

# Religious Devotion and Gender Equality: Parental Religiosity, Collective Conservatism, and Missing School-Girls in Turkey

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May 21, 2022

## Abstract

This paper studies how and to which extent religiosity causes gender equality. For this, I exploit quasi-natural variation in religiosity introduced by the rotating nature of Ramadan and the secular institutional setting of Turkey. I find that when the holy month coincides with the enrollment date in primary schools, girls' compulsory school attendance decreases. In addition, other outcomes suggest that the gap in gender equality persists: Women are less likely to participate in the labor force, be income-earners, or work in professional and technical jobs. Instead, they bear more children and are more likely to take primary roles in household chores. These results are robust to an alternative identification strategy that uses variation in daylight duration during Ramadan across provinces in the enrollment year. The findings suggest that increased religiosity in Ramadan and hence collective conservatism makes traditional gender norms more pronounced at the critical age of schooling, ultimately inflating gender inequality in the long run.

**Keywords:** Religiosity, Parents, Collective Conservatism, Ramadan, Social Norms, Education, Gender Equality, Compulsory School Attendance

**JEL Codes:** Z12, J16, I24, I25, J12, J13, K38, K42

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# 1 Introduction

Can parents' religiosity determine their daughters' futures? Parents are essential agents of the skills subsequent generations develop [Becker 1991]. They can shape the next generations' abilities in many ways, such as genes [Plug and Vijverberg 2003, Bjorklund, Lindahl, and Plug 2006], parental input [Borjas 1992, Fagereng, Mogstad, and Ronning 2021], neighborhoods inhabited [Chetty, Hendren, Kline, and Saez 2014, Chetty, Hendren, and Katz 2016], and transmitted economic preferences [Dohmen et al. 2012, Alan et al. 2017] and personal or cultural traits [Bisin and Verdier 2000; 2001, Lindbeck and Nyberg 2006] to next generations. However, the economics literature has not empirically elaborated on the role of religious beliefs carried by parents, as it is challenging to isolate them from other factors. Additionally, although education levels are improving globally, gender disparities persist, especially in developing countries [UNESCO 2010]. Recent studies such as Jayachandran [2015; 2021] suggest that social norms may be as important as levels of economic development in affecting the substantial variance in gender inequality across countries. Notably, the prevalence of Muslim people negatively correlates with females' education level [Norton and Tomal 2009, Cooray and Potrafke 2011, Kuran 2018] and most Muslim-majority countries persistently rank at the bottom of the Global Gender Gap Index.

In this study, I investigate the effects of parental religiosity on missing school-girls in Turkey and the extent to which it has resulted in gender inequalities long-term. To examine this question, I focus on the years after the proclamation of the Turkish republic in 1923. This context provides an excellent study environment for the following reasons: First, the state's principle of secularism means the legal regulations are independent of religious doctrines and traditions. Second, the society at that time was largely homogeneous in terms of education, religion, and occupation.<sup>1</sup> Third, the inherent nature of creating a secular nation

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<sup>1</sup> The population was predominantly agricultural, Muslim, and illiterate. According to the 1927 Census of Turkey, the adult literacy rates were 13 percent for men and 4 percent for women. Agriculture was the dominant means of production: 82 percent of adults (75 percent of men and 96 percent of women) worked in agriculture whereas trade and industry constituted less than 10 percent of the total jobs. In addition, 97 percent of the total population were Muslim and most non-Muslims lived in Istanbul.

plausibly eliminates the first-order effects of religious motivations for public servants' certain behaviors. Last but not least, compulsory school laws only became compelling after the 1961 Constitutional Law, which was passed following the military coup in 1960.<sup>2</sup> Therefore, in the absence of rigid legal pressure, as exists before 1961, parents' tastes for schooling and the perceived net returns in the labor and marriage markets associated with education will substantially affect children's enrollment in primary schools. To empirically analyze this, I focus on individuals who were of schooling age before this intervention and use census data from 1985, 1990, and 2000. As an identification strategy, I leverage Ramadan—the holy month of Islam—because Ramadan can increase participation in religious activities at intensive and extensive margins.

For the investigation, I apply the following empirical approaches: I first exploit the variation in distance between enrollment dates and Ramadan over time, as in [Van Ewijk \[2011\]](#), [Colussi, Isphording, and Pestel \[2021\]](#). The secular institutional setting ensures that the dates to enroll in compulsory primary school are fixed, whereas Ramadan moves around 10 days earlier every year. Additionally, 6-year-old children—the age at which compulsory schooling attendance (CSA, hereafter) starts—do not typically fast; therefore, children's schooling behaviors are unlikely to change because of Ramadan. However, children whose school registrations coincided with Ramadan experienced higher levels of parental religiosity during enrollments. To estimate the effect on the missing school-girls phenomenon, I interact the treatment variable with the gender of individuals after accounting for year- and province-specific variations in outcomes. Alternatively, I investigate it using the different fasting durations across provinces within the same registration year, as in [Campante and Yanagizawa-Drott \[2015\]](#), [Hornung, Schwerdt, and Strazzeri \[2021\]](#), [Aksoy and Gambetta](#)

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<sup>2</sup> [Angrist and Krueger \[1991\]](#) describes mechanisms that make compulsory schooling laws more effective: i. monitoring or outlawing child labor ii. introducing effective class attendance policies iii. requiring parents to send their children to school via parental responsibility laws. The Primary Education and Training Act of 1961 is the first effective Turkish law that dissuades parents from not complying with schooling laws by introducing penalties including fines and imprisonment. Furthermore, it is the first law that assigns wide-ranging duties to public servants at various administrative levels to monitor students' attendance and launch legal actions against parents.

[2020], Mehmood and Seror [2020]. In this case, religiosity intensity is higher for individuals from localities where fasting lasts longer when they turn 6. Again, I interact the intensity of religiosity with the individuals' genders to better understand differential impacts on boys and girls. I assume that prolonged durations within a region only induces an exogenous source of higher parental religiosity. Employing two types of exogenous variation offers certain advantages. For instance, it shows whether the results are sensitive to different measures of religiosity. Secondly, it allows a thorough analysis to reveal the impacts on gender gaps in various outcomes.

The results reveal that parental religiosity impedes girls' educational attainment in Turkey. Girls' probability to have CSA decreases by 4.3 pp when primary school enrollment dates occur up to three months after the start of Ramadan. The effect of increased parental religiosity is economically important: it corresponds to 8.8 percent of a standard deviation. The results are qualitatively similar on females' literacy status and year of completed schooling: Female literacy rates decrease by 2.7 pp when their enrollment in compulsory education coincides with Ramadan or occurs shortly after. Likewise, 5.6 hours more fasting in a year than the regional average lowers girls' CSA by 2.0 pp, on average. In contrast, Ramadan has no significant effects on male students' educational outcomes. These results are qualitatively robust to alternative specifications. I also find that the periods to begin the first three grades are critical for females' CSA, especially when compulsory schooling laws are insufficiently compelling.

