

The Effect of a Conditional Cash Transfer on Child Marriage: Evidence from Mexico

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Abstract

I study the effect of a conditional cash transfer program in Mexico on child marriage. The program provided monetary benefits to households, conditional on children's school attendance. Leveraging on the staggered implementation of the program, I find that exposure to the conditional cash transfer *increased* girls' probability of early marriage. After five years of exposure to the program, beneficiary girls were, on average, 7 p.p. more likely to be married than the control group. I find no effect for boys. These novel and unanticipated results contrast with the conventional wisdom that would suggest that conditional cash transfers *reduce* child marriage through increases in education. I test whether there is an income effect that explains the overall result. I exploit the variation in household composition and find that non-eligible children in beneficiary households — who were only exposed to the increase in household income — were between 7 and 20p.p more likely to be married than their counterparts in non-treated villages.

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1 Introduction

Child marriage is widely recognized as a violation of human rights, particularly prevalent in developing countries. It is both a consequence and a cause of poverty, linked to educational abandonment and reduced participation in formal labor markets.¹ This practice disproportionately affects girls and exposes them to increased risks of early childbearing, violence, abuse, and limited autonomy.² According to UNICEF, around 20% of women worldwide aged 20 to 24 in 2021 married or entered in a union before turning 18. Child marriage is more prevalent in societies characterized by gender inequality, conservative social norms, conflict, insecurity, and acute poverty. Cash transfers conditional on school attendance or payment of school fees have been identified as one of the most promising strategies to decrease child marriage (Kalamar et al., 2016). However, little is known about the effects of these programs on child marriage decisions in marriage markets with no arranged marriages or marriage payments.

In this paper, I address that question and study one of the world's largest conditional cash transfer programs, Progresa/Oportunidades, implemented in rural Mexico to reduce poverty. I show its unintended consequences as it *increased* child marriage and provide evidence of a mechanism behind this unexpected result. The program gives monetary transfers to poor households, conditional primarily on children's school attendance. Therefore, the program can affect marriage through two main channels: (i) education and (ii) income.

Education has been shown to affect marriage decisions. Empirically, most evidence points to a negative effect of education on child marriage (Angrist et al., 2002; Hallfors et al., 2015; Ashraf et al., 2020; Kirdar et al., 2018; Skirbekk et al., 2004; Ferré, 2009). If there are returns from education in the labor market, we could expect Progresa/Oportunidades to decrease child marriage since the program successfully increased education (Behrman et al., 2005, 2009; Dubois et al., 2012). However, Attanasio et al. (2012) show that wages do not respond to education in rural Mexican villages. It can, then, be the case that increases in education do not affect marriage

¹See Thomson (2003) and Sperling and Winthrop (2015).

²On education and labor market, see Adebawale et al. (2012) and Kalamar et al. (2016). On violence and decision-making power, see Kirdar et al. (2018), Jejeebhoy et al. (1995), and Amin et al. (2017). On fertility choices and children outcomes, see Dahl (2010), Duflo et al. (2015), and Behrman (2015).

decisions.

The second channel through which Progres/Oportunidades might affect marriage decisions is through an income effect. This effect is ambiguous *ex-ante*. On the one hand, increased income may reduce households' reliance on marriage as an insurance mechanism (Amin et al., 2016). On the other hand, it could increase the marriage market value of beneficiaries or make marriage-related expenses more affordable, facilitating the formation of new households.

I study the overall effect of Progres/Oportunidades on child marriage and isolate the effect of income. Initially introduced in 1998 in randomly selected villages, Progres was renamed Oportunidades in 2000 when the control group villages were also incorporated into the program. In 2003, a new set of villages was selected through propensity score matching to serve as the pure control group. The staggered implementation of the program and the comprehensive panel data available allow for dynamic analysis of the program's causal effect by comparing the three groups of villages over six years using a staggered differences-in-differences estimator.

I find that exposure to the program increased the probability of marrying before the age of 18 years old. One year after the start of the program, the effect was small, of 0.8p.p., but statistically different from zero. After five years of exposure to the program, beneficiaries were 3.5p.p. more likely to be married than the control group. This effect corresponds to more than doubling child marriage probability for treated individuals. Quantitatively, this is a relevant effect, as the unconditional and unweighted proportion of married individuals in the control group was 2.55% in 2003. These effects were driven by girls, whose marriage probability increased by 7 p.p. after five years of program exposure. For reference, in 2003, the unweighted proportion of married girls under 18 in the control group was 4%. The effect of the program on boys' marriage probability is indistinguishable from zero.

The program had larger effects on older girls. However, being exposed longer to Progres/Oportunidades did not change the magnitude of the program's impact on marriage.³

³This finding is consistent with Behrman et al. (2005) and Araujo and Macours (2021), who, among other outcomes, compare the two treatment groups' marriage status in 2003 and age at marriage 20 years post-program, respectively, and found no difference between the two groups. In this paper, I add a pure control group to the analysis, who never received the benefit during the analysis period. This allows me to study the effect of being exposed to the program for 3 and 5 years versus none.

I also observe that the program's effect on marriage is larger in magnitude from 2001 onward for both treated groups. This observation suggests that the changes in the program around that time, which included expanding the benefit to high school years, might be relevant to explain the overall effect. I provide supporting evidence for this hypothesis, as I show that receiving the benefit at an age with high marriage risk, which coincides with high school, enables marriage for girls in treated villages. This hints at an important income effect explaining the program's overall impact on marriage decisions.

I test this hypothesis further and estimate the causal effect of income on marriage. To isolate the income effect from the education effect of the program, I restrict the analysis to all children (female and male) who are no longer eligible for program benefits but live in the same household as an eligible member. The program led to substantial increases in marriage for this population.⁴ Because these individuals are exposed to an increase in income only and not to the program's conditions, this is evidence that, in this population, positive income transfers enable individuals to marry.⁵ Marriage might increase with income due to different reasons. If there are financial costs to marriage, positive income transfers allow new households to form or welcome new members in already-formed ones. Alternatively, the program might have increased girls' bargaining power in the household, leading to more independence in decision-making, including marriage. Finally, marriage markets might have changed due to the program: beneficiary girls might be more valuable in the marriage market since they are now relatively wealthier due to the program.

The main finding of this paper could appear counter-intuitive given the prevailing findings of the existing literature. I show that a simple conceptual framework, where agents simultaneously make marriage and schooling decisions, can rationalize both sets of findings. In particular, the model provides two key insights. First, in line with the evidence, a school subsidy unambiguously increases school attendance. Second, the effect of the program on marriage

⁴I test whether there are spillover effects on education in this population, and I observe that they do not get more education than their counterparts in the control group.

⁵This finding is consistent with Bobonis (2011), who looks at the difference between the two treated groups and finds that the program increased marriage for young mothers of beneficiary children who were single and had low educational attainment.

is ambiguous. On the one hand, the program increases the mass of agents who potentially choose more schooling, and it increases the attractiveness of being in school, thereby increasing their reservation partner quality. Therefore, these changes lead to decreases in marriage as fewer agents drop school to marry. On the other hand, the income effect increases marriage rates. Depending on the relative magnitude of these effects, a school subsidy like Progresa/Oportunidades can lead to both increases in education and marriage.

The findings in this paper provide novel insights into our understanding of the causes and determinants of child marriage. I look at one of the largest education-conditional cash transfers in the world and show that the program increased child marriage for girls. I show that this effect is led by positive income effects on marriage by providing evidence that income increases led to increases in marriage rates. Additionally, I study this topic in an understudied context regarding child marriage. In this setting, there are no widespread marriage arrangements or payments, such as dowries or bride prices, and children are the decision-makers. The results in this paper challenge our conventional wisdom on the relationship between conditional cash transfers and child marriage. These results are important for the design of large-scale programs. In particular, they highlight how context-specific marriage-market features may determine the intensities of potentially opposing mechanisms, such as income and education effects, and how these can generate unintended consequences if not accounted for.

This paper also contributes to the literature on how marriage markets interact with income fluctuations. The results of this paper contrast with the ones reported by Baird et al. (2011). Contrary to what I find in Mexico, the authors show that, in Malawi, increasing disposable income leads to marriage delays. Handa et al. (2015), on the other hand, find that an unconditional cash transfer program in Kenya did not change early marriage probability. How income affects marriage decisions is an important determinant for the success of these programs regarding child marriage. Corno et al. (2020), for example, show how income shocks have opposing effects on child marriage depending on whether dowries or bride-price systems are in place. Namely, they find that transfer programs are more likely to decrease child marriage in countries with bride prices, like Malawi and Kenya. This might be the explanation for the different results found in this paper relative to the ones cited above. My paper adds to this literature by provid-

ing new evidence on income effects on early marriage decisions in contexts with no marriage payments.

Furthermore, this paper contributes to the literature on the effect of educational programs on child marriage. I show that a program praised for its success in educational outcomes led to increases in marriage. My results contrast with the findings of Angrist et al. (2002) and Hallfors et al. (2015). Both studies find that two programs that decreased the cost of education in Colombia and Zimbabwe led to an increase in years of education and a decrease in the probability of marriage. An explanation for the different results can be that the education channel cannot counteract the positive effect income has on marriage. This can be the case due to the lack of returns from education in Mexican rural labor markets (Attanasio et al., 2012). In urban Mexico, for example, where returns from education are positive, Gulemetova-Swan (2009) shows that Oportunidades led to a delay in age at marriage between 2002 and 2004. However, this delay was small, of 1 to 4 months, and in the urban setting households self-selected into the program by applying for the benefits.

The rest of this article is organized as follows. Section 2 presents the context, where I introduce child marriage in the context of Mexico and describe in detail the conditional cash transfer program. Section 3 introduces the data used in this project, and some relevant summary statistics and Section 4 explains and motivates the empirical strategy used to estimate the program's effect on child marriage. In Section 5, I present the results and evidence of the mechanisms in place in Section 6. Finally, Section 7 discusses the implications of these findings, and Section 8 concludes this paper.

2 Context

In the past decades, Mexico has witnessed rapid and prosperous socioeconomic change, and the witnessed economic development was significant for women. In Mexico, between 1970 and 2020, the percentage of women with secondary and tertiary education increased from 5 to 38% and 1 to 22%, respectively, and female labor-market participation from 13 to 47% during the same period (Bhalotra and Fernández, 2021). Usually, age at marriage correlates positively

with economic progress, and child marriage is more prevalent in poorer societies. In Mexico, however, the average marriage age has only increased slightly, from 21.2 to 23 years, despite the large economic growth in the past decades. For 1990 and 2010, one would predict a lower per-capita GDP for Mexico, given the country's average age at first marriage (see Figure A1). The percentage of women aged 20-29 in consensual unions has decreased from 60 to 55% (World Bank), but child marriage rates have remained relatively constant, around 23% (UN Women). Fertility, however, has been consistently decreasing.

In Mexico, there are no widespread practices of dowries, and price brides and arranged marriages are rare. Children are the decision-makers. The main reasons offered to explain the high rates of child marriage in Mexico are: first, women in rural areas are mostly valued by their ability to create and sustain a family rather than their occupation; second, girls marry to initiate their sexual lives without the risk of the stigma attached to out-of-wedlock pregnancy; and third, to escape violent households and protect themselves from exploitative groups in areas with extreme violence (Brides, 2017; Taylor et al., 2019). Finally, marriage also offers economic stability, as formal insurance and labor-market opportunities are limited (UNICEF, 2019; Parrado and Zenteno, 2002).⁶

Marriage markets in Mexico are relatively local. According to 'Estadística de matrimonios' (marriage statistics) from the Mexican Statistical Institute INEG, in 1997 and 1999, 83% of formal marriages occurred between spouses from the same municipality.

Most early marriages occur as informal unions. Around 75% of the girls between 15 and 17 years of age who were ever married or in a union report being in an informal union (Girls Not Brides). Given this informality, tackling this problem through legislative changes might be inefficient. A change in the state laws between 2014 and 2018, forbidding completely legal marriages under 18 years of age, led to a decrease in legal marriages offset by an increase in informal unions (Bellés-Obrero and Lombardi, 2020). At the time of the implementation of

⁶According to the survey 'Lo que dicen los pobres', run by the Secretary for Social Development in Mexico (SEDESOL) in 2003, 70% of the respondents resort to family first when facing problems regarding lack of money, almost 60% seek family help first to improve housing conditions, and around 65% count on family in case of an accident and 43% when they need a job. Family is a social institution in Mexico; the wider it is, the better insurance it provides.

Progresa/Oportunidades, the minimum legal age at marriage varied by state.

Finally, in Mexico, schooling and marriage are not exclusive. According to Rivero and Palma (2017), in 2015, 17.10% and 8.15% of formally and informally married girls were enrolled in school. School attendance during marriage rarely happens in countries often covered by the literature on child marriage.

3 Progresa/Oportunidades and Data

In 1998, a conditional cash transfer program, Progresa/Oportunidades, was implemented to reduce poverty and its inter-generational cycle in rural Mexican areas through increased education. There were three sets of actions: (i) offering basic health care to all family members; (ii) providing a fixed monetary transfer to be spent on food consumption and nutritional supplements, targeting children under two years old, malnourished children under five years old and pregnant and breast-feeding women; and (iii) monetary transfers to families with children in school, between the third grade of primary school and the third grade of secondary school. The benefits scheme for 1998 is in Table 1. Benefits were increasing in grade and were slightly higher for girls than boys in middle and secondary school. Transfers consisted, on average, of approximately 14% of eligible households' income (1400 pesos, equivalent to 173 USD in 1998). To receive these transfers, eligible children had to attend scheduled medical visits and at least 85% of classes/school activities.

Eligible households were identified inside each locality through socioeconomic data collected in 1997, assessing their poverty status. On average, 78% of the households in the treatment group were eligible for the program, and 97% of these accepted being beneficiaries (Dubois et al., 2012). In the analysis of this paper, I consider only those households within the surveyed villages that were eligible for the benefit (poor households).

The program was first implemented in 320 randomly chosen rural localities (now referred to as T1998). A further 186 localities were randomly assigned to the control group. All these localities were highly deprived, with access to elementary school, middle school, and a health clinic (Abúndez et al., 2006). In December 1999, all villages in the control group started receiving the

program (T2000).⁷ Households in T1998 and T2000 villages were surveyed in November 1997 (ENCASEH97) and March 1998 (before the introduction of the program), in October 1998, and twice in 1999 and 2000 (ENCELs).

In 2000 and 2001, the program underwent some changes, including its geographic expansion to T2000, and was renamed Oportunidades. Other significant changes for this analysis are extending benefits to high school (*preparatoria*) students and providing bonuses in case students pass grades.⁸ After the expansion of the program, in order to evaluate its long-term effects in 2003, the evaluation team selected a new control group of localities via propensity score matching. These 151 villages are from the same states as the original 506 communities (except for one, for which the neighboring state was used). The matching was performed on aggregated locality aspects using individual data from the Census in 1995 and 2000. These include housing and demographic characteristics, poverty level, labor-force participation, and ownership of durable goods. Besides, localities had to fulfill the program's eligibility criteria concerning distance to schools and health clinics. I refer to this set of localities as C2000, the pure control group. Figure 1 shows a diagram summarizing the program allocation across villages.

Table 1: 1998 Monthly Benefit (pesos)

Primary School			Secondary School		
	Boys	Girls		Boys	Girls
3rd Year	60		1st Year	175	185
4th Year	70		2nd Year	185	205
5th Year	90		3rd Year	195	225
6th Year	120				

Note: This table presents the benefits scheme of Progresa in its first year of implementation. Children are eligible from the 3rd year of primary school until the third and last year of secondary school. Monetary benefits are increasing in schooling level and slightly higher for girls than boys in secondary school.

In 2003, a new survey (ENCEL2003) included all the households found in the original 320 treated localities and the new control group (C2000). The survey asked the control group cur-

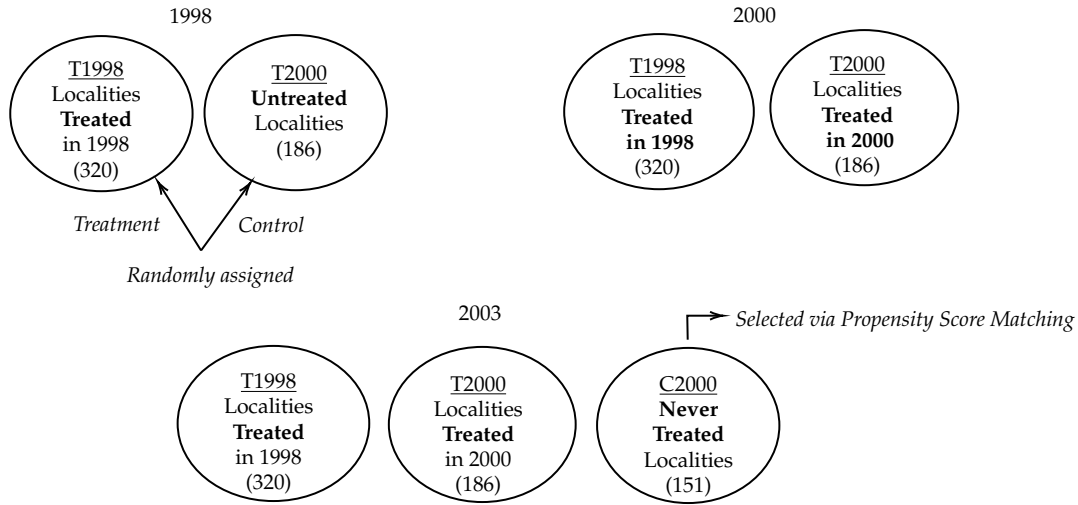
⁷The last survey T2000 answered as a control group was set in November 1999, before the program's introduction. Therefore, for simplicity, I name this group T2000.

⁸Oportunidades introduced *Jóvenes con Oportunidades*, a component of the program that awards a monetary prize to those students who completed high school in less than 4 years and before turning 22.

rent and retrospective questions, referring to 1997, 2000, 2001, and 2002.⁹

The design of the program allows for comparisons across the three groups: (i) T1998 is the group of treated localities in 1998; (ii) T2000, the set of villages that started receiving the program only from 2000 onward; and (iii) C2000, the pure control, or the group of villages that did not receive the program until 2003. I use the data collected through the ENCAESH and ENCEL to evaluate the effect of the program from its start until 2003.

Figure 1: Treatment and Control Villages



Note: This figure presents the three groups I will be comparing: T1998, 320 villages that were randomly selected to start treatment in 1998; T2000, 186 localities that were randomly selected to be the control group in 1998, who were then included in the program in 2000; C2000, 151 localities that were selected in 2003, via propensity score matching, to be the pure control group.

The main outcome of interest for this analysis is *marital status* from 1997 to 2003. I consider an individual married if they report being legally married, living in an informal union, cohabiting, being divorced, or widowed. I choose to do so since I am interested in first marriages, thus not accounting for separations. A child is single if she reports her status to be single. Marriage rates in 1997 were balanced in treatment and control groups.¹⁰

My population of interest is all children between 6 and 16 years old in 1997, the baseline

⁹I use information from the survey conducted in 2007 to complete missing information on year and age at marriage.

¹⁰In ENCEL2007, individuals were asked about age at first marriage or union. This information allows me to retrieve the year and age at marriage for individuals for whom I did not have that information in previous surveys and for those who married after 2003. I use this information only for the descriptive statistics and to complete marriage status in case of missing information from the other surveys.

year.¹¹ Keeping all those whose relevant information is not missing, I have 25 thousand observations, roughly half of which are females. Recall that I am considering only poor households within each locality, meaning those eligible for the program.

3.1 Summary Statistics

Table 2 presents the proportion of married individuals by group and year for the whole sample (Panel (a)) and those younger than 18 (Panel (b)). I present in the first three rows of the descriptive tables the unweighted average of married individuals in each group, T1998, T2000 and C2000. Due to the non-randomness of the pure control group, C2000, I also present in the fourth and fifth rows the weighted average of married individuals for the pure control group, weighted by the probability of being first treated in 1998 and 2000, respectively, versus being in the control group.

Across all years, there are more married children in the treatment groups than in the control group. However, in the first years of analysis, the proportions are close across groups, starting to diverge after 1999. The proportion of girls who are married is systematically larger than the proportion of boys who are married across all groups (see Tables A7 to A8 in Appendix A).

Of those reporting age at marriage, 1.5% married before turning 12, 18.6% married between 12 and 15, 30% married while 16 or 17 years old, and almost 50% at 18 or later. From those who married before turning 18, 60% married at 16 and 17 (see Figure A2 in the Appendix). The average age at marriage is 1.1 years lower for girls, at 17 than for boys, at 18.1.

4 Empirical Strategy

To estimate the program's causal effect on child marriage, I exploit the random and quasi-random allocation of the program across municipalities and the variation in the timing of implementation. Recall that I have information on three groups: (i) T1998, the group of villages

¹¹Only 1.5% of children declared marrying younger than 12; therefore, I assume that a child becomes at risk of marriage only at that age. I excluded from the sample all children who had not turned 12 until 2003. I do not consider children who were over the age of 16 in 1997 either, given that they were exposed to the program close to their 18th birthday.

Table 2: Proportion of Married by Group and Year (in %)**(a) All**

	1997	1998	1999	2000	2001	2002	2003
T1998	0.74	1.46	2.97	5.49	10.03	13.25	15.17
T2000	0.88	1.58	3.17	5.81	10.83	14.14	16.28
C2000	1.49	2.03	3.02	4.42	6.62	9.71	11.33
C2000(IPW1998)	0.65	1.18	2.11	3.42	5.02	6.91	8.13
C2000(IPW2000)	0.78	1.35	2.23	3.76	5.46	7.74	9.11

(b) Under 18 years old

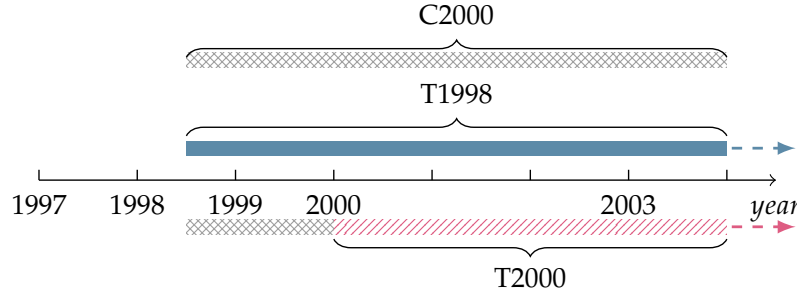
	1997	1998	1999	2000	2001	2002	2003
T1998	0.74	1.36	2.31	3.23	4.43	5.22	4.62
T2000	0.88	1.49	2.33	3.14	4.90	5.68	5.34
C2000	1.49	2.03	1.66	1.88	2.19	2.90	2.55
C2000(IPW1998)	0.65	1.18	1.12	1.43	1.55	1.93	1.70
C2000(IPW2000)	0.78	1.35	1.24	1.60	1.78	2.36	2.01

Note: This table presents the proportion of married individuals by group and year. Panel (a) refers to all individuals between 6 and 16 years old in 1997, and Panel (b) refers to the same individuals until they turn 18. T1998 are those individuals who started receiving the program in 1998. T2000 is the set of individuals who first received the program in 2000. C2000 is the control group. C2000(IPW1998) and C2000(IPW2000) are the control group weighted by the probability of being first treated in 1998 and 2000, respectively, versus being in the control group.

