. For example, Ashraf et al. (2014) show that the extent to which contraception methods are observable has an important implication on household bargaining.

The final column in table 4 shows the results for female empowerment. We create an index of empowerment using three questions available in the BDHS. The BDHS asks questions related to female autonomy, such as which person usually decides on (1) the respondent's health care, (2) large purchases in the respondent's household, and (3) visits to family or relatives.[21] Correlations across these three measures are high, ranging from 0.5 to 0.6. Thus we use a factor analysis to create an index.[22] The factor loadings and correlation matrices between the empowerment index and three variables depicting autonomy are shown in tables A2 and A3. The empowerment index has mean 0 and standard deviation of 0.84. The results suggest that the stipend program has improved self-

[19] The types of contraceptive methods included in the BDHS are the pill, IUD, injection, condom, female sterilization, male sterilization, abstinence, withdrawal, implant, and other.

[20] Abstinence and withdrawal are likely to be observable by husbands if women refuse having sex for birth control purposes. However, one can define visible contraceptive methods in a more stringent way by excluding abstinence and withdrawal and including only condom use and male sterilization. When we use this alternative definition, the point estimate for Cohort 1 $\times$ Rural falls from 0.027 to 0.020 but remains statistically significant at 1%.

[21] There are more variables that potentially measure female autonomy available in 1 or 2 years of data, but only these three variables are available in all 3 years of the BDHS data.

[22] See Pitt, Khandker, and Cartwright (2006) for a more detailed description of the factor analysis used in a similar context of creating an index for empowerment.

empowerment by about 0.04 standard deviations among those women who received the stipend for 5 years.

Table 5 shows female employment outcomes. The FSSSP has no apparent effect on the likelihood of women working (col. 1). However, there is some suggestive evidence that the program induced a change in job characteristics. Program-eligible women were more likely to work in the formal sector and less likely to work in either the agricultural sector or the informal sector. In the last column of table 5, we show that the FSSSP is associated with an increase in women having a bank account, which could indicate greater financial literacy or independence (the information is available for 2011 only). Having a bank account might also imply being involved in the labor force and higher bargaining power within the household.

### C. *Spousal Outcomes*

Table 6 presents results for husbands' characteristics. Column 1 suggests that eligible women were more likely to marry highly educated partners. On average, schooling of husbands of women eligible for the program was 0.54 (10%)

**TABLE 5**
**EFFECT OF THE FSSSP ON WOMEN'S OCCUPATIONS**

| | Work | Work in Agricultural Sector | Work in Informal Sector | Work in Formal Sector | Having a Bank Account |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Cohort 1 × Rural | −.018 | −.028 | −.001 | .012 | .058 |
| | (.011) | (.007)*** | (.005) | (.006)** | (.014)*** |
| Cohort 2 × Rural | −.014 | −.006 | −.016 | .008 | .062 |
| | (.011) | (.008) | (.006)** | (.006) | (.018)*** |
| Cohort 1 | .001 | .010 | .005 | −.013 | −.037 |
| | (.020) | (.015) | (.009) | (.008)* | (.026) |
| Cohort 2 | −.014 | −.005 | .010 | −.019 | −.026 |
| | (.014) | (.012) | (.007) | (.005)*** | (.026) |
| Rural | −.077 | .041 | −.052 | −.067 | .022 |
| | (.011)*** | (.007)*** | (.006)*** | (.004)*** | (.010)** |
| Muslim | −.061 | −.031 | −.006 | −.024 | .031 |
| | (.014)*** | (.008)*** | (.006) | (.007)*** | (.013)** |
| Wealth index | −.034 | −.023 | −.022 | .011 | .189 |
| | (.003)*** | (.002)*** | (.003)*** | (.002)*** | (.003)*** |
| Extended family | −.025 | −.014 | −.007 | −.003 | .041 |
| | (.006)*** | (.003)*** | (.003)** | (.004) | (.009)*** |
| Observations | 24,329 | 24,329 | 24,329 | 24,329 | 10,425 |
| $R^2$ | .067 | .091 | .032 | .029 | .323 |

**Note.** Women's age, year, and division fixed effects are controlled for. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses. Information on whether the woman has a bank account (col. 5) is available only in 2011 BDHS.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

