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Does education affect religiosity?

Causal evidence from a conservative emerging economy*

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Abstract

Do people become more or less religious with more education? The previous literature offers mixed findings on the relationship between education and religiosity. This may be due to endogeneity bias: education and religiosity can be caused by a third variable such as culture or upbringing. We instrument education by exposure to the 1997 education reform in Turkey which increased mandatory schooling from 5 to 8 years. The reform increased the probability that young girls complete 8 years of schooling and reduced their later-in-life self-reported religiosity. In contrast, it did not influence such outcomes for boys. These effects are primarily observed for females growing up in strongly religious or poor areas and in areas without significant presence of the Kurdish minority.

Keywords: Education, religiosity, 2SLS, gender, social norms, Turkey.

JEL Codes: H52; I26; J10; Z12.

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A little philosophy inclineth man's mind to atheism, but depth in philosophy bringeth men's minds about to religion. Francis Bacon

Where knowledge ends, religion begins. Benjamin Disraeli

1. Introduction

Religion is “human beings’ relation to that which they regard as holy, sacred, absolute, spiritual, divine, or worthy of especial reverence”.¹ By its nature, religion is based on premises that are unverifiable and taken at face value, supported by long-held beliefs, traditions, and occurrences interpreted as miracles. As such, some would argue that religion is potentially at odds with *science*, defined as a “system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation”.² This brings the question whether education, based on scientific principles and results, should not lead to a decline in religiosity.

Religion has a number of important implications for one’s wellbeing. It offers a system of behavioral norms and values: the *Ten Commandments* in Judaism, Christianity and Islam are one example. These norms help improve the outcomes of inter-personal interactions and make them more predictable. Religious people also tend to be happier (see Deaton and Stone, 2013, and the references therein). A potentially important reason for this is the prospect of eternal life (in the afterlife or by means of reincarnation) offered by religions. Furthermore, religious communities provide insurance against income shocks (Clark and Lelkes, 2009; Dehejia et al., 2005) and club goods such as spiritual or monetary support, dispute resolution and the like (Berman, 2000). However, religions also impose important restrictions on one’s behavior and appearance, which may in turn restrict their labor-market options. This is especially the case in relatively conservative and traditional societies. O’Neil and Bilgin (2013) show that religious women in Turkey are more likely to hold conservative and patriarchal views, while Dildar (2015) finds that women in Turkey who are religious and/or identify with patriarchal norms are in turn less likely to join the labor force. Submitting to such restrictions may diminish one’s wellbeing. Inasmuch as education has an impact on religiosity, it can thus make an important contribution to one’s quality of life beyond impacting their labor-market participation and other outcomes.

So far, the evidence on the relationship between education and religion has been mixed. Glaeser & Sacerdote (2008) observe that, in the United States, participation in religious activities increases with one’s education. A similar positive correlation is found also in the UK and France, but is absent in other countries. In contrast, Glaeser & Sacerdote (2008) report a negative correlation between education and religious participation at the level of denominations: the members of the most religiously active groups tend to be least educated, and vice versa; they explain this by sorting, whereby educated individuals (who have more outside options) migrate to less strict religions.

¹ Encyclopedia Britannica, <https://www.britannica.com/topic/religion> (accessed September 2023).

² Ibid.

Other studies also fail to reach a consensus on the relationship between education and religion. Some find a negative correlation: Arias-Vazquez (2012) for the US; Hungerman (2014), Dilmaghani (2019) for Canada; and Mocan and Pogorelova (2017) for European countries). However, others find a positive effect: Albrecht and Heaton (1984) for Mormons, Gruber (2005) for American in general. Most such studies, however, constitute correlational evidence and thus lack causal identification free of endogeneity bias. For example, both education and religiosity could be caused by a third, unobserved, variable such as parental upbringing or culture.

Several recent contributions present causal evidence on the relationship between education and religiosity. Using a reform in compulsory years of schooling as an instrumental variable, Hungerman (2014) concludes that higher education levels lead to lower levels of religious participation later in life. An additional year of education results in a 4 percent decrease in the likelihood of an individual identifying with any religious tradition. Becker et al. (2017) use data from 61 German cities between 1890 and 1930 and, controlling for city-fixed effects, they find that an increase in advanced-school enrolment rates in those cities is negatively related to the rate of Protestant church attendance. Mocan and Pogorelova (2014) employ microdata from 11 European countries and find that compulsory schooling reforms, enacted in the 1960s and 1970s, decreased various measures of religiosity and the tendency for being superstitious. Similarly, Masuda and Yudhistira (2020) use cohort variations in exposure to the 1978 education reform in Indonesia and conclude that getting an extra year of education reduced self-declared religiosity by 4 percent.

In 1997, Turkey enacted a new Compulsory Education Law, which increased the compulsory education from 5 to 8 years, targeting those born after 1985 (11 years old and younger in 1997). Its primary stated objective was to prepare Turkey for entry into the European Union (EU) by increasing access to education and reducing geographic and gender-specific educational disparities. However, the immediate reasons for the reform were political (see the discussion in the next section). Access to education has been widely accepted by the EU as a way to increase economic and social development in Turkey as well as to achieve greater economic and social cohesion between the eastern and western regions. Important, while the reform increased the duration of compulsory education, the curriculum used or the quality of education did not change (Dulger, 2004). Looking at raw figures, the net enrolment rate in primary education for girls increased from 78.97% in the 1997-98 academic year, to 83.79%, 88.45%, and 90.79% for the 1998-99, 1999-00, and 2000-01 academic years, respectively. It took another six years (i.e., until the 2007-08 academic year) before net enrolments at primary education level between girls and boys equalized (Özgenur, 2019).

The findings for girls along with potential heterogeneities raise questions about the intended and unintended consequences of the reform and their pathways. While there was no explicit government statement linking the policy to gender inequalities or disadvantaged groups, the already high enrolment rates in primary education among boys help explain the more pronounced effects among girls. However, given the significant social and educational inequalities across regions, other characteristics, in addition to gender, may influence the impact of educational reforms.

In this analysis, we aim to identify such nuanced effects of education on religiosity. Exploiting the 1997 Turkish education reform, we estimate the causal effect of educational attainment on religiosity in Turkey and explore the heterogeneity of this relationship across genders and socio-economic characteristics. Previous studies evaluating the effect of education on religiosity in Turkey ignore the differential reform intensity across provinces and regions, which might cause bias in the estimates (Duflo, 2001). Therefore, our identification strategy employs instrumental variables with treatment interacted with regional reform intensity measured by teacher/student ratios at provincial level. Results show that the effect of education reform both on educational attainment and religiosity is restricted to girls, who report an increase in schooling and, as a result, a drop in religiosity. These effects, however, are observed only for girls from relatively poor or religious regions and from those without a significant share of the Kurdish minority. Our results are robust to the usage of different regression specifications and survive a multitude of robustness checks.