(320 villages) receiving the treatment in 1998 and beyond; (ii) T2000, the group that first received treatment in 2000 (186 villages); and (iii) a pure control group, C2000, which was never treated in the analysis period until 2003 (151 villages). I observe these groups from 1997 until 2003.

As described before, the program was randomly allocated at the start of the implementation. Villages in T1998 were randomly selected to receive the treatment in 1998, and villages in T2000 were randomly selected as the control group. In 2000 the control group was incorporated into the program and started receiving the benefits. C2000 is the group of villages selected in 2003, through propensity score matching, to be the pure comparison group. Figure 2 illustrates the program allocation across groups, the years of the analysis, and the role they represent in the empirical strategy.

Figure 2: Treatment and Control Groups Across Years of Analysis



Note: This figure presents the three groups I will be comparing: T1998, in full and blue, the first treated group; T2000, in both crosshatched gray and pink slide stripes, to emphasize that the same group of villages is a control group until 2000 (crosshatched gray) and joins the treated group from that year onward (pink and slide stripes); and C2000, the control group selected through propensity score matching which was never treated, crosshatched and gray.

The staggered implementation of the program and the rich panel structure of the data allow the estimation of dynamic causal treatment effects by comparing the three groups over 6 years. I use the doubly-robust estimator proposed by Callaway and Sant’Anna (2021) for three reasons. First, it has been shown that, in staggering designs, two-way fixed-effect models with staggered treatment cannot be interpreted causally when treatment effects are heterogeneous. The intuition behind this is that the estimate for the causal effect at a certain period might be contaminated by the treatment effects from other periods, even if the parallel trends and no anticipation assumptions hold.¹²

Second, this estimator allows us to use individual pre-treatment characteristics for more credible parallel trend assumptions. Controlling for these characteristics allows us to compare more similar individuals across the groups of localities. Improving this comparison is particularly important due to the non-randomness of the pure control group (C2000). On average, unobserved characteristics of villages in T1998 and T2000 should be uncorrelated with treatment allocation due to the random assignment to the program across these localities. However, the selection of villages in C2000 assumes that, given the observed characteristics, the treatment allocation was as good as random. Including individual attributes strengthens the plausibility of the assumption since the comparison is then across similar individuals in sim-

¹²See, for example, Goodman-Bacon (2018), Athey and Imbens (2022), Borusyak and Jaravel (2018), de Chaisemartin and D’Haultfœuille (2020), Callaway and Sant’Anna (2021), Sun and Abraham (2021).

ilar municipalities. The estimator proposed by Callaway and Sant’Anna (2021), from now on the CS estimator, allows for the use of pre-treatment characteristics through the combination of outcome-regression and inverse probability-weighting approaches. Outcome regression adjustment allows for covariate-specific trends in potential outcomes across groups. For example, if the potential outcome (marriage) evolution in the case of non-treatment depends on covariates (e.g., gender and age), conditional parallel trends are less restrictive. The causal treatment effect is identified as long as the remaining unobserved characteristics affecting the outcome are time-invariant. Inverse probability-weighting allows re-weighting the observations by the estimated treatment assignment probability to improve comparability across groups. The identifying assumption is that conditional on these characteristics, the treatment assignment was as good as random. Third, this doubly robust estimator identifies the average treatment effect for each group at a given point in time, even if either the propensity score model *or* the outcome regression models are misspecified, but not both.

The CS estimator identifies a group-time causal effect if the following assumptions hold. First, I need to assume that the overlapping condition is satisfied. Meaning that at least a small fraction of the population is treated at each ‘starting’ period (when treatment starts for each group) and that, for all periods, the propensity score is uniformly bounded away from one.¹³ Second, treatment must be irreversible, meaning that, if a group is treated at time t , then it is treated at $t + 1$ for any t , which this design satisfies. The third assumption requires limited treatment anticipation: individuals could not anticipate that they would be beneficiaries of the program prior to its implementation. Attanasio et al. (2012) find no evidence of anticipatory behavior by any of the cohorts. The fourth and final assumption is the conditional parallel trends assumption: in the absence of treatment, the average conditional outcome of the group first treated at a given year and the groups not yet treated would have evolved in parallel.

A common practice used to provide evidence on the plausibility of the parallel trends assumption is to test whether there are different pre-treatment trends for treated and control groups. The idea is that conditional on observed characteristics, the change in the outcome

¹³In practice, I exclude from my total sample 15 observations that have an estimated propensity score higher than 0.999.

that the treated group would have if they had not participated in the treatment is the same as the change observed for the untreated group. Conditional on the observed characteristics, the groups' evolution only differs due to their treatment status.

The estimand of interest is the average treatment effect at time t for the group that was first treated in period g , using the groups that were not yet treated for comparison. It is defined as

$$ATT_{dr}^{ny}(g, t) = \mathbb{E} \left[\left(\frac{G_g}{\mathbb{E}[G_g]} - \frac{\frac{p_{g,t}(X)(1-D_t)(1-G_g)}{1-p_{g,t}(X)}}{\mathbb{E} \left[\frac{p_{g,t}(X)(1-D_t)(1-G_g)}{1-p_{g,t}(X)} \right]} \right) (Y_t - Y_{g-1} - m_{g,t}^{ny}(X)) \right], \quad (1)$$

where $g \in \mathcal{G}$ is the first treatment year for a given cohort, or group, $p_{g,t}(X)$ is the propensity score, or the probability of being first treated in period g conditional on covariates X and conditional on either being treated the first time at g , ($G_g = 1$), or 'not yet treated', $((1 - D_s)(1 - G_g) = 1)$. Y_t is the outcome of interest at time t , and Y_{g-1} is the outcome at baseline before the unit is treated. Finally, $m_{g,t}^{ny}(X)$ is the expected outcome evolution from baseline to time t , conditional on covariates X for the 'not yet treated', $m_{g,t}^{ny}(X) = \mathbb{E}[Y_t - Y_{g-1} \mid X, D_t = 0, G_g = 0]$.

The estimation follows a two-step strategy. The first step estimates the propensity score and outcome regression, $p_{g,t}(X)$ and $m_{g,t}^{ny}(X)$. In the second step, the fitted values of these estimands are plugged into the sample analog of the ATT to obtain its estimate. I cluster the standard errors at the locality level, since this was the unit of treatment randomization.

Threats to Identification Progreso/Oportunidades was first implemented in the poorest Mexican villages, and the set of villages included in C2000 by the program was determined by a matching model to select those localities that were the closest possible to the treatment groups. However, we cannot guarantee that, on average, these groups are equal in observed and unobserved characteristics. Since we cannot control for potential unobserved differences across individuals in the treated and control villages, it is important to ensure that we compare individuals for whom, conditional on a set of characteristics, treatment was equally likely and/or for whom outcomes would have evolved similarly.

I use two sets of characteristics for the propensity score and the outcome regression models: (i) those that are important to determine outcome progression — motivated by the literature on the determinants of marriage; (ii) and those that are determinants of treatment status — stated and used by the program authorities. Despite the different motivations for including the different variables (either them being relevant for the outcome evolution or the treatment status), both models include all variables.

The propensity-score model is misspecified if its functional form is not the true one and/or if it does not include all relevant characteristics that predict treatment status. The functional form chosen is the logistic function. Regarding treatment status, the program's documentation lists the characteristics used to calculate the marginality index of the village, which determined treatment eligibility. I use the same variables for determining the eligibility of individuals: adult literacy, the existence of water in the dwelling, drainage system and electricity, floor quality, number of occupants for room, and labor market occupation. Besides, I add wall quality and asset/durable-goods possession, which are good proxies for wealth, household composition, and a poverty index calculated by the program.¹⁴

I also include gender, age, education level at baseline, indigenous background, and household head and spouse characteristics. The marriage literature has identified these characteristics as important determinants of marriage decisions besides wealth, as mentioned earlier, and household composition. Furthermore, qualitative evaluations of Progres a/Oportunidades suggest heterogeneous effects over these dimensions (Escobar Latapí and González De La Rocha (2009)).¹⁵

¹⁴**Housing characteristics:** dummy variables for dirt floor, inferior-quality wall, inferior-quality roof, number of bedrooms, piped water, electricity, ownership of animals, land, blender, refrigerator, gas stove, gas heater, radio, TV, dishwasher, car or truck; **Household composition:** the number of members in the household and dummy variables for having at least one child between 0 and 5, at least one teenager between 16 and 19, at least one woman between 20 and 30, 40 and 59, and 60+, respectively, and at least one man between 20 and 30, 40 and 59, and 60+, respectively;

¹⁵**Head and Spouse characteristics:** if any of them has ever attended school, if any of them worked the week before, if anyone in the household speaks an indigenous language, if the spouse of the household head is a housewife, if the household head is a woman, and the age of the household head. Given the large number of missing data on education levels, working status and indigenous language of either the head or the spouse of the household, I decided to use variables at the couple level (e.g., either chief or spouse worked the week before), instead of the two separately. For the same reason, instead of using the education level of both, I consider whether any of them has even attended school. Finally, a household with an indigenous background is one where at least

The final specification is very close to the one used by Diaz and Handa (2006), who show that propensity-score matching performs well in the evaluation of Progresa, replicating the RCT results.¹⁶ They show that, for outcomes that are measured comparably across survey instruments, which is the case of marriage, matching estimates on a non-experimental sample are not statistically different from the experimental estimates. They also show that the larger the set of (relevant) covariates, the larger the reduction in the bias.¹⁷

Additionally, a common practice to assess propensity-score misspecification is to compare the density of the propensity-score between treatment and control groups. I show that, despite the low proportion of individuals in the treated group with low propensity-score values, there is overlap across the entire distribution. I also show evidence of balance in the baseline characteristics across treated groups and the re-weighted control group, using the probability of being in one of the two treatment groups as weights, as explained in Section 3.1 (Tables A1 to A6 in the Appendix, for all individuals and separate by gender). Given that some means are statistically different across groups, I run the main analysis of the paper using the improved doubly robust DiD estimator for the ATT based on the inverse probability of tilting and weighted least squares, after which there is, by construction, perfect mean balance, and the results are robust.

Another caveat I need to address is that, for the pure control group (C2000), the pre-treatment information on the used covariates is recall data collected in 2003 regarding 1997. Therefore, there could be recall bias regarding the baseline characteristics, which could then lead to biased estimates. Since the recall data was only collected for C2000 and not T1998 and T2000, it is hard to judge the accuracy of this data. One way of sensing how problematic this might be is to remove from the propensity score and outcome regressions the variables that are more likely to be subject to recall bias, such as asset possession. I kept those unlikely to have that issue, like

one person speaks an indigenous language.

¹⁶My specification includes the same variables as the ones used in Diaz and Handa (2006), except for access to social security. I add more variables that are important determinants of wealth, treatment heterogeneity, and marriage.

¹⁷My specification is also similar to the one used by Behrman et al. (2011), which estimates the program's effect on education. The most significant difference is that I am not using missing variable flags; instead, I am losing the observations for which there is no information on baseline characteristics (see Appendix B). Despite these differences, I can replicate the results from the paper mentioned above regarding the program's effect on educational achievement.

household composition and parental education. The results are robust to this specification.

An in-depth analysis of attrition and missing data is available in Appendix B. In summary, attrition increases with years, and it is higher for T1998 than T2000 (this difference is statistically significant from November 1999 onward). Since individuals in the treatment group are more likely to have missing information regarding marriage, I perform a robustness check using Lee bounds with inverse probability weights and tight bounds. Treating the data as repeated crosssection, I estimate a lower bound for the aggregate effect for girls of 2p.p, statistically different from zero at 1%, $CI=[0.0176, 0.0293]$. Besides attrition, the age of some individuals does not progress as expected, or their gender changes. These might indicate a mismatch in the IDs or misreporting gender or age. For the main analysis, I exclude all those observations in which gender is inconsistent and age decreases. If I am stricter and drop those observations that show any inconsistency in age (either decreasing or unreasonably increasing), I obtain qualitatively similar results with larger magnitudes. A third problem concerns missing data regarding baseline characteristics, mainly in the control group. I exclude all observations for which I do not have complete information on these characteristics. Imputing missing values would introduce bias in the propensity score estimates due to the non-zero covariance across the predictors. Finally, 34% of the sample does not have information on education at baseline. Since the literature suggests that education is a good predictor of marriage decisions, I exclude those observations with missing education in the primary analysis. If I instead exclude the variable from both the propensity score estimation and the outcome regression, thus still keeping those observations, I obtain qualitatively the same results but with a smaller magnitude.

5 Results

5.1 Probability of Child Marriage

I start by analysing whether the program has affected the probability of child marriage. In this set of results, and when not stated otherwise, I consider only the individuals until they turn 18. Table 3 shows that the program increased, on average, the probability of early marriage by 1.9

percentage points (p.p) (with the lower bound of the 95% confidence interval being 0.012, and the upper bound 0.026, hereafter CI=[0.012, 0.026]), significant at 1%. This effect corresponds to doubling the marriage rate compared to the control group (the average marriage rate for C2000(IPW1998) is 1.7%, and 2% for C2000(IPW2000)).

Table 3: Average Treatment Effect of Progresa/Oportunidades on Marriage

	All		
	All	T1998	T2000
ATT	0.019 (0.0037) [0.0117 , 0.0262]	0.0181 (0.0044) [0.0086 , 0.0275]	0.0206 (0.0057) [0.0082 , 0.0329]
Control Mean		0.013	0.015
N		25623	

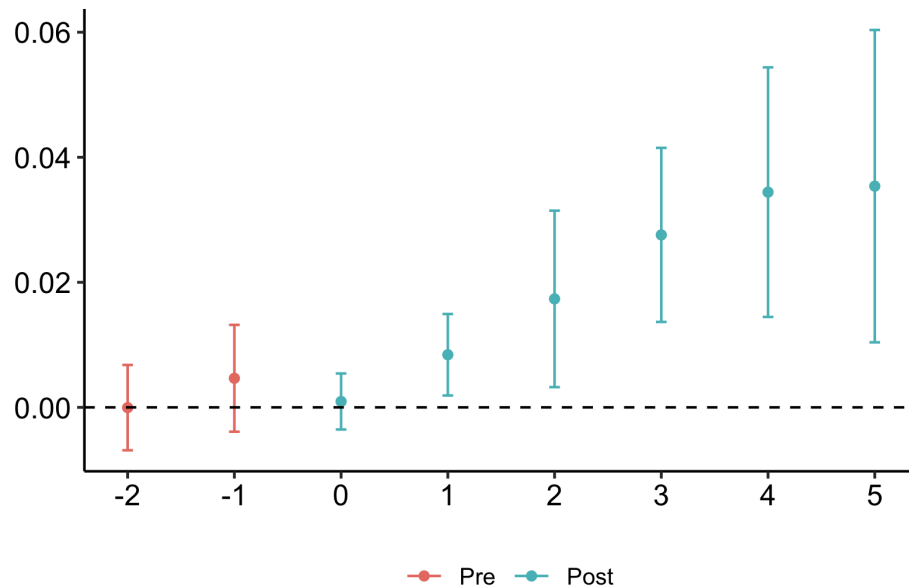
Note: This table presents the aggregated average treatment effect on the treated. 'All' represents the estimate using treatment groups T1998 and T2000. The second and third columns separately present the average treatment effect over time for treatment groups T1998 (who first received the treatment in 1998) and T2000 (who first received the treatment in 2000). Standard errors were obtained through clustering at the randomization level: locality. The average marriage rate for C2000(IPW1998) is 1.3% and for C2000(IPW1998) 1.5%.

Then, I explore how this effect varied with the length of exposure to Progresa/Oportunidades. Figure 3 shows the effect of the program on the probability of being married by the number of years exposed to the benefit (these results are also in Table A12 in the Appendix). For instance, time -1 represents one period before treatment, so for group T1998, $t = -1$ corresponds to 1997, and to 1999 for group T2000. Similarly, time 2 represents two years after treatment. Note that the effects in times 4 and 5 are only estimated using T1998, the only group treated for more than 3 years in the studied period. It is similar for period -2, which is only observed for T2000. In the pre-treatment periods, I do not reject the null hypothesis of no effect of the program at any conventional significance level, supporting the plausibility of the parallel trends assumption.

Then, I observe that the program did not affect child marriage in its first year of implementation ($t = 0$). However, it started leading to increases in marriage after one year of exposure. One year after receiving the benefit ($t = 1$), treatment groups were 0.8 p.p (CI=[0.002, 0.015]) more likely to be married than the control group. This effect increased to 2.8 pp (CI=[0.014, 0.042])

in the third year and around 3.5 p.p (CI=[0.01,0.06]) after five years, statistically significant at 1%. For reference, the unconditional and unweighted proportion of married individuals in the control group was 2.55% in 2003, so the effect corresponds to more than doubling marriage incidence.

Figure 3: Effect of Progresa/Oportunidades on the Probability of Marriage by Length of Exposure



Note: This figure presents the average treatment effect on the treated by the length of exposure to treatment. Time -1 represents one period prior to treatment. For T1998 (the group that first received the treatment in 1998) time -1 corresponds to 1997, and for T2000 (the group that first received the treatment in 2000) to 1999. Period 2 represents two years after treatment, and so on. In red are the estimates before treatment started, and in blue after. Standard errors were obtained through clustering at the randomization level: locality. The p-value for the pre-test of parallel trends assumption is 0.38.

Across treatment groups, I observed a positive trend in the estimated coefficients one year after the program started for T1998. However, these were not statistically different from zero until 2001, when beneficiaries were 2.4 p.p (CI=[0.005,0.044]) more likely to marry before turning 18 than non-beneficiaries. In 2000, the point estimate is already large, 1.3p.p., but the estimates are noisy, with a 95% confidence interval ranging from -0.006 to 0.03p.p. After 5 years of exposure, beneficiaries of T1998 were 3.5p.p (CI=[0.01,0.06]) more likely to marry, 3 times more likely than the control group (C2000(IPW1998)). Figure A9 and Table A13 in the Appendix

show these results.

For the second treatment group, T2000, the program increased marriage after the first year of implementation. In 2001, the effect is 2 p.p (CI=[0.005,0.04]) , 2.6 p.p (CI=[0.005,0.046]) in 2002 and 3.4 p.p (CI=[0.013,0.05]) in 2003, significant at 1%. These results hint that the changes made in the program around 2001 (from Progresa to Oportunidades) were important in explaining the program's positive effect on marriage.

5.2 Heterogeneous Effects

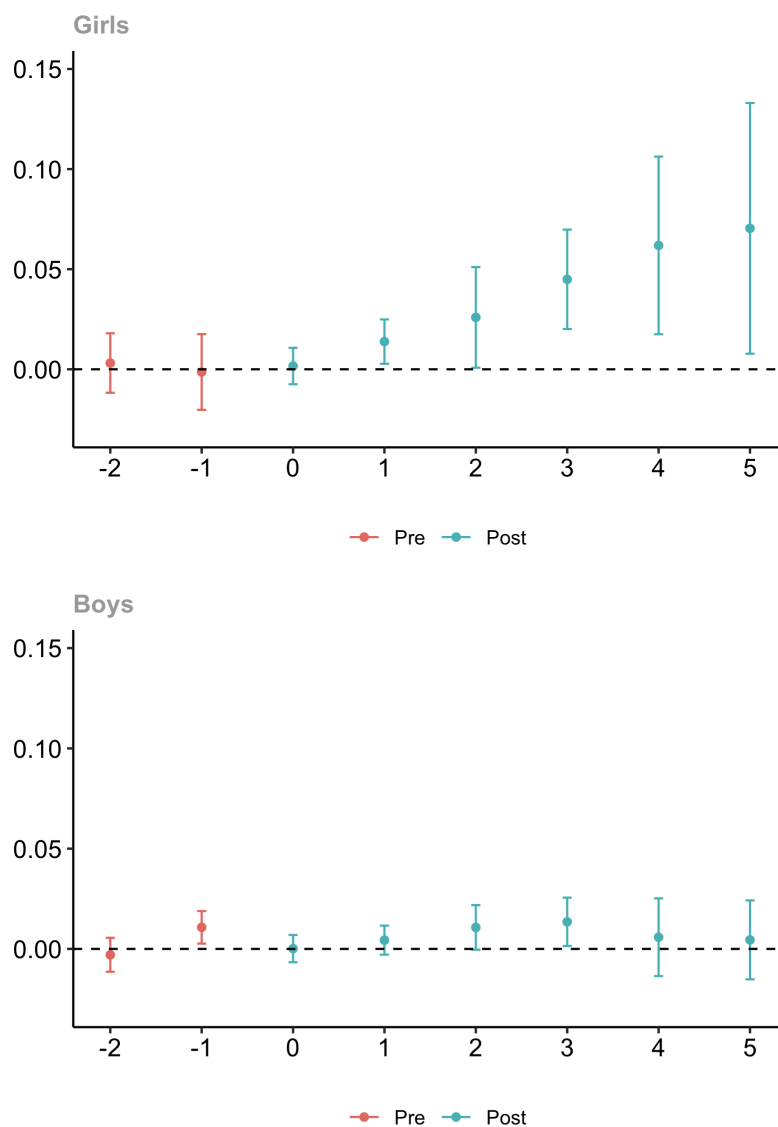
5.2.1 Gender

Around the world, child marriage is a more prevalent phenomenon among girls than boys. Also, the socioeconomic consequences associated with child marriage are known to be more damaging for females than males due to early childbearing, exposure to violence, and a higher likelihood of formal labor-market exclusion. Hence, in this section, I look at the heterogeneous effect of the program by gender. Table 4 shows that the large treatment effects on girls drive the overall effects. On average, the program increased the probability of child marriage for girls by 3 p.p (CI=[0.0183, 0.0472]). However, this effect was not substantive and not significant for boys, 0.7p.p (CI=[0.0003, 0.01]).

After 1 year of exposure to Progresa/Oportunidades, girls were, on average, 1.4 p.p (CI=[0.0028, 0.0249]) more likely to be married if living in a beneficiary village, significant at 1% (see Figure 4, upper panel). After 5 years, child marriage probability increased by 7 p.p (CI=[0.008, 0.133]) due to the program. In 2003, in the weighted control group C2000(IPW1998), 2.2% of the girls were married; thus, the program tripled the likelihood of marriage for girls in T1998. The point estimates are positive and increasing for girls in both treatment groups across the years. However, it is after 2001 that they start being meaningful (see Figure A10 and Table A15 in the Appendix for the estimates for each treatment cohort separately). For reference, in 2003, the unweighted proportion of married girls under 18 in the control group was 4%, larger than the weighted averages — between 2.2 and 3% (see Table A7).

Results for boys, presented in the bottom panel of Figure 4 (and A11 in the Appendix) are

Figure 4: Effect of Progresa/Oportunidades on the Probability of Marriage by Year and Gender



Note: This figure presents the average treatment effect on the treated by treatment group and time for girls and boys separately. Group 1998, or T1998, is the group that first received treatment in 1998 and Group 2000, or T2000, is the group that first received treatment in 2000. In red are the estimates before treatment started, and in blue after. The left panel restricts the analysis to girls, and the right panel to boys. Standard errors were obtained through clustering at the randomization level: locality.

