The Impact of Schooling on the Timing of Marriage and Fertility: Evidence from a Change in Compulsory Schooling Law

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Abstract

This paper estimates the impact of schooling on the timing of marriage and early fertility using the 2003 Turkish Demographic and Health Survey and duration analysis methodology. The source of exogenous variation in schooling is the extension of compulsory schooling in Turkey in 1997. The findings indicate that at age 17 –three years after the completion of compulsory schooling –, the predicted probability of marriage drops from 15.2 to 10 percent and the predicted probability of birth falls from 6.2 to 3.5 percent as a result of the new policy. This implies that the impact of increased schooling on marriage and early fertility persists beyond the completion of compulsory schooling for an important duration. In addition, the delay in the timing of first-birth is driven from the delay in the timing of marriage. After a woman is married, schooling does not have an effect on the duration until her first-birth.

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1. Introduction

A negative relationship between schooling and fertility is reported in several empirical studies (Schultz, 1998). A fall in fertility rates with higher schooling has several benefits that are outlined by Schultz (2008). A lower fertility rate has macroeconomic implications. It implies a higher saving rate due to a lower dependency ratio, especially at certain ages in the life-cycle. In addition, a lower fertility rate would decrease maternal and child mortality and improve child and mother health in general. Furthermore, fewer children would also allow women to have more training and work experience that would increase their productivity and, therefore, wages in the market, in particular in developed countries. In developing countries, fewer children would allow women to devote more time to self-employment activities, thereby contribute to family income. A low sibship size, as a result of lower fertility, also improves children's schooling outcomes as implied by the quantity-quality theory of Becker (1960). As also pointed out by Schultz (2008), a lower fertility rate would also exert an influence on several other economic decisions in the family that are jointly determined with fertility like a child's migration and marriage, family labor supply, intergenerational transfers as well as household living arrangements.

The literature on the link between schooling and fertility indicate that the rising levels of education must have been instrumental in lowering fertility. Delays in exposure time to risk of marriage due to longer schooling years, heightened awareness towards the ills of marriage and giving birth at too early an age, better knowledge of contraceptive methods, higher opportunity cost of raising children (Becker, 1981), lower infant mortality rates– which lowers the number of births needed to reach the desired family size – (Schultz, 1994), and higher bargaining power in fertility decisions for more educated women (Mason, 1986) are all possible channels through which education would influence the age at marriage and first birth.

The transition of women into motherhood in Turkey still takes place relatively early despite the rise in the average age of first-birth over time. The average age at first-birth was 21.2 in 2003, up from 19.3 in 1983. Although remarkable improvements in education have also been recorded in Turkey, there is still room for improvement. The enrollment rate in secondary education was only 44 percent in 2000. Therefore, it becomes particularly important to understand the impact of increasing education on fertility in Turkey.

An important characteristic of the transition into motherhood of women in Turkey is that almost all are married at the time of birth. In fact, the sociology literature reports such a rigid sequence of events of completion of education, marriage, and, birth of first child in other

countries as well (Blossfeld and De Rose, 1992; Marini, 1984). A key fact here is that in this sequence of events of marriage and first-birth, the gap is quite narrow in Turkey.[1] The lapse of time between marriage and first-birth is on average 1.8 years. Given this narrow gap between the timing of marriage and first-birth and the fact that marriage and schooling are generally incompatible events, a change in the timing of marriage as a result of increased schooling would directly translate into a change in the timing of early fertility as well. On the other hand, in a developed country where women delay the birth of their first-child, a change in the timing of marriage due to increased schooling does not necessarily translate into delayed fertility as well.

The paper aims to determine whether schooling has a causal impact on the timing of marriage and first birth in Turkey. While the issue is not new, most of the studies in the literature do not go beyond establishing a positive association between schooling and age at marriage and first birth due mainly to the difficulty of controlling for unobservable factors that affect both schooling and age at marriage and first birth. For instance, if individuals who have strong preference for schooling also have strong preference to marry late, a positive association between schooling and age at marriage will be observed. Failing to control for such unobservable factors would therefore result in an erroneous conclusion that schooling delays age at marriage.

The literature that addresses this endogeneity problem in estimating the impact of schooling on marriage and fertility is scarce; the evidence for developing countries is even scarcer. This paper contributes to this literature by using a change in the compulsory education law in 1997 in Turkey as a source of exogenous variation in schooling. The cultural setting for marriage and fertility in Turkey – that 98 percent of women get married and that almost all births are to married women – makes it an excellent setting to study the impact of schooling on marriage and early fertility.

At the beginning of the 1997-1998 school-year, compulsory schooling was raised from five to eight years in Turkey. As a result, children who were 11 years of age and younger in 1997 were expected to remain in school for additional three years. Using the 2003 Turkish Demographic and Health Survey data and exploiting this exogenous change in schooling, we establish the causal impact of schooling on the timing of marriage and fertility among young women (ages 10-17 years) in Turkey. Due to the nature of our data set, we are only able to determine the impact of schooling on the timing of marriage and early fertility. However, the

[1] This is partly due to the fact that 29 percent of ever-married women between the ages of 15-49 do not use birth control in Turkey. Among those who do, 40 percent rely on traditional methods.

facts that many women marry young in Turkey and that a sizeable proportion exhibit high fertility rates where the spacing between births is short – as a result of limited birth control use as well as preferences –imply that our findings on the timing of fertility could very well carry over to completed fertility to some extent as well.

Our results indicate that schooling does indeed increase the age at marriage and age at first birth. What is more interesting is that the impact of extension of compulsory schooling persists beyond the completion of compulsory schooling and the magnitude of this impact is large. At age 17, three years after the end of compulsory schooling, the predicted proportion of married women go down from 15 to 10 percent and the proportion of women who give birth goes down from 6.2 to 3.5 percent as a result of the policy. The fall in early fertility as a result of increased schooling is driven by the delay in the age at marriage; once a woman is married, we find no evidence of a delaying effect of schooling on fertility.

The outline of the paper is as follows. Section 2 briefly discusses the timing of marriage and first birth in Turkey. Section 3 surveys the literature on the connection between schooling, age at marriage and first birth. Section 4 discusses the proposed methodology and the identification strategy used in the paper. Section 5 presents the results. Section 6 concludes the paper.

2. Timing of marriage and first-birth in Turkey

Despite the rise in non-marital unions in the West, marriage as a social institution remains strong in Turkey. Almost 98 percent of women marry by age 49.[2] In contrast, divorce is an unlikely event, with its rate estimated at less than 1 percent among 15-49 year-old women. Hence, it would not be incorrect to say that for an average woman in Turkey marriage is for life. Giving birth out-of-wedlock is even rarer than choosing an alternative living arrangement. According to DHS data, almost all births are to a married woman. Age at first birth is also closely linked to age at marriage; the lapse of time between marriage and first birth is, on average, 1.8 years.

Marriage occurs early on in life. The average age at first marriage is 19.4 years among women aged 15-49. However, age-at-marriage and first-birth have been increasing and total fertility rate declining in Turkey. The DHS data indicate that age-at-marriage increased from 17.9 years in 1983 to 19.4 years in 2003 and first-birth from 19.3 to 21.2 years over the same

[2] We do not distinguish between civil and religious marriages. The DHS data show that 91 percent of ever-married women have both a civil and a religious marriage. Although the latter is not recognized under the law, the proportion of women with a religious marriage only is non-negligible estimated at 6 percent in 2003. The proportion of women that have civil marriage only is limited to 3 percent of ever-married women.

time period. The total fertility rate, on the other hand, declined from 4.0 children per woman to 2.2 children per woman over the 10-year period. School enrollment has been on the rise as well. In 1990, while the net enrollment in 5-year compulsory schooling was 92 percent, despite the increase in compulsory schooling from five to eight year, it went up to 95.3 percent in 2000 (TUIK, 2007). Enrollment in secondary education has also increased from 26.4 percent in 1990 to 44 percent in 2000. Despite these achievements, considerable sex and regional differences remain. In 2000, there was almost a 10-percentage point difference between the enrollment rates of boys and girls in compuslory schooling. The gender gap was equally big in secondary education.