Our approach builds on and extends the research by Cesur and Mocan (2018), who, using the same reform episode, conclude that urban women who received more education are less likely to vote for an Islamic party, they are less likely to wear Islamic head covering, and they espouse more modern social values (while they find little impact on rural women or on men). Cesur and Mocan, however, determine urban vs rural status based on respondents' residence at the time of the survey, not when they were in full-time education. This could introduce bias as individuals can move to urban areas or remain in rural areas based on their educational attainments or other characteristics. In contrast, our methodology segments data based on residence before the reform's enactment. Moreover, while Cesur and Mocan use the date of birth as their primary metric for estimating the reform's impact, our analysis integrates both date of birth and reform intensity across time and provinces. This approach not only captures the direct effects of the reform based on birth cohorts but also accounts for the dynamic changes in educational resources over time and across different regions. By incorporating this temporal and provincial variation, we factor in the considerable differences in educational quality and access throughout Turkey, providing a more comprehensive understanding of the reform's influence on religiosity.

Another closely related paper is Erten & Keskin (2019), based on a later educational reform that took place in 2012. They find that this reform increased school attendance by both boys and girls, lead to more girls in religious areas staying in schools, and encouraged marginal student to choose vocational rather than academic high schools. However, there are important differences between the two reforms. As we argue above, the 1997 reform only changed the duration of education but did not affect it content or quality. Therefore, the reform serves as a particularly clean instrument to study the causal link between education and religiosity due to its exogenous. On the other hand, the 2012 education reform, known as the 4+4+4 reform, was implemented by the Justice and Development Party (AKP) which has been dominating Turkish politics since 2002. The reform increased the duration of compulsory education to 12 years as well as reformed the curriculum. In particular, the reform strengthened the religious education curriculum within the schooling system and reduced the strictly secular nature of

education in Turkey. Notably, the 2012 reform explicitly allows the option of opting for religious education, which was not permissible under the 1997 rules: it recreated religion schools – so called Imam Hatip schools (Gün & Baskan, 2014). The increased tolerance or even support of religious education could thus confound the Erten and Keskin's findings. Indeed, Meyersson (2014) finds that greater tolerance of religious attitudes by some schools in 1994 increases the school attendance of pious girls as their schools failed to enforce the headscarf bans that were in place at the time; no such bans were envisaged by the 2012 reform. Our analysis, by focusing on the 1997 education reform, provides a more straightforward examination of the relationship between education and religiosity without the confounding effects inherent in later reform.

Section 2 describes the education reform that increased the length of compulsory education in Turkey. Section 3 introduces the data and methods. Section 4 presents the results. Section 5 contains the robustness checks, while Section 6 discusses and concludes.

2. The 1997 Compulsory Education Reform (CER) in Turkey

The Compulsory education law was legislated in Turkey in August 1997. The new law, which increased compulsory education from 5 to 8 years, applied to the children born after 1985, i.e. those 11 years old and younger in 1997. The reform was politically motivated: it was adopted after Turkey briefly had a government headed by the religious *Welfare Party*: this government assumed office in June 1996 and was deposed by the military in February 1997.³ Although the stated objective of the reform was to accelerate the process of harmonization with the EU, the reform also served to restrict children's enrolment in religious schools as such schools were not recognized by the reform (Dulger, 2004; Özer et al., 2018, 2023).

The new law combined the primary school (years 1 to 5) and the lower-secondary school (years 6 to 8) were to form a new primary school covering years 1 to 8. The net enrolment rate went from 85.6% in 1997 to 96.3% in 2002, which translated to approximately 1.1 million additional students in years 1 to 8 (Figure 1). To meet the increased demands for teaching, there was a substantial increase in the number of teachers employed with more than 70,000 new primary school teachers hired after 1997 (Figure 2). Moreover, between 1997 and 2002, in order to accommodate the increased demand for school placements, a total of 81,500 new primary school classrooms were built, resulting in an approximate 40% increase in capacity (World Bank, 2005). Various plans were implemented to improve access for rural children, such as bus transport, the establishment of boarding schools, and the consolidation or closure of some village schools. Students from low-income families were given free textbooks and school meals (Dulger, 2004). The funds required for the Compulsory Education Plan to reach its goals

³ The *Welfare Party* was the winner of the general elections held in December 1995, receiving 21.4 percent of the votes and 158 deputies. However, this was not enough to form a government so a coalition government was formed which held office between 28 June 1996 and 30 June 1997. On February 28, 1997, the Turkish Armed Forces seized power and forced the government to resign. Subsequently, on May 21, 1997, the Chief Public Prosecutor of the Supreme Court, filed a lawsuit against the *Welfare Party* on the grounds of "acting against the principles of the secular republic". The *Welfare Party* was dissolved by the Constitutional Court on January 16, 1998, after 8 months of litigation.

were calculated at \$11.3 billion. These expenses were financed by allocations from the General budget, with additional financial support obtained from the World Bank.

3. Data and Methodology

3.1. Data

We use the 2013 wave of the Turkish Household Life Satisfaction Survey (THLSS) administered by the Turkish Statistical Institute. The use of a single wave was necessary as questions on respondents' province and region of residence (needed in the identification strategy) was only included in 2013. Our analysis is based on individuals born between 1981 and 1991. We designate those born after 1986 as the treatment group, while those born before 1986 constitute the control group. Due to the lax enforcement of the age cut-off, there remains ambiguity regarding the status of individuals born in 1986: some may have been affected by the reform while others were not. To circumvent potential misclassification, we omitted the birth year 1986 from the data. In subsequent robustness checks, we assess the implications of including individuals born in 1986, by examining them either as part of the treatment or control groups.

Educational attainment is measured with the following educational outcomes: did not receive any education; did not finish primary school; completed primary school; completed junior high school; completed senior high school; and graduated from university. From this variable, we isolate and construct three relevant educational outcomes to be used in the analysis: a) having completed 8 years of schooling (graduated from junior high school, or JHSG), b) having completed senior high school (graduated from senior high school, or SHSG) and c) having completed university education (university graduate, or UG).

Religiosity is captured by three variables, namely: 1) "How important are the religious beliefs of other people around you to you?" with "important", "moderate" and "not important" as possible answers; 2) "How important is the opinion of the people around you (relatives, friends, neighbors, etc.) about your religious beliefs?" again with "important", "moderate" and "not important" as possible answers; and finally, 3) "To what extent are you interested in religion?" with "interested", "moderately interested" and "not interested" as possible answers.⁴ Each of the three variables is dichotomized (1 for "important" or "interested" and 0 otherwise) and then all three are aggregated to form an index (i.e. ranging from 0 to 3) which is finally normalized by dividing the index values by three.