Table 4: Average Treatment Effect of Progresa/Oportunidades on Marriage, by Gender

Girls			
	All	T1998	T2000
ATT	0.0327 (0.0074) [0.0183 , 0.0472]	0.0312 (0.0092) [0.0118 , 0.0506]	0.0355 (0.0094) [0.0156 , 0.0554]
Control Mean		0.019	0.024
N		12350	
Boys			
	All	T1998	T2000
ATT	0.007 (0.0034) [3e-04 , 0.0137]	0.0058 (0.0033) [-0.0013 , 0.0129]	0.0092 (0.0061) [-0.0037 , 0.0221]
Control Mean		0.007	0.007
N		13273	

Note: This table presents the aggregated average treatment effect on the treated by gender. In the first column of each gender, 'All' represents the estimate using as treatment groups both T1998 and T2000. The second and third columns present the average treatment effect over time for treatment groups T1998 and T2000, respectively. Standard errors were obtained through clustering at the randomization level: locality.

to be interpreted cautiously, as I reject the null hypothesis of no pre-trends. Before the program started for boys in T2000, there was a positive trend, which hints at a different pre-treatment behavior. Thus, the post-treatment results may not be due to the program, but a product of those pre-existing differences. Despite overall positive point estimates, most are not statistically different from zero, with low magnitudes. For the disaggregated results by treatment group, see Tables A16 and A17, in the Appendix.

Those girls for whom I have information on their partners' ages were, on average, 3.5 years younger than their partners. 60% of these girls married older men, so I look at the program's effect on young men up to 30 years old at baseline. For this population, I find that older men in eligible and non-eligible households in treated villages were likelier to marry than those in

control villages.¹⁸

In summary, after Progres/Oportunidades was introduced, girls in households eligible to receive the program in beneficiary villages were more likely to be married before the age of 18, when compared with similar girls in villages that did not receive the conditional cash transfer program. The same does not happen for boys under 18, but I observe an increase in marriage probability for older men.

5.2.2 Age

Since marriage is positively associated with age, it is also interesting to investigate whether the program had heterogeneous effects across this dimension. Given the results in the previous section, I restrict this analysis to girls.¹⁹ I split the sample into three age groups, defined at baseline: (i) girls aged between 6 and 8 in 1997, (ii) girls from 9 to 11 years of age, and (iii) girls from 12 to 14 years old. Recall that I stop considering individuals once they turn 18. Therefore, the last year I observe the oldest group is 2002, since in 2003 all of these children would have turned 18. For the same reason, I do not consider girls 15 and 16 years old at baseline, since I would not have post-treatment periods for those in T2000.

Across the three age groups and the two treatment groups, I observe the same pattern as in the aggregated results. Figure A12 shows the effect of Progres/Oportunidades on early marriage separately for girls in T1998 and T2000. Note that girls in T1998 are being compared to those in T2000 until 1999 (including) and those in the pure control group, C2000. Those in T2000 are being compared exclusively to the pure control group. The fewer observations in each age group make the estimates noisier, but the point estimates are consistent with the aggregate results. I find positive point estimates across all ages and treatment groups, statistically significant and large for the two older groups.

The magnitude of the effect increases with age, but conditional on age, there is no difference in the effect across treatment groups. This suggests that the length of exposure to the

¹⁸Results available upon request. Just like Bobonis (2011), I also find a positive effect on older women who were single at baseline.

¹⁹Analyzing just boys, results suggest positive but small, effects at younger ages and no significant effect for the last age group.

program does not affect marriage decisions. What appears relevant is having been exposed to the program and the age at which that happens.

Another important observation is that the program started having more substantial effects in 2001 when it extended benefits to secondary school. For example, girls who were 13 or 14 years old in 1997 and turned 16 or 17 in 2000 had a lower marriage probability than those girls who turned 16 or 17 in 2003. Students are supposed to reach secondary school at around 15 years old if they do not repeat any year. This observation suggests that the program's changes might be relevant to explain its overall effect.

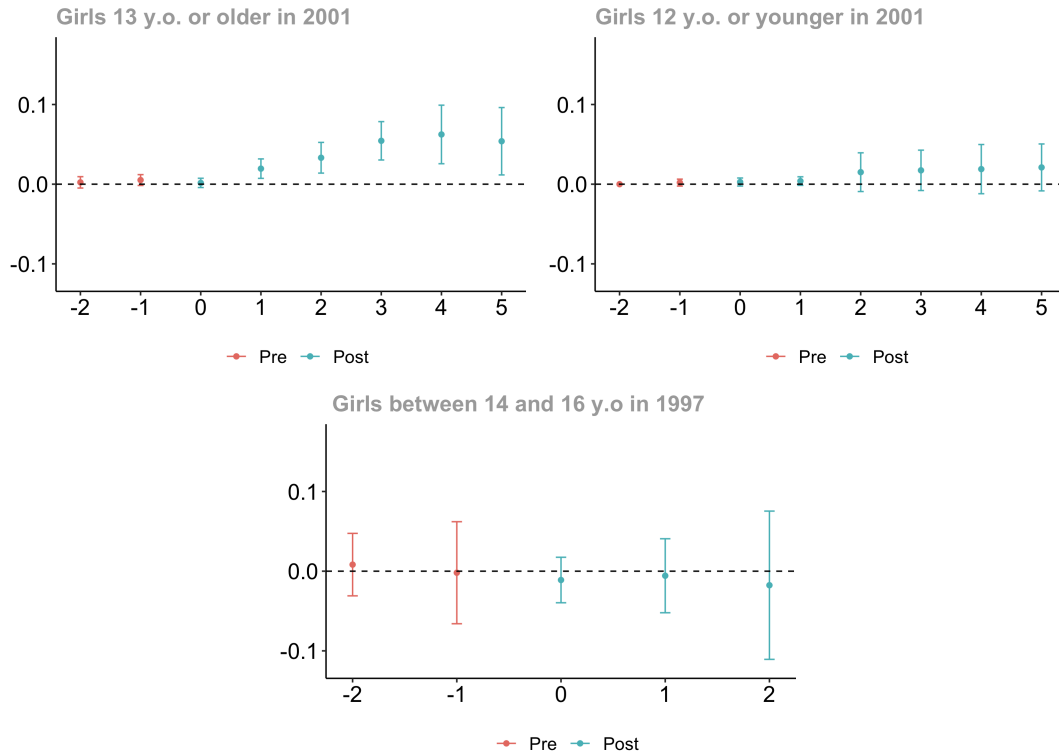
I test this hypothesis by comparing the program's effect across three groups. The first group is all the girls older than 13 in 2001, who were likely to be in high school between then and 2003. The second group is girls younger than 12 years old in 2001, who were unlikely to be in high school during this period. To compare girls of similar ages, the third group is girls between 14 and 17 in the years before the benefits extension. If these were in high school until 2001, they received no benefit.²⁰

Figure 5 shows evidence supporting the previous hypothesis. The first graph shows that the program had large and statistically significant effects on the group likely to receive benefits during high school. For the younger cohort, the point estimates are positive but not statistically significant. The two age groups did not behave differently before the program's implementation, but the effect is significantly larger for the older cohort than the younger one (see Figure A13 in the Appendix). Comparing treatment and control individuals who were similar in age to the first group but did not receive benefits during high school age, I found no effect of the program. Figure A14 in the Appendix shows that we can reject the null of equal effects for girls older than 13 in 2001 and girls between 14 and 16 in 1997.

Most early marriages in Mexico happen between 15 and 17 years old; thus, the evidence suggests that receiving the benefit at this age facilitates marriage decisions for girls in treated villages. This is also supporting evidence that the income effect of the program might explain the overall observed effect. I will discuss this in more detail in the next section.

²⁰Girls with 13 years of age in 1997 are likely to still be in high school in 2001, thus my choice of restricting the third group to 14-17.

Figure 5: Effect of Progresa/Oportunidades on the Probability of Marriage by Group Receiving Secondary High School Benefits



Note: This figure presents the average treatment effect on the treated by treatment group and time for three different groups: (i) girls 12 or younger in 2001, (ii) girls 13 or older in 2001, and (iii) girls between 14 and 16 in 1997. In red are the estimates before treatment started, and in blue after. Standard errors were obtained through clustering at the randomization level: locality.

6 Mechanism: Income Effect

In the previous analysis, I found that the conditional cash transfer program Progresa/ Oportunidades led to an increase in the marriage probability for girls under 18. Although the program was not targeted at reducing child marriage, this result might be surprising since the program led to increases in education, which is often an important mechanism for decreasing child marriage (Angrist et al., 2002; Hallfors et al., 2015; Ashraf et al., 2020; Kirdar et al., 2018; Skirbekk et al., 2004; Ferré, 2009).

Given the nature of Progresa/Oportunidades, we cannot disentangle the effect of education from the overall program's effect. This is because if beneficiary children are exposed to more education, then their household should be receiving the benefit. However, we can hypothesize

if and how education is changing marriage decisions. If there are labor-market returns from education, increases in education should lead to an increase in the opportunity cost of marriage. In Mexico, however, this might not be the case. First, there is evidence that education may be an imperfect measure of human capital accumulation. Behrman et al. (2005) found no evidence that the program led to better grades, and Dubois et al. (2012) found that the program harmed the probability of passing grades for secondary school students. Second, Attanasio et al. (2012) showed that the relationship between wages and education is flat in rural Mexican villages. If this is the case, education may not directly affect marriage decisions. To test the plausibility of this argument, I compare Progresa/Oportunidades' effect on child marriage between villages with returns to education above the median and villages below the median.²¹ I find that, on average, the program's effect is larger in villages where returns to education are below the median compared to villages above the median (see Figure A15). This suggests that there might be a negative education effect on child marriage in Mexico, but it is not strong enough due to no returns from education in the labor market.

However, we cannot disregard the hypothesis that education actually increases child marriage. Agarwal et al. (2023), for example, show that in India — where dowries are common practice — education and youth are valuable in the marriage market, leading to young educated girls marrying earlier than less-educated ones. These findings are consistent with Andrew and Adams (2022), who show that parents believe education is valuable in the marriage market, but age is not. Thus, early school abandonment might push parents to marry off their daughters earlier, leading to the positive effect of education on marriage. Further investigation is necessary to determine where the Mexican case falls.

An alternative channel through which the program might affect marriage decisions is the income effect of the program. The monetary transfer received by eligible households that complied with the conditionality might lead to increases in marriage rates. Ex-ante, however, the

²¹I estimate a Mincerian regression using municipal-level data from the 1995 census. Out of 658 localities of the Progresa/Oportunidades sample, I could match returns to education to only 261. The availability of this information is not statistically different between treatment and control villages, and child marriage rates do not statistically differ between villages for which there is information on returns to education and those for which the information is unavailable. The overall effect of the program on villages for which I observe returns to education is similar to the effect in the entire sample.

direction of the income effect is not clear. The transfers may reduce reliance on marriage as a safety net by relaxing budget constraints. On the other hand, the household's extra income may increase boys' and girls' desirability on the marriage market, change their network, and/or it may facilitate marriage by making wedding expenditures more affordable.

Looking at the correlation between the annual per-capita benefit the household received and females' marriage probability, I find that, compared to households in the lowest quartile of the benefit distribution, those in the 2nd and 3rd are 2 and 1.5p.p more likely to marry, respectively (see Table 5). This correlation is not linear since it becomes negative for those in the highest per-capita benefits-distribution quartile. When looking exclusively at child marriage, I observe the same pattern. This exercise suggests a positive but non-linear correlation between income and marriage probability. Since the benefit amount is endogenous, I proceed with a strategy to estimate the *causal* effect of an increase in income on marriage decisions.

Table 5: Correlation between Yearly Benefit and Marriage: Girls

	(1) Married (all)	(2) Married (CM)
2nd quartile of per capita yearly benefit	0.0208*** (0.00584)	0.0101** (0.00427)
3rd quartile of per capita yearly benefit	0.0146** (0.00596)	0.00948** (0.00419)
4th quartile of per capita yearly benefit	-0.0308*** (0.00538)	-0.0213*** (0.00353)
N	46232	38411

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the correlation between the yearly monetary benefit received by each household, divided into quartiles, and the probability of girls being married. Observations were weighted by the inverse of the propensity score, and all regressions have the control variables described in the data section, including age and household composition. Standard errors were obtained through clustering at the randomization level: locality.

6.1 Empirical Test of the Income Effect

To test whether positive income transfers causally change marriage decisions, I exploit household composition variations to separate the program's income effect from its overall impact. I focus on the sub-sample of individuals between 6 and 16 years of age at baseline who were exposed to the income effect only. I restrict the analysis to those individuals who are not eligible for the benefit themselves, since they completed, in 1997, the final grade of middle school or higher, but live in the same household as an eligible child. For example, these could be older siblings who have completed middle school and whose younger sibling(s) is(are) eligible for the program.²² The sample consists of 3,115 individuals, 46% of them female and, on average, 15.51 years old at baseline. I consider marriage after 18 years old.²³ I believe that, for this exercise, it is enough to understand if a positive income shock leads to an increase in marriage without focusing on the age at which the union occurred.

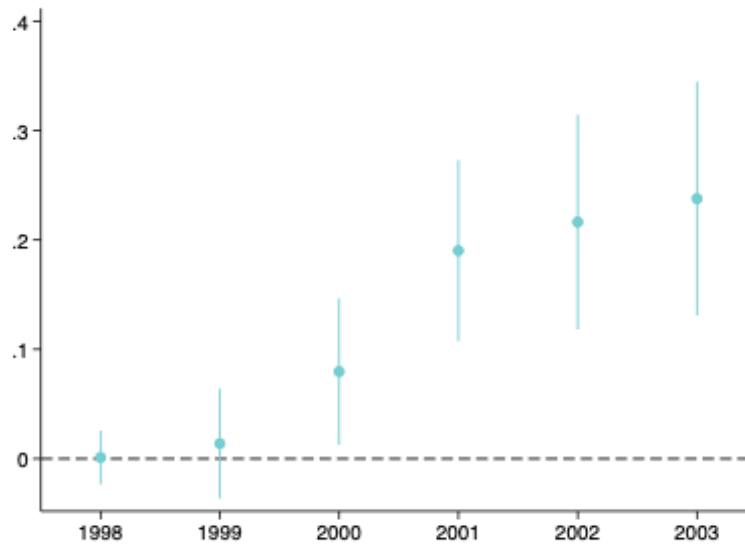
If it was the case that the program incentivized older siblings to pursue more years of education, then I could not disentangle the two effects. However, the benefit is likely not enough to compensate both the wage of the beneficiary child and the older sibling as well since it was calculated to compensate for around two-thirds of a child's wage in rural Mexico. Furthermore, empirically I do not observe different levels of education between treated and control groups in 1997, 2000 and 2003, which is suggestive evidence of no 'spillover' effects of the program on non-eligible members within the household.

Figure 6 shows the effect of a positive income shock on the probability of marriage. In the first two years, I observe a positive but small effect of the benefit on the probability of marriage, not statistically significant. However, from 2000 onward, I observe positive and substantial effects: the income component of the program led to an increase in marriage probability of between 7 and 23p.p, statistically significant.

²²Since the rules of eligibility changed in 2000, I use the comparison between T1998 and C2000 to avoid misclassification of eligibility.

²³If I restrict the sample to marriages below 18 years old, I find consistent results, but the point estimates are very noisy due to the small sample size.

Figure 6: Causal Effect of an Income Shock on the Probability of Marriage



Note: This figure presents the average treatment effect on the treated by year for the sample of individuals who would not be eligible for the program, but share the household with an eligible individual. Standard errors were obtained through clustering at the randomization level: locality.

These results suggest that, in this population, receiving a positive income transfer enables individuals to marry. This might be the case for several reasons. First, income availability increases marriage affordability, such as allowing for paying the costs of a new in-law in the household or helping support the creation of new households. Mier y Terán (2004) argue that higher earnings and the opportunity for better jobs in rural Mexico allow young people to create independent households and marry earlier. Rubalcava and Teruel (2005), which studies the effect of Progresa (T1998 vs C2000) on living arrangements and finds that the transfer leads to both young adults (children of the head of the household) leaving the household and constitute their own family and to an inflow of new members, some of those being sons-in-law and daughters-in-law.

A second possibility that might explain this income effect is that girls' bargaining power in the household increases with the program. Since the benefit is only received if girls regularly attend school, girls might use it to improve their household situation. Higher bargaining power could entail reducing their homemaking labor supply, thus decreasing the need to live in the same household, or through more independent decision-making, such as marrying and exiting

the household, conditional on continuing to attend school so that the family continues receiving the benefit. Evidence that supports this is that married girls in treatment villages attend school at a higher rate than married girls in control villages. In 2003, beneficiary-married girls were 7p.p. more likely to attend school than non-beneficiary-married girls. Girls might stay in school, even after marriage, to continue receiving the benefits. A caveat of this theory is that it can be the case that all married girls want to go to school (in spite of their arrangement within the household), but only beneficiaries can afford it, which also explains the observed pattern.

Finally, the program might also be changing marriage markets. Beneficiary girls' value in the marriage market might increase due to better economic conditions after the program. Mier y Terán (2004), for example, argues that early marriage is more common in land-holding households, suggesting resources are an asset in the marriage market. Indeed, the program also increased the marriage probability of non-eligible young male adults in treatment villages. Within these villages, these men are relatively more affluent (thus the non-eligibility), which hints that some beneficiary girls are marrying into higher economic status households. Unrelated to income but due to schooling, girls might also have a broader marriage market. They might be meeting new potential partners at a higher rate, which increases the likelihood of marriage. However, it is unlikely that girls are meeting their partners in school since, on average, their partners are three years older than them.

These are all plausible explanations that support the presented evidence on the causal effect of income on marriage. Despite not being able to specifically pinpoint which of the previously discussed channels is prevailing, these are important results for future research and policy design. Given that marriage is a normal good in Mexico and there are no counteracting forces in the society and the economy, giving monetary transfers to young people leads them to marry more. In the next section, I rationalize this result in a two-period model of schooling and marriage decisions, where a school subsidy is introduced.

6.2 Theoretical Framework

In this section, I theoretically discuss how introducing a school subsidy as Progresa/Oportunidades can change schooling and marriage decisions.

Agents live for two periods and discount the future at rate $\beta < 1$. They derive utility from consumption, $u(c)$, marriage, $f(q)$, which depends on marriage quality q , with $u' > 0$, $u'' < 0$, $f' > 0$. Individuals are heterogeneous in their preference for school $\xi \sim J(\xi)$. Agents can be either in school or in the labor market. Whenever they are in school, they receive an endowment ω and, in the first period, they receive payments from the program p . When they participate in the labor market, they obtain a market wage $w(h)$, increasing in human capital h . School attendance in the first period implies that the human capital level in the second period is $h' > h$.

Agents also make marriage market decisions. At the beginning of both periods, if they are single, each agent draws a match quality $q \sim G(q)$. If they decide to marry, they pay a cost c . If, in the first period, they choose to marry a partner of quality \tilde{q} , they will receive a marriage utility $f(\tilde{q})$ in both periods. Denote single agents not in school as in state N . Single agents in school as in state E . Married and in school agents as EM and married not in school as in state M . Then, formally, the per-period payoffs are given by

$$\begin{aligned} U^N(\xi, h, q) &= u(w(h)) \\ U^E(\xi, h, q) &= u(\omega + p) + \xi \\ U^{EM}(\xi, h, q) &= u(\omega + p - c) + \xi + f(q) \\ U^M(\xi, h, q) &= u(w(h) - c) + f(q) \end{aligned}$$

Define ξ^{**} as the level of taste for schooling such that the agent is indifferent today between marrying and going to school (EM) and marrying and leaving school (M). If an individual's taste for schooling ξ is larger than ξ^{**} , then this individual prefers to be married in school rather than married out of school. ξ^{**} is decreasing in p , which means that the program decreases the minimum taste necessary for individuals to choose schooling over the labor market, conditional on marriage. Therefore, the program increases the mass of people who choose EM over M.

Furthermore, denote ζ^* the preference for schooling such that agents are indifferent between being single in school and being single in the labor market. If agents' taste for schooling is larger than ζ^* , they will prefer to be single than in the labor market. The program decreases ζ^* , increasing the mass of people choosing E over N.

I assume that $\zeta^{**} > \zeta^*$, meaning the reservation school taste to choose between going to school married and married is higher than the reservation school taste to choose between going to school single and leaving school single. The idea behind this assumption is that for an agent to continue going to school while married, they need to enjoy school more than when they are single.²⁴

Depending on their preference for schooling, agents will have different reservation partner qualities. Denote q^{**} the partner quality that makes agents indifferent between being in school and being in school and married. Denote q^* the partner quality that makes agents indifferent between being in school and married out of school. And, finally, denote \tilde{q} , the reservation partner that makes agents indifferent between out-of-school married and out-of-school single. It is immediate to show that $\partial q^{**} / \partial p < 0$.²⁵ Namely, agents in school are more likely to marry as the program induces an income effect on marriage. Further, $\partial q^* / \partial p > 0$: in the choice between marriage out of school and single in school, the program increases the payoff associated with schooling, thus agents are less likely to marry. Finally, $\partial \tilde{q} / \partial p = 0$ since the program does not change the trade-off between being out of school single or out of school married.

Note that, if $\omega > w(h') > w(h)$, all agents would choose schooling in both periods. Since we observe that the program induces higher schooling but that older individuals work a natural assumption is that $\omega < w(h) < \omega + p < w(h')$. If this is the case, then $q^{**} < q^*$ and $\tilde{q} < q^*$. Partner's reservation quality is the highest when choosing between being single in school and being married in the labor market.

To understand what a school subsidy does to schooling and marriage, define the mass of individuals in school, \mathcal{E} , as the sum of those who choose to be in school single (E) and being in school married (EM), and the mass of married individuals, \mathcal{M} , as the sum of those who choose

²⁴It is immediate to rationalize this assumption by introducing a time endowment that agents have to use for schooling and marriage activities.

²⁵See Appendix C for detailed derivations

to be in school married (EM) and married in the labor market (M):

$$\mathcal{E} = 1 - J(\xi^{**}) + (J(\xi^{**}) - J(\xi^*))G(q^*)$$

$$\mathcal{M} = (1 - J(\xi^{**}))(1 - G(q^{**})) + J(\xi^*)(1 - G(\tilde{q})) + J((\xi^{**}) - J(\xi^*))(1 - G(q^*))$$

The first key result is that an expansion in the program changes the mass of agents in school

$$\frac{\partial \mathcal{E}}{\partial p} = j(\xi^{**}) \frac{\partial \xi^{**}}{\partial p} (G(q^*) - 1) - j(\xi^*) \frac{\partial \xi^*}{\partial p} G(q^*) + (J(\xi^{**}) - J(\xi^*))g(q^*) \frac{\partial q^*}{\partial p} > 0$$

The program unequivocally increases schooling. It does so in two distinct ways. First, it reduces the threshold preference ξ^{**} above which agents never consider dropping out of school. Next, it increases the reservation partner quality q^* above which agents are happy to get married and leave school.