3. Literature Review

The simultaneous rise in women's schooling and the fall in marriage and fertility rates in the West have spurred an interest on the association between schooling and the demographic phenomena. Becker (1973, 1991) using a marriage model where individuals compare the benefits of marriage to remaining single and choose to get married if doing so is more beneficial, predicts a fall in marriage with education. Becker emphasizes the comparative advantage of couples in producing different marital outputs as the main source of marital benefits and as a result, predicts that the break away from traditional division of labor with the increasing participation of women in the labor market would reduce the gains from marriage leading to greater marriage instability and higher incidence of non-marriage.

Different from Becker, Oppenheimer (1988) using a modified version of job-search theory attempts to understand the timing of marriage. She argues that the difficulties encountered in mating assortatively – due primarily to uncertainties about future attributes of potential mates – explain the variation in the timing of marriage among individuals. Although search increases the chances of a better match, it involves costs and therefore, stops when benefits outweigh costs. Oppenheimer explains that in societies where the traditional division of labor is the norm, women tend to marry earlier than men because what they would bring to marriage (e.g. home productivity, appearance, family background) gains certainty earlier on than men, whose contribution to marriage output largely depends on future labor market outcomes. Within the framework of the job-search model, the move from traditional division of labor to a greater involvement of women in the labor market is predicted to give rise to postponement of marriage not necessarily because of reduced gains to marriage as claimed by Becker, but for other reasons such as the increased opportunity cost of early marriage due to higher returns to schooling (the implicit assumption being that marriage and schooling are

incompatible events), lower search costs financed through labor market earnings, the job market rather than school becoming marriage-market settings for better matches, and reduced feasibility of post-marital socialization acting as corrective matching mechanisms (pp. 582-585).

The negative association between education and fertility, on the other hand, is postulated to arise through multiple channels. Education, for instance, by increasing market productivity more than home productivity creates incentives for women to shift more of their time from home to market production (Becker, 1981). Education may also change the preferences of women towards fewer children. Rosenzweig and Schultz (1985, 1989), on the other hand, argue that education increases the ability of women to control their fertility better through for instance better access to contraceptives. Reduced child mortality due to better educated mothers and therefore, the need to give birth to a smaller number of children to reach the desired family size, is offered as a another possible reason for the negative association between fertility and education (Schultz, 1994a, b). Yet another reason is the shortened exposure time due to delayed marriage with schooling. In social settings where contraceptive use and knowledge is limited, fertility will be a function of age at marriage.

Although the empirical literature has generally confirmed the negative association between schooling and age at marriage and fertility, the results of especially older studies remain to be confirmed in regards to whether the observed relationships are causal. Studies that have tackled the problem of endogeneity of schooling in the demographic outcomes are rather sparse. While the results on the effect of education on completed fertility and marriage before age 49 is mixed, there seems to be a general agreement on the initial negative impact of schooling on age at marriage and fertility.

Breierova and Duflo (2004), for instance, find that education increases the age at marriage and reduces fertility in Indonesia using IV techniques. They identify the causal effect of schooling on demographic variables through the exposure of certain age groups to the massive schooling building program. Using a similar technique as Breierova and Duflo, Osili and Long (2007) also find a negative causal relationship between schooling and fertility in Nigeria. In establishing causality they exploit the fact that the universal primary education program in Nigeria has brought about an exogenous change in the schooling of children of certain age.

Skirbekk, Kohler and Prskawetz (2004), on the other hand, exploit the fact that children in Sweden differ in age at school graduation due to their month of birth and use time-to-event methodology to identify the causal impact of schooling. They find a negative causal

relationship between school graduation age and age at first marriage and first birth, but no effect on completed fertility or the probability of marriage by age 45. They interpret their findings as a 'rigid sequencing of demographic events in early adulthood' (p.547) and make a distinction between 'social age' – determined by individuals' school cohort - and biological age, claiming that what matters for the demographic events is the former.

Lefgren ve McIntyre (2006), using IV methodology and birth month variation to bring about an exogenous change in the level of schooling in the US, arrive at the conclusion that the probability that women ever marries does not change with schooling but that marriage stability is enhanced.

Brien ve Lillard (1994) jointly model educational attainment, age at first marriage and first birth for Malaysian women and thereby, account for the endogeneity of education and school enrollment in the latter two equations. The results show that a large part of the difference in age at first marriage among cohorts can be attributed to enrollment and completed education levels. In a similar vein, almost all the variation in age at first conception among women of different birth cohorts stem from delayed marriage among younger cohorts. The authors also note that treating education as exogenous to the timing of marriage and first conception, conditional on marriage, changed the hazards but not in a substantive way (p.1182).

4. Data and Descriptive Statistics

The data we employ come from the 2003 round of the Demographic and Health Survey of Hacettepe University of Turkey which provides detailed information on the timing of marriage, first and consequent births on ever married women, as well as a rich set of individual and household-level characteristics for both single and married women. Using this data, we construct retrospective event histories for marriage and first-birth. For marriage, the event history starts at age 10; for first-birth, it starts at age12 in accordance with the first age these events are observed in the data.

Using the DHS data, Figure 1 shows the hazard function for marriage among young women, who are the subject of this study. The hazard function is hump-shaped. In other words, the likelihood of getting married for the first time is low at very young ages, increases very fast when women reach 14-16 years, reaches a peak at around 21 years and declines there on. At age 21, the hazard rate for marriage is above 10 percent. The survivor function in Figure 2 illustrates the share of unmarried women remaining in the sample by age. While by age 12 less than 1 percent of women are married, this figure increases to 1.6 percent by age

14, to 4 percent by age 15, to 8.2 percent by age 16, and to 14.2 percent by age 17. By age 22, 46.8 percent of women are married.

The hazard function for first-birth, given in Figure 3, mimics the marriage function, with the exception that it is positioned at older ages. The probability of giving first-birth is very low for women younger than 15 years. This probability increases for those aged 15 and older, reaching a peak at age 22. The survivor function for first-birth shown in Figure 4 illustrates that the probability of not giving birth by age 15 is 99 percent. This probability drops to 97 percent for women aged 16 and to 93 percent for women aged 17. By age 22, 36 percent of women have given birth.

5. Methodology and Identification Strategy

Estimating the impact of schooling on marriage/fertility decisions using a standard OLS estimation is problematic because the right-hand-side variable in this case, schooling, is a decision variable that is jointly determined with marriage and fertility decisions. Therefore, this analysis would not yield the causal impact of schooling, which we seek to find in this paper. In order to capture this causal impact, we need a source of exogenous variation in the schooling decision that would not have a direct impact on the marriage and fertility decision.

We use the variation in years of compulsory schooling across different birth cohorts to identify the impact of schooling on marriage and fertility decisions. The validity of our instrument should be obvious as there is no reason to expect a direct impact of the change in compulsory schooling on marriage and fertility decisions of women. In order to examine the relevance of our instrument, we compare the school enrollment rates of 8- to 14-year-old girls before and after the change in policy using the 1993 and 2003 DHS data. When we compare the enrollment rates until age 10, we see very similar levels in 1993 and 2003 (Table 1). In fact, the enrollment rates for 10-year-old girls at 1993 and 2003 are identical. However, starting at age 11 – as some children make their transition to the sixth grade level –, enrollment rates at 1993 and 2003 start to diverge. The gap between the enrollment rates in the two years become substantial for 12-year-old and older girls. While 58.8 percent of 12-year-old girls were enrolled in school in 1993, this percentage jumped to 87.7 percent in 2003. The gap between the enrollment rates in the two years in fact rises above 30 percent for 13-year-olds. Therefore, we can assert for sure that our instrument is in fact relevant and that the change in compulsory schooling duration brought about a substantial increase in the school enrollment rates at ages targeted by the policy.

