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Working Paper

Gender Gap in Intergenerational Educational Persistence: Can Compulsory Schooling Reduce It?

IZA Discussion Papers, No. 13362

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Demirel, Merve; Okten, Cagla (2020) : Gender Gap in Intergenerational Educational Persistence: Can Compulsory Schooling Reduce It?, IZA Discussion Papers, No. 13362, Institute of Labor Economics (IZA), Bonn

This Version is available at:

<https://hdl.handle.net/10419/223804>

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ISSN: 2365-9793

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ABSTRACT

Gender Gap in Intergenerational Educational Persistence: Can Compulsory Schooling Reduce It?*

We analyze the impact of an increase in compulsory schooling policy on the gender gap in intergenerational educational persistence using the Turkish Adult Education Survey (2012). Prior to the reform there is a gender gap in the association of parents' educational attainment with their offspring's. Daughters exhibit more intergenerational persistence than sons. We show that the education reform that increased compulsory schooling from 5 to 8 years, exposed children born after 1986 to 3 more years of schooling and reduced the effect of parental education on the completion probability of new compulsory schooling (8 years) from 30% to 1% percentage points for sons and from 49% to 11% percentage points for daughters, while the effect of parental education on post-compulsory schooling outcomes of sons and daughters decreased by 12 and 13 percentage points, respectively. The gender gap in intergenerational education transmission has decreased by 8 percentage points in the completion of new compulsory schooling level but remains unchanged at the post-compulsory schooling level after the reform.

JEL Classification: I20, I24, J16, J62

Keywords: intergenerational education transmission, gender equality, compulsory schooling

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* The authors are thankful to the Turkish Institute of Statistics (TurkStat) for granting permission to use micro-data from the Adult Education Survey. Comments and suggestions from Saziye Pelin Akyol and Asena Caner are highly appreciated.

1 Introduction

In general, low education of parents tends to be associated with low educational outcomes of their children, possibly because of liquidity or information constraints or lower investments early in life. However, there are large regional differences in intergenerational educational persistence, with Latin America displaying the highest intergenerational correlations, and the Nordic countries the lowest [Hertz et al. \(2008\)](#),¹ suggesting that public policies can play a role in decreasing educational persistence across generations.

A few studies from developing countries document large gender differences in the intergenerational transmission of education. In India, the magnitude of sibling education correlation among women is significantly higher than the sibling correlation among men ([Emran and Shilpi, 2015](#)) whereas there are no significant gender differences in sibling correlations in developed countries ([Björklund and Salvanes, 2011](#)). In West Africa, parental education has a higher impact on daughters' educational attainment than on sons' educational attainment ([Glick and Sahn, 2000](#)).

Turkey, an emerging economy has higher intergenerational educational persistence than all except for Latin American countries ([Aydemir and Yazici, 2019](#)) and a gender gap in intergenerational educational persistence with a higher persistence for daughters ([Demirel and Okten, 2020](#); [Tansel, 2015](#)). It is possible that relatively uneducated parents tend to be in locations where there are some barriers to girls' attendance. It is also possible that parents' education has an important effect on their attitudes towards girls' schooling.

An increase in compulsory schooling can mitigate educational persistence as well as the gender gap in the transmission of education across generations in a number of ways. The first effect is direct. Children of higher educated parents were going to attain at least the compulsory level of education in the absence of compulsory schooling law. Now, with the extension of mandatory years of schooling, children of lower educated parents, if parents comply with the law, are also going to attain the compulsory schooling level of education and hence the education gap among offspring, at the compulsory schooling level is expected to decrease. However, the expansion of compulsory schooling may also reduce the intergenerational educational persistence beyond compulsory schooling level via more indirect causal channels. Longer schooling of children may inform parents on the monetary and social returns to education and alter attitudes towards children's education.

Prior to 1997, the basic education system in Turkey was composed of five years of compulsory primary school. The subsequent three years of lower secondary education was optional. Among 25-34 year-olds in AES (2012), all of whom had the option to drop out after five years, 32% of men and 54% of women did not complete eight years of schooling. After the compulsory schooling law was enacted in the 1997-1998 academic year, students who were then in 5th grade or lower, had to complete eight years of mandatory schooling before having a right to drop out of school. Since the school starting age is 6, individuals born before 1986 could drop out after they complete five years of primary school, whereas those born after 1986 had to complete eight years of schooling, i.e., five years of primary school and three years of upper secondary education. As a result, the law generated an exogenous increase in the education of individuals born after 1986, but it did not affect those born before. This reform was unexpected and exogenous to parental decisions and mostly motivated by political factors. Hence, it is a natural experiment that creates a treatment group that consists of those born after 1986 and a control group that includes those born before.

In this study, we examine the impact of the compulsory schooling law on intergenerational educational persistence and the gender gap in intergenerational transmission of education both at the com-

¹[Hertz et al. \(2008\)](#) demonstrate that the global average correlation between parent and child's schooling has held steady at about 0.4 for the past fifty years.

pulsory and post compulsory level. We contribute to the literature in three important ways. First, we provide empirical evidence from an emerging economy with high intergenerational educational persistence, as to what extent compulsory schooling can mitigate the inheritance of educational inequality. Few existing studies are from advanced economies with high levels of intergenerational educational mobility (Meghir and Palme, 2005; Aakvik, Salvanes, and Vaage, 2010; Betthäuser, 2017).

Second, ours is the first paper to examine the effect of compulsory schooling on the gender gap in intergenerational transmission of education. In many developing countries including Turkey, intergenerational educational persistence is higher for women than men. Several studies identified parental attitudes as a source of women's lower educational attainment in Turkey (Rankin and Aytac, 2006; Caner et al., 2016), West Africa (Glick and Sahn, 2000), Brazil (Emerson and Souza, 2007) and India (Kingdon, 2002; Kingdon, 2005; Pal, 2004). Parents with low levels of education are less likely to have gender-equal views regarding educational and labor market outcomes of their offspring (Akyol and Okten, 2019). Hence it is an important policy question to what extent government policies can mitigate the adverse effects of the role parental attitudes play in leading to a higher intergenerational educational persistence for daughters.