The second insight from the model is that an increase in the program generosity affects the mass of married agents, according to

$$\begin{aligned} \frac{\partial \mathcal{M}}{\partial p} = & \overbrace{j(\xi^{**}) \frac{\partial \xi^{**}}{\partial p} [G(q^{**}) - G(q^*)]}^{\text{composition effect } > 0} + \overbrace{j(\xi^*) \frac{\partial \xi^*}{\partial p} [G(q^*) - G(\tilde{q})]}^{\text{composition effect } < 0} - \\ & \underbrace{-g(q^{**}) \frac{\partial q^{**}}{\partial p} [1 - J(\xi^{**})]}_{\text{income effect } > 0} - \underbrace{g(q^*) \frac{\partial q^*}{\partial p} [J(\xi^{**}) - J(\xi^*)]}_{\text{composition effect } < 0} \end{aligned}$$

The effect of the program on overall marriage is, however, ambiguous. It can be decomposed in three composition effects and one income effect.

The first term, $j(\xi^{**}) \partial \xi^{**} / \partial p [G(q^{**}) - G(q^*)] > 0$ contributes to increases in marriage. The program lowers ξ^{**} , the threshold of the school preference above which individuals go to school, independently of their marriage status. These individuals have a lower reservation partner than individuals choosing between school and marriage: $q^{**} < q^*$. As a consequence, the average reservation partner in the population decreases, and marriage increases.

A second composition effect $j(\xi^*) \partial \xi^* / \partial p [G(q^*) - G(\tilde{q})] < 0$ decreases the prevalence of

marriage. The presence of the program moves more mass in the group choosing between school and marriage by decreasing ζ^* . These agents have the highest reservation partner quality. As a consequence the average q increases and marriage declines.

The third term, $-g(q^{**})\partial q^{**}/\partial p[1 - J(\zeta^{**})] > 0$, denotes the income effect. Agents choosing between schooling and schooling while married have a reservation partner q^{**} . The higher income associated with the program reduces the reservation quality and, therefore, increases marriage.

Finally, the fourth term, $-g(q^*)\partial q^*/\partial p[J(\zeta^{**}) - J(\zeta^*)] < 0$ reduces marriage. The presence of the program implies that agents choosing between marriage and schooling are more likely, all else equal, to choose schooling. As a consequence, their reservation partner q^* increases, making them less likely to marry.

Concluding, this simple framework shows how introducing a school subsidy increases education unequivocally, as supported by empirical evidence. However, the overall effect on marriage depends on the relative magnitude of different composition and income effects. In contexts where the income effect is small, changes in the composition of the population induced by the program are likely to reduce marriage rates. On the other hand, in contexts where the income effect is large enough, the subsidy can lead to increased marriage, just as I show to be the case for rural Mexico. Given the empirical evidence presented in the previous sections, we can infer that the income effect of the program is significant enough to compensate for the composition effects that led to increases in schooling and would, all else equal, lead to decreases in marriage.

7 Discussion of Results

This paper studies child marriage in a setting where children are the decision-makers. It is reasonable to question whether this practice in rural Mexico is as harmful as in contexts with arranged marriages and marriage payments. If children decide to marry, they must receive some utility from it. Is it, then, prejudicial for their future? Given self-selection into marriage and age at marriage, it is extremely challenging to understand the causal effect of child marriage

on girls' education, well-being, and labor-market outcomes. However, we can analyze the association between child marriage and female well-being, which are the indicators governments and institutions use to call for the end of this practice.

To do this, I use two datasets. First, the Progres/Oportunidades data to understand whether child brides differ from adult brides and single children regarding education and labor-market outcomes. I focus on girls who were between 6 and 16 years old in 1997. Second, to address the differences in well-being, partnership quality, and fertility between child and adult brides, I use the 'Encuesta Nacional sobre la Dinámica de las Relaciones en los Hogares - ENDIREH, 2003', a Mexican national household survey on household dynamic and relationships, collected in 2003. Using ENDIREH, I look at females aged between 14 and 24 in 2003. This sample consists of approximately 2400 individuals.²⁶

Looking at the analyzed girls in the Progres/Oportunidades data, married girls in this sample are 0.1 years less educated than single girls. Married girls are 24p.p more likely to work at the house without pay (i.e., homemakers), but conditional on working outside the house, they are more likely to work for money. Of these, 6% of married girls and 8% of single girls work in agriculture. However, none of these differences are statistically significant (see Table A18).

Comparing those girls who married under 18 with those who married at 18 or later, I observe that child brides are, on average, less educated, more likely to be homemakers, less likely to work for money, and, conditional on working, more likely to work in agriculture. These differences are not statistically significant either (see Table A19).

Among all married girls, those who live in treated villages are more educated, are more likely to work for a wage, and are less likely to be homemakers and work in the agricultural sector. However, these differences are not statistically significant at conventional levels (see Table A20).

²⁶I do not fully analyze the Progres/Oportunidades data, given the poor quality of the available data regarding partners and fertility. There are about 14,000 girls in this sample, of whom 2,543 were married by 2003. Out of these, I was able to identify 367 partners. Fertility questions were only asked in 2003 to those girls above 15 years old (a total of 9,589), but I only have information on pregnancy for 1,625 girls, out of which 264 had been previously pregnant.

Finally, comparing child brides across treatment and control villages, I observe that treated brides are 0.6 years more educated. They are also likelier to work for money, less likely to work in the agricultural sector, and less likely to be homemakers. However, the difference is not statistically significant (see Table A21).

Using ENDIREH 2003, I can compare child brides (married between 12 and 17) and adult brides (married between 18 to 24) regarding their outcomes for education, labor market, well-being, and relationship quality (see A22 in Appendix A).²⁷ Approximately 40% of the girls were child brides, and the average marriage age was 15.8. On average, adult brides married at 19.6 years of age. Similarly to what the Progresa/Oportunidades data suggests, in the population covered by ENDIREH 2003, I observe that child brides have fewer years of education, are less likely to work, and, conditional on working, have lower monthly wages. They are also less likely to have money to spend on themselves and are more likely to be financially dependent and to receive social benefits. I find no difference, however, in reported decision-making power between child and adult brides. Child brides are also more likely to live in their in-laws' houses. I find no difference between these two groups regarding their reported socialization, but child brides are more likely to have suicidal thoughts and live in more violent houses. They are more likely to harm their children physically and verbally and are themselves more likely to be victims of sexual and physical violence from their partners. They are also more likely to have conservative gender views and less likely to have a pre-nuptial agreement. Child brides' partners are, on average, older and less educated. Conditional on working, the partners of child brides earn lower wages.

To conclude, as in other regions in the world, child marriage in rural Mexico is associated with several adverse outcomes: girls who marry before turning 18 years old are, on average, less educated, participate less in the labor market, have more children, and are subject to more violence. Descriptive statistics also suggest that, even though the program has increased child marriage, it might have attenuated the negative consequences of this practice, given that those girls in treated villages are more educated and have better labor-market outcomes, independently of their marital status. However, looking at the Birth Registry Data (INEGI) from 1997 to

²⁷ All correlations will be conditional on the girls' age and her partner's age, as well as on housing conditions.

2023, I observe that mothers in T1998 and T2000 villages were 0.9 and 0.6 years younger than in the control group when they had the first child (statistically different from zero at conventional levels). Additionally, the probability of mothers being younger than 18 at the time of first birth in treated villages is approximately 3p.p higher than in the control group.

8 Conclusion

In this paper, I study the effect of a conditional cash-transfer program on the probability of marriage for children under 18. Ending child marriage is one of the UN's Sustainable Goals due to its association with several adverse outcomes, particularly for young brides. Around the world, there have been initiatives to delay marriage. From financial incentives and law changes targeting the minimum age to marriage to programs aiming at changing social norms, their success varies depending on their design and the context where they operate. Education is an important determinant of marriage decisions, and programs targeting schooling have been evaluated in terms of their efficacy in decreasing child marriage.

I study Progresa/Oportunidades, a program implemented in rural Mexico that provided beneficiary households with a monetary transfer conditional on the school-aged children enrolling and attending school. Leveraging the random assignment of the program at the locality level and its subsequent expansion, I study the program's effects on marriage decisions by comparing two treatment groups that received the treatment at different times and a non-experimental control group. I estimate the average treatment effect on the treated using the doubly-robust estimator in a staggered differences-in-differences design proposed by Callaway and Sant'Anna (2021).

I find that the program led to an increase in child marriage rates. Girls drive this effect, and I find no meaningful effect for boys. I also provide evidence that the age at which children receive the benefits is important, since girls at higher risk of marriage — those in high school — marry at higher rates in the treatment group than in the control group when they receive school subsidies for those schooling years.

Since the program was considered successful in improving educational outcomes, and edu-

cation negatively correlates with child marriage, this result might sound surprising. Theoretically, with an increase in education, the opportunity cost of marriage also increases, which leads to decreasing marriage rates and delayed marriages. However, besides the education component, the program provides a monetary transfer to beneficiary households. The relaxation of the financial constraint of the household might also affect marriage decisions, and the direction of the effect is not clear ex-ante. On the one hand, higher income might lead families to rely less on marriage as an insurance mechanism. On the other hand, higher-income brides might be more valuable in the marriage market, and the extra income might be used to pay for marriage-related expenses.

I empirically test the program's income channel and show that positive income inflows lead to higher marriage rates in rural Mexico. Therefore, the unintended consequences of the program on child marriage can be explained through this income mechanism.

Despite the absence of arranged marriages and marriage payments in rural Mexico, child marriage in this context is also associated with adverse outcomes. I show a negative correlation between marrying before the age of 18 and years of education, labor-market outcomes, and well-being. This result is important for policymakers who aim to decrease child marriage rates in contexts similar to the one studied in this paper. Even if conditional cash transfers increase education, providing monetary transfers can backfire and cause children to marry earlier than they might have had they not received the money.

It is important to highlight that, despite the negative effect I present in this paper, Progresa/Oportunidades was a successful program in terms of many other social and economic outcomes.²⁸ The program improved beneficiary children's physical development, increased their schooling years, reduced child labor, and increased the probability of working and working for a wage while adults. It also increased the likelihood of beneficiaries having a micro-enterprise. In the long run, Araujo and Macours (2021) and Parker and Vogl (2023) documented positive effects of the program on education, labor-market outcomes, housing, and ownership of durable goods, particularly for women. The program has also reduced household poverty

²⁸See Parker et al. (2007) for a comprehensive summary and discussion of research on Progresa/ Oportunidades.

and increased consumption and investment in children and livestock. An important caveat, as mentioned before, is that there is no evidence of improvement in cognitive development or achievement tests due to the program. These might be explained by the low investment in the supply side of education, whether within the household or the educational system.

To determine whether the program had an overall positive or negative effect on girls, further research should assess the economic and social consequences of child marriage and do a cost-benefit analysis, accounting for the positive economic consequences that have already been documented.

Future research should focus on understanding the causal consequences of child marriage in this context and how education and social norms motivate marriage decisions.

References

- Abúndez, Carlos Oropeza, Gabriel Nagore Cázares, José Francisco Reveles Cordero, Daniel Arturo Domínguez Zetina, Sergio Reyes Angona, Susana de Voghel Gutiérrez, Samuel Rivero Vázquez, Liliana Rojas Trejo, Juan Pablo Luna Ramírez, G Olaiz-Fernández et al., “Encuesta nacional de salud y nutrición 2006,” *Instituto Nacional de Salud Pública*, 2006.
- Adebowale, Stephen A, Francis A Fagbamigbe, Titus O Okareh, and Ganiyu O Lawal, “Survival analysis of timing of first marriage among women of reproductive age in Nigeria: regional differences,” *African Journal of Reproductive Health*, 2012, 16 (4), 95–107.
- Agarwal, Madhuri, Vikram Bahure, and Sayli Javadekar, “Marrying young: The surprising effect of education,” *Available at SSRN 4010142*, 2023.
- Amin, Sajeda, M Niaz Asadullah, Sara Hossain, and Zaki Wahhaj, “Eradicating child marriage in the Commonwealth: is investment in girls’ education sufficient?,” *The Round Table*, 2017, 106 (2), 221–223.
- , Niaz Asadullah, Sara Hossain, and Zaki Wahhaj, “Can conditional transfers eradicate child marriage?,” Technical Report, IZA Policy Paper 2016.
- Andrew, Alison and Abi Adams, “Revealed beliefs and the marriage market return to education,” Technical Report, Institute for Fiscal Studies 2022.
- Angrist, Joshua, Eric Bettinger, Erik Bloom, Elizabeth King, and Michael Kremer, “Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment,” *The American Economic Review*, 2002, 92 (5).
- Araujo, Maria Caridad and Karen Macours, “Education, income and mobility: Experimental impacts of childhood exposure to progresá after 20 years,” 2021.
- Ashraf, Nava, Natalie Bau, Nathan Nunn, and Alessandra Voena, “Bride price and female education,” *Journal of Political Economy*, 2020, 128 (2), 591–641.

- Athey, Susan and Guido W Imbens**, “Design-based analysis in difference-in-differences settings with staggered adoption,” *Journal of Econometrics*, 2022, 226 (1), 62–79.
- Attanasio, Orazio P, Costas Meghir, and Ana Santiago**, “Education choices in Mexico: using a structural model and a randomized experiment to evaluate Progresa,” *The Review of Economic Studies*, 2012, 79 (1), 37–66.
- Baird, Sarah, Craig McIntosh, and Berk Özler**, “Cash or condition? Evidence from a cash transfer experiment,” *The Quarterly Journal of Economics*, 2011, 126 (4), 1709–1753.
- Behrman, Jere R, Susan W Parker, and Petra E Todd**, “Long-term impacts of the Oportunidades conditional cash transfer program on rural youth in Mexico,” Technical Report, Discussion papers/ /Ibero America Institute for Economic Research 2005.
- , —, and —, “Schooling impacts of conditional cash transfers on young children: Evidence from Mexico,” *Economic development and cultural change*, 2009, 57 (3), 439–477.
- , —, and —, “Do conditional cash transfers for schooling generate lasting benefits? A five-year followup of PROGRESA/Oportunidades,” *Journal of Human Resources*, 2011, 46 (1), 93–122.
- Behrman, Julia Andrea**, “Does schooling affect women’s desired fertility? Evidence from Malawi, Uganda, and Ethiopia,” *Demography*, 2015, 52 (3), 787–809.
- Bellés-Obrero, Cristina and María Lombardi**, “Will you marry me, later? Age-of-marriage laws and child marriage in Mexico,” *Journal of Human Resources*, 2020, pp. 1219–10621R2.
- Bhalotra, Sonia R and Manuel Fernández**, “The rise in women’s labour force participation in Mexico: Supply vs demand factors,” Technical Report, WIDER Working Paper 2021.
- Bobonis, Gustavo J**, “The impact of conditional cash transfers on marriage and divorce,” *Economic Development and cultural change*, 2011, 59 (2), 281–312.
- Borusyak, Kirill and Xavier Jaravel**, *Revisiting event study designs*, SSRN, 2018.

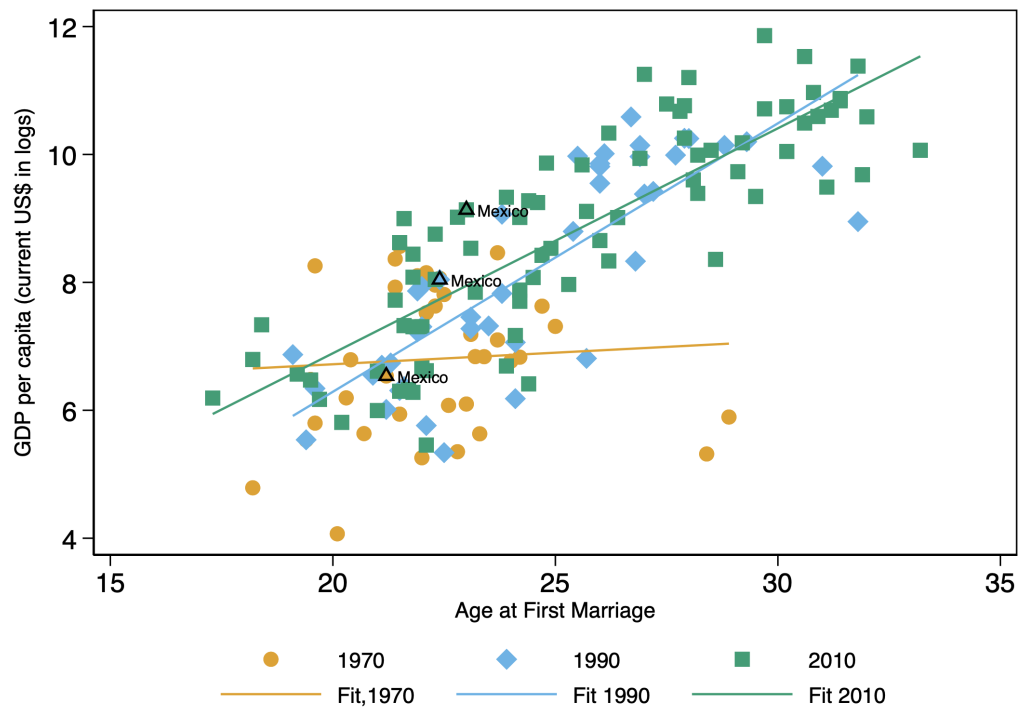
- Brides, Girls Not**, “Child marriage in Latin America and the Caribbean,” 2017.
- Callaway, Brantly and Pedro HC Sant’Anna**, “Difference-in-differences with multiple time periods,” *Journal of Econometrics*, 2021, 225 (2), 200–230.
- Corno, Lucia, Nicole Hildebrandt, and Alessandra Voena**, “Age of marriage, weather shocks, and the direction of marriage payments,” *Econometrica*, 2020, 88 (3), 879–915.
- Dahl, Gordon B**, “Early teen marriage and future poverty,” *Demography*, 2010, 47 (3), 689–718.
- de Chaisemartin, Clément and Xavier D’Haultfœuille**, “Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects,” *American Economic Review*, September 2020, 110 (9), 2964–2996.
- Diaz, Juan Jose and Sudhanshu Handa**, “An Assessment of Propensity Score Matching as a Nonexperimental Impact Estimator: Evidence from Mexico’s PROGRESA Program,” *The Journal of Human Resources*, 2006, 41 (2), 319–345.
- Dubois, Pierre, Alain de Janvry, and Elisabeth Sadoulet**, “Effects on School Enrollment and Performance of a Conditional Cash Transfer Program in Mexico,” *Journal of Labor Economics*, July 2012, 30 (3), 555–589.
- Duflo, Esther, Pascaline Dupas, and Michael Kremer**, “Education, HIV, and early fertility: Experimental evidence from Kenya,” *American Economic Review*, 2015, 105 (9), 2757–97.
- Escobar Latapí, Augustin and Mercedes González De La Rocha**, “Girls, mothers, and poverty reduction in Mexico: evaluating Progres-Oportunidades,” *The gendered impacts of liberalization: Towards embedded liberalism*, 2009.
- Ferré, Celine**, *Age at first child: does education delay fertility timing? The case of Kenya*, The World Bank, 2009.
- Goodman-Bacon, Andrew**, “Difference-in-differences with variation in treatment timing,” Technical Report, National Bureau of Economic Research 2018.

- Gulemetova-Swan, Michaela**, "Evaluating the impact of conditional cash transfer programs on adolescent decisions about marriage and fertility: The case of Oportunidades." Ph.D., University of Pennsylvania, United States – Pennsylvania 2009.
- Hallfors, Denise Dion, Hyunsan Cho, Simbarashe Rusakaniko, John Mapfumo, Bonita Iritani, Lei Zhang, Winnie Luseno, and Ted Miller**, "The Impact of School Subsidies on HIV-Related Outcomes Among Adolescent Female Orphans," *Journal of Adolescent Health*, January 2015, 56 (1), 79–84.
- Handa, Sudhanshu, Amber Peterman, Carolyn Huang, Carolyn Halpern, Audrey Pettifor, and Harsha Thirumurthy**, "Impact of the Kenya Cash Transfer for Orphans and Vulnerable Children on early pregnancy and marriage of adolescent girls," *Social Science & Medicine*, September 2015, 141, 36–45.
- Jejeebhoy, Shireen J et al.**, "Women's education, autonomy, and reproductive behaviour: Experience from developing countries," *OUP Catalogue*, 1995.
- Kalamar, Amanda M., Susan Lee-Rife, and Michelle J. Hindin**, "Interventions to Prevent Child Marriage Among Young People in Low- and Middle-Income Countries: A Systematic Review of the Published and Gray Literature," *Journal of Adolescent Health*, September 2016, 59 (3), S16–S21.
- Kirdar, Murat G, Meltem Dayıoğlu, and Ismet Koc**, "The Effects of Compulsory-Schooling Laws on Teenage Marriage and Births in Turkey," *Journal of Human Capital*, 2018, 12 (4), 640–668.
- Mier y Terán, Marta**, "Pobreza y transiciones familiares a la vida adulta en las localidades rurales de la península de Yucatán," 2004.
- Parker, Susan W and Tom Vogl**, "Do Conditional Cash Transfers Improve Economic Outcomes in the Next Generation? Evidence from Mexico," *The Economic Journal*, 07 2023, p. uead049.
- , **Luis Rubalcava, and Graciela Teruel**, "Evaluating conditional schooling and health programs," *Handbook of development economics*, 2007, 4, 3963–4035.

- Parrado, Emilio A. and René M. Zenteno**, “Gender Differences in Union Formation in Mexico: Evidence From Marital Search Models,” *Journal of Marriage and Family*, August 2002, 64 (3), 756–773.
- Rivero, Estela and José Palma**, “Report on Early Unions in Mexico: A National, State and Regional Analysis,” Technical Report, Insad 2017.
- Rubalcava, Luis and Graciela Teruel**, “Conditional transfers, living arrangements and migration decisions: PROGRESA, six years of evidence,” *CIDE Working Paper*, 2005.
- Skirbekk, Vegard, Hans-Peter Kohler, and Alexia Prskawetz**, “Birth month, school graduation, and the timing of births and marriages,” *Demography*, 2004, 41 (3), 547–568.
- Sperling, Gene B and Rebecca Winthrop**, *What works in girls’ education: Evidence for the world’s best investment*, Brookings Institution Press, 2015.
- Sun, Liyang and Sarah Abraham**, “Estimating dynamic treatment effects in event studies with heterogeneous treatment effects,” *Journal of Econometrics*, 2021, 225 (2), 175–199.
- Taylor, Alice Y., Erin Murphy-Graham, Julia Van Horn, Bapu Vaitla, Ángel Del Valle, and Beniamino Cislighi**, “Child Marriages and Unions in Latin America: Understanding the Roles of Agency and Social Norms,” *Journal of Adolescent Health*, April 2019, 64 (4), S45–S51.
- Thomson, Marilyn**, “Rights of Passage: harmful cultural practices and children’s rights,” 2003.
- UNICEF**, “A Profile of Child Marriage and Early Unions in Latin America and the Caribbean,” August 2019.

A Appendix

Figure A1: Correlation between Age at First Marriage and GDP per capita



Note: This graph presents a correlation between a country's GDP and age at marriage for several countries for three years. Each data point corresponds to a country in a given year. The lines represent the prediction for GDP from a linear regression of GDP on age at marriage. Data is from the World Bank Data Gender Portal. Data displayed in yellow circles correspond to 1970, blue diamonds to 1990, and green squares to 2010.