Table 1 Enrollment Rates by Age over Time

Year	Age 8	Age 9	Age 10	Age 11	Age 12	Age 13	Age 14
1993	90.5	93.1	91.8	79.8	58.8	49.6	43.1
2003	90.5	94.9	91.8	92.6	87.7	81.2	67.4

Since compulsory schooling in Turkey was extended from five to eight years at the beginning of the 1997-1998 school year, all students who completed grade four or lower grades at the end of the 1996-1997 school year (or who started grade four or lower grades in September 1996) were bound by the new policy. In other words, compulsory schooling was for eight years for all students who started the first grade in September 1993 or later; but it was five years for those who started earlier.

Unfortunately, we do not have the information on school starting age of children in our sample. Therefore, using the year-of-birth information, we make an assumption on school starting age based on children's current age. Children generally start school after they complete age six in Turkey. However, it is not uncommon, especially in rural parts of the country, to delay starting school to age seven. (According to the 2003 DHS, while 52 percent of the 6-years-olds are in school, 87 percent of 7-year-olds are.) Since the new compulsory schooling system affected children who started school at of after September 1993, we chose to assume that children who were born in 1986 or later were bound by the new policy.

We use duration analysis as the estimation method since both marriage and fertility decisions fit well into the time-to-event framework. A child enters the risk set at a certain age (which is taken as 10 in the marriage analysis and as 12 in the fertility analysis according to the first age at which these events are observed), and exits when a marriage and fertility takes place or the child turns 25-years-old. A child could also exit the risk set before age 25 without a marriage/fertility decision if the child is younger than 25 in 2003; in this case, she exits at whatever age she is in 2003. For some children, the duration is censored in the right because either the child does not marry/give birth until age 25 or the last age she is observed in the sample (for those who are younger than 25 in 2003).

The data is arranged in a person-age format in the estimation. For a child who is 10 years old in 2003 (1993 birth-cohort), there is only one row in the data where age is 10 and year is 2003. On the other hand, for a child who is 15 years old in 2003 (1988 birth-cohort), there are six rows in the data: one for each age from 10 to 15 (or for each year from 1998 to 2003).

In order to identify the impact of the new compulsory schooling policy, we generate a policy dummy variable. Table 2 shows how the value of this policy variable varies over the birth-cohorts and ages that are included in our sample. When the calendar years are in bold, the policy dummy variable takes the value of 1; otherwise, the policy variable is zero. For all birth cohorts after 1986, the policy variable is one at all ages. For the 1986 birth cohort, it is one after age 11 (calendar year 1997) because the policy was not expected before implementation. For all other birth cohorts, the policy variable is zero at all ages.

Table 2 Policy Dummy Variable According to Birth-Cohorts and Age

Age													Birth
10	11	12	13	14	15	16	17	18	19	20	…	25	Cohort
2003													1993
2002	**2003**												1992
2001	**2002**	**2003**											1991
2000	**2001**	**2002**	**2003**										1990
1999	**2000**	**2001**	**2002**	**2003**									1989
1998	**1999**	**2000**	**2001**	**2002**	**2003**								1988
1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**							1987
1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**						1986
1995	1996	1997	1998	1999	2000	2001	2002	2003					1985
1994	1995	1996	1997	1998	1999	2000	2001	2002	2003				1984
1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003			1983
…	…	…	…	…	…	…	…	…	…	…	…	…	…
1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	…	2003	1978

Since different birth cohorts attend a certain grade level at different calendar years, it becomes critical to disentangle the effects of calendar years on education – like a steady improvement in enrollment rates over time – from the effect of the change in the compulsory schooling policy, which is implemented at a certain point in time. Our identification strategy purges the impacts of these two factors. We use the variation in the policy dummy variable across different birth cohorts in identifying the impact of year dummies. For instance, while the policy variable takes the value of one in 2003 for birth cohorts after 1986, it is zero in 2003 for the rest of the birth cohorts as can be seen in Table 2. A similar issue arises in purging the impact of the policy variable from age effects. Here, the source of identification is again the variation across birth-cohorts. For instance, when we examine the first column in

Table 2 (where age is 10), we see that the policy dummy is one for birth cohorts after 1987 and zero otherwise. This separates the effect of the policy variable from the age effects. Of course, this identification strategy assumes that there is no direct impact of year-of-birth variable; i.e. at a given age and calendar year, all year-of-birth cohorts would display the same marriage and fertility behavior.

There exists another complication in the estimation arising from the change in the Civil Code: Prior to 2002, the Civil Code stipulated age 15 as the minimum age for marriage for women in Turkey.[3]. In line with the more egalitarian spirit of the new Civil Code, the age at marriage was equated for men and women so that the legal age of marriage was increased to 17 years for women as well.[4][5] Therefore, the new law made a difference for 15- and 16-years-old girls in 2002 and 2003. In Table 2, the cells for which the new Civil Code is in effect are underlined. A dummy variable is used to control for the effect of this policy change.

In the duration analysis, we use a logistic form for the hazard function. The baseline hazard function we choose is non-parametric: we use a piece-wise constant baseline hazard (where the waiting time concept is age); therefore, we have age dummies for ages 10 to 25. In certain specifications, we also allow the impact of the policy variable to vary according to the baseline hazard variable in order to see any differential impact of the policy at different age values. In particular, we interact the policy variable with three age groups: ages 10 to 12, ages 12 to 14, and ages 15 to 17.

In the empirical specification, in addition to the two policy control dummy variables and age as well as year dummies, we also control for the geographic location (by including interaction terms of the 12 NUTS region dummies with the rural dummy as well as dummy controls for large city and small city, where the baseline is town) and wealth (five dummy variables are generated for each quintile where the lowest quintile is the baseline).

6. Results

In this section, we present the results of duration analysis on the timing of marriage and fertility. To ease discussion, we report the odds ratios that show how the probabilities change given a change in the variable of interest. As discussed earlier, the causal effect of education is identified through the 'policy' variable – the change in the compulsory schooling

[3] Under unusual circumstances such as pregnancy and with parental consent and court decree, a female child as young as 14 years could get married.
[4] Again, under unusual circumstances, a 16-year-old is allowed to get married.
[5] The Law went into effect on January 1st, 2002.

law - that has brought about an exogenous change in the schooling of some children but not of others.

6.1. Impact of Education on the Timing of Marriage

The results presented in Table 1 indicate that there is evidence, statistically significant at five percent level, that an increase in schooling – measured by the policy variable – reduces the probability of marriage before age 18. Moreover, the magnitude of the effect of the policy has been large: the odds of marriage before age 18 is 36 percent lower for children who have been affected by the new education policy. In contrast, the change in the civil code had no impact on the probability of marriage before age 18. The latter result may stem from the fact that in the present study we consider both civil and religious marriages, whereas the civil code only affects the former. Nevertheless, these results indicate that while the policy that aimed at changing the timing of marriage had no effect, the change in education policy – that did not have such an aim – achieved the desired outcome.

Table 3 Odds ratios for the probability of marriage

	Model I	Model II
Policy	0.633**	
	[0.131]	
Policy*Ages 10-11		1.389
		[1.215]
Policy*Ages 12-14		0.435**
		[0.147]
Policy*Ages 15-17		0.753
		[0.189]
Change in civil code	0.775	0.652
	[0.254]	[0.230]
Number of subjects	7,659	
Number of failures	1,621	
Time at risk	58,234	58,234
Pseudo R squared	0.1959	0.1961

Note: Robust standard errors are in brackets. * indicates significance at 10%, ** significance at 5%; and *** significance at 1%. Other covariates include wealth indices, place of residence and its size, single age groups and year dummies. Wealth index is measured based on household durables and housing facilities.