**TABLE 6**
**EFFECT OF THE FSSSP ON HUSBAND'S CHARACTERISTICS**

| | Husband's Education (Year) | Age Gap | Work in Agricultural Sector | Work in Informal Sector | Work in Formal Sector |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Cohort 1 × Rural | .862 | −.451 | −.060 | −.013 | .070 |
| | (.081)*** | (.153)*** | (.011)*** | (.011) | (.013)*** |
| Cohort 2 × Rural | .545 | −.609 | −.058 | −.037 | .085 |
| | (.076)*** | (.139)*** | (.010)*** | (.013)*** | (.012)*** |
| Cohort 1 | −.558 | −.172 | .011 | .017 | −.018 |
| | (.140)*** | (.320) | (.016) | (.017) | (.022) |
| Cohort 2 | −.346 | .405 | .030 | .021 | −.041 |
| | (.098)*** | (.199)** | (.010)*** | (.014) | (.014)*** |
| Rural | −.400 | .344 | .208 | −.110 | −.107 |
| | (.079)*** | (.140)** | (.010)*** | (.008)*** | (.010)*** |
| Muslim | −.671 | −.106 | −.003 | .057 | −.065 |
| | (.084)*** | (.138) | (.009) | (.010)*** | (.011)*** |
| Wealth index | 1.827 | −.108 | −.070 | −.017 | .085 |
| | (.035)*** | (.047)** | (.003)*** | (.003)*** | (.003)*** |
| Extended family | .523 | −.294 | .003 | −.030 | .021 |
| | (.077)*** | (.076)*** | (.006) | (.007)*** | (.006)*** |
| Observations | 24,329 | 24,329 | 24,329 | 24,329 | 24,329 |
| $R^2$ | .321 | .012 | .156 | .074 | .117 |

**Note.** Age gap is husband's age minus woman's age. Women's age, year, and division fixed effects are controlled for. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses.
*** $p < .01$.
** $p < .05$.
* $p < .1$.

to 0.86 years (17%) higher than that of husbands of ineligible women. Note that the coefficients for women's education in table 2 are greater than that for husband's education, implying that the gap between spouse's educational attainments decreased, which is consistent with assortative mating.

The remaining columns in table 6 show the effects of the stipend program on the age gap between spouses and husband's occupation. The program has altered the stereotype that women in Bangladesh marry much older men. We find that higher education has encouraged women to marry partners closer to their own age (col. 2). Figure 2 depicts a large age difference between spouses in Bangladesh. The mean was 9.2 years (table 1). Thus, the FSSSP can be attributed to a decrease in age gap between spouses by 0.45 years, or 4.9%, in rural areas. Our result is consistent with Mansour and McKinnish (2014), who show that educational attainment and age differences among couples are inversely related.

Columns 3 to 5 in table 7 present results for husbands' labor supply and occupation. Almost all husbands in the BDHS are reported as working; thus we examine only the type of occupation in which they are employed. The program reduced the likelihood that women married men who worked in the agricul-

TABLE 7
EFFECT OF THE FSSSP ON CHILD HEALTH OUTCOMES

| | Height for Age | Weight for Age | Hemoglobin | Anemia |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Cohort 1 × Rural | .143 | .106 | 1.377 | −.025 |
| | (.032)*** | (.042)** | (.878) | (.045) |
| Cohort 2 × Rural | .205 | .093 | .058 | −.038 |
| | (.038)*** | (.049)* | (.980) | (.052) |
| Cohort 1 | −.217 | −.064 | −5.375 | .142 |
| | (.051)*** | (.057) | (1.284)*** | (.072)* |
| Cohort 2 | −.119 | .004 | −4.843 | .147 |
| | (.043)*** | (.055) | (1.417)*** | (.057)** |
| Rural | −.124 | −.103 | −2.105 | .063 |
| | (.026)*** | (.034)*** | (1.009)** | (.045) |
| Muslim | −.114 | −.099 | .342 | −.054 |
| | (.037)*** | (.038)** | (1.268) | (.046) |
| Wealth index | .205 | .180 | 1.286 | −.054 |
| | (.011)*** | (.008)*** | (.309)*** | (.012)*** |
| Extended family | .104 | .090 | −.266 | .036 |
| | (.033)*** | (.027)*** | (.686) | (.025) |
| Observations | 11,951 | 11,951 | 1,257 | 1,257 |
| $R^2$ | .076 | .073 | .057 | .059 |

**Note.** Based on first-born child's health information. Sample size is lower than main samples of women because not all women reported their child's health information. Information on hemoglobin level and anemia is available in 2011 only. Women's age, year, and division fixed effects are controlled for. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses.
*** $p < .01$.
** $p < .05$.
* $p < .1$.

tural or informal sectors, while it increased the probability of husbands working in the formal sector by 7 percentage points for girls in Cohort 1 and 8.5 percentage points for girls in Cohort 2.