Table A1: Balance Test on Baseline Characteristics: All (1)

	T1998	T2000	T1998(IPW)	T2000(IPW)	Control
Married	-0.008 (-3.415)	-0.01 (-2.60)	0.001 (0.536)	0.00 (0.58)	0.01
Education Level	-0.057 (-0.796)	-0.14 (-1.77)	-0.159 (-1.606)	-0.01 (-0.11)	3.44
Age in 97	0.177 (2.846)	0.13 (1.98)	-0.208 (-1.747)	-0.12 (-1.19)	10.64
Dirt Floor	-0.009 (-0.260)	0.02 (0.57)	0.029 (0.469)	0.02 (0.37)	0.72
Inferior quality wall	0.002 (0.060)	0.06 (1.72)	-0.001 (-0.023)	0.02 (0.51)	0.23
Inferior quality roof	-0.073 (-2.029)	-0.05 (-1.24)	-0.025 (-0.604)	-0.03 (-0.70)	0.21
No. of bedrooms	0.081 (1.639)	0.03 (0.57)	-1.424 (-2.123)	-0.39 (-1.59)	1.71
Piped water	-0.065 (-1.305)	-0.15 (-2.79)	-0.038 (-0.557)	-0.02 (-0.37)	0.28
Electricity	-0.018 (-0.428)	-0.00 (-0.08)	0.038 (0.651)	0.03 (0.51)	0.69
Animals	0.140 (4.818)	0.12 (3.62)	0.062 (1.476)	0.01 (0.30)	0.40
Land	0.196 (4.714)	0.16 (3.61)	0.024 (0.487)	0.00 (0.09)	0.64
Blender	-0.009 (-0.365)	0.02 (0.56)	-0.013 (-0.258)	0.02 (0.76)	0.25
Refrigerator	-0.022 (-1.364)	-0.04 (-2.71)	0.020 (1.662)	0.01 (0.68)	0.05
Gas Stove	-0.089 (-2.113)	-0.09 (-2.03)	0.015 (0.471)	-0.00 (-0.07)	0.19
Gas heater	-0.004 (-0.814)	-0.01 (-1.78)	-0.025 (-1.054)	-0.02 (-1.19)	0.02
Radio	0.056 (2.242)	0.06 (2.22)	0.035 (0.732)	0.01 (0.19)	0.61
TV	0.025 (0.672)	0.05 (1.33)	-0.023 (-0.409)	0.03 (0.56)	0.42
Video player	0.006 (1.393)	-0.00 (-0.44)	0.003 (0.421)	0.00 (0.16)	0.01
Dish Washer	0.007 (1.098)	-0.00 (-0.04)	-0.006 (-0.527)	0.00 (0.44)	0.02
Car	-0.011 (-2.721)	-0.02 (-4.02)	-0.000 (-0.093)	-0.00 (-0.48)	0.00
Truck	-0.012 (-1.848)	-0.01 (-1.03)	0.004 (0.643)	0.00 (0.07)	0.03
Anyone in the HH speaks an indigenous language	0.130 (2.163)	0.15 (2.17)	0.014 (0.203)	-0.00 (-0.01)	0.43

Note: This table reports parameter estimates and t-statistics (in parentheses) for regressions of baseline characteristics on a treatment indicator. T1998 (T2000) equals 1 if the individual belongs to the set of villages treated in 1998 (2000) and 0 if it belongs to C2000. The first two columns report the parameters without any re-weighting. The third and fourth columns report the estimates re-weighting the control group as described. In the four regressions, standard errors were clustered at the locality level. The last column presents each characteristic's unconditional and unweighted mean for the control group C2000.

Table A2: Balance Test on Baseline Characteristics: All (2)

	T1998	T2000	T1998(IPW)	T2000(IPW)	Control
HH Chief or Spouse have gone to school	0.077 (2.279)	0.07 (2.02)	0.009 (0.213)	-0.00 (-0.02)	0.71
HH Chief or Spouse worked the week before	-0.003 (-0.420)	-0.02 (-1.95)	-0.025 (-3.364)	-0.02 (-1.99)	0.91
Progresa/Oportunidades'poverty index	0.248 (3.594)	0.31 (4.27)	0.061 (0.765)	0.02 (0.22)	0.59
Housewife	-0.045 (-5.911)	-0.05 (-5.45)	0.007 (0.917)	-0.00 (-0.14)	0.07
Number of individuals in the HH	-0.063 (-0.488)	0.01 (0.10)	-0.048 (-0.311)	0.02 (0.12)	7.51
HH head age	1.104 (3.427)	1.17 (2.89)	-1.517 (-2.698)	-0.18 (-0.36)	43.23
HH head is female	-0.051 (-4.939)	-0.05 (-5.03)	0.013 (1.620)	0.01 (1.01)	0.06
Anyone in the HH speaks an indigenous language	0.130 (2.163)	0.15 (2.17)	0.014 (0.203)	-0.00 (-0.01)	0.43
HH Chief or Spouse have gone to school	0.077 (2.279)	0.07 (2.02)	0.009 (0.213)	-0.00 (-0.02)	0.71
HH Chief or Spouse worked the week before	-0.003 (-0.420)	-0.02 (-1.95)	-0.025 (-3.364)	-0.02 (-1.99)	0.91
At least one child between 0 and 5 y.o	0.004 (0.229)	0.02 (1.01)	-0.015 (-0.471)	0.01 (0.59)	0.69
At least one teen between 16 and 19 y.o	0.063 (3.917)	0.04 (2.44)	-0.008 (-0.215)	-0.01 (-0.22)	0.42
At least one woman between 20 and 39 y.o	0.023 (1.829)	0.05 (3.31)	0.099 (2.132)	0.04 (1.43)	0.74
At least one woman between 40 and 59 y.o	-0.010 (-0.663)	-0.03 (-1.70)	-0.113 (-2.553)	-0.04 (-1.35)	0.36
At least one woman over 60 y.o	-0.042 (-3.089)	-0.04 (-2.36)	0.006 (0.332)	0.01 (0.71)	0.10
At least one man between 20 and 39 y.o	0.026 (1.593)	0.04 (2.13)	0.068 (1.725)	0.03 (0.97)	0.57
At least one man between 40 and 59 y.o	0.002 (0.106)	-0.02 (-1.02)	-0.072 (-1.697)	-0.03 (-1.02)	0.46
At least one man over 60 y.o	-0.042 (-2.869)	-0.04 (-2.89)	0.010 (0.802)	0.01 (1.47)	0.10
Guerrero	0.043 (1.127)	-0.00 (-0.08)	0.052 (1.293)	0.03 (1.10)	0.06
Hidalgo	0.077 (1.759)	0.01 (0.34)	0.008 (0.135)	0.01 (0.18)	0.12
Michoacan	0.011 (0.255)	0.01 (0.13)	-0.012 (-0.236)	0.00 (0.00)	0.13
Puebla	0.058 (1.412)	0.07 (1.46)	-0.012 (-0.205)	-0.02 (-0.37)	0.16
Queretaro	-0.061 (-1.013)	-0.06 (-1.03)	-0.013 (-0.372)	-0.01 (-0.22)	0.04
San Luis Potosi	0.026 (0.491)	0.01 (0.16)	-0.037 (-0.495)	0.00 (0.01)	0.13

Note: This table reports parameter estimates and t-statistics (in parentheses) for regressions of baseline characteristics on a treatment indicator. T1998 (T2000) equals 1 if the individual belongs to the set of villages treated in 1998 (2000) and 0 if belongs to C2000. The first two columns report the parameters without any re-weighting. The third and fourth columns report the estimates re-weighting the control group as described. In the four regressions, standard errors were clustered at the locality level. The last column presents each characteristic's unconditional and unweighted mean for the control group C2000.

Table A3: Balance Test on Baseline Characteristics: Girls (1)

	T1998	T2000	T1998(IPW)	T2000(IPW)	Control
Married	-0.015 (-3.529)	-0.01 (-3.15)	0.003 (1.034)	0.00 (0.55)	0.01
Education Level	-0.102 (-1.074)	-0.16 (-1.58)	-0.001 (-0.006)	0.02 (0.14)	3.47
Age in 97	0.082 (0.953)	0.03 (0.32)	-0.062 (-0.248)	-0.07 (-0.44)	10.60
Dirt Floor	0.001 (0.037)	0.02 (0.61)	0.031 (0.463)	0.03 (0.65)	0.71
Inferior quality wall	-0.000 (-0.003)	0.06 (1.64)	0.016 (0.413)	0.03 (0.58)	0.22
Inferior quality roof	-0.079 (-2.229)	-0.05 (-1.32)	0.006 (0.147)	-0.01 (-0.31)	0.21
No. of bedrooms	0.091 (1.848)	0.06 (1.01)	-1.723 (-2.308)	-0.66 (-1.80)	1.72
Piped water	-0.072 (-1.443)	-0.15 (-2.73)	-0.048 (-0.669)	-0.03 (-0.51)	0.29
Electricity	-0.033 (-0.762)	-0.02 (-0.45)	0.007 (0.128)	0.02 (0.42)	0.70
Animals	0.140 (4.826)	0.11 (3.41)	0.058 (1.256)	0.02 (0.42)	0.40
Land	0.188 (4.421)	0.15 (3.17)	0.030 (0.519)	-0.00 (-0.07)	0.63
Blender	-0.014 (-0.537)	0.02 (0.73)	-0.010 (-0.201)	0.01 (0.27)	0.26
Refrigerator	-0.027 (-1.500)	-0.05 (-2.63)	0.021 (1.553)	0.01 (0.53)	0.05
Gas Stove	-0.090 (-2.077)	-0.09 (-1.97)	0.020 (0.599)	-0.00 (-0.05)	0.20
Gas heater	-0.001 (-0.161)	-0.01 (-1.93)	-0.030 (-1.126)	-0.02 (-1.32)	0.01
Radio	0.054 (1.941)	0.06 (2.01)	0.071 (1.349)	0.03 (0.85)	0.62
TV	0.022 (0.547)	0.05 (1.10)	-0.013 (-0.201)	0.02 (0.39)	0.42
Video player	0.005 (0.961)	-0.00 (-0.63)	-0.000 (-0.017)	0.00 (0.13)	0.01
Dish Washer	0.004 (0.574)	-0.00 (-0.50)	-0.008 (-0.596)	0.00 (0.16)	0.02
Car	-0.010 (-1.947)	-0.02 (-3.39)	-0.003 (-0.542)	-0.00 (-0.77)	0.00
Truck	-0.008 (-1.259)	-0.01 (-0.57)	-0.000 (-0.050)	-0.00 (-0.05)	0.03
Anyone in the HH speaks an indigenous language	0.128 (2.084)	0.14 (1.99)	0.044 (0.630)	0.03 (0.33)	0.42

Note: This table reports parameter estimates and t-statistics (in parentheses) for regressions of baseline characteristics on a treatment indicator for girls. T1998 (T2000) equals 1 if the individual belongs to the set of villages treated in 1998 (2000) and 0 if belongs to C2000. The first two columns report the parameters without any re-weighting. The third and fourth columns report the estimates re-weighting the control group as described. In the four regressions, standard errors were clustered at the locality level. The last column presents each characteristic's unconditional and unweighted mean for the control group C2000.

Table A4: Balance Test on Baseline Characteristics: Girls (2)

	T1998	T2000	T1998(IPW)	T2000(IPW)	Control
HH Chief or Spouse have gone to school	0.077 (2.157)	0.06 (1.50)	0.004 (0.087)	-0.01 (-0.34)	0.71
HH Chief or Spouse worked the week before	0.000 (0.037)	-0.02 (-2.28)	-0.026 (-2.946)	-0.03 (-2.73)	0.91
Progresa/Oportunidades'poverty index	0.275 (3.929)	0.32 (4.30)	0.127 (1.463)	0.07 (0.75)	0.58
Housewife	-0.081 (-5.359)	-0.08 (-5.04)	0.018 (1.126)	0.00 (0.15)	0.14
Number of individuals in the HH	-0.023 (-0.177)	0.01 (0.07)	-0.058 (-0.305)	0.04 (0.20)	7.52
HH head age	0.697 (1.777)	1.24 (2.48)	-2.257 (-2.912)	-0.27 (-0.42)	43.39
HH head is female	-0.056 (-4.829)	-0.05 (-4.08)	0.013 (1.465)	0.01 (1.11)	0.07
Anyone in the HH speaks an indigenous language	0.128 (2.084)	0.14 (1.99)	0.044 (0.630)	0.03 (0.33)	0.42
HH Chief or Spouse have gone to school	0.077 (2.157)	0.06 (1.50)	0.004 (0.087)	-0.01 (-0.34)	0.71
HH Chief or Spouse worked the week before	0.000 (0.037)	-0.02 (-2.28)	-0.026 (-2.946)	-0.03 (-2.73)	0.91
At least one child between 0 and 5 y.o	0.014 (0.753)	0.02 (0.77)	-0.007 (-0.167)	0.01 (0.40)	0.69
At least one teen between 16 and 19 y.o	0.042 (2.387)	0.03 (1.65)	-0.047 (-1.126)	-0.02 (-0.69)	0.43
At least one woman between 20 and 39 y.o	0.029 (1.978)	0.05 (2.68)	0.098 (1.961)	0.04 (1.37)	0.74
At least one woman between 40 and 59 y.o	-0.015 (-0.867)	-0.02 (-1.04)	-0.128 (-2.607)	-0.04 (-1.05)	0.36
At least one woman over 60 y.o	-0.056 (-3.544)	-0.05 (-2.97)	0.016 (1.295)	0.01 (1.02)	0.09
At least one man between 20 and 39 y.o	0.032 (1.878)	0.05 (2.40)	0.070 (1.549)	0.04 (1.26)	0.57
At least one man between 40 and 59 y.o	-0.002 (-0.124)	-0.03 (-1.40)	-0.102 (-2.292)	-0.05 (-1.57)	0.45
At least one man over 60 y.o	-0.053 (-3.222)	-0.05 (-2.75)	0.017 (1.281)	0.02 (2.03)	0.10
Guerrero	0.032 (0.825)	-0.01 (-0.22)	0.035 (0.749)	0.02 (0.78)	0.06
Hidalgo	0.074 (1.682)	0.01 (0.26)	-0.012 (-0.174)	0.00 (0.05)	0.11
Michoacan	0.006 (0.142)	0.00 (0.09)	-0.012 (-0.213)	-0.00 (-0.09)	0.14
Puebla	0.055 (1.296)	0.07 (1.35)	-0.012 (-0.204)	-0.02 (-0.28)	0.17
Queretaro	-0.057 (-0.933)	-0.06 (-0.99)	-0.012 (-0.301)	-0.01 (-0.30)	0.04
San Luis Potosi	0.036 (0.720)	0.02 (0.35)	-0.015 (-0.194)	0.00 (0.05)	0.13

Note: This table reports parameter estimates and t-statistics (in parentheses) for regressions of baseline characteristics on a treatment indicator for girls. T1998 (T2000) equals 1 if the individual belongs to the set of villages treated in 1998 (2000) and 0 if belongs to C2000. The first two columns report the parameters without any re-weighting. The third and fourth columns report the estimates re-weighting the control group as described. In the four regressions, standard errors were clustered at the locality level. The last column presents each characteristic's unconditional and unweighted mean for the control group C2000.

Table A5: Balance Test on Baseline Characteristics: Boys (1)

	T1998	T2000	T1998(IPW)	T2000(IPW)	Control
Married	-0.001 (-0.494)	0.00 (0.74)	-0.000 (-0.276)	0.00 (0.35)	0.00
Education Level	-0.015 (-0.201)	-0.12 (-1.42)	-0.226 (-1.647)	-0.02 (-0.22)	3.41
Age in 97	0.266 (3.258)	0.23 (2.62)	-0.260 (-1.808)	-0.13 (-1.00)	10.68
Dirt Floor	-0.019 (-0.527)	0.02 (0.51)	0.029 (0.479)	0.01 (0.14)	0.72
Inferior quality wall	0.004 (0.113)	0.06 (1.73)	-0.004 (-0.096)	0.03 (0.69)	0.23
Inferior quality roof	-0.067 (-1.797)	-0.05 (-1.12)	-0.039 (-0.898)	-0.03 (-0.82)	0.21
No. of bedrooms	0.072 (1.327)	0.01 (0.13)	-1.163 (-1.864)	-0.23 (-1.25)	1.69
Piped water	-0.059 (-1.150)	-0.15 (-2.80)	-0.034 (-0.514)	-0.02 (-0.44)	0.26
Electricity	-0.005 (-0.106)	0.01 (0.25)	0.048 (0.826)	0.02 (0.42)	0.69
Animals	0.141 (4.515)	0.12 (3.56)	0.064 (1.494)	0.01 (0.14)	0.41
Land	0.203 (4.857)	0.18 (3.92)	0.029 (0.599)	0.02 (0.45)	0.66
Blender	-0.005 (-0.180)	0.01 (0.37)	-0.013 (-0.272)	0.04 (1.19)	0.24
Refrigerator	-0.018 (-1.123)	-0.04 (-2.58)	0.019 (1.461)	0.01 (0.58)	0.05
Gas Stove	-0.088 (-2.103)	-0.09 (-2.05)	0.005 (0.148)	-0.01 (-0.25)	0.18
Gas heater	-0.007 (-1.294)	-0.01 (-1.29)	-0.022 (-0.978)	-0.01 (-0.95)	0.02
Radio	0.059 (2.265)	0.06 (2.17)	0.016 (0.342)	-0.01 (-0.35)	0.61
TV	0.029 (0.773)	0.06 (1.50)	-0.030 (-0.544)	0.02 (0.50)	0.42
Video player	0.007 (1.592)	-0.00 (-0.17)	0.005 (0.623)	0.00 (0.28)	0.02
Dish Washer	0.009 (1.536)	0.00 (0.44)	0.000 (0.025)	0.01 (0.78)	0.02
Car	-0.013 (-3.020)	-0.02 (-3.72)	0.001 (0.308)	0.00 (0.05)	0.00
Truck	-0.015 (-2.101)	-0.01 (-1.35)	0.006 (0.982)	0.00 (0.14)	0.03
Anyone in the HH speaks an indigenous language	0.132 (2.203)	0.16 (2.31)	-0.001 (-0.008)	-0.01 (-0.13)	0.44

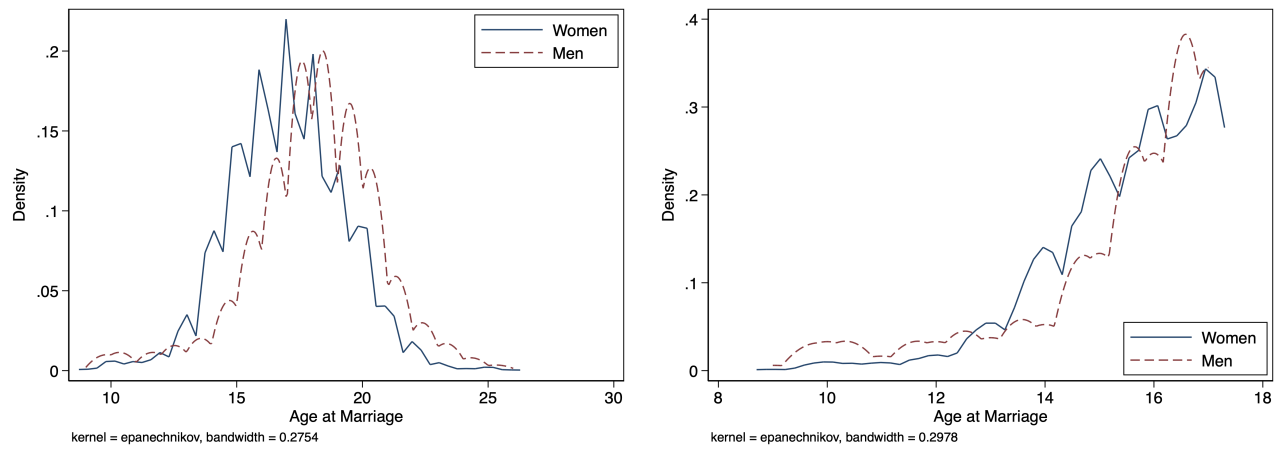
Note: This table reports parameter estimates and t-statistics (in parentheses) for regressions of baseline characteristics on a treatment indicator for boys. T1998 (T2000) equals 1 if the individual belongs to the set of villages treated in 1998 (2000) and 0 if belongs to C2000. The first two columns report the parameters without any re-weighting. The third and fourth columns report the estimates re-weighting the control group as described. In the four regressions, standard errors were clustered at the locality level. The last column presents each characteristic's unconditional and unweighted mean for the control group C2000.