3.2 Empirical Strategy

To address the potentially endogenous relationship between education and religiosity, we adopt an instrumental variable (IV) approach. The 1997 education reform in Turkey increased the number of years of compulsory education from 5 to 8 and established new primary schools (years 1 to 8) integrating the previous compulsory primary (years 1 to 5) and non-compulsory junior high schools (years 5 to 8).

⁴ A fourth answer of "I do not know" was also available, which however was recorded as missing due to the lack of clarity about its interpretation. The questions were formulated in a neutral fashion, without implying judgement concerning the respondent's religious views.

The reform itself was largely politically motivated and unrelated to the educational situation in Turkey at the time, hence rendering it a policy change that could provide exogenous variation to study the effects of education in Turkey.

In practice, there was substantial geographical heterogeneity in reform implementation with greater intensity in regions with low pre-reform gross enrolment in secondary schools (Dinçer et al., 2014; Özer et al., 2018). Duflo (2001) argues that in countries where disparities in educational attainments are common across regions and provinces, the use of a single dummy variable as an instrument for schooling is inaccurate. Following Duflo (2001), and in contrast to most past studies on education reform in Turkey, we employ an identification strategy that interacts the treatment variable with intensity so as to capture the effect of the reform by province and year. As reform intensity variable, we use the variation in the number of teachers by province and year of birth.⁵ The first stage regression is given in eq (1), whereby exposure to the education reform augmented by reform intensity is used as an instrument.

$$S_{ipc} = \beta_0 + \beta_1(Teacher_{pc} * Treated_i) + \beta_2 Teacher_{pc} + \beta_3(Genrol96_p * Treated_i) + \mu_p + \theta_c + \varepsilon_{ipc} \quad (1)$$

S_{ipc} denotes the education level of individual i living in city p and birth year c . $Treated_i$ denotes the treatment status and takes the value of 1 for the group was born between 1987-1991 who completed 8 years of compulsory education due to the education reform, and 0 for the those born between 1981-1985 who therefore were not affected by the education reform. $Teacher_{pc}$ is a treatment intensity variable and is obtained by dividing the number of teachers in years 1 to 8 in province p when the cohort with birth year c started in year 6 by the total number of students at primary and secondary schools for cohort c and province p . $Genrol96_p$ is the gross enrolment rate to sixth grade in the 1996-97 academic year, which we include to control for the pre-reform state of education in the province (see below for further details). μ_p denotes the province fixed effects capturing unobserved and time-invariant regional factors (such as socio-economic development, school and teacher quality, urbanization rates), θ_c stands for the birth-year fixed effects, capturing cohort effects such as economic and social policies that may affect religion and/or education, while ε_{ipc} is a random error term.

⁵ Data for the number of teachers by province and year were collected from the National Education Statistics yearbooks of Turkey's Ministry of Education. These allow detailed categorization according to the number of teachers and year. However, data collation requires reviewing all yearbooks and manually aggregating teacher numbers at the province level. Information on the number of children aged 6 to 13 comes from censuses conducted in 1985, 1990, and 2000. The exponential function method was used for the missing years between the censuses. The main source of the teachers/children ratio is the increase in the number of teachers. For this reason, filling the missing data with the exponential function method will not make a significant difference in the calculations. However, we cannot say that the missing data imputations to fill the data between the census years are correct for the estimation requirement.

The effect of the reform on education of the treatment group is calculated as $\beta_1 + \beta_2$, while the effect on the control group is β_2 . Therefore, β_1 shows the effect of education reform on the treated group if the control and treatment groups are equally affected by other factors related to the intensity variable, and the reform is exogenous. The identifying assumption is based on the fact that there is no correlation between education reform and uncontrolled region-specific or time-varying variables (Duflo, 2001). As the intensity of the reform could be correlated with the pre-reform enrolment rates in 1996, the estimation can be biased without controlling for such factors. We do so through an interaction of the treatment dummy with gross enrolment rates in 1996, i.e. $Genrol96_p$.

The effect of schooling on religiosity is given in the second stage, eq (2).

$$R_{ipc} = \beta_0^r + \beta_1^r S_{ipc} + \beta_2^r Teacher_{pc} + \beta_3^r (Genrol96_p * Treated_i) + \mu_p^r + \theta_c^r + \varepsilon_{ipc}^r \quad (2)$$

where R_{ipc} is the religious outcome of individual i who lives in province p and was born in year c , while the rest of the notation is as previously explained. The regression in the second stage incorporates all the controls from the first stage, making the identification of the coefficient for predicted schooling solely reliant on the exclusion of the interaction term from the regression in this second stage. Provided that the ratio of primary school teachers to children ($Teacher_{pc}$) only impacts religiosity through its effect on schooling, the 2SLS models estimate will reflect the causal impact of schooling on religiosity.

For estimations, we use linear 2SLS model as proposed by Angrist (1991) and Angrist (2001). For binary outcomes and instrumental variables, linear models predict marginal treatment effects more robustly and accurately than non-linear models, regardless of whether the dependent variable is binary or continuous (Angrist & Pischke, 2009). Considering that standard errors may be correlated for individuals with the same birth year, and/or region, we cluster standard errors by region of residence and year of birth (Pischke and von Wachter, 2008; Brunello, Fabbri and Fort, 2013; Agüero and Bharadwaj, 2014; Grépin and Bharadwaj, 2015).

3.3 Heterogeneity

Heterogeneity of effects is explored according to a number of background characteristics. We focus on pre-determined characteristics to avoid considering outcomes affected by education. First, we split the sample by gender to see whether our analysis confirms past findings. Second, we examine whether the results differ according to the strength of religiosity in the student's province prior to the roll-out of the reform. We do this by splitting the sample at the median of the distribution of province-level votes for the Islamist political party, the *Welfare Party*, in the 1995 General Election in Turkey.⁶ Provinces with voting percentages above the national median (i.e. 22.2% of votes) are considered as exhibiting stronger religiosity sentiment. Third, we split the sample according to the provincial income based on the per capita 1996 Gross Domestic Product. In this, we follow Taşöz Düşündere (2019) by dividing the

⁶ The election results for the 79 provinces in 1995 were obtained from <http://www.secim-sonuclari.com/1995>.