Finally, we contribute to the literature that examine the causal effects of parental education on children's education. Empirical studies examine the causal effect of parental education on offspring's education using twin and adoptee studies (Rosenzweig and Wolpin, 1994; Behrman, Rosenzweig, and Taubman, 1994; Currie and Moretti, 2003; Sacerdote, 2002; Sacerdote, 2004) and instrumental variables method where a variable is used as an instrument for parent's education to solve for the omitted variable bias due to unobserved parental ability, Oreopoulos, Page, and Stevens (2006) in the USA, Chevalier (2004) in the UK, and Black, Devereux, and Salvanes (2005) in Norway. The results in this literature are mixed depending on level of education and instrument used. We contribute to this literature by examining the effect of parental education on offspring's 8-year primary education attainment where the slots are not rationed, and the graduation is not conditional on an exam. We expect that the bias due to unobserved family ability to be low at this level of schooling, and hence our results can be interpreted as causal estimates.

We analyze the effect of compulsory schooling policy on educational persistence using regression discontinuity design. There is a discontinuous jump at the time of policy in the offspring's education, and the relationship between the outcome variable (offspring's education) and the assignment variable (offspring's year of birth) is continuous. We capture the transmission of education from fathers to their offspring by the regression coefficient of father's education as a predictor of schooling in the next generation. Our identification strategy captures the relationship between parental education and offspring's educational attainment differentiated according to offspring's exposure to the compulsory schooling reform.

Our results show that the compulsory schooling law reduced the impact of paternal education on completion of new compulsory schooling (8-year primary education) from 30-33% to 1-2% percentage points for men and from 46-51% to 11-12% percentage points for women. At the post-compulsory schooling, the association between fathers' and offspring's education has decreased by 12-13 and 10-14 percentage points for men and women, respectively. Prior to the reform, effect of parental education was higher for women than men both at the new compulsory and post-compulsory schooling levels. The gender gap in intergenerational persistence in education has significantly decreased by 7-8 percentage points in the completion of new compulsory schooling level but remains unchanged at the post-compulsory schooling level after the reform. Our findings show that the direct effect of compulsory schooling on the gender gap is strong as gender gap at the compulsory schooling level has decreased substantially. However, positive spillover effects of the reform appear to be limited as the

gender gap in intergenerational persistence in education remains unchanged at the post-compulsory schooling level alluding to the strong and enduring effect of parental attitudes. This finding also provides support for the existing evidence on the interaction of policies and the gender gap that find that the positive spillover effects of policies that target to reduce gender gap tend to be limited and continuous policy commitment is needed to bring about equality between men and women (Duflo, 2012).

The remainder of the paper is organized as follows: Section 2 introduces the compulsory schooling reform; Section 3 introduces the conceptual framework. Section 4 and 5 explains the data and empirical strategy. Section 6 presents and discusses the results and Section 7 presents the robustness checks. Finally, Section 8 states the concluding remarks.

2 The Compulsory Schooling Reform in 1997

In Turkey, formal education has been managed by the central government since 1923, and the Ministry of National Education (MONE) is in charge of all structural reforms and education policies.

Prior to 1997, the formal education system in Turkey consisted of 5 years of primary, 3 years of lower secondary, and 3 years of upper secondary (called secondary in the rest of the paper) education in Turkey. The primary school was compulsory, and the rest was voluntary. After primary school, students could choose to attend general, vocational or religious schools. In 1997, the central government increased the compulsory schooling from 5 to 8 years by combining primary and lower secondary education under the name of 8-year primary education. In order to make the law applicable in a short amount of time, the MONE increased the number of classes and teachers in the existing schools, bussed children from rural areas to nearby schools, and established boarding schools for children living in distant rural areas. In 1998-2000 the public investment in education was around 30 percent, while prior to compulsory schooling law, it was about 15 percent (Dulger, 2004; Dayioglu, Kirdar, and Koc, 2016).

The compulsory education law came into force in 1997, just before the 1997-1998 school year. Students who had not completed their 5-year education on this date and had not been awarded the primary school diploma are required to complete 8-years of schooling to earn a primary education diploma. Since the primary school diploma is the first official proof of schooling one can earn, the incentive to finish the compulsory level of education is strong for students and their families.

The schooling law has increased primary school enrollment dramatically. Before the compulsory schooling policy, the schooling rate was 53% (1996-1997 school year) in the 8-year primary education and increased to 85% even in the first year of policy change (1997-1998 school year). In three years, the enrollment had increased to 95% (2000-2001 school year). Similarly, the secondary education enrollment rate had increased from 38% in 1997-1998 to 44% in 2000-2001 (MONE Education Statistics, 2006-2007).

3 Conceptual Framework

The association between educational decisions of parents and their offspring could come from several channels. There can be causal channels through which parents' education can influence education levels of their offspring. Parents with higher education may put a higher value on their children's education and hence observed differences in educational outcomes of children can be due to differences in parental attitudes towards education. Gender specific differences in intergenerational persistence can arise if there are larger differences in valuation of daughters' education across parents depending on their education levels. Furthermore, educated parents could provide a better learning environment, and so their children could reach higher levels of education. Also, higher educated parents are more

likely to have higher incomes, and their children may be less constrained with the cost of education. In addition to aforementioned causal effects of parents' education and income, the link between the schooling of parents and their children could be due to unobserved inherited family characteristics or common community environment. For example, higher educated parents are more likely to have higher abilities, and so are their children. Unobserved and inherited family characteristics such as genetic endowment can influence both parents' and offspring's education levels, also known as ability bias in the literature. Unobserved community characteristics such as social norms can also influence both parents' and offspring's education levels if parents and their offspring grow up in similar environments.