Table A6: Balance Test on Baseline Characteristics: Boys (2)

	T1998	T2000	T1998(IPW)	T2000(IPW)	Control
HH Chief or Spouse have gone to school	0.077 (2.300)	0.08 (2.43)	0.008 (0.177)	0.01 (0.23)	0.72
HH Chief or Spouse worked the week before	-0.007 (-0.734)	-0.01 (-1.26)	-0.026 (-3.020)	-0.02 (-1.15)	0.91
Progresa/Oportunidades'poverty index	0.223 (3.164)	0.31 (4.09)	0.038 (0.478)	0.01 (0.13)	0.60
Housewife	-0.011 (-3.643)	-0.01 (-4.41)	0.002 (1.301)	-0.00 (-0.02)	0.00
Number of individuals in the HH	-0.099 (-0.728)	0.02 (0.12)	-0.036 (-0.243)	0.01 (0.06)	7.50
HH head age	1.478 (4.281)	1.10 (2.73)	-0.827 (-1.412)	-0.18 (-0.32)	43.08
HH head is female	-0.047 (-4.157)	-0.06 (-4.94)	0.012 (1.297)	0.01 (0.76)	0.06
Anyone in the HH speaks an indigenous language	0.132 (2.203)	0.16 (2.31)	-0.001 (-0.008)	-0.01 (-0.13)	0.44
HH Chief or Spouse have gone to school	0.077 (2.300)	0.08 (2.43)	0.008 (0.177)	0.01 (0.23)	0.72
HH Chief or Spouse worked the week before	-0.007 (-0.734)	-0.01 (-1.26)	-0.026 (-3.020)	-0.02 (-1.15)	0.91
At least one child between 0 and 5 y.o	-0.006 (-0.355)	0.02 (1.10)	-0.020 (-0.683)	0.02 (0.75)	0.69
At least one teen between 16 and 19 y.o	0.083 (4.662)	0.05 (2.74)	0.004 (0.106)	-0.01 (-0.17)	0.42
At least one woman between 20 and 39 y.o	0.018 (1.251)	0.05 (3.20)	0.087 (1.886)	0.03 (1.18)	0.74
At least one woman between 40 and 59 y.o	-0.005 (-0.320)	-0.04 (-2.03)	-0.096 (-2.178)	-0.04 (-1.60)	0.35
At least one woman over 60 y.o	-0.029 (-2.168)	-0.02 (-1.41)	0.010 (0.456)	0.02 (1.17)	0.11
At least one man between 20 and 39 y.o	0.021 (1.094)	0.04 (1.60)	0.059 (1.541)	0.01 (0.40)	0.57
At least one man between 40 and 59 y.o	0.005 (0.314)	-0.01 (-0.43)	-0.048 (-1.116)	-0.01 (-0.43)	0.47
At least one man over 60 y.o	-0.031 (-2.168)	-0.04 (-2.71)	0.009 (0.602)	0.01 (0.64)	0.09
Guerrero	0.053 (1.400)	0.00 (0.07)	0.062 (1.593)	0.03 (1.20)	0.06
Hidalgo	0.080 (1.805)	0.02 (0.40)	0.017 (0.297)	0.01 (0.13)	0.12
Michoacan	0.015 (0.366)	0.01 (0.17)	-0.009 (-0.185)	0.01 (0.11)	0.13
Puebla	0.060 (1.513)	0.07 (1.56)	-0.014 (-0.236)	-0.03 (-0.44)	0.16
Queretaro	-0.066 (-1.085)	-0.07 (-1.07)	-0.016 (-0.452)	-0.01 (-0.18)	0.04
San Luis Potosi	0.017 (0.304)	0.00 (0.01)	-0.042 (-0.589)	0.00 (0.06)	0.13

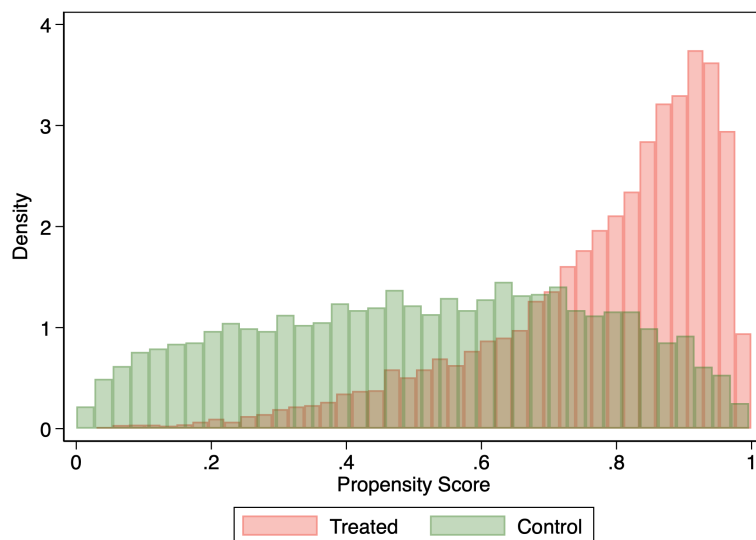
Note: This table reports parameter estimates and t-statistics (in parentheses) for regressions of baseline characteristics on a treatment indicator for boys. T1998 (T2000) equals 1 if the individual belongs to the set of villages treated in 1998 (2000) and 0 if belongs to C2000. The first two columns report the parameters without any re-weighting. The third and fourth columns report the estimates re-weighting the control group as described. In the four regressions, standard errors were clustered at the locality level. The last column presents each characteristic's unconditional and unweighted mean for the control group C2000.

Figure A2: Distribution of Age at Marriage



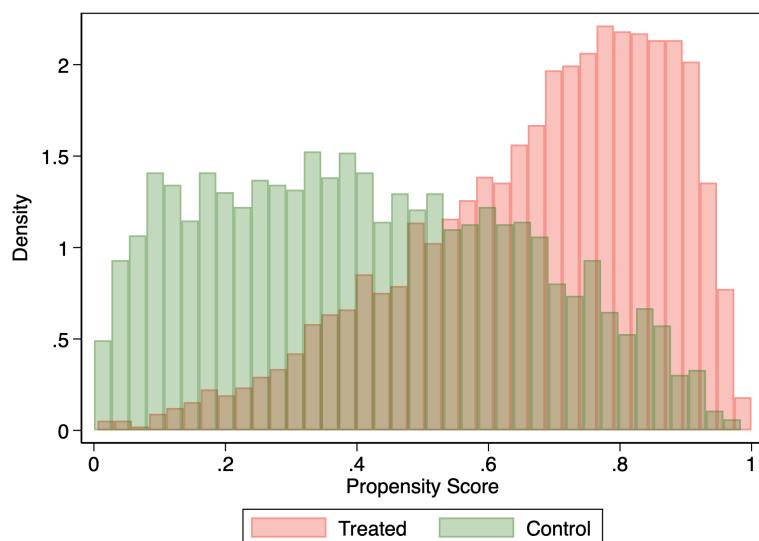
Note: The left panel presents the age distribution at marriage for the entire sample, separately for men and women. The right panel presents the same distribution but only considers individuals who married before 18 years old.

Figure A3: Distribution of the Propensity Score by Group: T1998 VS C2000



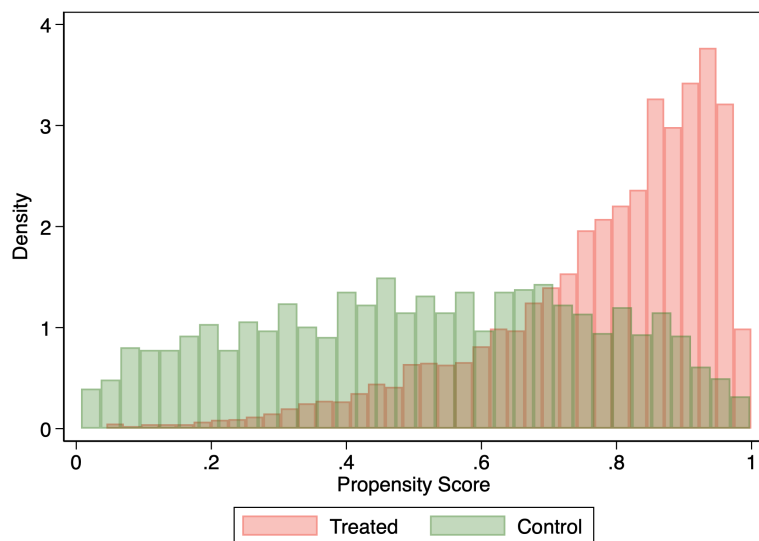
Note: This figure separately presents the histogram of the propensity score for treated (T1998) and control (C2000) groups.

Figure A4: Distribution of the Propensity Score by Group: T2000 VS C2000



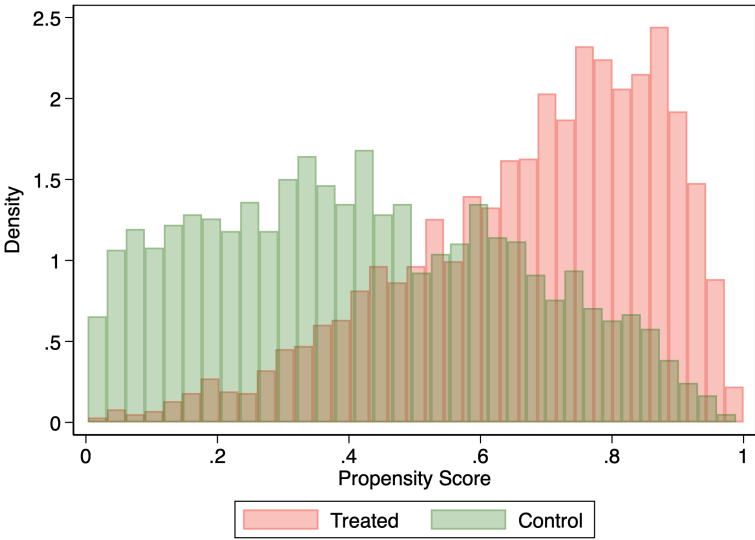
Note: This figure separately presents the histogram of the propensity score for treated (T2000) and control (C2000) groups.

Figure A5: Distribution of the Propensity Score by Group: Girls T1998 VS C2000



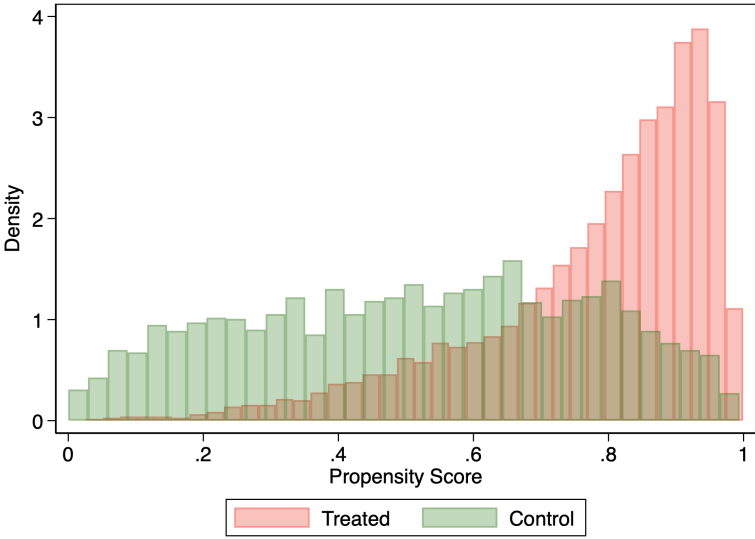
Note: This figure separately presents the histogram of the propensity score for girls in treated (T1998) and control (C2000) groups.

Figure A6: Distribution of the Propensity Score by Group: Girls T2000 VS C2000



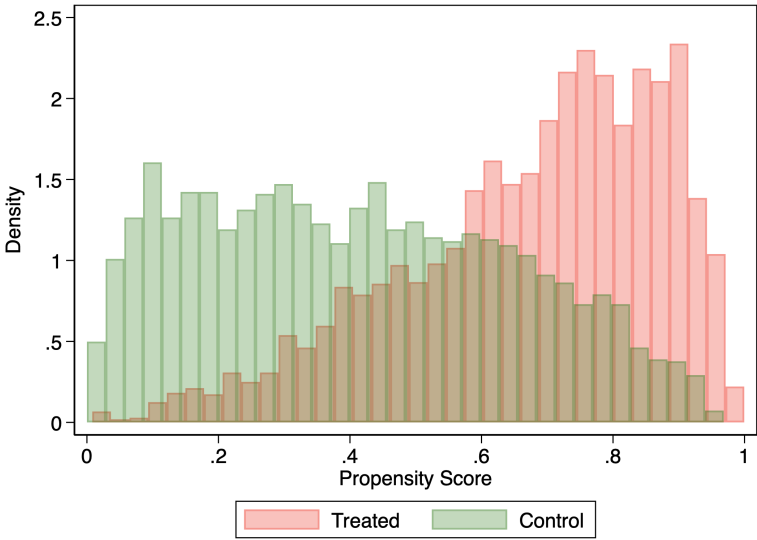
Note: This figure separately presents the histogram of the propensity score for girls in treated (T2000) and control (C2000) groups.

Figure A7: Distribution of the Propensity Score by Group: Boys T1998 VS C2000



Note: This figure separately presents the histogram of the propensity score for boys in treated (T1998) and control (C2000) groups.

Figure A8: Distribution of the Propensity Score by Group: Boys T2000 VS C2000



Note: This figure separately presents the histogram of the propensity score for boys in treated (T2000) and control (C2000) groups.

Table A9: Proportion of Children Attending School Conditional on Being Married

		Attends School				
		1997	1998	1999	2000	2003
Year of Marriage	1997	51.32	38.03	26.67	7.74	3.2
	1998		51.67	33.77	21.74	13.04
	1999			50	40.99	31.91
	2000				46.45	34.96
	2001					8.43
	2002					8
	2003					20.24

Note: This table shows the proportion of children attending school in the year of or after declaring marriage.

Table A7: Proportion of Married by Group and Year (in %): Girls**(a) All**

	1997	1998	1999	2000	2001	2002	2003
T1998	1.29	2.25	4.26	7.58	14.08	18.70	20.95
T2000	1.40	2.35	4.35	7.96	15.14	19.52	21.92
C2000	2.79	3.28	4.73	6.78	9.95	13.71	15.57
C2000(IPW1998)	1.00	1.37	2.68	4.72	7.20	9.32	10.94
C2000(IPW2000)	1.23	1.77	3.04	5.44	8.22	11.02	12.74

(b) Under 18 years old

	1997	1998	1999	2000	2001	2002	2003
T1998	1.29	2.11	3.29	4.50	6.69	8.06	7.00
T2000	1.40	2.22	3.08	4.31	7.24	8.48	7.55
C2000	2.79	3.28	2.81	3.16	3.60	4.58	4.04
C2000(IPW1998)	1.00	1.37	1.80	2.43	2.51	2.83	2.21
C2000(IPW2000)	1.23	1.77	1.99	2.62	2.98	3.88	2.98

Note: This table presents the proportion of married individuals by group and year, restricting the analysis to girls. Panel (a) refers to all girls between 6 and 16 years old in 1997, and Panel (b) refers to the same girls until they turn 18. T1998 are those individuals who started receiving the program in 1998. T2000 is the set of individuals who first received the program in 2000. C2000 is the control group. C2000(IPW1998) and C2000(IPW2000) are the control group weighted by the probability of being first treated in 1998 and 2000, respectively, versus being in the control group.

Table A8: Proportion of Married by Group and Year (in %): Boys**(a)** All

	1997	1998	1999	2000	2001	2002	2003
T1998	0.22	0.74	1.78	3.57	6.30	8.25	9.87
T2000	0.38	0.84	2.04	3.76	6.73	9.02	10.90
C2000	0.28	0.87	1.42	2.22	3.53	5.99	7.38
C2000(IPW1998)	0.26	0.97	1.57	2.05	2.79	4.42	5.21
C2000(IPW2000)	0.32	0.96	1.50	2.22	2.99	4.74	5.62

(b) Under 18 years old

	1997	1998	1999	2000	2001	2002	2003
T1998	0.22	0.67	1.41	2.05	2.29	2.51	2.38
T2000	0.38	0.79	1.62	2.03	2.65	2.96	3.18
C2000	0.28	0.87	0.59	0.71	0.92	1.36	1.19
C2000(IPW1998)	0.26	0.97	0.49	0.45	0.56	1.02	1.20
C2000(IPW2000)	0.32	0.96	0.59	0.75	0.59	0.95	1.11

Note: This table presents the proportion of married individuals by group and year, restricting the analysis to boys. Panel (a) refers to all boys between 6 and 16 years old in 1997, and Panel (b) refers to the same boys until they turn 18. T1998 are those individuals who started receiving the program in 1998. T2000 is the set of individuals who first received the program in 2000. C2000 is the control group. C2000(IPW1998) and C2000(IPW2000) are the control group weighted by the probability of being first treated in 1998 and 2000, respectively, versus being in the control group.

Table A10: Proportion of Individuals in the State ‘Married and in School’ VS All Other States (in %)

	1997	1998	1999	2000	2003
T1998	0.17	0.29	0.74	1.12	0.91
T2000	0.16	0.22	0.57	1.02	0.71
C2000	1.50	.	.	0.09	0.31
C2000(IPW1998)	0.65	.	.	0.06	0.19
C2000(IPW2000)	0.78	.	.	0.07	0.27
T-stat H0: Equal coefficients					
T1998vsT2000	0.29	0.89	1.29	0.58	1.09
T1998vsC2000(IPW1998)	-3.09	.	.	8.75	6.52
T2000vsC2000(IPW2000)	-4.41	.	.	6.61	2.26

Note: This table reports the proportion of individuals in the state ‘married and in school’, versus all other states (married out of school, single in school and single out of school). The first five rows present this statistic for each group. T1998 are those individuals who started receiving the program in 1998. T2000 is the set of individuals who first received the program in 2000. C2000 is the control group. C2000(IPW1998) and C2000(IPW2000) are the control group weighted by the probability of being first treated in 1998 and 2000, respectively, versus being in the control group. The last three rows present the t-statistic of a regression of the probability of being ‘married and in school’ on a treatment indicator, with clustered standard errors at the locality level. In row T1998vsT2000, the treatment indicator was equal to 1 if the individual was in group T1998 and 0 if in T2000. In row T1998vsC2000(IPW) the treatment indicator was equal to 1 if the individual was in group T1998 and 0 if in C2000, and the control units were re-weighted based on the probability of being in either group. Similarly for T2000vsC2000(IPW2000).

Table A11: Proportion of Married Individuals in School (in %)

	1997	1998	1999	2000	2003
T1998	24.18	45.95	39.91	30.29	15.68
T2000	18.33	26.42	31.40	25.94	11.73
C2000	100.00	.	.	3.15	4.49
C2000(IPW1998)	100.00	.	.	5.81	5.37
C2000(IPW2000)	100.00	.	.	6.11	6.73
T-stat H0: Equal coefficients					
T1998vsT2000	0.94	2.27	1.54	1.08	1.31
T1998vsC2000(IPW1998)	-16.33	.	.	5.29	4.52
T2000vsC2000(IPW2000)	-17.48	.	.	3.88	1.43

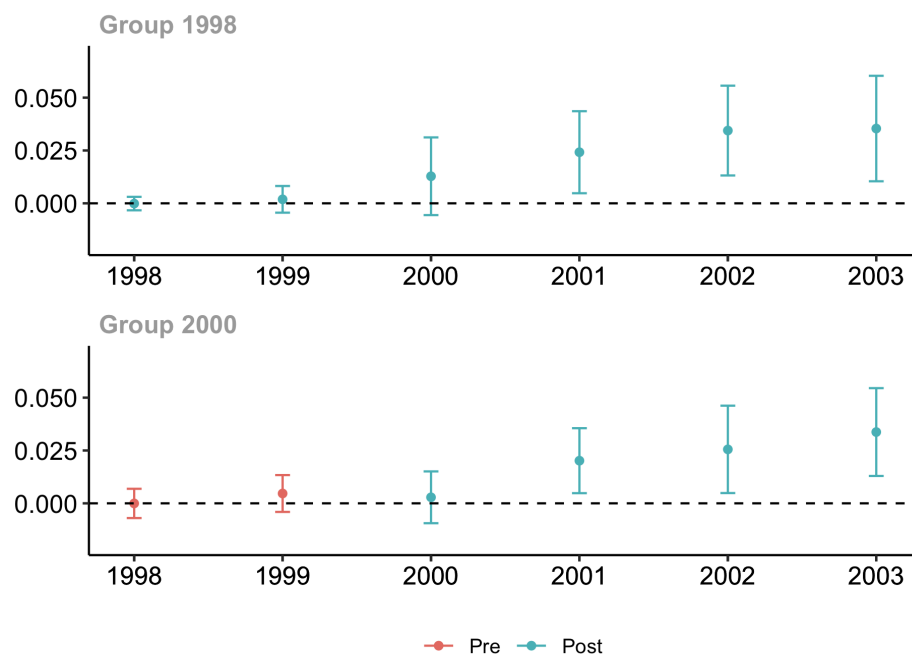
Note: This table reports the proportion of individuals in the state 'in school', versus all other states (married out of school, married in school and single out of school). The first five rows present this statistic for each group. T1998 are those individuals who started receiving the program in 1998. T2000 is the set of individuals who first received the program in 2000. C2000 is the control group. C2000(IPW1998) and C2000(IPW2000) are the control group weighted by the probability of being first treated in 1998 and 2000, respectively, versus being in the control group. The last three rows present the t-statistic of a regression of the probability of being 'married and in school' on a treatment indicator, with clustered standard errors at the locality level. In row T1998vsT2000, the treatment indicator was equal to 1 if the individual was in group T1998 and 0 if in T2000. In row T1998vsC2000(IPW) the treatment indicator was equal to 1 if the individual was in group T1998 and 0 if in C2000, and the control units were re-weighted based on the probability of being in either group. Similarly for T2000vsC2000(IPW2000).

Table A12: Effect of Progresa/Oportunidades on the Probability of Marriage by Length of Exposure

Event-Time	ATT(t)	Std. Error	Conf. Interval
-2	0	0.0027	[-0.0069 , 0.0068]
-1	0.0047	0.0033	[-0.0039 , 0.0132]
0	9e-04	0.0018	[-0.0035 , 0.0054]
1	0.0084	0.0025	[0.0019 , 0.0149]
2	0.0173	0.0055	[0.0032 , 0.0315]
3	0.0276	0.0054	[0.0137 , 0.0415]
4	0.0344	0.0078	[0.0145 , 0.0544]
5	0.0354	0.0098	[0.0104 , 0.0604]
N	25623		

Note: This table shows the average treatment effects by length of exposure and the respective standard errors and confidence intervals. N is the number of observations. Event-Time refers to the period relative to the treatment year.

Figure A9: Effect of Progresa/Oportunidades on the Probability of Marriage by Group



Note: This figure presents the average treatment effect on the treated by treatment group and period. Group 1998, or T1998, is the group that first received treatment in 1998 and Group 2000, or T2000, is the group that first received treatment in 2000. In red are the estimates before treatment started, and in blue after. Standard errors were obtained through clustering, at the randomization level: locality. The p-value for the pre-test of parallel trends assumption is 0.565.

Table A13: Effect of Progresa/Oportunidades on the Probability of Marriage by Group and Year

	Time	ATT(g,t)	Std. Error	Conf. Interval
T 1998	1998	-1e-04	0.0012	[-0.0033 , 0.0031]
T 1998	1999	0.0019	0.0024	[-0.0044 , 0.0082]
T 1998	2000	0.0128	0.007	[-0.0056 , 0.0312]
T 1998	2001	0.0242	0.0074	[0.0048 , 0.0436]
T 1998	2002	0.0344	0.0081	[0.0132 , 0.0557]
T 1998	2003	0.0354	0.0095	[0.0104 , 0.0603]
T 2000	1998	0	0.0026	[-0.007 , 0.0069]
T 2000	1999	0.0047	0.0033	[-0.0041 , 0.0134]
T 2000	2000	0.0028	0.0047	[-0.0094 , 0.0151]
T 2000	2001	0.0202	0.0059	[0.0048 , 0.0355]
T 2000	2002	0.0255	0.0079	[0.0049 , 0.0462]
T 2000	2003	0.0337	0.0079	[0.0129 , 0.0545]
N			25623	

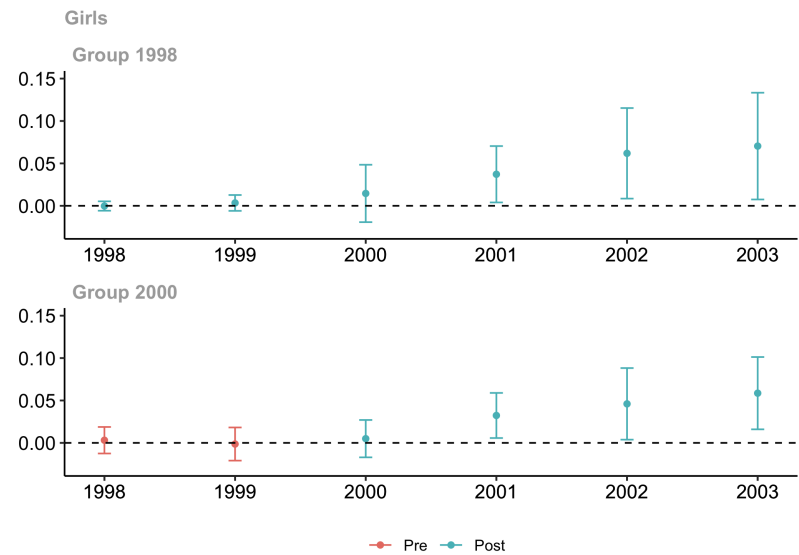
Note: This table shows the average treatment effects by group and length of exposure and the respective standard errors and confidence intervals. N is the number of observations. P-value for pre-test of parallel trends assumption is 0.565.