province into those falling into its low middle income and high middle income categories in 1996 (the World Bank did not classify any Turkish provinces as either low or high income in that year). Fourth, we further divide our analysis based on the provinces' Kurdish population densities. In this approach, we categorize provinces into those with significant Kurdish minorities and those without. Determining the exact percentage of people belonging to Kurdish ethnic groups can be complex, because of a variety of factors, including the policies of local authorities and the historical context of the region. In areas with a history of inter-ethnic conflict, people can be reluctant to express their ethnic identities, which can further complicate efforts to obtain accurate demographic data of Kurds in the region. Therefore, we classify provinces as having a significant Kurdish identity based on the historical presence of Kurdish political movements and their electoral performance rather than according to officially-reported minority shares in the population.⁷

4. Analysis

4.1 Descriptive statistics

Panel A of Table 1 presents the descriptive statistics by gender and treatment status. For all educational outcomes, men have higher attainments than women. The pre-reform proportion of those completing an 8-year education is 45% and 72% for women and men, respectively, which rises to 74% for women and 90% for men post-reform. Similar but smaller increases are observed for the other two education variables. As for religiosity, women seem more devoted than men for each of the religiosity variables. For both genders, the differences in religiosity between the treatment and control groups seem small.

Panel B shows the descriptive statistics for the main subgroups that we consider in the heterogeneity analysis. Not surprisingly, well-off regions have significantly higher educational levels than poorer regions. Similar, though smaller, differences can also be observed between less and more religious regions. Also in line with expectations, provinces that are below the median level of income display higher levels of religiosity, both for men and women, than provinces with above-median incomes. Not surprisingly, provinces with greater support for political Islam show higher average levels of religiosity. Finally, when considering the presence of the Kurdish minority, particularly glaring differences appear: the Kurdish-dominated regions show substantially lower educational attainment than Turkish-dominated regions – especially for girls. The Kurdish areas also seem more religious but these differences are less dramatic.

When comparing the control and treatment groups, it is apparent that the dichotomies discussed in the previous paragraph were only slightly diminished by the reform of compulsory education.

4.2 Results

The results of the first stage estimations by gender are given in Table 2. The instrument has a strong positive and statistically significant effect on the junior high school completion rates (JHSG) for women born in 1987 or later. The F-statistic is 40.7 indicating instrument validity and allowing robust estimation

⁷ The provinces included in this study as regions with significant Kurdish populations are Diyarbakır, Mardin, Şırnak, Van, Batman, Hakkari, Siirt, Tunceli, Ağrı, Bitlis, Muş, and Iğdır.

(Staiger & Stock, 1997). The results indicate also an increase in the probability of senior high school completion (SHSG) for the treated but the instrument does not appear sufficiently strong, with the F-statistic being only 4.9. We find no effect of the reform on university education (UEDC) for females: this is not surprising, as the reform did not affect education beyond the junior high school. On the other hand, the estimated effects of the reform on males are insignificant (or only moderately significant for the senior high school). Overall, the law change had little effect on male education but did seem to significantly affect the JHS completion for females. Therefore, we continue the analysis by focusing on females and causally evaluate the effect of women's education on religiosity.

According to the OLS regressions in Table 3, the completion of 8 years of compulsory education decreases the women's religious orientation for all four variables used in the study. The IV estimates, for the most part, confirm these findings but suggest an even larger impact of education on religiosity. Specifically, we find that the reform reduced the probability that respondents consider others' religious belief important by 42 percentage points, while a drop of 32 percentage points was estimated for the probability of being interested in religion. The religiosity index was reduced by 0.37 units, implying a 65% drop in religiosity (i.e. in Table 1, the mean religiosity index is 0.57).⁸

4.3 Robustness checks

As previously explained, those born in 1986 were dropped from the main estimations. To examine how the results change when this year is included, we first include it in the treatment group, then in the control group, and again repeat the estimations. Tables 4 and 5 present the results of the first and second-stage regressions suggesting that our findings are robust to these alterations.

Further, we examine the robustness of the first-stage results by birth cohort. To do so, eq (1) is expanded and instead of collapsing cohorts to a binary treatment, we interact the policy intensity variable with birth cohort dummies and as such estimate the effect of the reform on educational attainment separately for each cohort.

$$S_{ipc} = \beta_0 + \beta_1 \sum_{i=1}^{10} (Teacher_{pc} * Cohort_{ic}) + \beta_2 Teacher_{pc} + \beta_3 (Genrol96_p * Treated_i) + \mu_p + \theta_c + \varepsilon_{ipc} \quad (3)$$

where $Cohort_{ic}$ denotes different cohort dummies. Results are given in Table 6. In line with our previous findings, the effect of the reform is non-significant for all cohorts before the reform took place, while it turns highly significant and positive for birth years 1987 onwards.

⁸ Note that our results suggest that exposure to schooling reduced religiosity while the descriptive statistics in Table 1 suggest that religiosity remained similar in the women exposed to the schooling reform and those who were not affected (we are grateful to an anonymous referee for pointing this to us). This is because the IV estimates are the conditional Local Average Treatment Effects (conditional LATEs), meaning that they show the effect on religiosity conditional on the control variables for compliers, ie those who changed their education as a result of the reform. The descriptive statistics, instead, are the unconditional Average Treatment Effects (unconditional ATEs). The additional education could have affected religiosity directly, or indirectly through its effect on some of the covariates.

As a final robustness check, we examine a narrower window of birth years and keep in the sample those born between 1982 and 1990. This brings control and treatment groups closer to each other in terms of age. Individuals born 1982-1985 form the control group with the rest in the treatment group. The caveat here is that the reduction in the number of observations implies larger standard errors. Table 7 suggests that the narrower birth year window does not significantly alter the reform's effect on education or religiosity when compared to the main results.

4.4 Counterfactual tests

To test whether the findings are driven by unobserved time trends, we perform a temporal counterfactual test, whereby individuals born in 1980-1982 are denoted as the control group and those born between 1983 and 1985 are denoted as treated. Given that neither of these groups was actually affected by the education reform, we would expect no statistically significant effects either on educational attainment or on religiosity. Table 8 presents the result for the first and second-stage regressions. All coefficients are statistically insignificant and the F-statistic is close to zero, suggesting the absence of effects on outcomes and low explanatory power for the instrument.

4.5 Heterogeneity

In this section, we present the results of a nuanced analysis of the impact of educational outcomes on religiosity, particularly with respect to gender. Table 9 presents the results of splitting the provinces according to the vote percentage for the *Welfare Party* in the 1995 election. We can see that although educational outcomes improve across the board, the magnitude of this improvement is more pronounced in provinces with stronger religiosity. This suggests that the reform might have been particularly instrumental in bridging the educational gap for females in religious regions. This finding has significant implications for gender equality. It indicates that reforms targeting education can potentially counteract deeply entrenched cultural and religious norms that might otherwise hinder female educational attainment. It also resonates with the idea that providing education in regions with stronger religious sentiments can be a strategic move towards achieving gender equality.