The expansion of compulsory schooling may reduce the effects of casual channels on intergenerational education persistence in a number of ways. The first effect is direct. Offspring of higher educated parents were going to attain at least the compulsory level of education in the absence of compulsory schooling law. Indeed, in AES data, among cohorts born in 1973-1985 and hence not exposed to the compulsory schooling law, only 4% of men and 8% of women did not complete 8-years of education if their fathers had at least a lower secondary education(then 8 years) degree. Whereas for the same cohorts, 41% of men and 65% of women did not complete 8-years of education if their fathers had only primary school education (then 5 years) or less. Now, with the extension of mandatory years of schooling, offspring of lower educated parents, if parents comply with the law, are also going to attain the compulsory schooling level of education and hence the gap between offspring at the compulsory schooling level is expected to decrease.

However, the expansion of compulsory schooling may also reduce the intergenerational education persistence beyond compulsory schooling level via more indirect causal channels. Longer schooling of their children may alter parents' attitudes toward education by making them more informed on the monetary and social returns to education. Enforcing the mandatory years of schooling required that supply of education is available for everyone. In some cases, it decreased distance to schools lowering the monetary costs of education for families. This effect is expected to be important for low income families. As the implementation of compulsory schooling lowered the monetary cost of primary school, it might also have relaxed the financial constraint of low income, low education, cash constrained families thereby increasing their demand for education, even possibly above the compulsory level.

In order to understand how the new compulsory schooling policy in Turkey affects the intergenerational education persistence differences by gender, we first need to understand the causes of those differences. Since there is no evidence in the literature that suggests the inherited family characteristics differ by gender, the possible channels at work for the gender differences could be the causal ones, namely differences in parental attitudes in valuation and perceived costs of education, towards sons

and daughters.

Table 1: Intergenerational education transmission of paternal education before the reform.

	Less than primary	Primary	Secondary	Tertiary	Obs.
<i>Son's education</i>					
Primary or lower	41%	17%	25%	16%	3,236
Secondary	5%	10%	32%	54%	305
Higher	3%	9%	17%	75%	218
<i>Daughter's education</i>					
Primary or lower	65%	9%	16%	10%	4,555
Secondary	11%	9%	33%	47%	351
Higher	2%	3%	18%	77%	218

Notes: Authors' calculations using AES, 2012. Intergenerational education transmission matrices for men and women are calculated for individuals born in 1973-1985 (individuals not exposed to the reform). The rows and columns represent fathers' and offspring' educational attainment, respectively. The numbers given in each cell present the percentage of offspring's education conditional on paternal education. Hence the sum of percentages given in each row should be around 100, though may not be exactly 100 due to rounding.

Several studies, which focus on Turkey, identified parental attitudes as a source of the gender gap in education. Rankin and Aytaç (2006) find that patriarchal family beliefs and practices discourage the education of girls beyond the compulsory level using the 1988 Turkish Family Structure Survey. Caner et al. (2016) similarly show that a traditional view on gender roles adversely affects the educational attainment of daughters by analyzing the Turkish Demographic and Health Surveys conducted in 1998 and 2003. Similar results found by the two studies, which examine data from three different decades, show the persistence of the view on the gender roles in a conservative society. The differences in the valuation of daughters' education can also arise from low labor market expectations for women. Female labor force participation rate in Turkey, at 28.9 percent, is the lowest among OECD countries and the 22nd lowest in the world (World Bank, 2018). Parents might also value their daughters' non-market time at home as daughters help with household chores. Hence the opportunity cost of sending daughters to school might be higher than sons (Rankin and Aytaç, 2006). Socially conservative families also may incur a psychic cost of educating daughters since education is carried out in mixed schools. Finally, the value of future earnings would be discounted more for girls as daughters are more likely to move away from their parents after marriage. Since those parental attitudes which lead girls to have a lower level of education are more apparent in low educated families (Akyol and Okten, 2019), parental attitudes might also be a reason for the gender differences in the association between parents' and offspring's education.

Extending the compulsory years of schooling could shift parental attitudes by their upward generational spillover effects (Berniell, De la Mata, and Valdés, 2013; Torssander, 2013; Friedman and Mare, 2014; Gulesci, Meyersson, and Trommlerová, 2018). One study by Gulesci, Meyersson, and Trommlerová (2018) presents evidence that children's schooling can have an impact on their parents' attitudes on gender roles by exploiting the same compulsory schooling law like ours. They find that mothers in Turkey whose eldest daughters were exposed to higher compulsory schooling in response to the 1997 reform are less likely to find domestic violence justifiable. They did not find a similar effect for boys' schooling.

Hence, compulsory schooling law and the associated increase in the supply of education, can reduce monetary and psychic costs of sending daughters to school and increase parents' valuation of their education for low educated, low income families and reduce the effect of parental education on daughters' education and possibly decrease the gender gap in intergenerational persistence of educa-

tion outcomes.

4 Data

The empirical analysis of the intergenerational transmission of education requires a data set providing information on the education of individuals and their parents. Here, we use the 2012 Adult Education Survey (AES), which provides information on adults aged 18 and older, conducted by Turkstat. The major advantage of this data is that it allows the matching of an individual's educational attainment to her parental educational outcome, even if parents and offspring do not share the same residence. This is the first study, to our knowledge, examining the effect of the Turkish compulsory school reform using this data. In addition to the educational attainment of individuals and their parents, the AES provides information on personal characteristics like age, gender, the region of residence and type of current residence.²

AES provides schooling outcomes as the highest level of education that an individual has completed. Using this information, we have introduced four different dummy variables that show whether individuals have completed at least each of the four levels of education: 5-year primary, 8-year primary, secondary (high school), and higher (college and above) education. Our focus is to analyze the changes in the inheritance of the educational background of parents on basic education outcomes of their offspring with the compulsory schooling law. Thus, we use 8-year primary education and secondary education attainment binary variables as dependent variables instead of the years of schooling.