The physical effects of fasting and particular school dress codes are unlikely to explain these findings. Instead, I attribute them to the effects of Ramadan on people's first- and second-order beliefs regarding gender norms. The results suggest that increasing religiosity may lead families to adopt more traditional gender norms and undervalue education for women, which may inflate gender inequality long-term. For example, I find that affected girls are 1.2 pp more likely to be out of the labor force, 2.8 pp less likely to be income-earners, and 0.6 pp less likely to work in professional and technical jobs. Similarly, exposure to more

intense parental religiosity in the form of 5.6 more hours of fasting in the enrollment year reduces girls' probability of being in the labor force by 2.2 pp and of being income-earners by 2.3 pp. It also reduces their likelihood of working in professional or technical jobs by 0.6 pp. Along with the decision not to participate in the labor force, I find that these women display certain demographic characteristics. They tend to have more children and they are more likely to be housewives. I found that 5.6 hours more fasting increases the number of children women bear by 8.8 percent, the likelihood of being married by 6.1 pp, and the probability of being a housewife by 14.7 pp.

These results contribute to several strands of the literature. First and most importantly, it contributes to the economics of religion.<sup>3</sup> This rapidly growing field includes studies document the factors that drive individuals into religiosity or increase the spread of religious organizations [Barro and McCleary 2005, Botticini and Eckstein 2007, Chen 2010, Binzel and Carvalho 2017, Ager and Ciccone 2018, Fruehwirth, Iyer, and Zhang 2019, Bentzen 2019; 2021]; the impact of religious identity on educational outcomes [Altonji et al. 2005, Botticini and Eckstein 2007, Becker and Woessmann 2008; 2009, West and Woessmann 2010, Botticini and Eckstein 2012, Alesina et al. 2020]; and the long-term impacts of missionary activities on education and economic development [Bai and Kung 2015, Castelló-Climent et al. 2018, Valencia Caicedo 2019]. The papers most similar to this study, Becker and Woessmann [2008], Norton and Tomal [2009], Cooray and Potrafke [2011], indicate the positive and negative correlations between Protestantism and Islam and gender equality general and in education. Nunn et al. [2014] reveals the different effects of Protestant and Catholic missionary activities in colonial Africa on the education of men and women. I contribute to this literature by documenting that Muslim parents' religiosity significantly hinders girls' education, whereas decisions on boys' educational opportunities are resilient. As Iyer [2016] ascertained, the nexus between religion and demography remains an under-researched area by economists. Previous

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<sup>3</sup> Iannaccone [1998] and Iyer [2016] offer an overview of the literature on the economics of religion. Basedau, Gobien, and Prediger [2018] also reviews the studies on the causal effects of religion on socioeconomic outcomes. Kuran [2004] discusses the role of Islam in the underdevelopment of the Middle East and Kuran [2018] reviews and discusses the recent findings on Islam with their methodologies and aspects of future research.

studies on Ramadan fasting, such as [Campante and Yanagizawa-Drott \[2015\]](#), [Oosterbeek and van der Klaauw \[2013\]](#), [Mehmood and Seror \[2020\]](#), do not isolate the physiological effects of Ramadan fasting. However, future studies can approach Ramadan in experiments in an innovative way that mitigates its physical implications.

This paper also contributes to our understanding of the role of religion in education in Turkey. While previous studies, such as [Meyersson \[2014\]](#), [Gulesci and Meyersson \[2015\]](#), [Erten and Keskin \[2019\]](#), [Sakalli \[2020\]](#), examine changes in the provision of education or institutional settings, I address how religiosity affects demands for CSA when controlling for the supply-side characteristics associated with educational attainment. So, the policy recommendations differ dramatically: Augmenting religiosity may result in adverse beliefs towards gender equality and aggravate the dire gender equality situation in Turkey that can persist over generations.<sup>4</sup> The findings also suggest that the phenomenon of missing school-girls cannot be fully explained by secular school dress codes, given that the conventional time for wearing a headscarf in Turkey corresponds to the onset of puberty, after the compulsory schooling age.

This study also contributes to the literature on the origins of norms and economics of culture.<sup>5</sup> [Clingsmith, Khwaja, and Kremer \[2009\]](#) shows that participating in certain religious activities can increase tolerance and [Benjamin, Choi, and Fisher \[2016\]](#) shows that priming individuals' religious identity affects their decision to contribute to the public good. The study is also related to the origins of gender norms. Previous studies reveal that agricultural technology [[Alesina, Giuliano, and Nunn 2013](#)], language [[Gay et al. 2018](#)], soil texture [[Carranza 2014](#)], and matrilineality [[Gneezy, Leonard, and List 2009](#)] are some of the roots of the prevailing gender inequality today. I add that religiosity, as well as religious

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<sup>4</sup> Erdoğan's nation-building policy targets Islamization of society [[Yilmaz 2019](#)]. He frequently declares his desire to raise a pious and revengeful generation. The expansion of religious schools, increased religious courses in the school curriculum, vast increases in the Directorate of Religious Affairs' budget, and the symbolic conversion of the Hagia Sophia in Istanbul from museum to mosque are some of his interventions intended to make Islamic values dominant again. [Karapehlivan \[2019\]](#) presents the implemented educational policies during Turkey's pro-Islamist era.

<sup>5</sup> The economics of culture is elaborated in [Guiso, Sapienza, and Zingales \[2006\]](#), [Alesina and Giuliano \[2015\]](#). [Giuliano \[2017\]](#) discusses the literature on the origins of gender disparities from a historical perspective.

salience, may induce the higher salience of traditional gender values for women. This paper also speaks to the literature on the importance of family ties to the roles attitudes and beliefs play in promoting or hampering women’s agency. [Alesina and Giuliano \[2010\]](#) reveals that women from families with stronger ties have lower labor force participation. I also suggest that parental religiosity ultimately leads Muslim women to lead lives under the traditional male breadwinner framework.

The remainder of this paper proceeds as follows. Section 2 outlines the compulsory schooling laws in the late Ottoman period and after the proclamation of the republic. Section 3 starts with the rules on the primary school enrollment process. Then, the data and identification strategies employed in this study are explained, along with a discussion of Ramadan and religious beliefs. This section ends with the empirical strategy employed in this work. Section 4 illustrates the main findings. Finally, Section 5 presents the concluding remarks.

## 2 Background

Directly after the proclamation of the republic, the new state implemented modernization reforms in many areas, including education, though most of these followed the state ideology disseminated after the *Tanzimat* Edict. Before the *Tanzimat* Edict, girls from Muslim families were only able to attend courses in primary schools. After that, primary education—religious or liberal—was compulsory for all children of different religious backgrounds; however, every religious community had to provide education for its own people. Coeducation in these schools was uncommon and only possible when only one school existed in the neighborhood [[Gelisi 2004](#)].<sup>6</sup> Over time, liberal female schools for further levels of education were opened.<sup>7</sup>

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<sup>6</sup> The other exception is coeducation at the university level, which started after female students boycotted the courses at the female university in 1921.