In an alternative specification (Model II), we try to pinpoint more precisely the ages around which this fall in the risk of marriage has occurred due to the policy. We do this by interacting the policy variable with three age groups: ages 10-11, 12-14 and 15-17.[6] The

[6] The sample size does not allow single age categorizations.

results, which are shown in the second column of Table 3, indicate that the probability of marriage has registered a decline around ages 12 to 14. (This is statistically significant at five percent level.) The odds of marriage at ages 12-14 is reduced by 54 percent due to the policy. This is quite a significant decline. We do not observe a fall in the odds of marriage before age 11, probably because there are very few children who marry before this age. Nor does there exist evidence of a decline in the risk of marriage between ages 15 and 17. Although the odds ratio is less than 1 showing that the risk has been reduced, the impact is not statistically significant at conventional levels.

The interpretation of the above results is that the education policy has directly affected the marriage probability of 12- to 14-years-old girls– who were now required to stay in school longer - but not of girls who were beyond the compulsory school age. However, the fact that the marriage probability in the 15-17 year-age group did not increase following the policy change implies that there has not been a catching up effect through an increase in the risk of marriage right after the end of compulsory schooling. If girls were delaying their marriage decision only because of the fact that schooling and marriage are incompatible events, we would expect the girls who would marry between the ages of 12 and 14 before the new policy to marry as soon as they complete the new compulsory schooling years. As a result, an upsurge in the risk of marriage right after the end of compulsory schooling at around age 15 would take place. However, such an upsurge is not observed. Therefore, we can assert that the effect of schooling extends beyond the delay it creates in exposure time. Three years after most girls complete the new compulsory schooling the impact of longer schooling years on marriage is still felt. In fact, according to the estimates in Table 3, the predicted proportion of girls married by age 17 drop from 15.2 percent to 10 percent with the implementation of the new policy.

At this point it is important to emphasize that the effects of education on the timing of marriage reported in Table 3 are obtained after controlling for year effects. As noted earlier, a gradual increase in the age at marriage has been occurring in Turkey, part of which probably results from a secular increase in the marriage age. Indeed, the year effects, reported in Appendix Table 1, are all statistically significant pointing to the existence of a secular time trend. Ignoring the time effects would unduly exaggerate the effect of schooling on the timing of marriage. To show the magnitude of the bias, we repeat the same analysis as before but ignore the time effects. Appendix Table 1 (column 3) shows that doing so would lead to the conclusion that the odds of marriage before age 18 are lower by 66 percent due to increased schooling. This is a considerably larger effect than found earlier, which was 36 percent.

To complete the discussion on the timing of marriage, we now briefly discuss the effects of other covariates. As would be expected, the risk of marrying before age 18 is lower among women from wealthier households (see Appendix Table A1). The wealth effect strengthens as a household's position in the wealth distribution improves. While the probability of marrying before age 18 does not differ between women from the lowest and second lowest wealth quintiles, those from the third and fourth quintiles have 16 and 28 percent lower odds of marriage in comparison to the poorest group, respectively. Among women from the top wealth quintile, the odds are down by 58 percent.

Place of residence also affects the probability of marrying young. Women from large cities are less likely to marry before age 18 than women from smaller town and cities. Regional differentiation also exists in the probability of marriage before age 18. Women residing in any other region but Istanbul tend to have a higher likelihood of marrying at a given age, with the expectation of those in the Aegean. Finally, the age effects are all statistically significant and positive indicating that the risk of getting married increases as women age.

Notwithstanding these findings, it is important to note that the effect of policy remains robust to the inclusion of other covariates. This is not a surprising result given that the covariates included in the model are all orthogonal to the policy change.

6.2. Impact of Education on the Timing of First-Birth

Table 4 displays the estimates on the impact of the policy change on the first-birth decisions for two different specifications. The first specification provides evidence, at five percent level of statistical significance, that schooling decreases a woman's probability of giving birth to her first child before age 18. More specifically, the odds of giving birth at a given age are reduced by 45 percent as a result of the policy. This is quite a dramatic change. Based on the estimates in Table 4, we calculate that the predicted proportion of women giving birth to their first child by age 17 drops from 6.2 percent to 3.5 percent with the implementation of the new policy.

In the second specification, the interaction of the policy variable with the two age groups - ages 12-14 and 15-17 - indicate that the drop comes from the reduced first-birth probability for women in the latter group. The probability of first-birth is also reduced among 12-14 year-olds but the effect is not statistically significant, whereas there is evidence at five percent statistical significance that the probability of first-birth at ages 15 to 17 has decreased. These findings are consistent with what we found earlier for the timing of marriage. As noted

earlier, giving birth out-of-wedlock is an extremely rare event in Turkey. That the age at marriage has registered an increase due to policy implies an increase for the age at first-birth as well and this is what we find. Moreover, that the impact of change in policy on marriage is most prominent at ages 12 to 14 is also consistent with the fact that the impact of policy change on fertility is more prominent at ages 15-17.

Table 4 Odds ratios for the probability of first birth

	Model I	Model II
Policy	0.554**	
	[0.162]	
Policy*Ages 12-14		0.872
		[0.547]
Policy*Ages 15-17		0.518**
		[0.168]
Number of subjects	7,659	7,659
Number of failures	1,206	1,206
Time at risk	45,753	45,753
Pseudo R squared	0.1802	0.1802

Note: Robust standard errors are in brackets. * indicates significance at 10%, ** significance at 5%; and *** significance at 1%. Other covariates include wealth indices, place of residence and its size, single age groups and year dummies. Wealth index is measured based on household durables and housing facilities.

The estimates for the rest of the control variables are provided in Table A2 in the Appendix. A secular increase in the age at first-birth is observed, which again parallels the secular increase in the age at marriage noted earlier. Re-estimating the effect of policy on the age at first-birth in the absence of year controls increases the effect of policy dramatically, showing that a woman's probability of giving birth to her first child is reduced by 72 percent due to the policy. Age controls are also statistically significant and increasing, showing that the probability of giving birth increases with age. The wealth controls are also significant except for the bottom three groups indicating that while the probability of giving birth to their first child at a given age does not statistically differ among women in the bottom 60 percent of the wealth distribution, for those in higher income groups the risk is lower compared to the poorest group. The wealth effect is again strongest for women in the highest wealth quintile: in comparison to the poorest group, the odds of giving birth to their first child for women in the top quintile is 59 percent lower than that for women in the lowest quintile. The size of the place of residence is again important with women from cities having lower probabilities of giving birth before age 18 in comparison to women from small towns. In parallel to the regional variation observed in the timing of marriage, women living in Istanbul and the

Aegean have a lower likelihood of giving birth to their first child at a given age than women in other regions. It is interesting to note the close parallelism in the impact of regions on the timing of marriage and first-birth. In 19 out of 23 regional dummies, the magnitude of the coefficients and their level of significance are similar. In other words, the regions where women have higher likelihood of marriage at a given age are also where they have a higher likelihood of giving birth to their first child.

6.3. Impact of Education on the Timing of Fertility among Ever-Married Women

Finally, we look at the effect of policy on the timing of first-birth among ever-married women and try to answer the following question: once a woman is married, does an increase in schooling reduce the probability of giving birth to the first-child at a given age? The answer we get is a "no". Although the effect of the policy is negative, it is not statistically significant (Table 5). In other words, once married, schooling does not change the timing of first-birth. This result implies that the source of the increased age at first-birth that we noted earlier must be the delayed age at marriage. In regards to the timing of first-birth, we find a 'rigid sequencing of events'. This is not surprising given that childlessness is not common in Turkey – only 1 percent of ever married women are childless at the end of their reproductive period - and that there is a social pressure on the couple to demonstrate the 'femininity' of the bride and the 'masculinity' of the groom by producing an offspring. Added evidence comes from time series data showing that the lapse of time between age at marriage and first birth has not registered significant increases over time although, as mentioned earlier, age at marriage has increased and total fertility declined. Results derived from the 1993, 1998 and 2003 DHS consistently show that the birth interval has remained stable over time at 1.8 years. Total fertility rate, on the other hand, has decreased by 19 percent over the same period.