The parental educational attainment is given in three categories in the AES data: 8-year primary education or lower, secondary education, and higher education. Using the three categories of parental education, we construct a dummy variable indicating whether the father (mother) has at least secondary education attainment, called father's (mother's) education, to estimate the relationship between parental education and offspring's education. In order to further check the robustness of our results, we also construct two dummy variables for paternal education: father's secondary education and father's higher education.

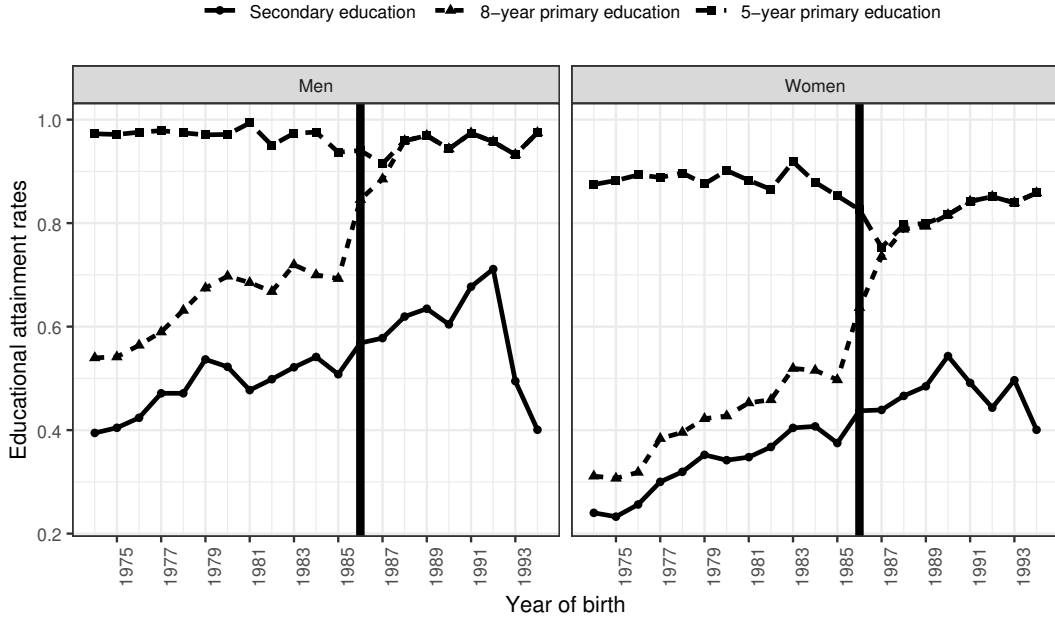
5 Identification

Students who do not have a primary school diploma by the beginning of the 1997-1998 school year are the ones affected by the policy change. Since most people start their education at age 6 in Turkey, we assume those who are born in 1987 or later are the ones treated by compulsory schooling law. Starting school one year late is also a common practice in Turkey. Thus, we drop the cohort born in 1986 to decrease the fuzziness in the treatment status.

Figure 1 shows the rate of completing at least 5-year primary, 8-year primary, and secondary (high school) education for men and women by their year of birth. Prior to the policy change, compliance with the old compulsory schooling law (completing 5-year primary education) is almost 100% for men, but around 90% for women. The figure shows that the policy change closed the gap between 5 and 8-year of primary education attainment for both men and women with a remarkable jump in 8-year primary education attainment for those born after 1986. After the policy cutoff, compliance of women with the former 5-year requirement slightly fell. It might be the case that some parents who were willing to send their daughters to primary school when it consisted of 5 years are not willing to send their daughters to primary school at all when it consists of 8 years, realizing that they will not be able to finish 8 years of education. However, we do not observe any difference between at least 5 year or at

²We use 2012 wave of the AES since it contains region and urban-rural information, unlike 2016 wave.

Figure 1: Educational attainment by cohorts



Source: Adult Education Survey, 2012

least 8 year of primary school attainment rates after the policy. In other words, those who finish 5 years of primary school complete new compulsory schooling of 8 years. In addition to its direct effect on the mandatory level of education, a structural increase is also observed in secondary education attainment of those exposed to compulsory schooling law. The fall, observed in the secondary education attainment of the last three cohorts, could be due to the fact that those individuals are 18-20-year-olds who could still be enrolled in high school at the time of the survey.

We analyze the effect of compulsory schooling policy on educational persistence using regression discontinuity design. According to Figure 1, there is a discontinuous jump at the time of policy, and the relationship between the outcome variable (offspring's education) and the assignment variable (offspring's year of birth) is continuous. We identify the stark increase in the outcome variable by the dummy policy variable which denotes the treatment status by year of birth. We capture the transmission of education between fathers and their offspring by the regression coefficient of father's education as a predictor of schooling in the next generation.

To account for time trends in the outcome variable, we use linear polynomial of year of birth, normalized by subtracting 1986, the time of discontinuity. We include the parental education and its interaction with policy dummy to capture the differential effect of father's education by the compulsory schooling law and estimate the following linear probability model for male and female offspring separately:

$$E_{irt} = \beta_1 F_i + \beta_2 D_{it} + \beta_3 F_i D_{it} + \alpha X_{irt} + \epsilon_{irt} \quad (1)$$

where E_{irt} denotes the educational attainment (8-year primary or secondary education attainment variables) of offspring i from region r and cohort t , F_i denotes the father's educational attainment, which is equal to 1 if father's final education level is secondary school or above and 0 otherwise, and D_{it} denotes the treatment status, which is 1 if the offspring's year of birth is later than 1986, and 0 otherwise. In addition to controlling for linear time trend heterogeneous across policy, we include a constant, the

region dummies (NUTS-2) and the rural residence dummy to the vector of control variables X_{irt} .

Our parameters of interest β_1 and $\beta_1 + \beta_3$ capture the relation between parental education and the offspring's education outcomes before and after the compulsory schooling reform, respectively. The negative coefficient estimate for the interaction of father's education with policy dummy would indicate a decrease in the intergenerational persistence in education outcomes.