<sup>7</sup> The first female lower-middle school, *İnas Ruşdiye*, was opened in 1859 [[Somel 2001](#)]. Upper-middle schools, *İnas İdadî*, and high schools, *İnas Sultanîye*, and a university for women, *Inas Darülfunun*, were opened in 1911, 1913, and 1915, respectively.

**Education in the Context of Nation-Building.** The political elites of the time reached the consensus that the decentralized education system was one of the reasons the Ottoman Empire became a failed state [Çiçek 2012]. They perceived that education delivered within communities enabled them to build national identities and escalated secessionist movements. Additionally, the cultural divide between schooled and unschooled generations of Muslims was another motive to design a countrywide education policy. In addition, the mass execution and deportation of non-Muslim populations in the 1910s resulted in a lack of skilled laborers. According to the 1927 census, the proportion of men who could read Arabic letters was 12.9 percent and only 3.7 percent of women could do the same. Even in Istanbul, the former capital city that was exempted from the 1923 population exchange program between Greece and Turkey, literacy in Arabic letters was at 45.5 percent among men and 36.9 percent among women.<sup>8</sup> Consequently, the transformation of the remained population from pre-modern to modern society was essential [Pamuk 2018]. Education was integral to Atatürk’s nation-building policies.<sup>9</sup>

After abolishing the Sultanate, a series of top-down policies, including educational reforms, were implemented.<sup>10</sup> Five months after the proclamation of the republic, the education system took its conventional form, i.e., unified, centralized, national, and secular. Authority over schools was given to the Ministry of National Education and all religious education institutions were terminated. According to the law, children aged 6 were obliged to receive a 5-year

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<sup>8</sup> Istanbul contained only 5 percent of the Turkish population at that time.

<sup>9</sup> Alesina, Giuliano, and Reich [2021] discusses states’ internal motives to homogenize the population by providing mass primary education.

<sup>10</sup> The secularization of the West is widely documented in the economics literature. Increased religious competition after the Protestant Reformation [Ekelund, Hébert, and Tollison 2002, Cantoni, Dittmar, and Yuchtman 2018], the conflict-reducing effect of Ottomans in Europe [Iyigun 2008], Martin Luther’s translation of the Bible to German and its encouragement of literacy [Becker and Woessmann 2009], the diffusion of printing technologies during the Protestant Reformation [Rubin 2014], and the power shift during the post-Reformation period from religious elites to secular ones [Cantoni, Dittmar, and Yuchtman 2018] are some examples given in the literature.



primary education regardless of their gender.<sup>11</sup> Additionally, coeducation in primary schools was allowed [Earle 1925]. In 1927, gender-mixed education was established in all secondary schools [Başgöz 2005]. The primary education curriculum contained some religious courses until 1933 [Özdalga 2018]. From 1938 to 1950, religious courses were omitted from the regular curriculum and then became voluntary in primary schools.

**Pious People’s Resistance to the Reforms.** In the late 1920s, Islamic elements in every state institution were largely erased. Sharia courts were abolished and the civil marriage law was introduced. The new civil code prohibited polygamy, subjected marriage to secular law, outlawed unilateral divorce, and recognized gender equality in children’s inheritance and guardianship. Although most of the language reforms in the early republican era focused on fostering literacy among ordinary people, these reforms also targeted the creation of a new culture compatible with the state ideology. As such, longer periods of exposure to secular values and instilling them through education in Turkey reduced religious preferences [Meyersson 2014, Gulesci and Meyersson 2015, Cesur and Mocan 2018]. Furthermore, more than 80 percent of the Ottoman vocabulary was either Arabic or Persian [Assouad 2020]. Attempts to Turkify the language, converting the alphabet and numbering system from Arabic to Latin, translating the Quran to Turkish, and initiating the recitation of call to prayer in Turkish are some of the social engineering practices used to curb Arab civilizations’ cultural influences on the nation. However, these cultural policies were not widely appreciated. Sakalli [2020] points to religiosity, proxied by the historical presence of Armenians, as an underlying reason for the East-West divide of Turkey. He finds that secularist policies further strengthened religious identity in these areas, reduced levels of educational attainment and labor productivity, and increased support for pro-Islamist parties.

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<sup>11</sup> A regulation passed in the following years also states that primary schools in villages could provide *at least three years of schooling*. In contrast, schools in other categories should offer the 5-year track. However, the law was quickly reworked and the duration of compulsory education was finalized at 5 years. As this study focuses on parents’ enrollment decisions for compulsory education and village schooling could last for five years, according to the existing law, I assume that primary school education at this time continues for 5 years.

The new civil codes did allow women to be emancipated from traditional Islamist interpretations had imposed on them; however, resilient norms remained an obstacle for the full implementation of women’s rights [Toprak 1995, Arat 2010]. Most Turkish families still maintain traditional values and gender inequality remains a serious problem in Turkey. For instance, Erten and Keskin [2019] reveals that the reform that increased the compulsory years of schooling from 8 to 12 in 2012 was most effective on girls in more religiously conservative regions and their inclusion in education substantially reduced the percentage of girls who did not attend school or training programs and were absent from the labor force. Many families consider schools a threat to their daughters’ modesty and prefer an early marriage to schooling [Rankin and Aytac 2006]. Especially, more impoverished (and pious) parents hesitated to send their daughters to school without a headscarf [Çarkoğlu and Toprak 2007].<sup>12</sup> Likewise, Meyersson [2014] finds that Islamic rule increased female education in poorer areas, where Islamic values are more prevalent, reduced adolescent marriages, and increased female political participation.

### 3 Empirical Framework

Here, I first elaborate on the CSA regulations that have been in effect since the republic began. In the 3.2 section, I present the data used in this study with detailed information on how I construct the main variables of interest. I allocate the 3.3 section to explain the two identification strategies that I leverage in this study. Additionally, I discuss and present the potential effects of Ramadan on individuals’ beliefs. In the final part 3.4, I explain the specifications that I use to estimate these effects.

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<sup>12</sup> Veiling as a strategic choice enabling women to engage with outside economic opportunities while preserving their reputation in the community is demonstrated theoretically by Carvalho [2013] and empirically by Aksoy and Gambetta [2016], Shofia [2021].

### 3.1 Enrollments in Primary Schools

Despite the strenuous effort expended to build a modern Turkish nation, the state guaranteed the right to education by introducing the 1961 Constitutional Law after the military coup. The new constitution includes a well-defined monitoring system for school-aged children and a deterrence mechanism for parents who remove education rights from their children. More precisely, the Primary Education and Training Act of 1961 enacted on January 12, 1961, clearly defined the duties of elected neighborhood representatives (*muhtar*), provincial directorates of education, and school principals to monitor the CSA of school-age children.<sup>13</sup> Furthermore, the law allowed legal action against parents of non-attending students. According to the constitution, parents could be fined up to 2 TL  $\approx$  2 \$ per day of absence. Figure A.1 shows the predictions of the gender gap in the proportion of formal degree holders in provinces over time. The estimates indicate that Kemalist education reform slightly increased the gender gap. In other words, despite the increased number of schools permitting female students, we observe an equilibrium resulting in a larger gender gap in education. At the same time, when parents are discouraged from failing to enroll students' siblings, a substantial reduction in the gender gap occurs.