Table 10 presents results according to provincial income per person. We find that for provinces with higher GDP per capita, the reform had no effect on educational attainment or religiosity. On the contrary, the reform both increased education and reduced religiosity in the poorer provinces. This could suggest that in the regions with a higher GDP per capita, other factors beyond the reform might play a pivotal role in determining educational outcomes. However, in the poorer provinces, the reform had a dual impact: it not only boosted educational attainment but also reduced religiosity.

As a final element of our heterogeneity analysis, we explore the impact of education reform on religiosity by comparing regions with varying Kurdish population densities. Table 11 presents these findings, segregating provinces into those with and without significant Kurdish minorities. In provinces with a less pronounced Kurdish presence, we observe a notable correlation between our instrumental variable and education. Similarly, we observe a reduction in religiosity measures among females in these provinces. This suggests that the reform has been effective in these areas, especially in bridging the

educational gap for women and reducing the strength of religious beliefs. Conversely, in Kurdish-dominated provinces, the results indicate a lack of significant impact of the reform on both education and religiosity. The instrumental variable shows no substantial effect on education duration. Similarly, we observe no impact of education on religiosity. This disparity in outcomes underscores the importance of considering regional and ethnic contexts in assessing the effectiveness of educational policies, particularly when addressing gender-based educational disparities.⁹

5. Conclusions

This paper investigates the effect of education on religiosity, using the 1997 Compulsory Education Reform in Turkey which led to an increase in compulsory education from 5 to 8 years. Our paper extends the existing literature by focusing on the heterogeneity of the policy effect and identifies the channels through which such effect works. Further, we offer a methodological extension of the past work, whereby we incorporate differential policy intensity in the identification strategy. Using the reform as a source of exogenous variation in schooling, we obtain causal estimates of the effect of education on religiosity.

Overall, we find the reform had a significant impact on female education and religiosity, while it did not influence such outcomes for males. Specifically, the reform increased the probability that young girls completed 8 years of schooling and reduced their later-in-life self-reported religiosity. The effect of the reform is limited to increasing junior high school completion rates. In contrast, there appears to be little spillover to higher educational attainment suggesting that those who would complete more than 8 years of education would do so irrespective of the compulsory education law.

The lack of an effect on males potentially implies an imbalance in the experience of young males and females within households. The reform was successful in closing the gap between males' and females' educational attainment and through an increase in female education potentially influences their role in the society. In the absence of the reform, males would still attain roughly the same level of education. In contrast, the reform raised the completion rates for females as their barriers to education were mainly cultural. Exploring heterogeneity of the effect further, we find that the effects are not homogenous across all females. Rather, they are present mainly for females from strongly religious or relatively poor backgrounds. However, we do not observe these effects in the Kurdish-dominated areas – although these tend to be also poorer and more religious, suggesting that the education reform was less effective there. Whether intentional or not, the reform affected these sub-groups that would be disadvantaged otherwise and potentially affords them opportunities to overcome labor-market barriers and close the inequality gap.

Overall, our results, are partially in line with Cesur and Mocan (2018) who also examine the Turkish education reform, finding evidence of effects concentrating on females currently residing in

⁹ We estimated similar regressions for males with the sample split into sub-groups according to income, religiosity and significant presence of the Kurdish minority. The first stage results again show no statistically significant effects of the reform on educational attainments of males for these sub-samples (these results are available upon request).

urban areas (as opposed to the conditions experienced at the time of the reform), which could be an endogenous choice and an outcome of the reform. Looking at the wider literature, a decline in religiosity due to increased education is a persistent finding among studies controlling for confounding factors that seems generalizable across countries, although the lack of heterogeneity in analyses and the different in context make comparisons hard to draw (Hungerman, 2014; Mocan and Pogorelova, 2014; Becker et al., 2017; Masura, and Yudhistira, 2020). On the contrary, correlational studies yield mixed evidence suggesting endogeneity might be biasing results (Arias-Vazquez, 2012; Dilmaghani, 2019; Gruber, 2005).

We should, nevertheless, acknowledge that our religiosity outcome measures are subjective and self-reported and hence one should be cautious drawing inferences on the wider religiosity of Turkish society. This is even more important considering that our causal estimate is the local average treatment effects relevant for educational reform compilers and not necessarily for the average individual (Imbens and Angrist, 1994). Hence, while the Turkish educational reform seems to isolate the effect on those most in need, generalizations to other contexts or outcomes should be cautious.

References

- Agüero, J. M., & Bharadwaj, P. (2014). Do the more educated know more about health? evidence from schooling and HIV knowledge in Zimbabwe. *Economic Development and Cultural Change*, 62(3), 489-517. doi:10.1086/675398
- Albrecht, S. L., & Heaton, T. B. (1984). Secularization, higher education, and religiosity. *Review of Religious Research*, 26(1), 43. doi:10.2307/3511041
- Angrist, J. D., & Pischke, J. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton, NJ: Princeton University Press.
- Arias-Vazquez, F. J. 2012. "A Note on the Effect of Education on Religiosity." *Economics Letters* 117 (3): 895–897. doi:10.1016/j.econlet.2012.07.005.
- Berman, E. (2000), "A Sect, Subsidy and Sacrifice: An Economist's View of Ultra-Orthodox Jews." *Quarterly Journal of Economics* 115(3), 905-953.
- Becker, M., Neumann, M., & Dumont, H. (2017). Recent Developments in School Tracking Practices in Germany: An Overview and Outlook on Future Trends. *ORBIS SCHOLAE*, 10(3), 9–25. <https://doi.org/10.14712/23363177.2017.8>
- Brunello, G., Fabbri, D., & Fort, M. (2013). The causal effect of education on body mass: Evidence from Europe. *Journal of Labor Economics*, 31(1), 195-223. doi:10.1086/667236
- Cesur, R., and N. Mocan (2018). "Education, Religion, and Voter Preference in a Muslim Country." *Journal of Population Economics*, 31 (1): 1–44. doi:10.1007/s00148-017-0650-3.
- Clark, A. E., Lelkes, O., (2005), "Deliver Us from Evil: Religion as Insurance", *Papers on Economics of Religion* PER 06/03.
- Deaton, A., and A.A. Stone (2013). "Economic Analysis of Subjective Well-being: Two Happiness Puzzles." *American Economic Review: Papers & Proceedings* 103(3), 591–597
- Dehejia, R., DeLeire, T., Luttmer, E. F. .P., (2007), "Insuring Consumption and Happiness through Religious Organizations", *Journal of Public Economics* 91(1-2), 259-279.
- Dildar, Y. (2015). Patriarchal norms, religion, and female labor supply: Evidence from Turkey. *World Development*, 76, 40-61. doi: 10.1016/j.worlddev.2015.06.010.
- Dilmaghani, M. (2019). Education and religious decline: Evidence from the Canadian compulsory schooling laws. *Education Economics*, 27(3), 287-307. doi:10.1080/09645292.2019.1580349
- Dinçer, M. A., Kaushal, N., & Grossman, M. (2014). Women's Education: Harbinger of another spring? evidence from a natural experiment in Turkey. *World Development*, 64, 243-258. doi:10.1016/j.worlddev.2014.06.010
- Duflo, E. (2001). Schooling and labor market consequences of school construction in Indonesia: Evidence from an unusual policy experiment. *American Economic Review*, 91(4), 795-813. doi:10.1257/aer.91.4.795
- Dulger, I. (2004). Case study on Turkey: Rapid coverage for compulsory education program. In conference on scaling up poverty reduction, Shanghai, China. https://web.worldbank.org/archive/website00819C/WEB/PDF/TURKEY_B.PDF
- Özgenur, K. (2019). Eğitimin Yönetişi ve Finansmanı-Eğitim İzleme Raporu 2019. *Eğitim Reformu Girişimi (ERG) Eğitim Gözlem Evi*. (<https://dspace.ceid.org.tr/xmlui/handle/1/410>)
- Erten, B., & Keskin, P. (2019). Compulsory schooling for whom? The role of gender, poverty, and religiosity. *Economics of Education Review*, 72, 187-203.
- Glaeser, E. L., & Sacerdote, B. I. (2008). Education and religion. *Journal of Human Capital*, 2(2), 188-215.