In order to examine the differential effect of policy on intergenerational education transmission by gender, we next pool the sample of male and female offspring and estimate equation (2) where we allow all variables in equation (1)- father's education, policy, and the interaction of policy with father's education, in addition to a constant, time trends before and after the policy, region dummies, and rural residence dummy- to vary by gender. Hence, our linear probability model becomes:

$$E_{irt} = \gamma_1 F_i + \gamma_2 W_i F_i + \gamma_3 D_{it} + \gamma_4 W_i D_{it} + \gamma_5 F_i D_{it} + \gamma_6 W_i F_i D_{it} + \theta_1 X_{irt} + \theta_2 W_i X_{irt} + v_{irt} \quad (2)$$

where W_i is a dummy variable, which takes value 1 if the the offspring i is woman and all the other variables are as defined before. The parameters of interest γ_2 and $\gamma_2 + \gamma_6$ captures the gender gap in the association of parental education and offspring's education before and after the reform. The negative coefficient estimate for the three-way interaction of father's education with policy and woman dummy would indicate a decrease in the gender gap in intergenerational persistence.

As can be seen in Figure 1, the educational attainment is increasing, in addition to a jump observed with the policy change. To distinguish this time trend from the effect of the policy, we use three samples which consist of different time intervals around the policy year. In each of these data intervals around the cut-off, we control for linear time trends to avoid overidentification. The further comparison of time trends on both sides of the cut-off suggests that the slope of the linear fit of both 8-year primary and secondary education attainment varies before and after the policy cutoff. Thus, we allow the time trend to differ in the pre- and post-policy years. We also experiment with a second-order polynomial of time trend, though our results with alternative polynomials of time trend not presented here, available upon request.

Our largest sample covers those born between 1974 and 1994 except for those born in 1986, which corresponds to 12 cohorts who are not exposed to compulsory schooling law and 8 cohorts who are exposed to schooling law. Then we trim down the lower tail and take 8 cohorts on both sides of the policy year. Finally, in our narrowest sample, we include 5 cohorts before and after the policy cut-off. This sample excludes the cohorts that exhibit a decrease in their secondary education attainment, presented in Figure 1, since they could still be in the education. We use linear time trend heterogeneous across policy in all our samples, by including the continuous year of birth normalized around the policy cutoff and its interaction with the policy dummy.

In all of our analyses, we report robust standard errors clustered at the cohort level, since it captures the time trend related autocorrelation in the sample (Bertrand, Duflo, and Mullainathan, 2004).

6 Results

We first estimate equation (1) and present our results on the impact of compulsory schooling policy on the association of father's education and offspring's education outcomes in Table 2. Our coefficient estimates for the binary *father's education* variable shows the relation between the educational attainment of parent and offspring prior to policy change. We observe that before the compulsory schooling law, men and women whose father has at least a high school degree, are 30-33 and 46-51 percentage

points more likely to attain 8-year primary education. The compulsory schooling has decreased the effect of parental education on primary education attainment since the coefficient of the interaction term $policy \times father's\ education$ is negative and significant for all samples of men and women. The remaining persistence is estimated to be around 1-3 (found by adding the coefficient on father's education and the coefficient on the interaction term) (around 90% decrease) percentage points for men and 11-12 (around 85% decrease) percentage points for women. In other words, men (women) whose fathers have at least a high school degree are more likely to attain primary education by about 1-3 (11-12) percentage points even after the change in the compulsory schooling law.

For the post-compulsory level of education, the relation between the secondary education attainment and father's education prior to the policy change is higher in magnitude, compared to the compulsory level for all samples of men and women. Having a father with at least a high school degree increases the probability that the offspring will also have a high school degree by about 42-44 percentage points for men and 50-54 percentage points for women before the change in compulsory school reform. We find a negative and significant coefficient on the interaction term of father's education with the policy dummy variable. Hence, the compulsory schooling policy has decreased educational transmission for both men and women, as the negative and significant coefficient of $policy \times father's\ education$ indicates. Our results suggest that the intergenerational persistence after the policy, measured by the sum of the coefficient on father's education and the coefficient on the interaction term, is about 31-33 percentage points for men and 40 percentage points for women. These results suggest that compulsory schooling significantly decreases intergenerational persistence at both 8-year primary and secondary education levels though the reduction appears to be higher at the 8-year new compulsory level.

Table 2: The effect of compulsory schooling on the intergenerational education transmission

<i>Dependent var: 8-year primary education attainment</i>						
	Men			Women		
Father's education	0.334*** (0.019)	0.308*** (0.017)	0.302*** (0.023)	0.512*** (0.020)	0.488*** (0.022)	0.463*** (0.023)
Father's education \times Policy	-0.318*** (0.021)	-0.294*** (0.021)	-0.276*** (0.026)	-0.402*** (0.023)	-0.377*** (0.025)	-0.343*** (0.029)
Observations	5,764	4,428	2,676	7,737	6,035	3,802
<i>Dependent var: Secondary education attainment</i>						
	Men			Women		
Father's education	0.440*** (0.013)	0.429*** (0.014)	0.427*** (0.020)	0.544*** (0.021)	0.526*** (0.026)	0.502*** (0.034)
Father's education \times Policy	-0.131*** (0.024)	-0.123*** (0.025)	-0.122*** (0.020)	-0.140*** (0.026)	-0.124*** (0.030)	-0.107** (0.040)
Observations	5,764	4,428	2,676	7,737	6,035	3,802
Cohorts	1974-94	1978-94	1981-91	1974-94	1978-94	1981-91

Notes: The sample includes the cohorts born between the years given for each column, and the cohort 1986 is excluded. Robust standard errors clustered at cohort level, are given in parentheses. A constant, policy dummy, time trend and its interaction with policy dummy, region fixed effects, and rural residence dummy are included in control variables. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$.