### *D. Child Health Outcomes*

In table 7 we present the results for children's health outcomes. All the outcome measures in table 7 are based on the health status of the oldest child who was born within 5 years of the survey. The first two columns show the results for height and weight for age measured in standard deviation. According to UNICEF (2009), 43% of children in Bangladesh under the age of 5 are stunted, and 41% are underweight. The results show that children of stipend-eligible women were taller (about 0.14–0.2 standard deviation) and heavier (about 0.1 standard deviation) for their age. Only height and weight measures are available for all years. The BDHS also has data on hemoglobin level and whether a child exhibits symptoms of anemia. The coefficients on these measures, which are available only in 2011, have the expected sign but are not statistically significant.

### E. Suggestive Channels of the Effect of the FSSSP on Fertility

We have thus far examined whether the stipend program affects several aspects of women's socioeconomic outcomes as well as their husbands' characteristics. Some of these outcomes may have an independent effect on fertility other than through the direct effect of education. For instance, improved women's labor market outcomes may affect fertility by increasing the opportunity cost of having a child. Increased husband's level of education can also influence fertility if the husband and wife determine fertility jointly. Although we do not have an exhaustive list of variables affecting fertility, as an exploratory exercise to examine the channel through which the FSSSP affects marriage market outcomes, in particular fertility, we reestimate equation (1) after controlling for alternative potential channels. Compared to the baseline estimate, the effect of the FSSSP on fertility decreases when we control for woman's own education. In addition, once the woman's own education is controlled for, other factors such as husband's education, women's labor market status, and our measure of female empowerment do not affect the coefficients for Cohort 1 and Cohort 2 much, suggesting that the effects of the FSSSP on fertility may channel through the increased level of women's education.[23]

## VI. Robustness Checks

As a first robustness check, we control for division-specific time effects to account for any region-specific effects, such as geographic shocks over different periods or time trends. Table 8 reestimates our main results reported in previous tables for the two treatment effects but controls for division-specific time fixed effects (panel A). The results are almost identical to the results reported in the previous tables.

Another potential concern with the main results relates to the age gap between the oldest girls in the control (Cohort 3) and the youngest girls receiving the full stipend (Cohort 1). One might be worried that the age difference is too large to be a meaningful comparison. To test whether the previous results are sensitive to the age of those cohorts, we reestimate the main specifications using a narrower age range. To do so, we eliminate from the sample the youngest girls (bottom 2 years) in Cohort 1 and the oldest girls (top 2 years) in Cohort 3. By restricting the sample to a narrower age range, the age of the affected cohorts should be more comparable to the older cohort who already finished secondary

[23] These results are not reported but are available upon request. We also conduct a similar exercise when the outcome variables are (1) desired number of children, (2) child's height for age, (3) child's weight for age, and (4) an indicator for using contraception observable by the husband, using the same strategy described in this section. We find a similar pattern to actual fertility (i.e., woman's own education explains much of the effect of the FSSSP).