### 3.2 Data

I use a pool of samples from Turkish population censuses collected in 1985, 1990, and 2000. The censuses were conducted by imposing one-day country-wide curfews on October 20, 1985, October 21, 1990, and October 22, 2000. The data include all the face-to-face interviews conducted through census-takers' visits to all places serving as households or

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<sup>13</sup> See the original version of the Law on Primary Education and Education [here](#) (available only in Turkish). By introducing this into the new constitution, the elected representatives and the provincial directorates of education became responsible for ensuring that school-age children were enrolled. Additionally, the elected representatives became liable for an annual list of children living in their jurisdiction at the relevant age, which they were required to present to the provincial directorates of education 15 days before school began. Moreover, in cases of non-registration, school principals had the right to register the children and inform the parents of students' compulsory attendance by law. [Karapehlivan \[2019\]](#) also states that the right to education was fully recognized in the 1961 Constitution.

non-households, including dormitories, hospitals, prisons, and military districts. The census samples I incorporate record 5 percent of the population randomly selected by their province of residence and all subgroups within the sample are representative.<sup>14</sup>

The survey instruments include some universally asked questions as well as birth information, e.g., the age of individuals during the census and their province of birth. Also, I can retrospectively observe whether individuals completed primary school as well as their literacy status. Female respondents represent 48 percent of the total; year of birth is 1942, on average (Table B.3). 70 percent of the individuals born in 1923–1955 can read and write in Turkish and 61 percent completed primary school. Note that I cannot directly measure when individuals enrolled in or completed primary school; therefore, the enrollment rates in primary school are lower than these statistics as individuals may attain primary education after the typical schooling age. I also estimate the year of completed schooling based on the 5+3+3 pre-tertiary tracking system in Turkey and assuming literacy skills are gained after one year of education.

I generate some labor market outcomes that align with the sub-indicators of the Global Gender Gap Index to construct the contributions of parental belief systems to gender equality in Turkey. These are individuals' labor force participation status, whether they are income-earners or not, and whether they work in professional or technical jobs.<sup>15</sup> Having professional and technical jobs refers to working in the reference period at the following occupations: physician, chemist, or related occupations; architect, engineer, or similar technician; pilot, warrant officer, or maritime engineer; biologist, agronomist, or related

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<sup>14</sup> As Turkey's administrative boundaries changed slightly over time, the number of provinces increased from 67 in 1985 to 81 in 2000. I discuss the potential implications of this change in Section 4.1.

<sup>15</sup> I predominantly rely on the definitions and indicators of the Global Gender Gap Index, with some exceptions. Firstly, the index is based on macro-level data and this paper uses micro-level data. Secondly, the index uses estimated gender gaps in income and wage; however, I look at this effect at an extensive margin because the census does not include the earned income. Regarding the advancement gap between women and men, the index uses the ratio of women to men among legislators, senior officials, and managers and the ratio of women to men among technical and professional workers. However, I only focus on professional and technical jobs. To construct data on professional and technical jobs, the index uses the standard occupational classifications of the International Labour Organization (ILO). Because the ILO and the census apply different classifications—ISCO-08 and ISCO-68, respectively—I harmonize them using the respective correspondence table.

technician; medicine-related occupation; statistician, mathematician, system analyst, or related technician; economist; financial advisor or accountant; teaching-related occupation, religious cleric, or related occupation; writer or literature-related occupation; sculptor, painter, photographer, or other fine art; sportsperson or related occupation; and unclassified scientific or technical occupation.

In addition to the labor market conditions of individuals, I measure their marital status and the number of children that the female respondent has birthed. To better understand the reason behind their decision to participate in the labor force, I also generate an outcome showing whether the woman is a housewife, which suggests that the main reason for her to be out of the labor force is that she is busy with household chores. Of the sample, 62 percent are in the labor force, the income earners constitute 42 percent, and 6 percent of the individuals work in professional or technical jobs. Marriage is almost universal: 89 percent of respondents are married (Table B.3). Note that the census collects childbearing information only from females, whereas housewife status is captured from a question asked of everybody out of the labor force to know why they are not looking for a job. However, I only focus on females, given the strictly gendered division of household labor in Turkey, particularly among these cohorts. On average, there are 4.8 births per woman and 53 percent of women are not seeking jobs due to their household chore responsibilities.

To estimate the effect of parental religiosity on female enrollment in primary schools, I mainly use two exogenous variables related to Ramadan fasting. First, I exploit the timing of the enrollment dates compared to the starting date of the last Ramadan. To measure this, I rely on the educational regulations applied in the past has been ongoing and I choose the middle day of the enrollment period to minimize the measurement error in calculating its distance to the most recent Ramadan's starting date. According to current regulations, children's registrations start on the first day of July. Although the end of the registration period is not specified by the regulations, schools usually start in the second week of September. Therefore, I use August 5 to calculate the distance measure. As the starting age for school

is fixed at 6 years old, I match this variable with the birth year information of individuals in the sample. By doing so, I identify the birth cohorts whose enrollments fall into the 3 months following Ramadan’s starting date. I discuss the potential measurement error and its implications on the main findings in Section 4.2. I show there that the results remain qualitatively similar when I use alternative enrollment dates within the period from July 5 to September 15.

The second variable that I use to estimate the effect of parental religiosity is the duration of religious fasting. After retrieving the coordinates of districts, I use the *datetime* package of Python and the beginning and ending dates of Ramadan to calculate districts’ fasting duration each year, proxied by the time between sunset and sunrise on the dates during Ramadan. To estimate this variable at the province level, I weight the results by the districts’ population sizes. Birthplace and birth year information are the identifiers that I use to match these variables of interest with the census data. Table B.3 shows that 26 percent of the individuals’ enrollment dates were no more than 90 days after the beginning of Ramadan. The average daily fasting hours in the year that an average individual in the sample must have enrolled in primary school was 12.5 hours with 1.8 hours of standard deviation. Note that as Ramadan fasting lasts for roughly 30 days, the variation across provinces is considerable: one standard deviation of total hourly fasting duration corresponds to 55.6 hours total.

To consider the economic conditions in the enrollment year, I use the historical national income per capita retrieved from [2010 Maddison Project](#) as well as the estimates of [Asik et al. \[2020\]](#) for the historical administrative units to determine the disparity between provincial and national per capita income. They calculate an index starting in 1913 and showing the evolution of spatial disparities in Turkey, using Ottoman statistics and other sources of data for the decades before World War I as well as official statistics and other data from modern Turkey since the 1920s. As two of the income statistics that I use in this study are calculated for some benchmark years, I use linear interpolation to generate annual and provincial data. In addition, because there are some changes in administrative boundaries over time, I impute

the same value to new administrative units of the historical administrative unit that contains the new one. The primary school enrollment year income per capita of the birth province of an average person in the sample was 10 pp lower than the country-level income per capita (Table B.3).