Table 5 Odds ratios for the probability of first birth among ever-married women

	Model I	Model II
Policy	0.863 [0.248]	
Policy*Ages 12-14		1.830 [1.302]
Policy*Ages 15-17		0.788 [0.248]
Number of subjects	1,621	1,621
Number of failures	1,206	1,206
Time at risk	3,959	3,959
Pseudo R squared	0.028	0.029

Note: Robust standard errors are in brackets. * indicates significance at 10%, ** significance at 5%; and *** significance at 1%. Other covariates include wealth indices, place of residence and its size, single age groups and year dummies. Wealth index is measured based on household durables and housing facilities.

7. Conclusion

In this paper, we used a change in the duration of compulsory schooling in Turkey as a source of exogenous variation in education to find its causal impact on the timing of marriage and early fertility. We find that education does indeed have a negative impact on marriage and early fertility. The impact of the extension of compulsory schooling on marriage decisions is the strongest at ages 12 to 14, i.e. the additional years girls were required to stay in school. However, its impact persists beyond the completion of compulsory school. The proportion of married women at age 17 drops from 15.2 to 10 percent after the policy is implemented. The impact of the extension of compulsory schooling on early fertility is also strong and particularly felt at ages 15 to 17. The proportion of women who give birth by age 17 falls from 6.2 to 3.5 percent as a result of the new policy. We also find that the negative impact of education on fertility is mostly driven from the negative impact of education on marriage. A higher level of education does not change the timing of fertility once a woman is married.

The finding that the impact of the extension of compulsory education on marriage and early fertility persists three years beyond the completion of compulsory school in Turkey is important. In a similar paper investigating the causal impact of education on marriage and early fertility decisions in Sweden, Skirbekk et al. (2004) find that extension of compulsory schooling has a timing effect but not a stock effect (completed fertility do not change). Similarly, we report a timing effect in Turkey. However, unlike Sweden, we would expect the timing effect to exert a much stronger influence on the stock due to the high fertility rates in Turkey – we have not been able to test this, though—. Early fertility and short spacing between births, partly as a result of limited use of modern contraceptive methods and partly due to preferences – is a much more frequent phenomenon in Turkey. Therefore, a change in the timing is likely to result in a change in stock for a sizeable number of women.

A change in the timing of marriage and fertility, even though it does not make an impact on the stock, could still be important. The health literature boasts evidence indicating the negative health effects of marriage and child birth at too early of an age on mothers and children. Given that infant mortality still hovers rather high in Turkey, estimated at 29 per 1000 births, any measure that can reduce this rate is welcome. While health measures are often thought to be the key in improving health outcomes of children and mothers, education

policies can be rather important as well. Among other things, by increasing the age at marriage and first birth education can impact positively on these outcomes, especially when marriage among adolescents is non-negligible and control on own fertility is limited.

Beginning with the 2006 school year, high school education in Turkey is extended from three to four years and the currently debated issue is whether to increase compulsory schooling further to include high school education. This papers shows that the debate on compulsory schooling also needs to consider the possible advantages it will bring through delayed marriage, reduced fertility and improved health outcomes of children and mothers. Extension of compulsory schooling until age 18 (including high school education) could make a large difference in marriage and early fertility patterns given our findings on the incompatibility of schooling and marriage as well as the persistence of the effect of increased schooling on marriage and fertility beyond the completion of compulsory schooling. The incompatibility of schooling and marriage suggests that marriage and early fertility would drop significantly at ages 15 to 18. However, compliance with a policy of extension to ages 15 to 18 could be lower than the compliance to a policy of extension to ages 12 to 14 – the policy change considered in the paper-, reducing the policy's effect on the timing of marriage and fertility. On the other hand, the fraction of children whose schooling behavior would change with such a new policy would be higher as fewer students attend high school, increasing the impact of policy on the timing of demographic events. Another issue concerning the extension of compulsory schooling to cover high school years is in regards to persistence of the effect of increased schooling on marriage and early fertility beyond compulsory schooling years. As noted earlier, we have found the effect to persist at least three years beyond compulsory schooling when the affected group was 12-14-year-old girls. Given that the treatment group will be older (15-17-year-olds), it is not clear whether and how long the policy effect would be felt beyond compulsory schooling years in this case.

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Figure 1: Hazard Function for Marriage