Table A14: Effect of Progresa/Oportunidades on the Probability of Marriage by Length of Exposure: Girls

Event-Time	ATT(t)	Std. Error	Conf. Interval
-2	0.0031	0.0056	[-0.0117 , 0.018]
-1	-0.0014	0.0071	[-0.0203 , 0.0175]
0	0.0016	0.0034	[-0.0075 , 0.0107]
1	0.0138	0.0042	[0.0028 , 0.0249]
2	0.0259	0.0095	[8e-04 , 0.0511]
3	0.0449	0.0094	[0.0201 , 0.0698]
4	0.0619	0.0167	[0.0175 , 0.1063]
5	0.0704	0.0236	[0.0078 , 0.133]
N		12350	

Note: This table shows the average treatment effects by length of exposure and the respective standard errors and confidence intervals. N is the number of observations. Event-Time refers to the time period relative to the treatment year.

Figure A10: Effect of Progresa/Oportunidades on the Probability of Marriage by Group: Girls



Note: This figure presents the average treatment effect on the treated by treatment group and period. Group 1998, or T1998, is the group that first received treatment in 1998 and Group 2000, or T2000, is the group that first received treatment in 2000. In red are the estimates before treatment started, and in blue after. Standard errors were obtained through clustering, at the randomization level: locality. The p-value for the pre-test of parallel trends assumption is 0.588.

Table A15: Effect of Progresa/Oportunidades on the Probability of Marriage by Group and Year: Girls

	Time	ATT(g,t)	Std. Error	Conf. Interval
T 1998	1998	-3e-04	0.0021	[-0.0058 , 0.0053]
T 1998	1999	0.0034	0.0035	[-0.006 , 0.0127]
T 1998	2000	0.0146	0.0127	[-0.0193 , 0.0484]
T 1998	2001	0.0372	0.0125	[0.004 , 0.0704]
T 1998	2002	0.0619	0.0201	[0.0085 , 0.1153]
T 1998	2003	0.0704	0.0236	[0.0075 , 0.1333]
T 2000	1998	0.0031	0.0059	[-0.0125 , 0.0188]
T 2000	1999	-0.0014	0.0073	[-0.0209 , 0.0182]
T 2000	2000	0.005	0.0083	[-0.017 , 0.027]
T 2000	2001	0.0323	0.01	[0.0057 , 0.0589]
T 2000	2002	0.046	0.0159	[0.0038 , 0.0882]
T 2000	2003	0.0586	0.016	[0.016 , 0.1012]
N			12350	

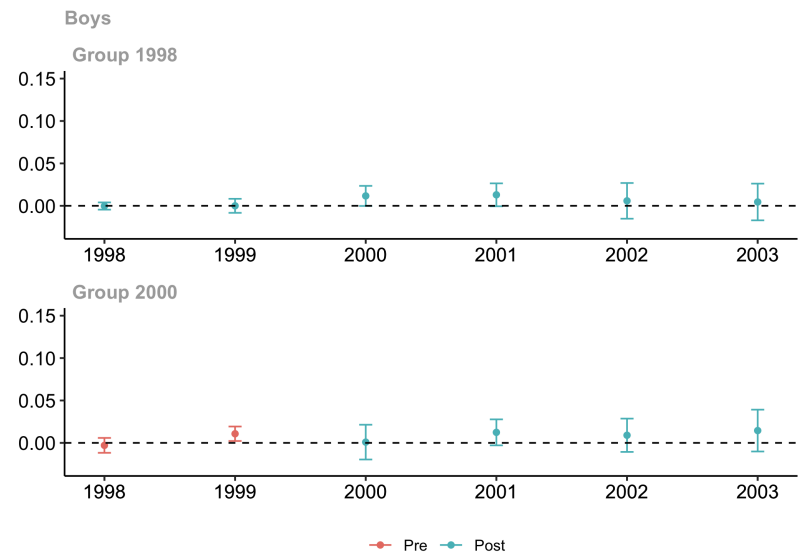
Note: This table shows the average treatment effects by group and length of exposure and the respective standard errors and confidence intervals. N is the number of observations. P-value for pre-test of parallel trends assumption is 0.565.

Table A16: Effect of Progresa/Oportunidades on the Probability of Marriage by Length of Exposure: Boys

Event-Time	ATT(t)	Std. Error	Conf. Interval
-2	-0.0029	0.0032	[-0.0114 , 0.0055]
-1	0.0108	0.0031	[0.0027 , 0.0189]
0	2e-04	0.0026	[-0.0066 , 0.007]
1	0.0044	0.0028	[-0.0029 , 0.0116]
2	0.0107	0.0043	[-4e-04 , 0.0218]
3	0.0135	0.0046	[0.0015 , 0.0256]
4	0.0058	0.0074	[-0.0135 , 0.0252]
5	0.0045	0.0075	[-0.0151 , 0.0242]
N		13273	

Note: This table shows the average treatment effects by length of exposure and the respective standard errors and confidence intervals. N is the number of observations. Event-Time refers to the time period relative to the treatment year.

Figure A11: Effect of Progresa/Oportunidades on the Probability of Marriage by Group: Boys



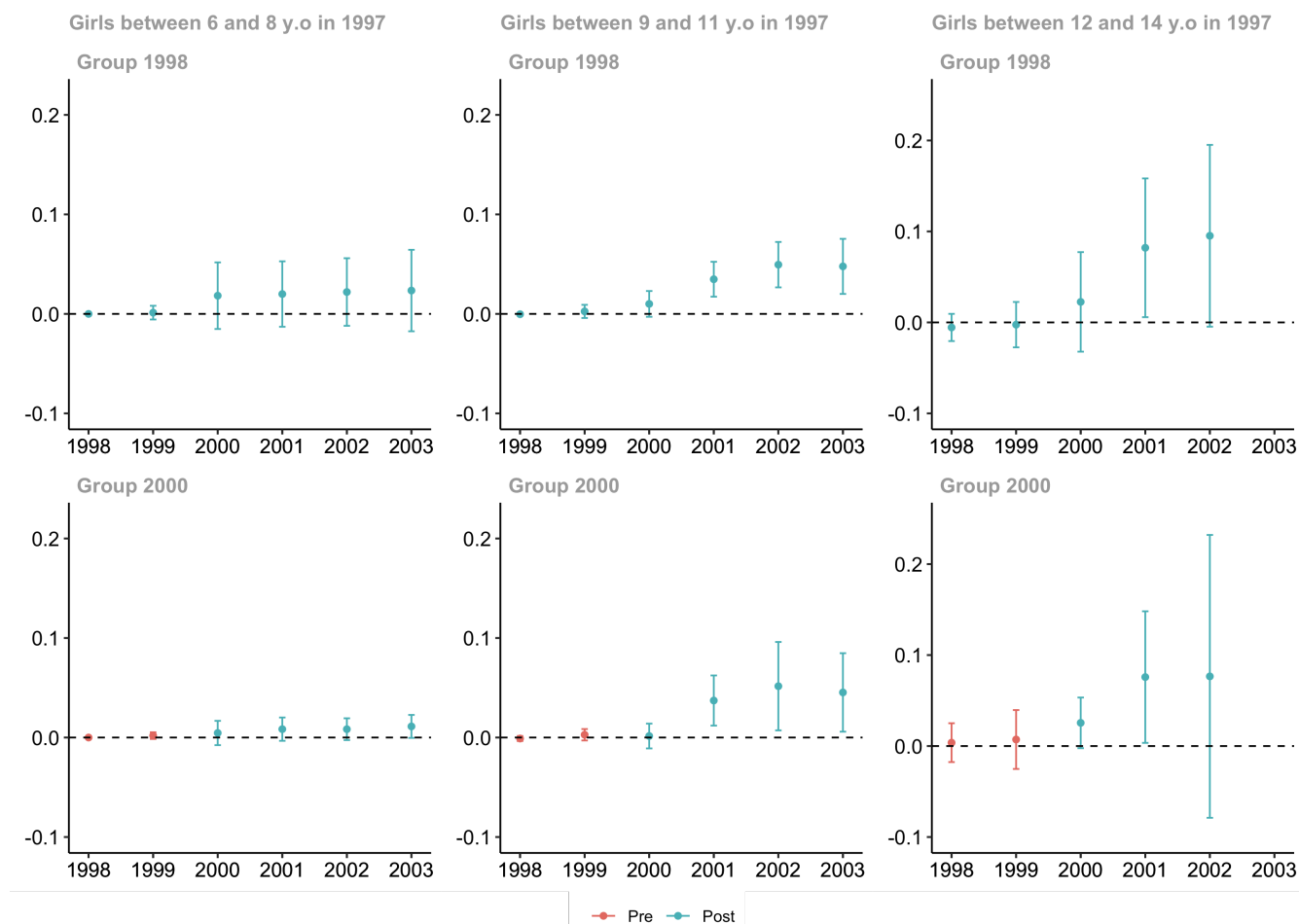
Note: This figure presents the average treatment effect on the treated by treatment group and period. Group 1998, or T1998, is the group that first received treatment in 1998 and Group 2000, or T2000, is the group that first received treatment in 2000. In red are the estimates before treatment started, and in blue after. Standard errors were obtained through clustering at the randomization level: locality. The p-value for the pre-test of parallel trends assumption is 0.0109.

Table A17: Effect of Progresa/Oportunidades on the Probability of Marriage by Group and Year: Boys

	Time	ATT(g,t)	Std. Error	Conf. Interval
T 1998	1998	-3e-04	0.0016	[-0.0045 , 0.004]
T 1998	1999	0	0.0031	[-0.0083 , 0.0083]
T 1998	2000	0.0117	0.0044	[-2e-04 , 0.0235]
T 1998	2001	0.013	0.005	[-5e-04 , 0.0265]
T 1998	2002	0.0058	0.0078	[-0.0152 , 0.0269]
T 1998	2003	0.0045	0.008	[-0.0171 , 0.0262]
T 2000	1998	-0.0029	0.0033	[-0.0117 , 0.0059]
T 2000	1999	0.0108	0.0032	[0.0022 , 0.0193]
T 2000	2000	9e-04	0.0076	[-0.0196 , 0.0214]
T 2000	2001	0.0124	0.0057	[-0.0029 , 0.0277]
T 2000	2002	0.009	0.0073	[-0.0107 , 0.0286]
T 2000	2003	0.0145	0.0091	[-0.0101 , 0.0392]
N			13273	

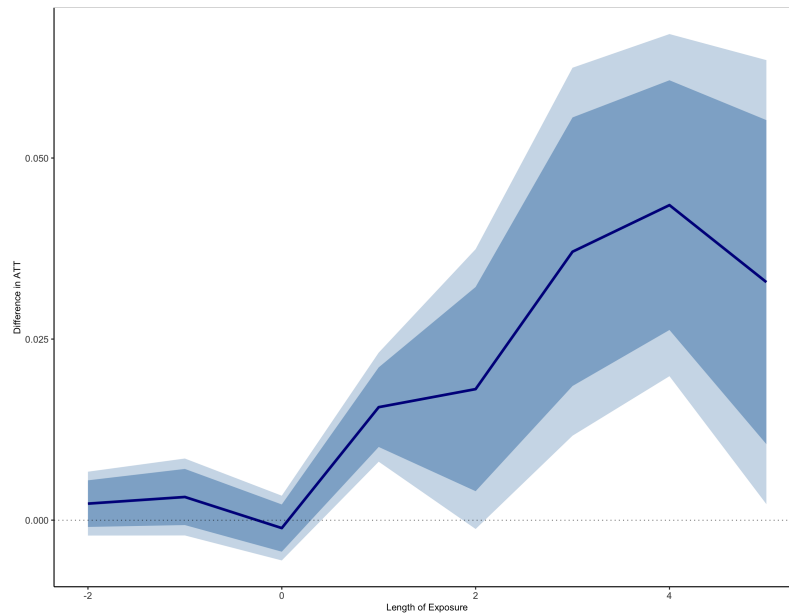
Note: This table shows the average treatment effects by group and length of exposure and the respective standard errors and confidence intervals. N is the number of observations. P-value for pre-test of parallel trends assumption is 0.565.

Figure A12: Effect of Progresa/Oportunidades on the Probability of Marriage: Girls, by Age



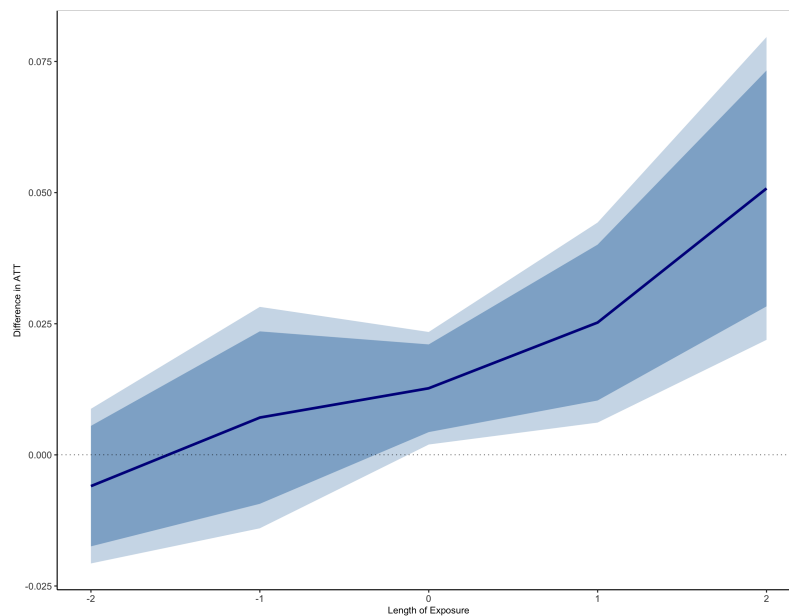
Note: This figure presents the average treatment effect on the treated girls in T1998 and T2000 by year and age at baseline. In red are the estimates before treatment started, and in blue after. Standard errors were obtained through clustering at the randomization level: locality.

Figure A13: Difference Between the ATT for the Cohort of Girls 13 y.o or older in 2001 and the Cohort of Girls 12 y.o or younger in 2001



Note: This figure presents the difference in the program's average treatment effect for girls older than 13 in 2001 and girls younger than 12 in 2001. Standard errors were obtained through clustering at the randomization level: locality.

Figure A14: Difference Between the ATT for the Cohort of Girls 13 y.o or older in 2001 and the Cohort of Girls 14 and 16 y.o in 1997



Note: This figure presents the difference in the program's average treatment effect for girls older than 13 in 2001 and girls younger than 12 in 2001. Standard errors were obtained through clustering at the randomization level: locality.

Table A18: Summary Statistics of Girls by Marriage Status: Married (M) VS Single (S)

	M	S	M(IPW)	S(IPW)	Difference(IPW)
Education Level in 2003	6.69 (2,321.00)	6.79 (8,578.00)	6.43	6.54	-0.10 (-0.50)
Occupation: Unpaid housekeeper (week before survey, 2003)	0.44 (832.00)	0.19 (8,638.00)	0.38	0.14	0.24 (5.21)
Worked for money (week before survey, 2003)	0.70 (283.00)	0.55 (2,454.00)	0.70	0.57	0.13 (1.67)
Occupation: agriculture (week before survey, 2003)	0.09 (202.00)	0.08 (1,685.00)	0.06	0.08	-0.02 (-0.66)

Note: This table shows the summary statistics by marriage status: married or single by 2003. The first two columns report the mean for each characteristic for married (M) and single (S), respectively, and the number of observations in parentheses. The third and fourth column report the re-weighted means, re-weighting each observation in the control group by $\frac{p(x)}{1-p(x)}$, where $p(x)$ is the probability of ever being treated. The last column reports the parameter estimated and the t-statistic (in parentheses) for a regression of the characteristic on a marriage status indicator, re-weighting the control group as described.

Table A19: Summary Statistics of Married Girls by Age at Marriage: Child Brides (CM) VS Adult Brides (AM)

	CM	AM	CM(IPW)	AM(IPW)	Difference(IPW)
Education Level in 2003	6.44 (1,470.00)	7.05 (1,018.00)	6.24	6.60	-0.35 (-0.93)
Occupation: Unpaid housekeeper (week before survey, 2003)	0.40 (617.00)	0.43 (353.00)	0.35	0.32	0.03 (0.41)
Worked for money (week before survey, 2003)	0.69 (189.00)	0.68 (148.00)	0.65	0.76	-0.12 (-1.26)
Occupation: agriculture (week before survey, 2003)	0.10 (127.00)	0.12 (75.00)	0.22	0.04	0.18 (1.54)

Note: This table shows the summary statistics by age at marriage: child brides who married below 18 (CM) or adult brides who married at 18 or above (AM). The first two columns report the mean for each characteristic for child brides (CM) and adult brides (AM), respectively, and the number of observations in parentheses. The third and fourth column report the re-weighted means, re-weighting each observation in the control group by $\frac{p(x)}{1-p(x)}$, where $p(x)$ is the probability of ever being treated. The last column reports the parameter estimated and the t-statistic (in parentheses) for a regression of the characteristic on a marriage status indicator, re-weighting the control group as described.

Table A20: Summary Statistics of Girls in 2003: By Marriage and Treatment Status

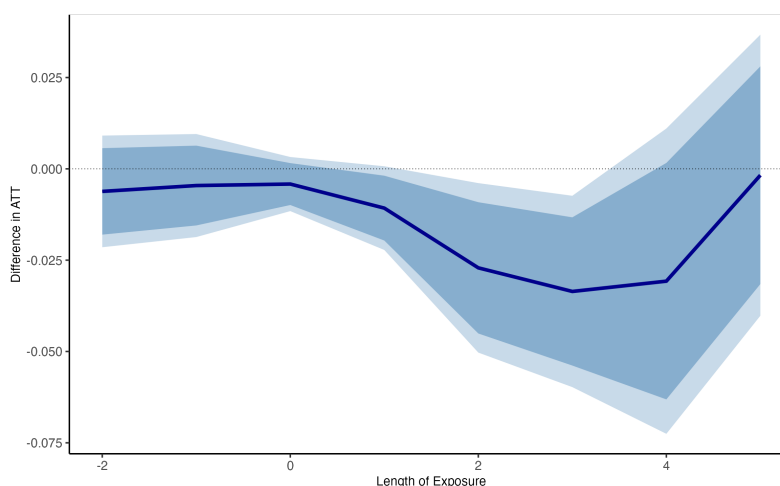
(a) Single				
	T	C	C(IPW)	Difference(IPW)
Education Level in 2003	6.88 (6,596.00)	6.48 (1,982.00)	6.34	0.53 (3.79)
Occupation: Unpaid housekeeper (week before survey, 2003)	0.18 (6,498.00)	0.22 (2,140.00)	0.11	0.07 (4.07)
Worked for money (week before survey, 2003)	0.55 (1,705.00)	0.56 (749.00)	0.58	-0.03 (-0.33)
Occupation: agriculture (week before survey, 2003)	0.07 (1,166.00)	0.09 (519.00)	0.09	-0.02 (-0.54)
(b) Married				
	T	C	C(IPW)	Difference(IPW)
Education Level in 2003	6.73 (1,918.00)	6.48 (403.00)	6.08	0.65 (1.49)
Occupation: Unpaid housekeeper (week before survey, 2003)	0.36 (617.00)	0.65 (215.00)	0.40	-0.03 (-0.31)
Worked for money (week before survey, 2003)	0.71 (226.00)	0.65 (57.00)	0.70	0.01 (0.16)
Occupation: agriculture (week before survey, 2003)	0.08 (166.00)	0.14 (36.00)	0.04	0.04 (0.90)

Note: This table shows the summary statistics by marriage status and treatment group. Panel (a) restricts the analysis to girls who were single in 2003. Panel (b) to girls who were married in 2003. The first two columns report the mean for each characteristic for treated and control groups, respectively, and the number of observations in parentheses. The third column reports the mean of the re-weighted control group, re-weighting each observation by $\frac{p(x)}{1-p(x)}$, where $p(x)$ is the probability of ever being treated. The last column reports the parameter estimated and the t-statistic (in parentheses) for a regression of the characteristic on a treatment indicator, re-weighting the control group as described.

Table A21: Summary Statistics of Married Girls by Age at Marriage and Treatment Status

(a) Married under 18y.o				
	T	C	C(IPW)	Difference(IPW)
Education Level in 2003	6.51 (1,192.00)	6.10 (278.00)	5.87	0.64 (2.40)
Occupation: Unpaid housekeeper (week before survey, 2003)	0.33 (445.00)	0.59 (172.00)	0.37	-0.04 (-0.63)
Worked for money (week before survey, 2003)	0.71 (151.00)	0.61 (38.00)	0.57	0.14 (0.98)
Occupation: agriculture (week before survey, 2003)	0.10 (103.00)	0.12 (24.00)	0.39	-0.29 (-1.30)
(b) Married at 18 or older				
	T	C	C(IPW)	Difference(IPW)
Education Level in 2003	7.04 (833)	7.10 (185)	6.22	0.82 (1.24)
Occupation: Unpaid housekeeper (week before survey, 2003)	0.41 (249)	0.47 (104)	0.25	0.16 (1.63)
Worked for money (week before survey, 2003)	0.69 (104)	0.66 (44)	0.80	-0.10 (-1.39)
Occupation: agriculture (week before survey, 2003)	0.12 (48)	0.11 (27)	0.01	0.11 (2.25)

Note: This table shows the summary statistics by Child Marriage status and treatment group. Panel (a) restricts the analysis to girls who married under 18. Panel (b) to girls who married at 18 or older. The first two columns report the mean for each characteristic for treated and control groups, respectively, and the number of observations in parentheses. The third column reports the mean of the re-weighted control group, re-weighting each observation by $\frac{p(x)}{1-p(x)}$, where $p(x)$ is the probability of ever being treated. The last column reports the parameter estimated and the t-statistic (in parentheses) for a regression of the characteristic on a treatment indicator, re-weighting the control group as described.

Figure A15: Difference Between the ATT for Villages with Returns to Education Above and Below the median.

Note: This figure presents the difference in the program's average treatment effect for villages with returns to education above the median and villages with returns to education below the median. Standard errors were obtained through clustering at the randomization level: locality.