We next examine whether the compulsory schooling law decreases the existing gender differences in intergenerational educational persistence and estimate equation (2) by using a pooled sample of men and women. Since this equation controls for interaction terms of all variables with woman (offspring) dummy variable, including a triple interaction term of binary policy, father's education and woman variables, we can estimate the differential effect of the policy on the impact of father's education on the offspring's educational attainment according to offspring's gender. We present our results in Table 3 for the new compulsory and post-compulsory level of education.

In columns (1)-(3), where we examine the 8-year primary education attainment, the intergenera-

tional persistence is higher for women prior to the policy change, compared to men, as indicated by the positive and significant coefficient estimates of *woman* × *father's education*. Prior to the policy change, the impact of a father's secondary education attainment on his daughter's 8-year primary education attainment is 16-18 percentage points higher than the impact of a similar father's secondary education attainment on his son's 8 year primary education attainment. Persistence for men has decreased with the policy suggested by the negative and significant coefficient estimates for the interaction of father's education with policy dummy. The decrease in persistence is even higher for women as the differential impact of the reform on the association of women's primary education attainment with parental education (as shown by the coefficient on the triple interaction term, *woman* × *policy* × *father's education*) are also estimated to be negative for all samples. Hence, the existing gender gap in intergenerational persistence before the compulsory schooling law to the detriment of women had significantly decreased by 7-8 percentage points with the mandatory schooling reform.

Table 3: The effect of compulsory schooling on the gender gap in intergenerational education transmission

<i>Dependent var:</i>	<i>8-year primary education attainment</i>			<i>Secondary education attainment</i>		
Father's education	0.334*** (0.019)	0.308*** (0.017)	0.302*** (0.023)	0.440*** (0.013)	0.429*** (0.014)	0.427*** (0.020)
Woman × Father's education	0.179*** (0.022)	0.180*** (0.030)	0.161*** (0.037)	0.103*** (0.023)	0.098*** (0.031)	0.076* (0.041)
Policy × Father's education	-0.318*** (0.021)	-0.294*** (0.021)	-0.276*** (0.026)	-0.131*** (0.024)	-0.123*** (0.025)	-0.122*** (0.020)
Woman × Policy × Father's education	-0.084*** (0.023)	-0.083** (0.030)	-0.067* (0.034)	-0.009 (0.031)	-0.001 (0.037)	0.015 (0.045)
Observations	13,501	10,463	6,478	13,501	10,463	6,478
Cohorts	1974-94	1978-94	1981-91	1974-94	1978-94	1981-91

Notes: The sample includes the cohorts born between the years given for each column, and the cohort 1986 is excluded. Robust standard errors clustered at cohort level, are given in parentheses. A constant, policy dummy, time trend and its interaction with policy dummy, region fixed effects, rural residence dummy, and the interaction of all variables with the woman dummy are included in control variables. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$.

In Table 3, columns (4)-(6), we examine offspring's secondary education attainment as our outcome variable. Similar to our results on the compulsory level, prior to the reform, we observe a gender gap in intergenerational persistence in secondary education attainment for all samples since the relation with the father's education is 8-10 percentage points higher for daughters compared to the sons. We confirm our results in Table 2, suggesting that intergenerational persistence has reduced with the policy change for men. Women exposed to the compulsory schooling reform have enjoyed a similar decrease in intergenerational persistence as their men peers, suggested by the imprecisely estimated coefficients for the three-way interaction of woman, policy, and father's education variables. Our findings suggest that extending compulsory schooling from 5 to 8 years did not reduce the gender gap in education transmission at the post-compulsory level as the reform reduced the impact of father's education on both sexes' secondary education attainment in a similar magnitude.

These findings suggest that compulsory schooling law is effective in promoting gender equality in intergenerational education persistence at the compulsory schooling level but has a limited positive spillover effect beyond what is compulsory. Our results point out that the number of years of education that is made compulsory by law and its enforcement are likely to be the key determinants in reducing the gender gap in intergenerational education transmission in societies with strict views on gender roles. Our results also provide support for the existing evidence on the interaction of policies and the gender gap that find that the positive spillover effects of policies that target to reduce gender gap tend to be limited and continuous policy commitment is needed to bring about equality between men and women (Duflo, 2012).

7 Robustness control

7.1 The intergenerational education transmission in the urban sample

In our samples, 77-78% and 22-23% of individuals live in the urban and rural areas, respectively. In the urban areas, we observe fewer gender disparities and intergenerational persistence compared to the rural areas, prior to compulsory schooling law. In the urban sample, the 8-year primary education attainment rates of the cohorts not exposed to the extension of compulsory schooling are 68% for men and 48% for women while the 8-year primary education attainment rates of their peers in the rural sample are 50% for men and 23% for women. Similarly, the percentage point difference in the educational attainment of those whose father has at least secondary education and others is 44 in the urban areas, and 60 in the rural areas. Since the initial differences in intergenerational persistence are not similar before the reform, one could argue that the equalizing effect of the policy could vary for those who live in urban and rural areas. Here, we restrict our sample by excluding those who live in rural areas and ask whether the reform helped reduce the gender gap in intergenerational education transmission in the urban sample.