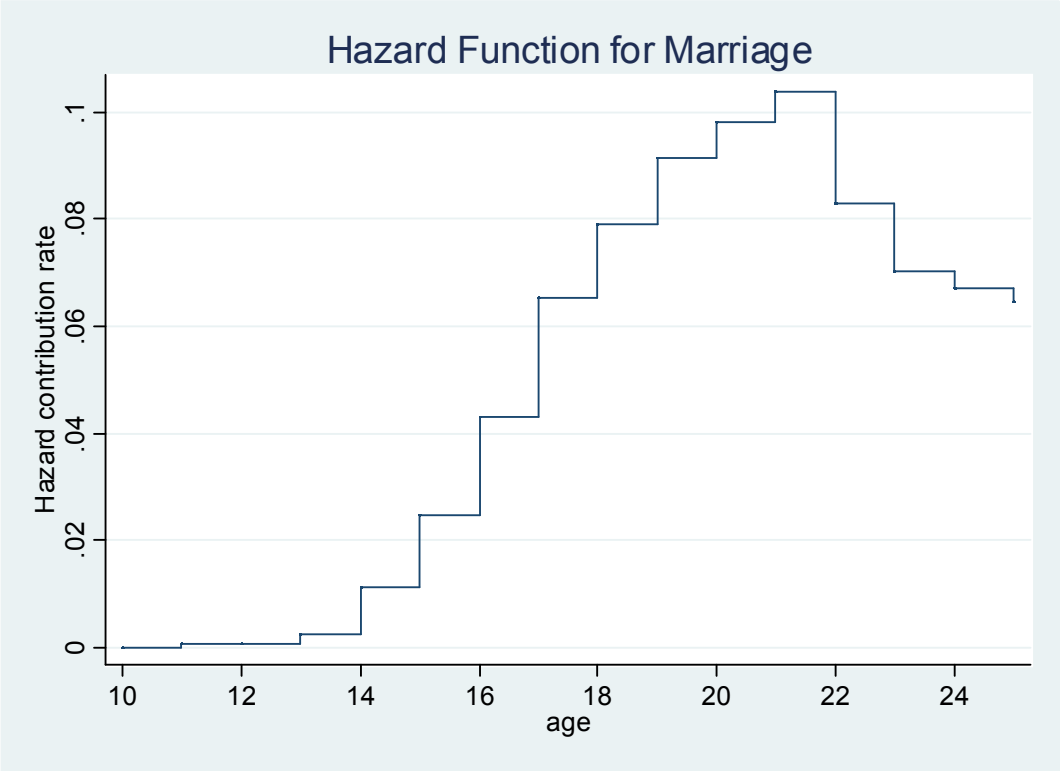


Figure 2: Survivor Function for Marriage

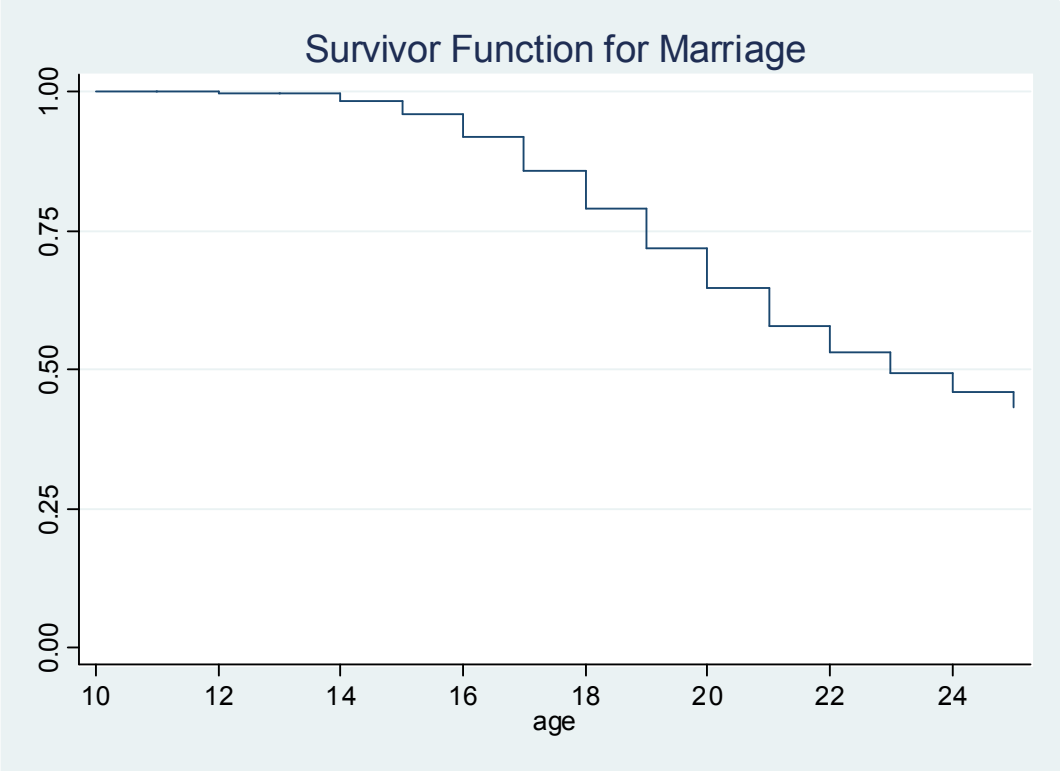


Figure 3: Hazard Function for First-Birth

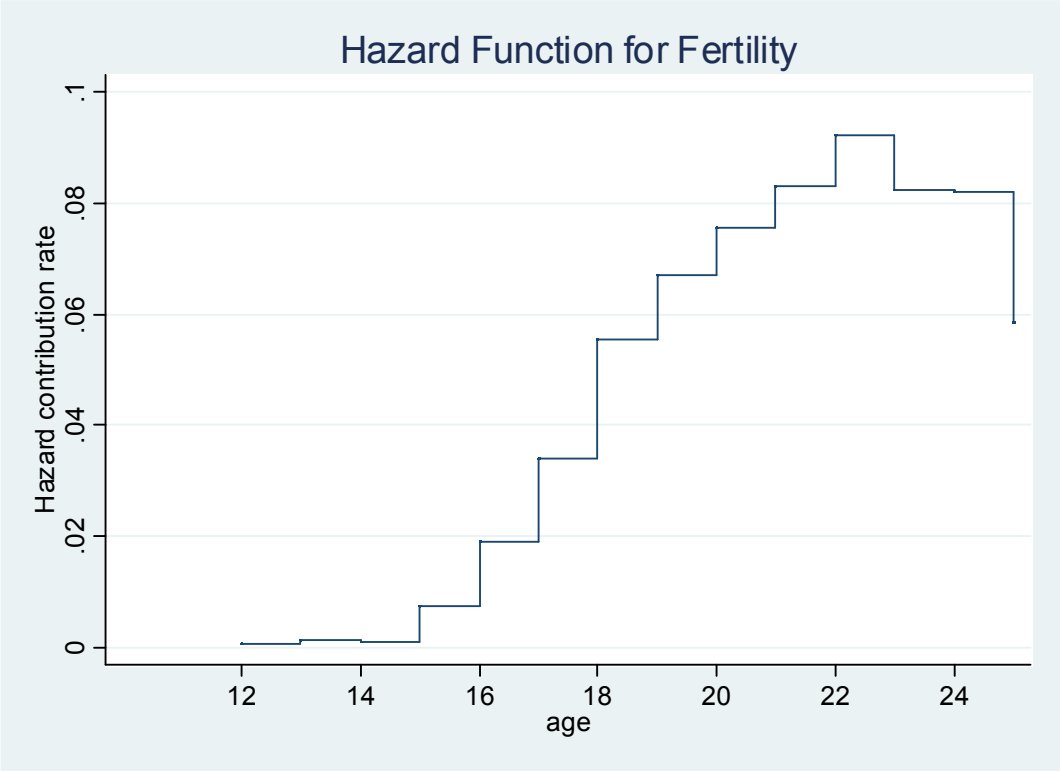
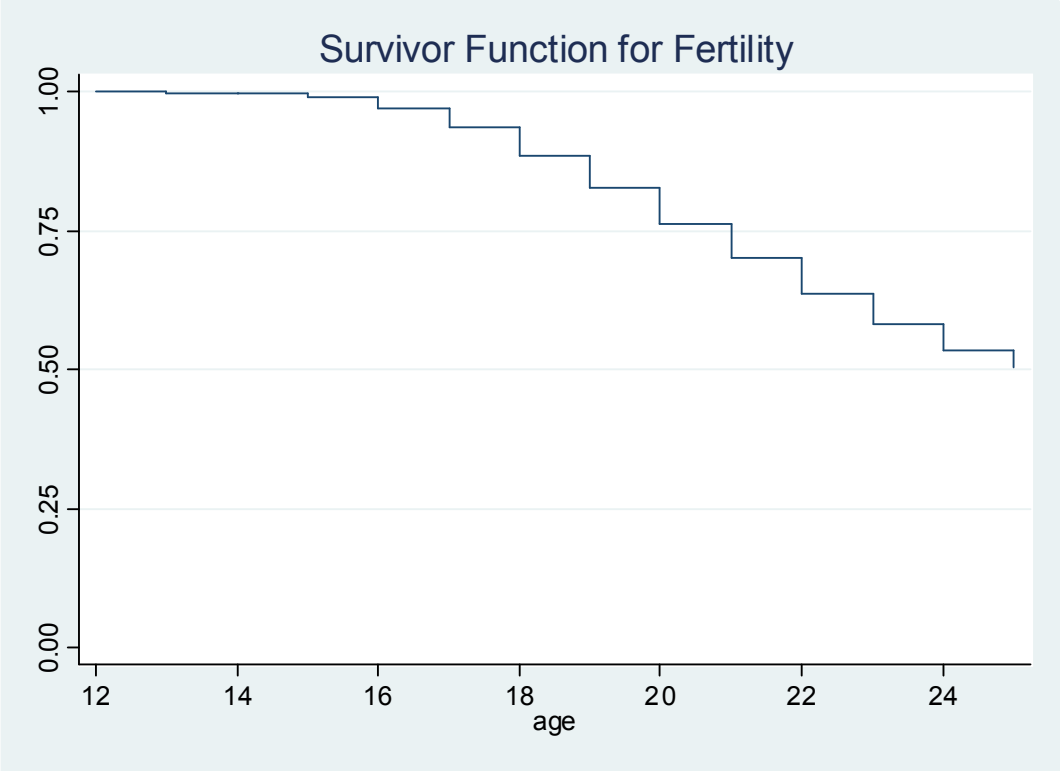