### 3.3 Identification Strategies

The role of religion and religiosity in women’s participation in the economy and its effects on their decisions have been long debated in the literature; however, identifying a causal effect is challenging as the extent to which individuals participate in religious activities is a choice to allocate their limited time among religious and secular activities while maximizing their lifetime and afterlife utility [Azzi and Ehrenberg 1975].<sup>16</sup> As Iyer [2016] pointed out, empirical analysis with the standard survey questions on religious affiliation and individuals’ religiosity is subject to the endogeneity problem in many ways. Therefore, an analysis to reveal the impact of religiosity requires an exogenous instrument that increases religiosity. In this regards, Ramadan constitutes a relevant natural experiment.

In Figure 1, I present the weekly Google search trend data of some terms closely related to religiosity from December 14, 2014 to December 1, 2019 and the spikes occurring during Ramadan months. People in Turkey search for information about the Quran more extensively during Ramadan, meaning that religious practices that are conducted digitally are more intensive during the holy month. Likewise, individuals make Google queries about the spiritual implications of their daily actions more frequently during Ramadan.

The use of Ramadan as a natural experiment in the economics literature is not new; previous studies have exploited it to address research questions varying from economic growth, health, and education to political economy. When methodologically classified, one can group

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<sup>16</sup> Iyer [2016], Basedau, Gobien, and Prediger [2018], Iyer [2019] review the literature on the effects of religion on economic development and demographics. Kuran [2018] focuses on the same stream of the literature, specifically studying Islam. Bentzen [2019] discusses why some societies are more religious than others, presenting the existing approach on religiosity in theoretical frameworks. The demand- and supply-side factors that cause differences in religiosity across societies are also presented.

them into two types: studies using the rotating nature of the Islamic calendar, hence the varying dates of Ramadan, and those using fasting hours, which change with Ramadan dates and latitude. Among the first group of studies, Ramadan months are exploited as a treatment to minority salience in Germany [Colussi, Isphording, and Pestel 2021]; as exposure to prenatal malnutrition [Van Ewijk 2011, Almond, Mazumder, and Van Ewijk 2015, Schultz-Nielsen, Tekin, and Greve 2016, Greve, Schultz-Nielsen, and Tekin 2017], and to reveal per se effects of Ramadan fasting on student performance in the Netherlands [Oosterbeek and van der Klaauw 2013]. Studies in the latter group use fasting hours to evaluate their impact on economic growth and subjective well-being [Campante and Yanagizawa-Drott 2015], student performance [Hornung, Schwerdt, and Strazzeri 2021]; support for Islamist parties in Turkey [Aksoy and Gambetta 2020]; and judicial behavior in Pakistan [Mehmood and Seror 2020]. In this study, I leverage both exogenous variations, sometimes using one to confirm the robustness of findings based on the other.

In Figure 2a, I show the varying time from enrollment dates to the first day of Ramadan over time. The enrollment dates, denoted by blue open circles, are fixed to August 5th due to the secular laws in Turkey, whereas the first Ramadan day, denoted by red solid circles, moves around 10 days earlier each year due to the Islamic calendar's idiosyncrasy. The vertical green lines display the number of days between the enrollment date and Ramadan for each school year. I first consider the affected group as the birth cohorts that are required to enroll in a primary school during Ramadan or the following two months. As registration dates fall just after Ramadan in 1946, the affected birth cohorts start with individuals born in 1940. The identifying assumption is that the time between enrollment dates and Ramadan is orthogonal to the individuals' observable and unobservable characteristics. I also assume that the variation only induces an exogenous variation in parents' religious beliefs. Note that Muslim children do not usually observe religious fasting, especially at age 6; therefore, in this context, we elicit an increased level of religiosity arising only in adults, including parents. Additionally, state officials' well-documented ambition to establish a secular Turkish state



rules out the possibility of Ramadan’s effects on state officials’ preferences.

This exogenous variation allows us to compare a group of individuals born in the same places but born in different years. However, incidents that occurred in certain years may violate the identifying assumption.<sup>17</sup> To address this issue, I use an alternative exogenous shock to religiosity that idiosyncratically varies across provinces within a single year: the fasting duration. Figure 2b shows the variation in total fasting duration across provinces within a region. Since the fasting duration differs by Ramadan dates and the latitude, the northern provinces’ fasting duration changes more substantially over time while that of southern provinces varies relatively little. Since the timing of Ramadan determines to what extent the fasting duration varies across provinces within the same region, the variation within a region almost disappears when Ramadan occurs in winter and is at its largest when Ramadan occurs in summer. When Ramadan occurs in summer, provinces’ fasting duration can deviate from the regional average by up to around 400 minutes. The identifying assumption here is that the religious fasting duration of provinces over time is orthogonal to individuals’ characteristics and exerts exogenous variation on parents’ religious beliefs, especially after controlling for some spatial- and time-fixed effects.

**Ramadan and Beliefs of Individuals.** The easily-screened nature of Ramadan fasting increases the number of participants. Augmented religiosity during Ramadan may directly affect individuals’ attitudes toward gender roles. At the same time, because Islamic practices are getting more salient, individuals’ second-order beliefs may tend to mimic religious doctrine. Thus, Ramadan may have explicit or implicit consequences for individuals’ preferences. Likewise, previous studies find that Ramadan fasting and other religious activities may reduce generalized trust [Campante and Yanagizawa-Drott 2015], increase tolerance [Clingingsmith, Khwaja, and Kremer 2009, Mehmood and Seror 2020], and reduce prosocial behavior of observants towards non-observants [Haruvy, Ioannou, and Golshirazi 2018].

Considering the correlation between religion and gender norms [Guiso, Sapienza, and

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<sup>17</sup> I discuss the plausibility of the assumption in Section 4.2.

Zingales 2003, Algan and Cahuc 2006], I examine whether Ramadan affects the religiosity and attitudes toward gender. To estimate, I use the Demographic and Health Survey of Turkey from 2008 and 2013. This much more recent data is applicable because women’s status in Islam has remained the same over a century, although the opportunities given to men and women have changed. For instance, the literacy rate among men in 1927 was 13 percent and the gender parity was 9 pp. In 2015, the men who completed short-term tertiary education or higher constituted 20 percent of the population over 25 years and the gender parity was 6 pp, according to the statistics released by UNESCO. For estimation, I follow the equation below:

$$\text{Beliefs}_{ipt} = \beta_m \text{ Monthly Distance}_{pt} + \theta_p + \mu_u + \lambda_t + \varepsilon_i \quad (1)$$

where Beliefs is the vector of gender norms as well as the religious practices of woman  $i$  living in province  $p$  at time  $t$ . Given the small variation in interview dates with respect to Ramadan (Figure B.1), I group the interviews monthly to estimate the effect of the time between interview dates and Ramadan on gender norms. Identification relies on the arguably exogenous variation of interview dates from the end of the most recent Ramadan that, consequently, induces presumably random variation in religiosity. Table B.2 in the Appendix supports this argument and reports whether the number of days since Ramadan is associated with women’s demographic characteristics. Despite some of the estimated coefficients being statistically significant, they remain economically insignificant. I include some personal characteristics as controls to increase the precision of the estimates and to absorb the slight differences in demographic characteristics by distance from Ramadan. Keeping the most recent month, i.e., the first month after Ramadan, as the reference group, I estimate to what extent women’s beliefs change in the second, third, fourth, and fifth months after Ramadan.  $\beta_m$  where  $m$  denotes these month groups reflects the estimated effect of time after Ramadan in months on individuals’ religiosity and gender norms compared to the reference group.