- Grépin, K. A., & Bharadwaj, P. (2015). Maternal education and child mortality in Zimbabwe. *Journal of Health Economics*, 44, 97-117. doi:10.1016/j.jhealeco.2015.08.003
- Gruber, J. (2005). Religious Market Structure, Religious Participation, and Outcomes: Is Religion Good for You? *Advances in Economic Analysis & Policy*. 5. 1454-1454. 10.2202/1538-0637.1454.
- Gün, F., & Baskan, G. A. (2014). New education system in Turkey (4+ 4+ 4): A critical outlook. *Procedia-Social and Behavioral Sciences*, 131, 229-235.
- Hungerman, D. M. (2014). The effect of education on religion: Evidence from compulsory schooling laws. *Journal of Economic Behavior & Organization*, 104, 52–63. <https://doi.org/10.1016/j.jebo.2013.09.004>
- Imbens, G. W., & Angrist, J. D. (1994). Identification and Estimation of Local Average Treatment Effects. *Econometrica*, 62(2), 467. <https://doi.org/10.2307/2951620>
- Masuda, K., & Yudhistira, M. H. (2020). “Does Education Secularize the Islamic Population? The Effect of Years of Schooling on Religiosity, Voting, and Pluralism in Indonesia.” *World Development* 130: 104915. doi:10.1016/j.worlddev.2020.104915.
- Meyersson, E. (2014). “Islamic Rule and the Empowerment of the Poor and Pious.” *Econometrica* 82(1), 229–269.
- Mocan, N., & Pogorelova, L. (2014). Compulsory schooling laws and formation of beliefs: education, religion and superstition. No. w20557. National Bureau of Economic Research
- Mocan, N., & Pogorelova, L. (2017). Compulsory schooling laws and formation of beliefs: Education, religion and superstition. *Journal of Economic Behavior & Organization*, 142, 509–539. <https://doi.org/10.1016/j.jebo.2017.07.005>
- O’Neil, M. L., & Bilgin, M. H. (2013). Religion as a factor influencing Turkish women's decisions to work. *Journal of International Women's Studies*, 14(3), 163-173.
- Özer, M., Fidrmuc, J., and Eryurt, A. (2018). “Maternal education and childhood immunization in Turkey.” *Health Economics* 27(8), 1218-1229.
- Özer, M., Fidrmuc, J., and Eryurt, A. (2023). “Education and domestic violence: Evidence from a natural experiment in Turkey.” *Kyklos* 76(3), 436-460.
- Pischke, J. S. & Till von, W. (2005). Zero Returns to Compulsory Schooling in Germany: Evidence and Interpretation. IZA Discussion Papers 1645, Institute of Labor Economics (IZA).
- Taşöz Düşündere, A. (2019). 1992-2018 Dönemi için Gece Işıklarıyla İl Bazında GSYH Tahmini: 2018’de 81 İlin Büyüme Performansı. TEPAV Değerlendirme Notu. Mart 2019. 5 Ekim 2020 tarihinde erişilmiştir. <https://www.tepav.org.tr/tr/haberler/s/4450>.
- Staiger, D., & Stock, J. H. (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica*, 65(3), 557-586.

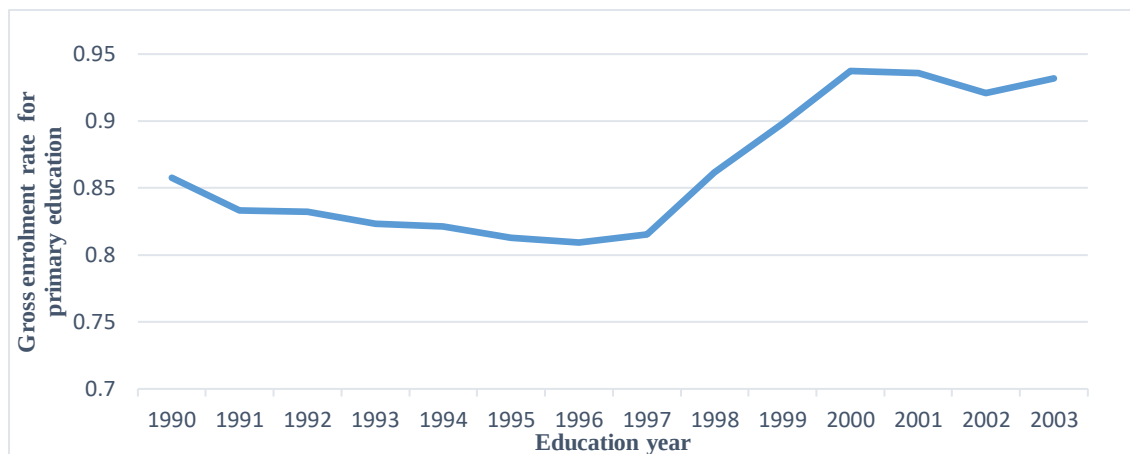


Figure 1. Gross enrolment rates to Grades 1 to 8 over time.