Figure 4: Survivor Function for First-Birth



Appendix

Table A1 Odds ratios for the probability of marriage

	Model 1	Model 2	Model 3
Policy	0.633**		0.341***
	[0.131]		[0.063]
Policy* Age 10-11		1.389	
		[1.215]	
Policy*Age 12-14		0.435**	
		[0.147]	
Policy*Age 15-17		0.753	
		[0.189]	
Change in civil code	0.775	0.652	0.824
	[0.254]	[0.230]	[0.269]
Wealth quintile 2	0.888	0.888	0.898
	[0.088]	[0.088]	[0.088]
Wealth quintile 3	0.837*	0.838*	0.832*
	[0.084]	[0.084]	[0.083]
Wealth quintile 4	0.722***	0.722***	0.728***
	[0.074]	[0.074]	[0.074]
Wealth quintile 5	0.423***	0.423***	0.433***
	[0.050]	[0.050]	[0.050]
Resides in large city	0.599***	0.599***	0.597***
	[0.100]	[0.100]	[0.099]
Resides in small city	0.867	0.867	0.879
	[0.102]	[0.102]	[0.102]
Istanbul - rural	0.879	0.879	0.847
	[0.309]	[0.309]	[0.321]
West Marmara	0.514***	0.514***	0.506***
	[0.113]	[0.113]	[0.110]
West Marmara – rural	0.457**	0.457**	0.445**
	[0.154]	[0.154]	[0.151]
Aegean	0.759	0.759	0.752
	[0.143]	[0.143]	[0.138]
Aegean –rural	0.798	0.797	0.746
	[0.199]	[0.199]	[0.185]
East Marmara	0.826	0.826	0.791
	[0.142]	[0.142]	[0.138]
East Marmara – rural	0.585**	0.585**	0.574**
	[0.156]	[0.156]	[0.153]
West Anatolia	0.692**	0.692**	0.677**
	[0.116]	[0.116]	[0.114]
West Anatolia – rural	0.437***	0.437***	0.437***
	[0.126]	[0.126]	[0.125]
Mediterranean	0.731**	0.730**	0.707**
	[0.108]	[0.108]	[0.104]
Mediterranean – rural	0.362***	0.362***	0.355***
	[0.084]	[0.084]	[0.082]
Central Anatolia	0.648**	0.648**	0.623**
	[0.123]	[0.123]	[0.118]
Central Anatolia – rural	0.95	0.949	0.904
	[0.233]	[0.233]	[0.223]
West Black Sea	0.504***	0.503***	0.506***
	[0.106]	[0.106]	[0.106]
West Black Sea - rural	0.538**	0.538**	0.511***

	[0.131]	[0.131]	[0.124]
East Black Sea	0.299***	0.299***	0.286***
	[0.068]	[0.068]	[0.065]
East Black Sea - rural	0.419***	0.419***	0.394***
	[0.128]	[0.128]	[0.119]
Northeast Anatolia	0.616**	0.616**	0.571***
	[0.120]	[0.120]	[0.111]
Northeast Anatolia –rural	0.545**	0.545**	0.522***
	[0.133]	[0.133]	[0.127]
Central East Anatolia	0.715*	0.715*	0.689**
	[0.134]	[0.134]	[0.128]
Central East Anatolia – rural	0.682	0.683	0.667*
	[0.163]	[0.163]	[0.157]
Southeast Anatolia	0.931	0.93	0.907
	[0.157]	[0.157]	[0.153]
Southeast Anatolia - rural	0.453***	0.453***	0.436***
	[0.094]	[0.094]	[0.089]
Age 11	11.721**	11.466**	10.463**
	[12.700]	[12.358]	[11.214]
Age 12	14.545**	18.508**	10.700**
	[15.983]	[21.397]	[11.378]
Age 13	54.386***	72.417***	30.918***
	[60.963]	[87.372]	[31.755]
Age 14	245.328***	323.197***	127.772***
	[266.327]	[378.927]	[129.142]
Age 15	559.892***	687.744***	272.920***
	[607.252]	[805.940]	[274.742]
Age 16	1,106.365***	1,367.593***	469.232***
	[1,200.238]	[1,602.125]	[471.889]
Age 17	1,739.888***	2,125.701***	672.268***
	[1,886.686]	[2,492.096]	[675.083]
Age 18	2,127.495***	2,626.040***	764.630***
	[2,309.433]	[3,079.055]	[768.106]
Age 19	2,666.942***	3,289.788***	912.249***
	[2,897.503]	[3,860.497]	[916.703]
Age 20	3,136.109***	3,868.239***	1,007.508***
	[3,411.967]	[4,544.659]	[1,013.181]
Age 21	3,534.970***	4,357.039***	1,080.741***
	[3,852.051]	[5,126.583]	[1,088.563]
Age 22	3,007.916***	3,709.287***	851.250***
	[3,287.918]	[4,375.708]	[859.515]
Age 23	2,870.282***	3,548.909***	724.694***
	[3,155.483]	[4,206.544]	[735.715]
Age 24	2,773.760***	3,430.211***	688.322***
	[3,107.633]	[4,136.538]	[713.693]
Age 25	3,232.643***	4,036.090***	654.321***
	[3,704.420]	[4,957.198]	[692.546]
Year 1991	0.32	0.275*	
	[0.227]	[0.202]	
Year 1992	0.286**	0.238**	
	[0.176]	[0.148]	
Year 1993	0.367*	0.316*	
	[0.214]	[0.188]	
Year 1994	0.280**	0.243**	
	[0.161]	[0.143]	

Year 1995	0.164***	0.143***	
	[0.095]	[0.085]	
Year 1996	0.235**	0.206***	
	[0.133]	[0.120]	
Year 1997	0.198***	0.174***	
	[0.113]	[0.101]	
Year 1998	0.198***	0.174***	
	[0.113]	[0.101]	
Year 1999	0.176***	0.154***	
	[0.100]	[0.090]	
Year 2000	0.181***	0.160***	
	[0.103]	[0.093]	
Year 2001	0.121***	0.106***	
	[0.069]	[0.062]	
Year 2002	0.136***	0.120***	
	[0.078]	[0.070]	
Year 2003	0.093***	0.080***	
	[0.053]	[0.047]	
Time at risk	58,234	58,234	58,234
R squared	0.1959	0.1961	0.1899

Note: Robust standard errors are in brackets. * indicates significance at 10%, ** significance at 5%; and *** significance at 1%. Wealth index is measured based on household durables and housing facilities. Reference categories are the lowest quintile for the wealth index, urban areas of Istanbul for the 12 regions of the country, towns for settlement size, age 10, and year 1990.

Table 2A Odds ratios for the probability of first-birth

	Model 1	Model 2	Model 3
Policy	0.554**		0.281***
	[0.162]		[0.075]
Policy*Age 12-14		0.872	
		[0.547]	
Policy*Age 15-17		0.518**	
		[0.168]	
Wealth quintile 2	0.88	0.879	0.893
	[0.098]	[0.098]	[0.098]
Wealth quintile 3	0.837	0.837	0.831
	[0.097]	[0.097]	[0.096]
Wealth quintile 4	0.714***	0.714***	0.722***
	[0.083]	[0.083]	[0.084]
Wealth quintile 5	0.414***	0.413***	0.421***
	[0.056]	[0.056]	[0.057]
Resides in large city	0.542***	0.542***	0.540***
	[0.105]	[0.105]	[0.103]
Resides in small city	0.759**	0.759**	0.771*
	[0.103]	[0.103]	[0.103]
Istanbul - rural	0.999	0.999	0.949
	[0.412]	[0.412]	[0.412]
West Marmara	0.516***	0.516***	0.506***
	[0.132]	[0.132]	[0.129]
West Marmara – rural	0.429**	0.429**	0.418**
	[0.172]	[0.172]	[0.167]
Aegean	0.698	0.698	0.697
	[0.167]	[0.167]	[0.161]