Praying, wearing a headscarf, and fasting are the outcomes for religiosity. As three-fourths of the women wear headscarves and three-fourths of the individuals observe religious fasting,

according to [Çarkoğlu and Toprak \[2007\]](#), headscarf and fasting questions act as a kind of balancing test to analyze whether the prevailing level of religiosity is stable across groups. Table 1 shows that the women interviewed on dates at different distances from Ramadan are statistically similar in their participation in such religious practices. Conversely, I find that the number of women reporting that they perform prayer regularly or irregularly decreases in the months after Ramadan. At the same time, in months further from Ramadan, I find that women’s influence on egalitarian family decisions, female education, and women’s participation in politics increase.

The findings could be driven by religiosity per se as well as by the higher salience of religion during Ramadan. In line with [Kuran \[1987; 1997\]](#)’s preference falsification hypothesis, women, who are often more gender-egalitarian, declare support for traditional gender roles when collective conservatism is more pronounced. Overall, it appears that the closer the interview date is to Ramadan, the more conservative and religious the responses of the women interviewed. The results suggest that families perceive lower educational returns for women in Ramadan and subsequent months, leading to girls missing school by reducing the likelihood of their enrollment in primary schools.

### 3.4 Empirical Strategies

The causal effect of religiosity during the enrollment period is captured by the following estimation equation:

$$Y_{i,p,c,t} = \beta_1 \text{Fem}_i * \text{Ramadan}_{t+6} + \theta_{p,t} + \lambda_{c,\text{Fem}} + t * \text{Fem}_{i,p} + \varepsilon_{i,p,t,c} \quad (2)$$

where  $Y$  denotes the education and labor-market-related outcomes for an individual  $i$  that are observed in census year  $c$  and born in province  $p$  in year  $t$ .  $\text{Ramadan}_{t+6}$  refers to whether individual  $i$  in birth cohort  $t$  has to register for primary school during Ramadan or the following two months. I estimate the effect among those born in 1923–1955 because, as

explained in Section 2, the Turkish education system available for this group of people was predominantly the same for all, regardless of gender. As the new constitutional law is very likely to affect parental enrollment decisions as well as incorporate public officials as additional actors in school registrations, I focus on the individuals born before the introduction of this law.

$\theta_{p,t}$  absorbs any spatial- and time-variant characteristics that affect the enrollment of boys and girls identically. Therefore, it includes the socioeconomic conditions of provinces where the children in the same birth-cohorts encounter challenges. For instance, I control for school resources, economic conditions, land productivity, and attitudes toward educational attainment through this fixed effect.  $\lambda_{c,\text{Fem}}$  captures any improvements in literacy skills over census years  $c$  through campaigns that aim to eliminate adult women’s illiteracy in Turkey, as well as population changes over time. Because the gender gap may vary differently across regions and over time,  $t * \text{Fem}_{i,p}$  accounts for the provincial gender gap trend over time in the outcome variables. Although the inclusion of time-specific fixed effects absorbs the Ramadan effect for individuals regardless of gender, it pays off greatly by capturing the crucial factors in parents’ decisions about the human capital investment in their children. As I aim to estimate the effect unique to girls,  $\beta_1$  constitutes the parameter of interest. I argue that the deviation in the affected years from the gender-gap trend exerts the causal effect of religiosity on girls’ educational attainment. As the errors can be correlated within provinces, I cluster the standard errors at the province-level (N=81).

The previous specification does not estimate Ramadan’s effect on men; on the other hand, the impact of religiosity on boys’ educational attainment may be substantial, given that [Sakalli \[2020\]](#) finds that the secularization of Turkey lowers educational levels in localities where religiosity was higher before secularization. To directly investigate the impact of parental religiosity for both boys and girls, I use an alternative instrument to measure parental religiosity that varies over time and across provinces. That is, the province-specific total fasting duration when birth cohorts must register for primary school. By doing so, I

can also assess the robustness of my previous results. By exploiting the variation in fasting duration within a year, I estimate the effect of religiosity on the probability of boys and girls holding a formal education diploma using the following equation:

$$Y_{i,r,p,c,t} = \beta_1 \text{FastHour}_{p,t+6} + \beta_2 \text{Fem}_i \times \text{FastHour}_{p,t+6} + \theta_{r,t} + t * \text{Fem}_{i,p} + \lambda_{c,\text{Fem}} + \varepsilon_{i,r,p,c,t} \quad (3)$$

where  $\text{FastHour}_{p,t+6}$  is the log of total fasting duration in birth province  $p$  in year  $t + 6$ , when birth cohort  $t$  is registered for primary school. I interact the fasting hours with the gender of individuals; therefore,  $\beta_1$  and  $\beta_2$  are the coefficients of interest in this estimation strategy. Therefore,  $\beta_1$  is the estimated effect that is prevalent among both boys and girls, whereas  $\beta_2$  reveals gender-differential effects of fasting durations in enrollment year. The fixed effects and the controls are mostly in line with Equation 2, with one exception: As fasting durations in a given year only vary across provinces (corresponding to NUTS-3 level), I instead use the NUTS-2 level of spatial fixed effects to not discriminate boys from girls.

## 4 Empirical Findings

This section starts with the main findings on the causal effects of parental religiosity on men’s and women’s educational outcomes. Then, I discuss the plausibility of my identifying assumptions in 4.2. Next, I elaborate, in 4.3, how the extent to which individuals were exposed to increased parental religiosity during their schooling age affects women’s educational outcomes. Finally, I show the consequences of parental religiosity on the other dimensions of gender equality.

### 4.1 Main Findings

Table 2 shows the estimated causal effects of parental religiosity on the educational attainment of men and women whenever possible. Column 1 reports the mean difference in completing

an educational degree between men and women conditional on province-specific birth cohort fixed effects, and the variation in outcomes across census years. The gender gap is extremely large: the estimated difference for individuals born in 1923–1956 is equivalent to 32.3 pp in favor of men, reflecting 66 percent of one standard deviation.

I introduce my benchmark treatment in the second column and the results are based on the specification given in the equation 2. In other words, the estimated effect here on females to be a degree-holder in their adult life obtained after the inclusion of province-specific time fixed effects, the census-year fixed effects, and the province-specific trend of the gender gap in the share of individuals holding any types of formal degree. It reveals that parental religiosity constitutes an impediment to girls' educational attainment and brings a significant group of missing school-girls in Turkey: Girls' chance to complete their compulsory education decreases by 4.3 pp when the registration date to primary schools is within three months since the start of Ramadan. In relative terms, the causal effect of increased religiosity on generating missing school-girls is by 8.8 percent standard deviation of the share of individuals with any type of formal degree. By the same token, the estimate reflects one-seventh of the prevailing gender difference in holding a formal degree presented in the first column.