Table A22: Correlation Between Outcomes and Age at Marriage: Child Brides VS Adult Brides - ENDIREH 2003

	Child Brides	T-Stat
Education level	-0.839	-5.41
Monthly wage	-945.757	-3.48
Worked last week	-0.060	-2.77
Money to spend on herself	-0.042	-1.89
Financial dependence index	0.197	4
Socialization	0.053	0.86
Decision making power	0.270	0.95
Sexism index	0.313	4.01
Social benefits	0.144	8.79
Suicidal thoughts	0.053	2.4
Number of children	0.515	7.19
Couple lives in own house	-0.130	-5.41
Couple lives with husband's parents	0.154	6.19
Prenup	-0.040	-1.6
Partner's age	0.656	1.75
Partner's education level	-0.816	-4.92
Partner works for money	-0.003	-0.08
Partner's monthly wage	-251.753	-2.37
Physical violence from the partner	0.139	3.25
Sexual violence from the partner	0.038	1.7
Physical violence in the household	0.023	1.22
Verbal violence in the household	0.015	0.89
Mother thinks about harming child	0.178	7.12
Mother actually harms child	0.214	8.14
Mother insults child	0.071	3.88

B Appendix: Attrition and Missing Data

In this analysis, there are three important groups of villages: T1998, the group that first received the program in 1998; T2000, the villages that received the program in 2000; and C2000, villages that did not receive the program until 2003. C2000 was included in 2003 and asked retroactive questions regarding 1997 and from 2000 to 2003. So by construction, attrition from the sample only regards the two treated groups. Although the analysis stopped in 2003, I added the attrition information in 2007, since some missing information from age at marriage was recovered from the survey in 2007. Table B1 shows the attrition rate measured by missing individual identifiers from baseline to follow-up surveys. Attrition increases with the years and is higher for T1998 than T2000 (this difference is statistically significant from November 1999 onward). The program positively affected migration, which might be a potential cause for attrition. However, it is important to note that some individuals not in a year's survey appear in the following years. For example, half of those who are not in October 1998 reappeared in March 1999. Roughly, between 50 and 70% of those missing in a specific survey reappear in the consecutive one; therefore, I can often retrieve marriage information for each year. Even if the individual is missing all year, in 1999, I can obtain marriage information on 37% of the cases, 30% in 2000 and only 4% in 2003, usually using the information on different surveys, like age at marriage or year of marriage. Since individuals in the treatment groups are more likely to have missing information regarding the outcome of interest, I perform a robustness check using Lee bounds with inverse probability weights and tight bounds. Then, treating the data as if it was repeated cross-section, I estimate a lower bound for the aggregate effect for girls of 2p.p, statistically different from zero at 1%, $CI=[0.0176, 0.0293]$.

Table B1: Attrition - Missing ID

	Means	
	T1998	T2000
Individual ID lost from 1997 to 1998 (march)	0	0
Individual ID lost from 1997 to 1998 (october)	.043	.044
Individual ID lost from 1997 to 1999 (march)	.11	.1
Individual ID lost from 1997 to 1999 (november)	.11	.077
Individual ID lost from 1997 to 2000 (march)	.13	.097
Individual ID lost from 1997 to 2000 (november)	.13	.11
Individual ID lost from 1997 to 2003	.15	.13
Individual ID lost from 1997 to 2007	.28	.24

Note: This table presents the proportion of individuals, by treatment group, surveyed in 1997 and missing in subsequent surveys.

Table B2: Missing in Outcome

	Means		
	T1998	T2000	C2000
Missing marriage status in 1997	.023	.021	.02
Missing marriage status in 1998	.059	.057	.02
Missing marriage status in 1999	.072	.059	.02
Missing marriage status in 2000	.094	.083	.021
Missing marriage status in 2001	0	0	0
Missing marriage status in 2002	0	0	0
Missing marriage status in 2003	.17	.16	.018
Missing Age at Marriage	.045	.042	0

Note: This table presents the proportion of individuals, by treatment group, with missing outcome information in each survey.

Besides attrition, there are other inconsistencies across surveys. Namely, the age of individuals does not progress as expected, or their gender changes from female to male or vice-versa, which might indicate a mismatch in the IDs or misreporting of gender or age (see Tables B3 and B4). These inconsistencies are not statistically different across T1998 and T2000. For the main analysis, I exclude all those observations in which gender is inconsistent and age decreases. If I

am stricter and drop observations that show any inconsistency in age (either decreasing or unreasonably increasing), I obtain qualitatively similar results with larger magnitudes. Therefore, if anything, I am being conservative in the main specification. Note that, if I forced missing values on marriage in those years in which the observation has an inconsistency, the estimator would only consider some of those observations that have information on two consecutive years.

Table B3: Attrition — Age inconsistency

	Means	
	T1998	T2000
Age in 1998 (march) not consistent with age in 1997	.039	.037
Age in 1998 (october) not consistent with age in 1997	.036	.037
Age in 1999 (march) not consistent with age in 1997	.16	.15
Age in 1999 (november) not consistent with age in 1997	.052	.051
Age in 2000 (march) not consistent with age in 1997	.16	.16
Age in 2000 (november) not consistent with age in 1997	.11	.11
Age in 2003 not consistent with age in 1997	.09	.083
Age in 2007 not consistent with age in 1997	.1	.1
Age is inconsistent in at least one year	.32	.33
Age is decreasing in at least one year	.065	.064
Age is inconsistent with 1997 in 2000 and 2003	.23	.22

Note: This table presents the proportion of individuals for whom age is not consistent across surveys, by treatment group.

Table B4: Attrition — Gender inconsistency

	Means	
	T1998	T2000
Gender changes from 1997 to 1998 (march)	.035	.033
Gender changes from 1997 to 1998 (october)	0	0
Gender changes from 1997 to 1999 (march)	0	0
Gender changes from 1997 to 1999 (november)	0	0
Gender changes from 1997 to 2000 (march)	.035	.034
Gender changes from 1997 to 2000 (november)		
Gender changes from 1997 to 2003	.025	.021
Gender changes from 1997 to 2007	.035	.034
Gender changes from 1997 in at least one year	.06	.058
Gender is missing	0	0

Note: This table presents the proportion of individuals for whom gender is not consistent across surveys, by treatment group.

The data lacks information for some individuals regarding baseline characteristics used to estimate the propensity score and the outcome regression. Missing rates are extremely low for both treatment groups, but between 5 and 7% of the control group did not have information on asset holdings and household head in 1997. I did not recur to imputation of these missing values: since I estimated the probability of treatment with these variables, imputation would have introduced bias in the estimates due to the non-zero covariance across the predictors. Therefore, I opted to exclude those observations from the sample.

Furthermore, 34% did not have information on education at baseline. Since the literature suggests that education is a good predictor of marriage decisions, I excluded those observations with education missing. I ran the main analysis with those individuals for whom I observe education information for baseline. When instead I exclude the variable from the econometrics models, and keep the observations, I obtain qualitatively the same results, but with a lower magnitude for the effect of the program on girls across the years: in 2003, girls were 3p.p more likely to be married if they were beneficiaries of the program.

Table B5: Missing in main controls (1)

	Means		
	T1998	T2000	C2000
Missing education in 1997	.026	.026	.34
Missing age in 1997	0	0	0
Missing indigenous background information	.000042	.000067	.00087
Missing if head or spouse went to school	.002	.0021	.067
Missing if head or spouse worked recently	.00013	.00013	.069
Missing standardized poverty index	0	0	.067
Missing if head or spouse is a housewife	0	0	0
Missing gender of household head	0	.000067	.0079

Note: This table presents the proportion of individuals for whom the main control variables are missing at baseline, by treatment group.

Table B6: Missing in main controls (2)

	Means		
	T1998	T2000	C2000
Missing floor quality information	.0033	.0021	.057
Missing wall quality information	.0027	.0013	.057
Missing roof quality information	.0011	.0012	.056
Missing no. bedrooms information	.002	.0011	.064
Missing water provision information	.0012	.0014	.057
Missing electricity provision information	.00059	.00054	.058
Missing animals ownership information	.0015	.0016	.059
Missing land ownership information	.0026	.00087	.057
Missing blender ownership information	.0011	.0004	.056
Missing refrigerator ownership information	.001	.00081	.057
Missing stove ownership information	.0008	.00034	.057
Missing heater ownership information	.004	.0025	.057
Missing radio ownership information	.0015	.00067	.057
Missing TV ownership information	.0011	.00094	.057
Missing video player ownership information	.0014	.0002	.057
Missing washing machine ownership information	.0015	.00027	.057
Missing car ownership information	.0022	.0012	.057
Missing truck ownership information	.0017	.00074	.057

Note: This table presents the proportion of individuals for whom the main control variables are missing at baseline, by treatment group.

C Appendix: Model's Detailed Derivations

The value functions of this problem are the following:

$$\begin{aligned} V^N(\xi, h, q) &= U^N(\xi, h, q) + \beta \max\{U^N(\xi, h, q'), U^E(\xi, h, q'), U^{EM}(\xi, h, q'), U^M(\xi, h, q')\} \\ &= u(w(h)) + \beta \max\{u(w(h)), u(\omega) + \xi, u(\omega - c) + \xi + f(q'), u(w(h) - c) + f(q')\} \end{aligned}$$

$$\begin{aligned} V^E(\xi, h, q) &= U^E(\xi, h, q) + \beta \max\{U^N(\xi, h', q'), U^E(\xi, h', q'), U^{EM}(\xi, h', q'), U^M(\xi, h', q')\} \\ &= u(\omega + p) + \xi + \beta \max\{u(w(h')), u(\omega) + \xi, u(\omega - c) + \xi + f(q'), u(w(h') - c) + f(q')\} \end{aligned}$$

$$\begin{aligned} V^{EM}(\xi, h, q) &= U^{EM}(\xi, h, q) + \beta \max\{U^{EM}(\xi, h', q), U^M(\xi, h', q)\} \\ &= u(\omega + p - c) + \xi + f(q) + \beta \max\{u(\omega - c) + \xi + f(q), u(w(h') - c) + f(q)\} \end{aligned}$$

$$\begin{aligned} V^M(\xi, h, q) &= U^M(\xi, h, q) + \beta \max\{U^{EM}(\xi, h, q), U^M(\xi, h, q)\} \\ &= u(w(h) - c) + f(q) + \beta \max\{u(\omega - c) + \xi + f(q), u(w(h) - c) + f(q)\} \end{aligned}$$

Define ξ^{**} as the school taste that, in the first period, makes agents indifferent between marrying and going to school (EM) and marrying and leaving school (M). Then,

$$\begin{aligned} \xi^{**} : & u(\omega + p - c) + \xi^{**} + f(q) + \beta \max\{u(w(h')) + f(q), u(\omega) + \xi^{**} + f(q)\} \\ &= u(w(h) - c) + f(q) + \beta \max\{u(w(h)) + f(q), u(\omega) + \xi^{**} + f(q)\} \\ \iff & \xi^{**} = u(w(h) - c) - u(\omega + p - c) + \beta \max\{u(w(h)) + f(q), u(\omega) + \xi^{**} + f(q)\} - \\ & \beta \max\{u(w(h')) + f(q), u(\omega) + \xi^{**} + f(q)\} \end{aligned}$$

$$\Rightarrow \frac{\partial \xi^{**}}{\partial p} = -u'(\omega + p - c) < 0$$

Let ξ^* be such that agents in the first period are indifferent between going to school single and working in the labor market single, $E = N$. Then,

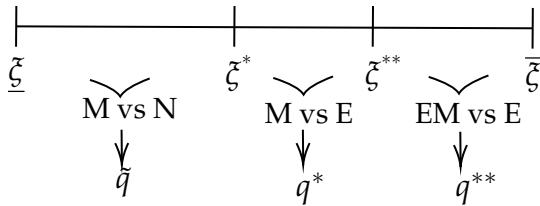
$$\begin{aligned}\xi^* : & u(\omega + p) + \xi^* + \beta \mathbf{E}_{q'} \max\{u(\omega) + \xi^*, u(\omega - c) + \xi^* + f(q'), u(w(h')), u(w(h') - c) + f(q')\} \\ & = u(w(h)) + \beta \mathbf{E}_{q'} \max\{u(\omega) + \xi^*, u(\omega - c) + \xi^* + f(q'), u(w(h)), u(w(h) - c) + f(q')\}\end{aligned}$$

$$\begin{aligned}\iff \xi^* & = u(w(h)) - u(\omega + p) + \\ & \quad \beta \mathbf{E}_{q'} \max\{u(\omega) + \xi^*, u(\omega - c) + \xi^* + f(q'), u(w(h)), u(w(h) - c) + f(q')\} - \\ & \quad \beta \mathbf{E}_{q'} \max\{u(\omega) + \xi^*, u(\omega - c) + \xi^* + f(q'), u(w(h')), u(w(h') - c) + f(q')\}\end{aligned}$$

$$\Rightarrow \frac{\partial \xi^*}{\partial p} = -u'(\omega + p) < 0$$

Assuming $\xi^{**} > \xi^*$, then:

1. If $\xi > \xi^{**} > \xi^* \Rightarrow$ Agents choose between EM or E
2. If $\xi < \xi^* < \xi^{**} \Rightarrow$ Agents choose between M or N
3. If $\xi^* < \xi < \xi^{**} \Rightarrow$ Agents choose between M or E



Those individuals for whom $\xi > \xi^{**} > \xi^* \Rightarrow$ choose between EM and E. That decision will depend on the potential partner's quality. Namely, define q^{**} as the reservation partner quality to make individuals indifferent between EM and E. Note that q^{**} exists unique since V^{EM} is

strictly increasing in q while V^E is a constant with respect to q .

$$\exists! q^{**} : V^{EM} = V^E \iff$$

$$\begin{aligned} & u(\omega + p - c) + \xi + f(q^{**}) + \beta \max\{u(w(h)) + f(q^{**}), u(\omega) + \xi + f(q^{**})\} \\ &= u(\omega + p) + \xi + \beta \mathbf{E}_{q'} \max\{u(\omega) + \xi, u(\omega - c) + \xi + f(q'), u(w(h)), u(w(h) - c) + f(q')\} \\ &\iff f(q^{**}) = \frac{1}{1 + \beta} [u(\omega + p) - u(\omega + p - c) + \beta \mathbf{E}_{q'} (\max\{N(h'), E(h'), EM(h', q'), M(h', q')\} \\ &\quad - \max\{N(h'), E(h')\})] \end{aligned}$$

Since $\xi > \xi^{**} > \xi^*$, we know than E is preferred to N, thus:

$$\begin{aligned} \iff f(q^{**}) &= \frac{1}{1 + \beta} [u(\omega + p) - u(\omega + p - c) - \beta(u(\omega) + \xi) \\ &\quad + \beta \mathbf{E}_{q'} \max\{EM(h', q'), M(h', q'), N(h'), E(h')\}] \end{aligned}$$

Note that $\frac{\partial q^{**}}{\partial p}$ is driven by the income effect induced by the program on marriage.

$$\frac{\partial f(q^{**})}{\partial p} = \frac{1}{1 + \beta} [u'(\omega + p) - u'(\omega + p - c)] < 0 \quad , \text{since} \quad u'' < 0$$

$$\text{Because } f \text{ is strictly increasing in } q \Rightarrow \frac{\partial q^{**}}{\partial p} < 0$$

As the program's generosity increases, the minimum partner quality to be indifferent between being single in school and married in school decreases.

If agents' taste for school is such that $\xi < \xi^* < \xi^{**}$, then they choose between M and N.

Define \tilde{q} as the reservation quality to make individuals indifferent between M and N:

$$\begin{aligned}
& \exists! \tilde{q} : V^M = V^N \iff \\
& u(w(h) - c) + f(\tilde{q}) + \beta \max\{u(w(h)) + f(\tilde{q}), u(\omega) + \xi + f(\tilde{q})\} \\
& = u(w(h)) + \beta \mathbf{E}_{q'} \max\{u(w(h) - c) + f(q'), u(\omega - c) + \xi + f(q'), u(\omega) + \xi, u(w(h))\} \\
& \iff f(\tilde{q}) = \frac{1}{1 + \beta} [u(w(h)) - u(w(h) - c) - \beta \max\{N(h), E(h)\} \\
& + \beta \mathbf{E}_{q'} \max\{N(h), M(h, q'), E(h), EM(h, q')\}]
\end{aligned}$$

Since $\tilde{\xi} < \xi^* < \xi^{**}$, we know than N is preferred to E, thus:

$$\iff f(\tilde{q}) = \frac{1}{1 + \beta} [(1 - \beta)u(w(h)) - u(w(h) - c) + \beta \mathbf{E}_{q'} \max\{N(h), E(h), EM(h, q'), M(h, q')\}]$$

The program does not change the reservation partner quality for those individuals who are not going to school and are choosing between marrying or staying single.

$$\Rightarrow \frac{\partial f(\tilde{q})}{\partial p} = 0 \Rightarrow \frac{\partial \tilde{q}}{\partial p} = 0$$

Finally, if an individual's school taste is such that $\tilde{\xi}^* < \xi < \xi^{**}$, then they will choose between M and E. I show that there exists a unique q^* that makes individuals indifferent between marrying and leaving school and staying in school single.

$$\begin{aligned}
& \exists! q^* : V^M = V^E \\
& \iff u(w(h) - c) + f(q^*) + \beta \max\{u(w(h)) + f(q^*), u(\omega) + \xi + f(q^*)\} \\
& = u(\omega + p) + \xi + \beta \mathbf{E}_{q'} \max\{u(\omega) + \xi, u(\omega - c) + \xi + f(q'), u(w(h) - c) + f(q'), u(w(h))\} \\
& \iff f(q^*) = \frac{1}{1 + \beta} [u(\omega + p) - u(w(h) - c) - \beta \max\{N(h), E(h)\} \\
& + \beta \mathbf{E}_{q'} \max\{E(h'), M(h', q'), EM(h', q'), N(h')\}]
\end{aligned}$$

Since $\xi^* < \xi < \xi^{**}$, then E is preferred to N, thus:

$$\begin{aligned} \iff f(q^*) &= \frac{1}{1+\beta} [u(\omega + p) - u(w(h) - c) - \beta(u(\omega) + \xi) + \xi \\ &+ \beta \mathbf{E}_{q'} \max\{E(h'), M(h', q'), EM(h', q'), N(h')\}] \end{aligned}$$

Increasing the program's generosity for those individuals who have $\xi^* < \xi < \xi^{**}$ and are undecided between being single in school and getting married and drop out of school, leads to increases in the reservation partner's quality:

$$\Rightarrow \frac{\partial f(q^*)}{\partial p} = \frac{1}{1+\beta} [u'(\omega + p)] > 0 \Rightarrow \frac{\partial q^*}{\partial p} > 0$$

I can also show that q^* is the largest reservation partner quality:. Assuming $\omega < w(h) < \omega + p$ and consequently $\omega - c < w(h) - c < \omega + p - c$. Recall

$$\begin{aligned} f(q^{**}) &= \frac{1}{1+\beta} [u(\omega + p) - u(\omega + p - c) - \beta(u(\omega) + \xi) + \beta \mathbf{E}_{q'} \max\{N(h'), E(h'), EM(h', q'), M(h', q')\}] \\ f(\tilde{q}) &= \frac{1}{1+\beta} [(1 - \beta)u(w(h)) - u(w(h) - c) + \beta \mathbf{E}_{q'} \max\{N(h), E(h), EM(h, q'), M(h, q')\}] \\ f(q^*) &= \frac{1}{1+\beta} [u(\omega + p) - u(w(h) - c) - \beta(u(\omega) + \xi) + \xi + \beta \mathbf{E}_{q'} \max\{N(h'), E(h'), EM(h', q'), M(h', q')\}] \end{aligned}$$

Due to the previous assumption, $u(w(h) - c) - u(\omega + p - c) < 0$ and $u(\omega + p) - u(w(h)) > 0$. Trivially, $\xi > 0$ and $(1 - \beta)\xi > 0$. Finally, because all payoff are strictly increasing in human capital h , then $\max\{N(h'), E(h'), EM(h', q'), M(h', q')\} > \max\{N(h), E(h), EM(h, q'), M(h, q')\}$.

It follows that:

$$\begin{aligned} f(q^{**}) - f(q^*) &= u(w(h) - c) - u(\omega + p - c) - \xi < 0 \Rightarrow f(q^{**}) < f(q^*) \Rightarrow q^{**} < q^* \quad \text{and} \\ f(q^*) - f(\tilde{q}) &= u(\omega + p) - u(w(h)) + (1 - \beta)\xi + \beta \max\{N(h'), E(h'), EM(h', q'), M(h', q')\} \\ &\quad - \beta \max\{N(h), E(h), EM(h, q'), M(h, q')\} > 0 \Rightarrow f(q^*) - f(\tilde{q}) > 0 \Rightarrow q^* > \tilde{q} \end{aligned}$$

Therefore, $q^{**} < q^*$ and $\tilde{q} < q^*$.

To conclude, define \mathcal{E} and \mathcal{M} as the mass of individuals who are in school and married, respectively.

$$\begin{aligned}\mathcal{E} &= 1 - J(\xi^{**}) + (J(\xi^{**}) - J(\xi^*))G(q^*) \\ \mathcal{M} &= (1 - J(\xi^{**}))(1 - G(q^{**})) + J(\xi^*)(1 - G(\tilde{q})) + J((\xi^{**}) - J(\xi^*))(1 - G(q^*))\end{aligned}$$

We are interested in showing how the program changes these two masses:

$$\frac{\partial \mathcal{E}}{\partial p} = j(\xi^{**}) \frac{\partial \xi^{**}}{\partial p} (G(q^*) - 1) - j(\xi^*) \frac{\partial \xi^*}{\partial p} G(q^*) + (J(\xi^{**}) - J(\xi^*))g(q^*) \frac{\partial q^*}{\partial p} > 0$$

The first term is positive because: $j(\xi)$ is trivially positive since it is the p.d.f of the ξ 's distribution, $\partial \xi^{**}/\partial p < 0$, as shown before, and $(G(q^*) - 1) < 0$ because $G(q)$ is the c.d.f of q 's distribution. The second term is also positive because $j(\xi^*)$ and $G(q^*)$ are positive and $\partial \xi^*/\partial p < 0$ as shown before. Finally, the last term is also positive since I assumed $\xi^{**} > \xi^*$, thus $J(\xi^{**}) - J(\xi^*) > 0$, $g(q^*) > 0$ and as shown before $\partial q^*/\partial p > 0$.

Regarding the effect of the program on marriage, we have three composition effects and an income effect:

$$\begin{aligned}\frac{\partial \mathcal{M}}{\partial p} &= \overbrace{j(\xi^{**}) \frac{\partial \xi^{**}}{\partial p} [G(q^{**}) - G(q^*)]}^{\text{composition effect (a)} > 0} + \overbrace{j(\xi^*) \frac{\partial \xi^*}{\partial p} [G(q^*) - G(\tilde{q})]}^{\text{composition effect (b)} < 0} - \\ &\quad \underbrace{-g(q^{**}) \frac{\partial q^{**}}{\partial p} [1 - J(\xi^{**})]}_{\text{income effect} > 0} - \underbrace{g(q^*) \frac{\partial q^*}{\partial p} [J(\xi^{**}) - J(\xi^*)]}_{\text{composition effect (c)} < 0}\end{aligned}$$

First, composition effect (a) is positive because $\partial \xi^{**}/\partial p < 0$, as shown before, and $G(q^{**}) - G(q^*) < 0$ since $q^* > q^{**}$. Second, composition effect (b) is negative. This is due to $\partial \xi^*/\partial p < 0$, as shown before, and $G(q^*) - G(\tilde{q}) > 0$ since $q^* > \tilde{q}$. Third, the income effect is positive, since $g(q^{**}) > 0$, $[1 - J(\xi^{**})] > 0$ and $\partial q^{**}/\partial p < 0$, as shown before. Finally, composition effect (c) is negative. Once again, $g(q^*) > 0$, $[J(\xi^{**}) - J(\xi^*)] > 0$ and $\partial q^*/\partial p > 0$.