## TABLE 8

ROBUSTNESS CHECKS WITH DIVISION-SPECIFIC TIME FIXED EFFECTS AND NARROWED AGE COHORTS

| | Education | Age at First Marriage | Number of Children | Age at First Birth | Women's Empowerment | Women at Formal Sector | Husband's Education | Age Gap | Husband at Formal Sector |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | A. Controlling for division-specific time fixed effects | | | | | | | | |
| Cohort 1 × Rural | 1.203 | .575 | −.285 | .483 | .038 | .012 | .854 | −.448 | .069 |
| | (.089)*** | (.081)*** | (.038)*** | (.097)*** | (.021)* | (.006)** | (.081)*** | (.154)*** | (.013)*** |
| Cohort 2 × Rural | .675 | .335 | −.198 | .309 | −.032 | .008 | .556 | −.609 | .085 |
| | (.077)*** | (.082)*** | (.031)*** | (.079)*** | (.031) | (.006) | (.079)*** | (.140)*** | (.012)*** |
| Observations | 24,329 | 24,329 | 24,329 | 22,397 | 23,792 | 24,329 | 24,329 | 24,329 | 24,329 |
| $R^2$ | .347 | .139 | .386 | .114 | .033 | .030 | .324 | .013 | .120 |
| | B. Sample of narrowed age cohorts | | | | | | | | |
| $\widehat{\text{Cohort}}$ 1 × Rural | 1.112 | .563 | −.268 | .434 | .028 | .010 | .849 | −.472 | .066 |
| | (.088)*** | (.086)*** | (.046)*** | (.107)*** | (.021) | (.007) | (.085)*** | (.135)*** | (.015)*** |
| $\widehat{\text{Cohort}}$ 2 × Rural | .674 | .398 | −.200 | .316 | −.038 | .010 | .576 | −.674 | .079 |
| | (.082)*** | (.089)*** | (.037)*** | (.066)*** | (.032) | (.006) | (.094)*** | (.131)*** | (.011)*** |
| Observations | 18925 | 18925 | 18925 | 17682 | 18541 | 18925 | 18925 | 18925 | 18925 |
| $R^2$ | .345 | .146 | .334 | .113 | .025 | .031 | .327 | .014 | .115 |
| | C. Controlling for division-specific time fixed effects with sample of narrowed age cohorts | | | | | | | | |
| $\widehat{\text{Cohort}}$ 1 × Rural | 1.111 | .565 | −.269 | .439 | .027 | .011 | .851 | −.466 | .067 |
| | (.089)*** | (.086)*** | (.046)*** | (.106)*** | (.021) | (.007) | (.086)*** | (.136)*** | (.015)*** |
| $\widehat{\text{Cohort}}$ 2 × Rural | .686 | .393 | −.203 | .322 | −.041 | .010 | .591 | −.677 | .079 |
| | (.081)*** | (.089)*** | (.036)*** | (.067)*** | (.033) | (.006) | (.097)*** | (.132)*** | (.011)*** |
| Observations | 18,925 | 18,925 | 18,925 | 17,682 | 18,541 | 18,925 | 18,925 | 18,925 | 18,925 |
| $R^2$ | .348 | .148 | .337 | .115 | .028 | .032 | .331 | .015 | .118 |

**Note.** $\widehat{\text{Cohort}}$ 1 and $\widehat{\text{Cohort}}$ 2 represent narrowed age groups. $\widehat{\text{Cohort}}$ 1 (receiving full stipend) consists of women aged 25–28 years, $\widehat{\text{Cohort}}$ 2 (receiving partial stipend) is 29–31 years old, and the control group is 32–38 years old in 2011. Age gap is husband's age minus woman's age. Regressions include a full set of controls as in table 2. Women's age, year, and division fixed effects are also controlled for. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

schooling at the time of the program introduction. Panel B in table 8 presents the results. Now the sample consists of girls born between 1973 and 1986, compared to the original sample born between 1971 and 1988. The results are almost identical to the main findings. The last panel shows that our main results are robust to the addition of division-specific time fixed effects and using a sample with narrower age cohorts.[24]

Thus far, the sample in the 2004, 2007, and 2011 data consists of married women who were 6–23 years old in 1994 as we mostly look at marriage outcomes. However, given that educated women tend to marry later, as shown in table 4, younger women are more likely to drop out of the sample if they are more educated. Thus, our results might underestimate the effects of the FSSSP by excluding these girls. Given that the FSSSP does not decrease the likelihood of getting married, and most of them got married before age 23 (in our full sample using all rounds of BDHS data sets, 97% of women got married before they turned 23), if we use the 2011 data only, most women (aged 23 to 40) in the sample will have already married, and thus we can partially address the sample selection issue. Table 9 shows the results with the 2011 data, where women are 23–40 years old. The results do not change much.

Next, we examine the effect of the FSSSP, including rural males of the same cohorts as alternative control groups. The validity of our main methodology depends on parallel trends between cohorts in rural and urban areas; thus, using the same rural cohorts as a control group might partly address this concern. We restrict our sample to individuals residing in rural areas only but include both males and females and run the following regressions, using the same age restriction as before:

$$\text{Educ}_i = \alpha_0 + \sum_{j=1}^{2} \beta_j \text{Cohort}_{ji} + \delta\ \text{Female}_i + \sum_{j=1}^{2} \pi_j \text{Cohort}_{ji} \times \text{Female}_i + \lambda \mathbf{X}_i + v_i, \tag{2}$$

where the dependent variable is years of education, Cohort and $\mathbf{X}$ are as defined in Section III, and Female is a dummy variable indicating that the individual is female. Due to data availability, we use education as the only dependent variable.[25]

[24] The estimates for other outcomes that are not reported in table 8 but included in the previous tables are robust to these three specifications. Child's hemoglobin level, which was not statistically significant at 10% when reported in table 7, becomes positive and significant at 5% when using the narrower age range sample.