The third column shows the estimates calculated with the alternative instrument that exploits the variation in total fasting duration across provinces and over time. Note that I control for spatial-related fixed effects at the NUTS-2 level; therefore, the estimates exploit within-region provincial fasting duration deviations from the region's average fasting duration in the same year, as depicted in Figure 2b. Also, I consider the potential variations in the gender gap of the province over time by taking a linear trend of the gender gap. The effect of fasting duration in the primary school enrollment year for boys' chance to be schooled is negative on average but statistically insignificant ( $\beta_1 = -0.267$ ,  $p = 0.573$ ). However, its effects for girls are negative as well as statistically and economically significant. I find that one standard deviation's increase in the yearly fasting duration ( $\mu = 387.2$   $\sigma = 55.6$ ) lowers girls' chances to hold any type of formal degree by 20 pp. Only 5.6 hours of positive deviation

from the regional average (10 percent of one standard deviation) lowers girls' chance to hold any type of formal degree by 2 pp; the equivalent of 6.1 percent of the conditional gender difference in completion rates as shown in the first column of the same table.

To better understand whether children are enrolled but then drop out after the first grade, I use the literacy status of individuals, as such skills are acquired during the first year of schooling. The estimated mean difference in literacy rates between men and women, conditional on birthplace, birth cohort fixed effects and census-year fixed effects is 32 pp, as shown in the fourth column of Table 2. I find that women's likelihood of literacy as adults decreases by 2.7 pp when their enrollment in primary school coincides with the three months following the start of Ramadan. The results related to fasting duration show that its effects on men's literacy are again negative and statistically insignificant ( $\beta_1 = -0.11$ ,  $p = 0.801$ ). For women, I find that 5.6 hours of positive deviation from the region's yearly fasting duration in the primary school registration year decreases girls' chances of literacy by 1.1 pp, reflecting 3.4 percent of the conditional gender gap in literacy status, as depicted in the fourth column.

The different magnitudes of the estimated effects on women's literacy rates and the percentage of women who completed at least primary school may mainly arise from what these outcome variables measure. I attribute this difference to what the outcome variables measure: Children gain literacy skills in the first grade; therefore, the results on literacy status may show the effects of Ramadan on girls' chance to start and complete the first grade of primary school. By the same token, the estimates on having completed primary school may reflect the aggregated effects of parental religiosity to which girls have been exposed during their entire primary school career. Yet, the estimates above underestimate the number of girls missing school due to parents' religious beliefs for several reasons. For instance, a law passed in 1983 during Kenan Evren's regime made literacy courses mandatory and introduced penal regulations. The campaign also prioritized some groups, including women [Sayilan and Yildiz 2009]. As such, due to the nature of the dataset, I am unable to capture to what extent mass literacy campaigns that had run before the earliest census year, particularly those targeting

women, lowered literacy rates.

In the remaining columns of Table 2, I show the results for the completed year of schooling. The conditional average years of completed schooling is lower for women than men by 66.9 percent. Having to enroll in primary school in the first three months since the start of Ramadan reduces girls' average completed years of schooling by 6.9 percent. As in the previous results, I do not find any significant changes in boys' completed years of education due to exogenous variation in fasting duration but 5.6 hours more fasting in a registration year lowers girls' average completed years of schooling by 2.9 percent.

## 4.2 Concerns over Identifying Assumptions

**Enrollment Period.** The previous results assume that the regulations for children born in 1923–1955 regarding school enrollment were the same as the present regulation. However, this is not certain, and this uncertainty may falsely identify unaffected groups as affected, and vice versa. In addition, even if this assumption is true, using the middle day of the enrollment period may give an average effect within the interval, but the estimated effects for the two most distant dates may differ both in direction and magnitude.

Thus, I employ every possible day within the enrollment period as the enrollment date to re-estimate the effect for all dates. Figure A.2 displays the previous results on all educational outcomes along with separate estimations for each enrollment date within the period. It shows that the estimates remain negative and statistically significant regardless of the date chosen within the enrollment period. Moreover, the estimates for each day are not statistically different from the presented results in Table 2, at a 95 percent confidence level. Although the results are statistically similar for different treatment definitions, I find the negative effects are slightly lower for enrollment dates during the second half of July and after September 1st.

**Localities within Same Province.** Available schools for children, attitudes towards schooling, the number of teachers, quality of education, and economic conditions and structure



may vary by locality, even within provinces. Considering this heterogeneity, the reported results are the average of the effects for localities with different characteristics within a province. If the data had contained more granular information regarding individuals' birthplaces, I could have better captured these heterogeneities and improved the estimates' precision. However, leveraging the increasing number of provinces over the census years, I show in Table A.1 that the estimates are highest in 2000, when there are 81 provinces, and lowest in 1985, when there are 67 provinces. Considering that life expectancy gets higher with education and the treated females are less educated, the issue of mortality is expected to underestimate the negative effect. Despite this, even after increasing the precision of the estimates, I still find statistically insignificant results regarding the effects on boys' education.

**World War II.** During the Second World War, Turkey remained neutral until the final stages and tried to remain equidistant from the Axis and the Allied forces until February 1945. However, the war's effects included economic distress. Thus, alongside families' gendered views about their offspring's education, budget constraints may have led families to prefer a higher investment in the children they believed to have a higher educational return. Such hardships may deepen the gender gap in education and may violate the identifying assumption about the treated group as assigned based on the dates corresponding to a particular group born in certain years. Nonetheless, the exogeneity of fasting duration remains plausible under these conditions.

I address this issue in two ways: First, I include the interaction of gender with the following income indicators: per capita income at the national level and provincial deviations from the national level when birth cohorts enroll in primary school. This accounts for the economic conditions at the local and macro levels when children enroll in primary school. The first and second columns of Table 3 report the results after controlling for such income effects and show that the estimates remain consistent with the previous results. I find that Ramadan lowers girls' chance to pursue their education by 3 pp, equivalent to 6.5 percent of

one standard deviation (reported in the first and second columns). At the same time, the negative estimated effects for boys increase slightly while those for girls decrease slightly. These changes in magnitude align with the argument given above. However, controlling for such concerns results in a lower bound of the estimates in the main results section. Second, I address this concern by estimating the effect within the five-year interval of birth cohorts from the same region. The results remain consistent with my previous findings.

**Income Effects of Religious Fasting.** As found in [Campante and Yanagizawa-Drott \[2015\]](#), religious fasting may induce lower labor productivity and decreases in income per capita as well as the physical consequences of longer hours of absenteeism. Therefore, families may prefer to educate male children over female ones in times that the household earns less. Note that the previous findings are based on variations in fasting duration within a region; therefore, the marginal effects of physical strains on labor productivity will be limited.