Source: Author's calculation from the National Education Statistics yearbooks of Turkey's Ministry of Education. The ratio is calculated by dividing the number of students in 1 to 8 grades with a population aged 6 to 13, the population should be at school.

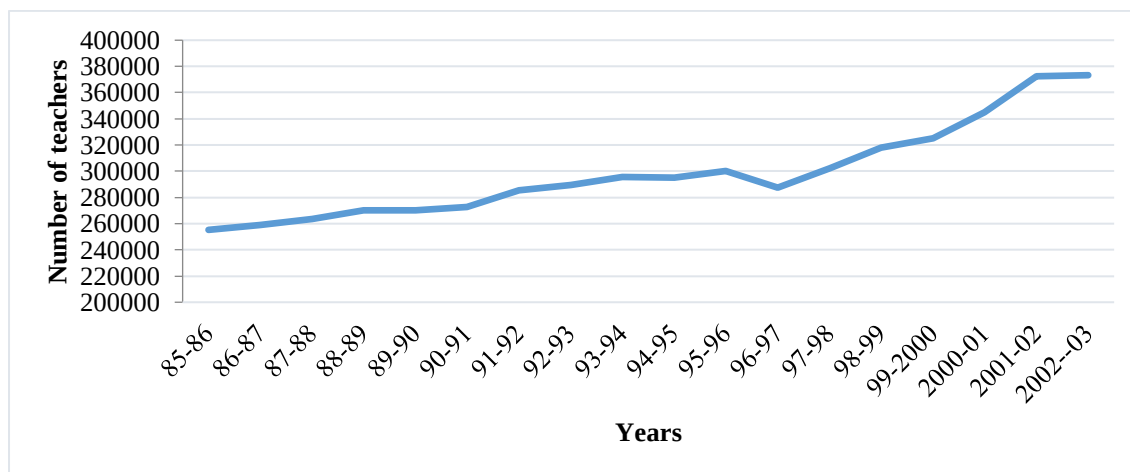


Figure 2. Number of teachers in Grades 1 to 8 over time.

Source: Author's calculation from the National Education Statistics yearbooks of Turkey's Ministry of Education.

Table 1: Descriptive statistics: Education and Religiosity

	Females				Males			
	Control (81-85 cohort)		Treatment (87-91 cohort)		Control (81-85 cohort)		Treatment (87-91 cohort)	
	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean
A. Full Sample								
JHS graduate	12609	0.452	10859	0.743	8263	0.719	7260	0.910
SHS graduate	12609	0.345	10859	0.470	8263	0.551	7260	0.625
University graduate	12609	0.174	10859	0.236	8263	0.279	7260	0.274
Religiosity index	12609	0.571	10859	0.579	8263	0.518	7260	0.510
Religion is important	12609	0.501	10859	0.506	8263	0.434	7260	0.430
Others' religious belief is important to me	12609	0.423	10859	0.434	8263	0.396	7260	0.390
High interest in religion	12609	0.789	10859	0.796	8263	0.725	7260	0.710

Source: Turkish Household Life Satisfaction Survey (2013 wave). JHS and SHS stand for junior and senior high school, respectively.

Table 1 (cont'd): Descriptive statistics: Education and Religiosity

B. Regional Sub-samples	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean
Poorer Regions	7576	0.375	6921	0.656	4470	0.693	4137	0.892
JHS graduate	7576	0.279	6921	0.394	4470	0.529	4137	0.596
SHS graduate	7576	0.129	6921	0.203	4470	0.267	4137	0.265
University graduate	7576	0.375	6921	0.656	4470	0.693	4137	0.892
Religiosity index	7576	0.603	6921	0.602	4470	0.537	4137	0.534
Religion is important	7576	0.525	6921	0.515	4470	0.456	4137	0.449
Others' religious belief is important to me	7576	0.456	6921	0.456	4470	0.413	4137	0.419
High interest in religion	7576	0.828	6921	0.835	4470	0.746	4137	0.733
Richer Regions								
JHS graduate	5033	0.554	3938	0.879	3793	0.746	3123	0.940
SHS graduate	5033	0.437	3938	0.579	3793	0.574	3123	0.671
University graduate	5033	0.230	3938	0.290	3793	0.296	3123	0.301
Religiosity index	5033	0.534	3938	0.535	3793	0.494	3123	0.477
Religion is important	5033	0.467	3938	0.476	3793	0.407	3123	0.403
Others' religious belief is important to me	5033	0.390	3938	0.390	3793	0.375	3123	0.353
High interest in religion	5033	0.745	3938	0.741	3793	0.700	3123	0.674
More Religious Regions								
JHS graduate	6097	0.416	5529	0.709	4078	0.707	3613	0.908
SHS graduate	6097	0.312	5529	0.436	4078	0.548	3613	0.634
University graduate	6097	0.152	5529	0.218	4078	0.291	3613	0.281
Religiosity index	6097	0.611	5529	0.618	4078	0.556	3613	0.548
Religion is important	6097	0.533	5529	0.539	4078	0.468	3613	0.458
Others' religious belief is important to me	6097	0.470	5529	0.477	4078	0.430	3613	0.424
High interest in religion	6097	0.830	5529	0.839	4078	0.769	3613	0.762
Less Religious Regions								
JHS graduate	6512	0.485	5330	0.775	4185	0.734	3647	0.920
SHS graduate	6512	0.378	5330	0.495	4185	0.555	3647	0.626
University graduate	6512	0.191	5330	0.255	4185	0.272	3647	0.282
Religiosity index	6512	0.536	5330	0.530	4185	0.472	3647	0.467
Religion is important	6512	0.467	5330	0.456	4185	0.388	3647	0.398
Others' religious belief is important to me	6512	0.383	5330	0.378	4185	0.354	3647	0.353
High interest in religion	6512	0.754	5330	0.755	4185	0.672	3647	0.650
Kurdish-dominated Regions								
JHS graduate	1850	0.229	2034	0.398	925	0.625	1020	0.810
SHS graduate	1850	0.168	2034	0.236	925	0.465	1020	0.490
University graduate	1850	0.085	2034	0.132	925	0.258	1020	0.226
Religiosity index	1850	0.669	2034	0.666	925	0.349	1020	0.590
Religion is important	1850	0.573	2034	0.552	925	0.471	1020	0.491
Others' religious belief is important to me	1850	0.540	2034	0.537	925	0.473	1020	0.467
High interest in religion	1850	0.894	2034	0.909	925	0.796	1020	0.813
Turkish-dominated Regions								
JHS graduate	10759	0.487	8825	0.818	7338	0.731	6240	0.930
SHS graduate	10759	0.374	8825	0.516	7338	0.562	6240	0.652
University graduate	10759	0.185	8825	0.259	7338	0.284	6240	0.290
Religiosity index	10759	0.558	8825	0.557	7338	0.508	6240	0.495
Religion is important	10759	0.489	8825	0.489	7338	0.425	6240	0.418
Others' religious belief is important to me	10759	0.410	8825	0.407	7338	0.385	6240	0.376
High interest in religion	10759	0.777	8825	0.775	7338	0.714	6240	0.689

Source: Turkish Household Life Satisfaction Survey (2013 wave). JHS and SHS stand for junior and senior high school, respectively.