[25] Education is the only relevant outcome variable that is commonly available to a sample of women and men.

## TABLE 9

ROBUSTNESS CHECKS WITH THE 2011 DATA

| | Education | Age at First Marriage | Number of Children | Age at First Birth | Women's Empowerment | Women at Formal Sector | Husband's Education | Age Gap | Husband at Formal Sector |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Cohort 1 × Rural | 1.247*** | .532*** | −.205*** | .471*** | .048*** | .023** | .929*** | −.543*** | .074*** |
| | (.097) | (.080) | (.032) | (.108) | (.016) | (.010) | (.102) | (.150) | (.012) |
| Cohort 2 × Rural | .543*** | .380*** | −.164*** | .353*** | −.001 | .005 | .577*** | −.621*** | .091*** |
| | (.080) | (.113) | (.048) | (.083) | (.053) | (.011) | (.110) | (.155) | (.014) |
| Observations | 10,425 | 10,425 | 10,425 | 10,006 | 9,892 | 10,425 | 10,425 | 10,425 | 10,425 |
| $R^2$ | .362 | .116 | .307 | .087 | .014 | .026 | .339 | .012 | .093 |

**Note.** The results are from the 2011 data, where women were aged 23 to 40 in 2011. Regressions include a full set of controls as in table 2. Women's age, year, and division fixed effects are also controlled for. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

As the FSSSP did not provide benefits to boys, it should have no direct effect on education of males of the same age as affected females. If the FSSSP confers any benefits to male siblings of a stipend recipient, via spillovers, for example, due to a relaxation of resource constraints on the family or due to the brother going to school because the sister is going, we are likely to estimate the lower bound of the true effect of the FSSSP. The results using the sample of rural men and women are reported in panel A in table 10, progressively controlling for more variables. We find that the FSSSP had a statistically significant positive effect on education of rural girls in Cohorts 1 and 2, which is of a similar magnitude to that when urban girls were used as a control group.

Last, we conduct a placebo test. One crucial assumption for the difference-in-differences methodology to provide unbiased estimates is parallel trends between early and later cohorts for both rural and urban areas. In our context,

**TABLE 10**
**EFFECT OF THE FSSSP ON EDUCATION (YEAR) USING RURAL MALES AS A CONTROL AND A PLACEBO TEST**

| | Education | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| | A. Using rural samples only | | |
| Cohort 1 × Female | 1.480 | 1.483 | 1.486 |
| | (.213)*** | (.135)*** | (.136)*** |
| Cohort 2 × Female | .791 | .813 | .827 |
| | (.179)*** | (.114)*** | (.120)*** |
| Observations | 34,389 | 34,389 | 34,389 |
| $R^2$ | .307 | .312 | .322 |
| | B. Placebo test | | |
| Cohort 1 × Rural | 1.261 | 1.249 | 1.248 |
| | (.147)*** | (.117)*** | (.117)*** |
| Cohort 2 × Rural | .631 | .621 | .612 |
| | (.133)*** | (.099)*** | (.105)*** |
| Cohort 3_1 × Rural | −.062 | −.064 | −.062 |
| | (.222) | (.120) | (.124) |
| Observations | 23,343 | 23,343 | 23,343 |
| $R^2$ | .321 | .327 | .341 |
| Age FE | Yes | Yes | Yes |
| Year FE | No | Yes | Yes |
| Division FE | No | No | Yes |

**Note.** In panel B, we divide Cohort 3 into two groups: those who were born between 1975 and 1979 (Cohort 3_1) and those born between 1971 and 1974 (Cohort 3_2). The main effects for Rural, Cohort 1, Cohort 2, and Cohort 3_1 are controlled (thus, the base category is Cohort 3_2). Regressions include a full set of controls as in table 2. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses. FE = fixed effects.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

the parallel trend assumption requires that the underlying trend in educational attainment for the treatment group would have been parallel to that for the control group in the absence of the treatment. To examine this issue, we divide the control group, Cohort 3, into two groups: those who were born between 1975 and 1979 (Cohort 3_1) and between 1971 and 1974 (Cohort 3_2). If the change in education over these two cohorts is significantly different, this would violate the assumption of parallel trends.