Aegean –rural	0.766	0.766	0.717
	[0.218]	[0.218]	[0.204]
East Marmara	0.811	0.811	0.772
	[0.167]	[0.167]	[0.161]
East Marmara – rural	0.591*	0.591*	0.580*
	[0.187]	[0.187]	[0.182]
West Anatolia	0.826	0.826	0.809
	[0.158]	[0.158]	[0.155]
West Anatolia – rural	0.528**	0.528**	0.528**
	[0.169]	[0.169]	[0.166]
Mediterranean	0.79	0.79	0.763
	[0.136]	[0.136]	[0.131]
Mediterranean – rural	0.427***	0.426***	0.418***
	[0.111]	[0.111]	[0.108]
Central Anatolia	0.627**	0.627**	0.605**
	[0.142]	[0.142]	[0.136]
Central Anatolia – rural	0.992	0.992	0.936
	[0.277]	[0.277]	[0.261]
West Black Sea	0.491***	0.490***	0.490***
	[0.122]	[0.122]	[0.121]
West Black Sea - rural	0.573*	0.573*	0.542**
	[0.165]	[0.165]	[0.155]
East Black Sea	0.350***	0.350***	0.332***
	[0.091]	[0.091]	[0.087]
East Black Sea - rural	0.404***	0.404***	0.380***
	[0.141]	[0.141]	[0.132]
Northeast Anatolia	0.794	0.794	0.733
	[0.176]	[0.176]	[0.162]
Northeast Anatolia –rural	0.468***	0.468***	0.448***
	[0.135]	[0.135]	[0.128]
Central East Anatolia	0.82	0.819	0.794
	[0.177]	[0.177]	[0.170]
Central East Anatolia – rural	0.761	0.761	0.744
	[0.202]	[0.202]	[0.195]
Southeast Anatolia	1.082	1.082	1.046
	[0.211]	[0.211]	[0.203]
Southeast Anatolia - rural	0.484***	0.484***	0.465***
	[0.115]	[0.115]	[0.109]
Age 13	1.974	2.015	1.817
	[1.146]	[1.161]	[1.057]
Age 14	1.234	1.291	1.013
	[0.810]	[0.851]	[0.627]
Age 15	11.578***	13.340***	8.385***
	[6.395]	[7.766]	[4.167]
Age 16	35.738***	41.387***	22.020***
	[18.831]	[23.125]	[10.432]
Age 17	83.050***	96.117***	42.846***
	[44.232]	[53.710]	[20.226]
Age 18	128.609***	148.473***	60.653***
	[68.443]	[82.948]	[28.429]
Age 19	181.707***	209.815***	84.649***
	[97.102]	[117.678]	[39.668]
Age 20	193.200***	223.098***	86.015***
	[103.689]	[125.609]	[40.368]
Age 21	208.489***	240.737***	89.164***

	[112.560]	[136.299]	[42.038]
Age 22	305.829***	352.929***	119.378***
	[166.001]	[201.130]	[56.623]
Age 23	301.222***	347.328***	107.477***
	[166.833]	[201.403]	[52.144]
Age 24	303.900***	350.001***	96.798***
	[173.693]	[208.935]	[48.413]
Age 25	188.181***	216.343***	46.551***
	[120.341]	[143.205]	[26.374]
Year 1991	1.052	0.961	
	[0.654]	[0.627]	
Year 1992	0.97	0.863	
	[0.561]	[0.531]	
Year 1993	0.445	0.393	
	[0.255]	[0.237]	
Year 1994	0.414	0.365*	
	[0.230]	[0.215]	
Year 1995	0.423	0.373*	
	[0.235]	[0.220]	
Year 1996	0.427	0.376*	
	[0.238]	[0.222]	
Year 1997	0.43	0.378*	
	[0.240]	[0.223]	
Year 1998	0.397*	0.349*	
	[0.220]	[0.206]	
Year 1999	0.338*	0.298**	
	[0.189]	[0.176]	
Year 2000	0.310**	0.274**	
	[0.173]	[0.162]	
Year 2001	0.191***	0.169***	
	[0.108]	[0.101]	
Time at risk	45,753	45,753	45,753
R squared	0.1802	0.1802	0.1739

Note: Robust standard errors are in brackets. * indicates significance at 10%, ** significance at 5%; and *** significance at 1%. Wealth index is measured based on household durables and housing facilities. Reference categories are the lowest quintile for the wealth index, urban areas of Istanbul for the 12 regions of the country, towns for settlement size, age 12, and year 1990.

Table 3 Odds ratios for the probability of first-birth among married women

	Model 1	Model 2
Policy	0.863	
	[0.248]	
Policy*Age 12-14		1.83
		[1.302]
Policy*Age 15-17		0.788
		[0.248]
Wealth quintile 2	0.995	0.995
	[0.112]	[0.113]
Wealth quintile 3	0.982	0.981
	[0.105]	[0.105]

Wealth quintile 4	0.937	0.936
	[0.100]	[0.100]
Wealth quintile 5	0.869	0.868
	[0.110]	[0.110]
Resides in large city	0.934	0.935
	[0.146]	[0.146]
Resides in small city	0.846	0.847
	[0.111]	[0.111]
Istanbul - rural	1.449	1.451
	[0.399]	[0.399]
West Marmara	0.927	0.934
	[0.233]	[0.236]
West Marmara – rural	0.835	0.834
	[0.326]	[0.325]
Aegean	0.913	0.914
	[0.269]	[0.269]
Aegean –rural	1.076	1.079
	[0.254]	[0.255]
East Marmara	1.069	1.071
	[0.196]	[0.197]
East Marmara – rural	1.002	1.003
	[0.294]	[0.294]
West Anatolia	1.481**	1.482**
	[0.235]	[0.235]
West Anatolia – rural	1.814**	1.792**
	[0.467]	[0.467]
Mediterranean	1.307	1.31
	[0.219]	[0.220]
Mediterranean – rural	1.22	1.223
	[0.290]	[0.290]
Central Anatolia	0.962	0.961
	[0.222]	[0.222]
Central Anatolia – rural	1.207	1.208
	[0.327]	[0.328]
West Black Sea	1.174	1.174
	[0.247]	[0.247]
West Black Sea - rural	1.253	1.254
	[0.309]	[0.309]
East Black Sea	1.075	1.075
	[0.267]	[0.267]
East Black Sea - rural	0.998	0.999
	[0.256]	[0.257]
Northeast Anatolia	1.632**	1.631**
	[0.363]	[0.363]
Northeast Anatolia –rural	0.727	0.727
	[0.205]	[0.204]
Central East Anatolia	1.337	1.338
	[0.275]	[0.276]
Central East Anatolia – rural	1.304	1.301
	[0.320]	[0.319]
Southeast Anatolia	1.617**	1.617**
	[0.304]	[0.304]
Southeast Anatolia - rural	1.282	1.286
	[0.269]	[0.270]
Age 13	0.738	0.789

	[0.542]	[0.583]
Age 14	0.096***	0.109***
	[0.079]	[0.091]
Age 15	0.355	0.459
	[0.245]	[0.340]
Age 16	0.572	0.75
	[0.393]	[0.556]
Age 17	0.87	1.142
	[0.595]	[0.839]
Age 18	1.062	1.387
	[0.727]	[1.015]
Age 19	1.216	1.588
	[0.835]	[1.166]
Age 20	1.033	1.349
	[0.710]	[0.992]
Age 21	0.914	1.193
	[0.633]	[0.882]
Age 22	1.331	1.735
	[0.928]	[1.292]
Age 23	1.225	1.594
	[0.868]	[1.204]
Age 24	1.19	1.546
	[0.867]	[1.194]
Age 25	0.744	0.965
	[0.586]	[0.799]
Year 1991	1.362	1.177
	[0.813]	[0.736]
Year 1992	1.79	1.475
	[1.020]	[0.895]
Year 1993	1.107	0.895
	[0.615]	[0.532]
Year 1994	0.838	0.676
	[0.455]	[0.393]
Year 1995	0.921	0.744
	[0.488]	[0.422]
Year 1996	0.973	0.784
	[0.512]	[0.444]
Year 1997	1.08	0.869
	[0.573]	[0.495]
Year 1998	1.034	0.833
	[0.544]	[0.471]
Year 1999	1.042	0.84
	[0.554]	[0.481]
Year 2000	1.029	0.833
	[0.547]	[0.474]
Year 2001	0.661	0.537
	[0.356]	[0.309]
Time at risk	3,959	3,959
R squared	0.0283	0.0285

Note: Robust standard errors are in brackets. * indicates significance at 10%, ** significance at 5%; and *** significance at 1%. Wealth index is measured based on household durables and housing facilities. Reference categories are the lowest quintile for the wealth index, urban areas of Istanbul for the 12 regions of the country, towns for settlement size, age 12, and year 1990.