Table 2. The effect of the reform on educational attainment (first stage)

	Females			Males		
	JHSG	SHSG	UG	JHSG	SHSG	UG
Treated*Teacher	6.001*** (0.941)	2.577** (1.159)	0.588 (0.933)	0.995 (0.782)	2.172* (1.134)	1.293 (0.909)
F-statistic	40.67	4.94	0.4	1.62	3.66	2.02
Observations	23,468	23,468	23,468	15,523	15,523	15,523

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 3. The effect of education reform on religiosity for females (second stage)

	Religiosity index	Religious belief important	Other's religious belief important	Interested in religion
OLS				
JHSG	-0.110*** (0.009)	-0.111*** (0.012)	-0.111*** (0.010)	-0.109*** (0.008)
IV				
JHSG	-0.365** (0.154)	-0.360 (0.228)	-0.420** (0.175)	-0.315** (0.158)
Observations	23,468	23,468	23,468	23,468

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 4. The effect of the reform on completing Junior High School (JHS) for females when 1986 birth cohort is included in the sample (first stage)

	1986 in treatment group	1986 in control group
Treated*Teacher	4.875*** (1.031)	5.656*** (0.861)
F-statistic	22.35	43.18
Observations	25,873	25,873

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 5. The effect of education on religiosity (second stage) for females when 1986 birth cohort is included in the sample

	Religiosity index	Religious belief important	Other's religious belief important	Interested in religion
1986 in treatment group				
JHSG	-0.432** (0.179)	-0.425 (0.259)	-0.376* (0.193)	-0.496** (0.210)
1986 in control group				
JHSG	-0.362** (0.154)	-0.354 (0.226)	-0.390** (0.177)	-0.342** (0.146)
Observations	25,873	25,873	25,873	25,873

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 6. Estimation effect of education reform on female Junior High School Graduation by birth cohort

1982	1.736 (2.178)
1983	-1.436 (1.920)
1984	-1.224 (2.109)
1985	0.573 (2.298)
1986	-0.210 (2.315)
1987	6.607*** (2.154)
1988	6.743*** (2.410)
1989	5.265** (2.482)
1990	5.308** (2.487)
1991	5.105** (2.099)
Observations	23468

Notes: 1981 birth year is the reference category. Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and teacher ratio by province and year.

Table 7. The effect of the reform on female education and religiosity when restricting window of birth cohorts to 1982-90

Variable	First Stage Dependent Variable	Second Stage Dependent Variables				
	JHSG	Variable	Religiosity index	Religious belief important	Other's religious belief important	Interested in Religion
Treated*Teacher	5.604*** (1.067)	JHSG	-0.320* (0.183)	-0.221 (0.263)	-0.346* (0.201)	-0.394** (0.198)
F-statistic	27.56					
Observations	18,694		18,694	18,694	18,694	18,694

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 8. The effect of the reform on female education and religiosity in a temporal counterfactual test

Variable	First stage dependent variable	Second stage dependent variables				
	JHSG	Variable	Religiosity index	Religious belief important	Other's religious belief important	Interested in religion
Treated*Teacher	-0.071 (1.022)	JHSG	2.555 (39.191)	10.755 (154.057)	-15.143 (213.210)	12.054 (172.684)
F-statistic	0.00					
Observations	25,575		23,468	23,468	23,468	23,468

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 9. The effect of education on religiosity (i.e. second stage) for females by share of votes for the Welfare Party.

Variable	First stage dependent variable	Second stage dependent variable				
	JHSG	Variable	Religiosity index	Religious belief important	Other's religious belief important	Interested in religion
Below median Welfare Party vote						
Treated*Teacher	6.177*** (1.345)	JHSG	-0.262 (0.211)	0.048 (0.273)	-0.495** (0.221)	-0.338 (0.271)
F-statistic	21.08					
Observations	11,308		11,308	11,308	11,308	11,308
Above median Welfare Party vote						
Treated*Teacher	9.876*** (1.645)	JHSG	-0.341** (0.141)	-0.482** (0.226)	-0.470** (0.217)	-0.072 (0.105)
F-statistic	36.02					
Observations	11,626		11,626	11,626	11,626	11,626

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 10. The effect of education on religiosity (i.e. second stage) for females by provincial per capita income classification

First Stage			Second stage			
Variable	JHSG	Variable	Religiosity index	Religious belief important	Other's religious belief important	Interested in religion
Low middle income						
Treated*Teacher	6.016*** (1.138)	JHSG	-0.476** (0.241)	-0.336 (0.360)	-0.580** (0.264)	-0.511* (0.265)
F stat	27.95					
Observations	14,497		14,497	14,497	14,497	14,497
High middle income						
Treated*Teacher	-0.511 (1.488)	JHSG	4.074 (11.891)	4.281 (12.284)	5.200 (15.056)	2.740 (8.687)
F stat	0.12					
Observations	8,971		8,971	8,971	8,971	8,971

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.

Table 11. The effect of education on religiosity (i.e. second stage) for females by provincial share of Kurdish population

	First Stage		Second stage			
Variable	JHSG	Variable	Religiosity index	Religious belief important	Other's religious belief important	Interested in religion
Provinces without significant Kurdish presence						
Treated*Teacher	4.873*** (1.060)	JHSG	-0.404** (0.200)	-0.402 (0.300)	-0.454** (0.226)	-0.356* (0.207)
F stat	21.13					
Observations	19,584		19,584	19,584	19,584	19,584
Provinces with significant Kurdish presence						
Treated*Teacher	-3.796 (5.470)	JHSG	-0.454 (1.421)	-0.653 (1.949)	0.447 (1.756)	-1.155 (1.920)
F stat	0.48					
Observations	3,884		3,884	3,884	3,884	3,884

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996, gross enrolment rates, fixed effects of 26 regions of residence, the instrument (the interaction of treatment and Teacher ratio by province and year), and Teacher ratio by province and year.