Table 4: The effect of compulsory schooling on the gender gap in intergenerational education transmission

<i>Dependent var:</i>	<i>8-year primary education attainment</i>			<i>Secondary education attainment</i>		
Father's education	0.316*** (0.023)	0.279*** (0.018)	0.267*** (0.026)	0.429*** (0.017)	0.406*** (0.015)	0.400*** (0.023)
Woman×Father's education	0.178*** (0.021)	0.190*** (0.027)	0.185*** (0.035)	0.103*** (0.024)	0.108*** (0.031)	0.099** (0.043)
Policy×Father's education	-0.296*** (0.022)	-0.262*** (0.018)	-0.245*** (0.025)	-0.127*** (0.024)	-0.109*** (0.024)	-0.101*** (0.023)
Woman×Policy×Father's education	-0.086*** (0.022)	-0.094*** (0.027)	-0.088** (0.036)	-0.016 (0.036)	-0.017 (0.042)	-0.023 (0.047)
Observations	10,430	8,113	5,051	10,430	8,113	5,051
Cohorts	1974-94	1978-94	1981-91	1974-94	1978-94	1981-91

Notes: The sample includes the cohorts born between the years given for each column, and the cohort 1986 is excluded. Robust standard errors clustered at cohort level, are given in parentheses. A constant, policy dummy, time trend and its interaction with policy dummy, region fixed effects, rural residence dummy, and the interaction of all variables with the woman dummy are included in control variables. *p<0.1 **p<0.05 ***p<0.01.

The results presented in Table 4 are similar to our earlier results in Table 3. The coefficients measuring the relation between the father's education and offspring's 8-year primary education attainment is smaller in magnitude for the urban sample at both new compulsory and post-compulsory level of education. Consistent with earlier results, the effect of father's education is higher for daughters than sons prior to the reform. We also observe a statistically significant decrease in the persistence for 8-year primary education attainment and secondary education attainment for men as implied by the negative and significant coefficient for *policy*×*father's education* in columns (1)-(6). The persistence decrease in 8-year primary education is significantly higher for women since the coefficient for *woman*×*policy*×*father's education* is estimated to be negative and significant for all samples. However, there are no gender differences in the intergenerational persistence decrease in secondary education attainment as coefficients on the triple interaction terms are not statistically significant in columns (4)-(6).

7.2 Father's secondary and higher education attainment

AES gives the educational attainment of parents in three categories: primary or lower, secondary, and higher education. In our baseline analysis, we measure the intergenerational persistence with the

dummy variable *father's education*, indicating whether the father has secondary or higher education attainment by combining two categories. In Table 5, we further check the robustness of our results by including two dummy variables for parental education: *father's secondary education* and *father's higher education*. Parental education variables indicate whether the father's highest educational attainment is the associated level. Father's secondary education variable takes value 1 if the father graduated from high school, but not from college. Similarly, the father's higher education variable is equal to 1 if the father has graduated from higher education. Table 5 shows the coefficient estimates for father's level of education variables and their interactions with policy and woman dummies.

Table 5: The effect of compulsory schooling on the gender gap in intergenerational education transmission

<i>Dependent var:</i>	<i>8-year primary education attainment</i>			<i>Secondary education attainment</i>		
Father's secondary education	0.330*** (0.018)	0.312*** (0.020)	0.309*** (0.029)	0.413*** (0.017)	0.404*** (0.020)	0.393*** (0.029)
Father's higher education	0.339*** (0.023)	0.301*** (0.018)	0.292*** (0.024)	0.478*** (0.017)	0.464*** (0.016)	0.474*** (0.024)
Woman×Father's secondary education	0.143*** (0.030)	0.137*** (0.040)	0.108* (0.052)	0.068** (0.030)	0.062 (0.038)	0.041 (0.053)
Woman×Father's higher education	0.235*** (0.019)	0.254*** (0.021)	0.249*** (0.026)	0.162*** (0.022)	0.164*** (0.029)	0.143*** (0.040)
Policy×Father's secondary education	-0.309*** (0.020)	-0.293*** (0.023)	-0.281*** (0.030)	-0.129*** (0.028)	-0.123*** (0.031)	-0.125*** (0.031)
Policy×Father's higher education	-0.331*** (0.028)	-0.296*** (0.025)	-0.269*** (0.031)	-0.128*** (0.031)	-0.119*** (0.031)	-0.112*** (0.030)
Woman×Policy×Father's secondary ed.	-0.064* (0.032)	-0.055 (0.041)	-0.039 (0.049)	0.017 (0.038)	0.025 (0.045)	0.049 (0.056)
Woman×Policy×Father's higher education	-0.112*** (0.020)	-0.128*** (0.022)	-0.108*** (0.025)	-0.045 (0.033)	-0.044 (0.039)	-0.039 (0.048)
Observations	13,501	10,463	6,478	13,501	10,463	6,478
Cohorts	1974-94	1978-94	1981-91	1974-94	1978-94	1981-91

Notes: The sample includes the cohorts born between the years given for each column, and the cohort 1986 is excluded. Robust standard errors clustered at cohort level, are given in parentheses. A constant, policy dummy, time trend and its interaction with policy dummy, region fixed effects, rural residence dummy, and the interaction of all variables with the woman dummy are included in control variables. *p<0.1 **p<0.05 ***p<0.01.

Our results suggest that both men and women whose father has secondary or higher education attainment are more likely to attain 8-year primary education prior to the policy change compared to the omitted category of those whose father has less than high school degree. For women, the relation between paternal education and the offspring's education is higher compared to men, since the coefficients for both *woman×father's secondary education* and *woman×father's higher education* are positive and significant in columns (1)-(6). We establish the gender gap in the intergenerational transmission of education at the new compulsory and post-compulsory level of education with the new variables measuring paternal education.

We find negative and significant coefficients on the interaction terms of policy variable with father's secondary school attainment and higher education attainment indicator variables and the difference of these coefficients are not statistically significant. Hence, the difference in the probability of completing new compulsory schooling between those whose fathers have secondary or higher education attainment and whose father less than a high school degree has significantly decreased. The coefficients of the interaction terms *woman×policy×father's secondary education* and *woman×policy×father's higher education*, which capture the differential decrease in persistence for women, are negative in all samples at the 8-year primary education attainment. However, the estimate for the former one is marginally significant in the largest sample and insignificant in other samples, while the latter one is strongly significant. These results indicate that the policy change has reduced the gender gap in intergenerational

persistence in primary education, among the ones whose father has less than secondary education attainment and the ones whose father attained higher education.