The interaction term between Cohort 3_1 and Rural, the placebo treatment group, will likely pick up any differential trend across ages between Rural and Urban. As shown in panel B, however, the effect for this placebo group is not statistically significant at the 10% level. In terms of the magnitude, it is also much smaller than the treated group of Cohorts 1 and 2.

## VII. Conclusion

The main objective of this paper is to examine the long-run effects of the FSSSP on fertility and marital outcomes for those women who received the full or partial stipend for secondary schooling. We take advantage of the fact that the introduction of the FSSSP generated exogenous variation in geographic concentration and duration of exposure to the program for girls of secondary school age. Our main finding is that the FSSSP significantly increased years of schooling for female students by 0.6 to 1.2 years and that girls exposed to the program married later and had lower desired and actual fertility. They were more likely to work in the formal sector and less likely to work in the agricultural or informal sector. Stipend-eligible women also married more educated husbands who had a better occupation and who were closer in age to their own age. The children of eligible women were taller and heavier for their age, suggesting that the stipend generated positive intergenerational health effects.

Our results provide evidence of one important policy-induced avenue through which there has been a decline in fertility, and in particular adolescent fertility, in Bangladesh over the last 2 decades. In this sense, our findings help to explain the channels through which demographic transition in Bangladesh has occurred. This study suggests that the short-term decline in fertility from remaining in school is sustained in the longer term.

An important policy implication of our finding is that stipend programs such as the FSSSP in Bangladesh can have considerable impact on marital and fertility outcomes over the long term. In a setting with initial low levels of education and high prevalence of early marriages, our results suggest that the stipend program can improve the socioeconomic status of women later in life. As such, our findings should be of value when designing similar programs for other countries.

## Appendix

**TABLE A1**

**EFFECT OF THE FSSSP ON AGE AT MARRIAGE AND FIRST BIRTH**

| | Age 14 | Age 16 | Age 18 | Age 20 | Age 22 |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | A. Married by | | | | |
| Cohort 1 × Rural | −.034 | −.046 | −.048 | −.052 | −.041 |
| | (.010)*** | (.009)*** | (.010)*** | (.008)*** | (.007)*** |
| Cohort 2 × Rural | −.028 | −.023 | −.019 | −.017 | −.027 |
| | (.010)*** | (.007)*** | (.011)* | (.010) | (.009)*** |
| $R^2$ | −.034 | −.046 | −.048 | −.052 | −.041 |
| Mean dependent variable | .413 | .683 | .857 | .932 | .965 |
| | B. First birth by | | | | |
| Cohort 1 × Rural | .002 | .011 | −.028 | −.027 | −.029 |
| | (.007) | (.014) | (.011)** | (.011)** | (.009)*** |
| Cohort 2 × Rural | .009 | −.007 | −.015 | −.006 | −.007 |
| | (.007) | (.008) | (.011) | (.014) | (.013) |
| $R^2$ | .002 | .011 | −.028 | −.027 | −.029 |
| Mean dependent variable | .113 | .366 | .609 | .770 | .849 |

**Note.** $N = 24{,}329$. Regressions include a full set of controls as in table 2. Women's age, year, and division fixed effects are controlled. Standard errors are clustered by birth year × rural/urban level and are reported in parentheses.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

**TABLE A2**

**FACTOR LOADINGS USED IN CREATING THE WOMEN EMPOWERMENT INDEX**

| | Factor |
|---|---|
| Women usually decide on own health care (1 = yes, 0 = no) | .64 |
| Women usually decide on large household purchases (1 = yes, 0 = no) | .74 |
| Women usually decide on visits to family or relatives (1 = yes, 0 = no) | .73 |

**TABLE A3**

**CORRELATION BETWEEN THE EMPOWERMENT INDEX AND DECISION VARIABLES**

| | Empowerment Index | Health Care | Large Purchase | Visit Family |
|---|---|---|---|---|
| Empowerment index | 1 | | | |
| Women usually decide on own health care | .76 | 1 | | |
| Women usually decide on large household purchases | .88 | .52 | 1 | |
| Women usually decide on visits to family or relatives | .86 | .50 | .61 | 1 |

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