When we consider secondary school attainment, we again find that policy reduces the effect of father’s education when the father has a secondary school degree or a higher education degree compared to the omitted category when the father has less than a high school degree. As before, the decrease in the effect of father’s secondary and higher education on offspring’s education are statistically the same. The triple interaction terms of father’s education indicators with policy and woman dummies are positive for father’s secondary education and negative for father’s higher education but both are imprecisely estimated in all samples.

7.3 Intergenerational education transmission of maternal education

In this section, we follow Carneiro, Meghir, and Parey (2013) and Chevalier et al. (2013), and examine the effect of intergenerational transmission of *mother’s education* instead of paternal education and report our results in Table 6.

Table 6: The effect of compulsory schooling on the gender gap in intergenerational education transmission

Dependent var:	8-year primary education attainment			Secondary education attainment		
Mother’s education	0.313*** (0.021)	0.283*** (0.017)	0.285*** (0.021)	0.454*** (0.022)	0.432*** (0.024)	0.463*** (0.026)
Woman×Mother’s education	0.198*** (0.020)	0.201*** (0.024)	0.171*** (0.034)	0.139*** (0.023)	0.139*** (0.029)	0.084*** (0.023)
Policy×Mother’s education	-0.292*** (0.023)	-0.262*** (0.021)	-0.257*** (0.027)	-0.153*** (0.049)	-0.134** (0.051)	-0.139*** (0.030)
Woman×Policy×Mother’s education	-0.125*** (0.022)	-0.127*** (0.024)	-0.088** (0.030)	-0.050 (0.036)	-0.049 (0.039)	-0.014 (0.029)
Observations	13,501	10,463	6,478	13,501	10,463	6,478
Cohorts	1974-94	1978-94	1981-91	1974-94	1978-94	1981-91

Notes: The sample includes the cohorts born between the years given for each column, and the cohort 1986 is excluded. Robust standard errors clustered at cohort level, are given in parentheses. A constant, policy dummy, time trend and its interaction with policy dummy, region fixed effects, rural residence dummy, and the interaction of all variables with the woman dummy are included in control variables. *p<0.1 **p<0.05 ***p<0.01.

Our estimates in columns (1)-(3), where 8-year primary education attainment is the dependent variable, show that mother’s education has a positive significant effect on the offspring’s education level, and this effect is reduced after the change in compulsory school law. The decrease in parental education with the compulsory schooling law captured by the coefficients of *policy×mother’s education* for men and the sum of *policy×mother’s education* and *woman×policy×mother’s education* for women suggest that the persistence decreased for both men and women and its magnitude is lower for both genders, compared to our results in Table 3. The statistical significance patterns are the same as Table 3.

In columns (4)-(6), where we focus on the post-compulsory schooling, we find that having a mother with at least a high school degree increases the probability of offspring’s having a high school degree by about 43-46 percentage points for men and 54-57 percentage points for women before the compulsory schooling policy. We show that the persistence has decreased with compulsory schooling since the coefficient of *policy×mother’s education* is negative and statistically significant for all samples. However, similar to our earlier results in Table 3, the policy fails to reduce the gender differences in intergenerational education transmission, which exists for all our samples in favor of men.

8 Conclusion

People who are well educated are likely to have children who are also well educated. Similarly, parents who have low education levels are likely to have children with low levels of education. This intergenerational transmission of education holds to varying degrees in most countries with Latin America displaying the highest, and the Nordic countries lowest (Hertz et al., 2008). Large gender differences in intergenerational education transmission also reported in several developing countries (Emran and Shilpi, 2015; Glick and Sahn, 2000). Daughters exhibit more intergenerational educational persistence than sons.

Turkey, an emerging economy, exhibits high intergenerational education persistence (Aydemir and Yazici, 2019) and a gender gap in intergenerational persistence to the detriment of women (Demirel and Okten, 2020; Tansel, 2015). In this study, we examine the impact of a change in compulsory schooling from 5 to 8 years in 1997 which affected some cohorts of offspring and not others, on intergenerational educational persistence and gender differences in intergenerational educational transmission in Turkey.

Our work contributes to the literature in three ways. First, we contribute to the small literature examining the impact of compulsory schooling policies on mitigating the inheritance of educational inequality. We provide empirical evidence from an emerging country with high intergenerational educational persistence. Existing studies are from advanced countries with relatively low levels of intergenerational persistence (Meghir and Palme, 2005; Aakvik, Salvanes, and Vaage, 2010; Betthäuser, 2017). Second, our work, to our knowledge, is the first to examine the impact of compulsory schooling on the gender gap in the intergenerational transmission of education. Finally, we contribute to the literature examining the causal effects of parental education on offspring's education by examining the effect of parental education on offspring's 8-year primary education attainment where the slots are not rationed and the graduation is not conditional on an exam. The bias due to unobserved family characteristics are expected to be low at this level of schooling, and hence our results can be interpreted as causal estimates.

Prior to the reform, there is a gender gap in the association of parents' educational attainment with their offspring's. Daughters exhibit more intergenerational persistence than sons. We show that compulsory schooling law reduced the impact of paternal education on completion of new compulsory schooling (8-year primary education) from 30% to 1% percentage points for men and from 49% to 11% percentage points for women. At the post-compulsory schooling, the association between fathers' and offspring' education has decreased by 12 and 13 percentage points for men and women, respectively. The gender gap in intergenerational persistence has decreased in the completion of new compulsory schooling but remains unchanged at the post-compulsory schooling level after the reform.

Our findings indicate that the direct effect of compulsory schooling on the gender gap in intergenerational education transmission at the compulsory level of schooling is strong. However, the positive spillover effect of the reform beyond the compulsory level is limited. Hence increasing mandatory years of schooling is an effective policy tool to eliminate the gender gap in the inheritance of education inequality as long as policymakers recognize that its effect will be limited to what is compulsory. Our results concur with Duflo (2012) in that continuous policy commitment is needed to bring about equality between men and women.

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