I provide evidence to support this argument in [Table A.3](#). The first two columns show the effect of fasting duration (in log) on the provincial income deviation from country-level income data (in log). The first column presents the unconditional effects of fasting duration on income. The second column additionally controls for the time trend of provinces' incomes. Despite the two results being statistically insignificant, I find that the duration of fasting hours causes provinces to deviate from the national income per capita by 4.9 percent. This finding aligns with the evidence [Campante and Yanagizawa-Drott \[2015\]](#) provides. However, when the duration variation occurs during the same year within a region, the negative effects turn positive and the standard error of the estimate increases dramatically. Therefore, the assumption that fasting duration increases parents' religiosity (after controlling for fixed effects) seems plausible.

### 4.3 Religiosity during Schooling Age

I next address whether exposure to parental religiosity at younger ages affects girls' level of education. To compare the relative effects, I use the starting date of education as school enrollments in Turkey automatically renew every year and parents register their children only once, before the first grade. For the estimation, I measure from the first day of Ramadan to September 15th, as the second week of September is the usual school starting week. Considering the potential collinearity, I estimate the effects separately for each grade, relying on the equation 2, and present the results on girls' average completed years of schooling in Figure 3. The estimated effect for the first grade is the largest and the hindering effect slightly diminishes by the fourth grade. The estimated effect of exposure by the eighth grade turns positive, potentially reflecting the self-selection of the female cohorts that reach eighth grade.

I then examine whether the intensity of parental religiosity when their children are schooling age matters for girls' education. The variation in average daily fasting hours measures it at the intensive margin exactly when the children enter primary schooling age. This investigation addresses the intensity that girls encounter during their entire schooling career. I estimate girls' chance to complete at least primary school and their completed year of schooling, relying on the equation 2 and I illustrate the results in Figure 4a and Figure 4b, respectively. The results reveal that a greater intensity of parental religiosity that girls experience during their entire CSA exacerbates the risk that they will not complete primary school. Additionally, the intensity significantly lowers girls' educational level. Table A.2 shows at which ages (or grades) girls are further vulnerable to ending their primary education while keeping the extent of exposure to Ramadan fixed. It appears that girls are more likely to end up with worse educational outcomes if their parents are more religious during their first three grades. Considering the age that girls are least likely to be schooled, being unable to wear a headscarf in schools is least likely to drive these results. At the same time, the state officials, including teachers, of that time were generally loyal to Kemalist ideology. Therefore,

the most likely source of this effect is parents' beliefs on gender. Otherwise, we would not find positive effects when girls experience a higher exogenous variation in religiosity during their eighth grade.

#### 4.4 Long-term Effects of Parental Religiosity

I now discuss the consequences of religious beliefs on women's adult outcomes, with a particular interest in the gender gap in the labor market to assess the implications for gender equality in Turkey. For the estimation, I rely on the specifications in equation 2 and 3; however, I additionally include the covariates introduced in the third column of Table 3 as labor market decisions are determined by age, labor market characteristics, and quality of education. As some of the individuals born in 1923–1955 were out of the working population after 1985, I estimate the results from 1985's census data. The results from other years' data are similar: The results from 1990 data are qualitatively identical to the reported year. In addition, I observe that the affected group of women is entering the labor market in 2000 as unpaid family workers due to Turkey's severe economic crisis starting in the final years of the 1990s. This outcome is not inconsistent with the main findings, given that women enter the labor market as unpaid and family workers, even in times when households face a high risk of income loss.<sup>18</sup>

I report the results using the days between enrollment and Ramadan and fasting duration in Table 4 and 5, respectively. They indicate that increased parental religiosity at enrollment age has substantial consequences for women's lives. For instance, I find that women who experience a higher level of parental religiosity in their early years are less likely to participate in the labor market. The estimated effects using the two instruments for parental religiosity are consistent and statistically significant. Women whose enrollment periods coincide with Ramadan are 1.2 pp less likely to be in the labor force. As parental religiosity did not exclude boys from schooling, I do not find significant effects on their participation in the labor market.

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<sup>18</sup> Results by census are available on request.

A higher degree of parental religiosity, measured by 5.6 hours more fasting in the primary school enrollment year, lowers women's participation rates in their adulthood by 2.2 pp. Women's lack of education due to their parents' beliefs result in significant inefficiencies in the Turkish economy.

Further results reveal that the labor force participation of women in Turkey is not only decreasing but parents' religious beliefs also reduce the proportions of female income-earners and female professionals in Turkey. I find that being an affected girl reduces women's likelihood of being income-earners by 2.8 pp and to work in professional or technical jobs by 0.6 pp. Similarly, exposure to more intense parental religiosity by 5.6 hours of fasting in the enrollment year reduces girls' probability of entering the labor force by 2.2 pp and of being an income-earner by 2.3 pp. It also reduces their likelihood of working in professional or technical jobs by 0.6 pp. As the coefficients for income-earner rates are considerably higher than those for labor force participation rates, if these women had had access to education, the opportunity cost of their inactivity would have been much higher and, therefore, they would have been more likely to be in the labor force. More importantly, it is unlikely that their participation in the labor market would have increased unemployment rates or the number of individuals working as unpaid family workers. Rather, they would have acquired jobs from which they could have earned an income and flourished with other female income-earners in the labor market, possible through inspiring other women as well as creating new jobs for them.

To further analyze the underlying reason for missing school-girls to be out of the labor force, I examine the effect on their marital status as a proxy for the number of children they bear, as the census collects the number of children only from women and enables us to observe one individual within a household. Additionally, marital status is one of the universally asked questions. The marital status results using these two instruments remain consistent and I find that the affected women's probability of being married is significantly higher, an increase of 3.0 pp.

The results of the number of children women bear are again consistent with the latter results. Women who are exposed to higher parental religiosity through 5.6 additional hours of fasting are 6.1 pp more likely to be married. For the regression result among women, I find that the effect of parental religiosity on their girls' childbearing is substantial; 5.6 hours more fasting in an enrollment year increases the number of children by 8.8 percent. Greater numbers of children may derive from these women marrying at an earlier age as well as their lack of information on contraceptive methods due to illiteracy. Because having more children increases the burden on women under the traditional household division of labor, I find that 5.6 hours more fasting increases the probability of women being out of the labor force due to household responsibilities by 14.7 pp.

## 5 Concluding Remarks

This study sheds light on the causal effects of parental religiosity on the gender gaps in educational access and labor market outcomes. For the empirical investigation, I focus on the first generation of the Turkish Republic, the first secular Muslim-majority country. The individuals born in 1923–1955 constitute the study group and the 1985, 1990, and 2000 censuses constitute the data.

In this study, I exploit Ramadan as a quasi-natural experiment for increased active religiosity in Turkey, where Muslims constitute 99 percent of the total population. Ramadan increases religious practice at both extensive and intensive margins. More importantly, the age of starting primary school is fixed at 6 years old and registration is only possible in a specified period during the summer. Therefore, some birth cohorts must enroll in primary school when their parents are more religious while the others enroll during relatively less religious periods. At the same time, some individuals enroll in primary school where fasting durations were longer than in other places within the region, exogenously creating higher parental religiosity.

The results reveal that parental religiosity impedes girls' educational attainment in Turkey. Girls' chance to complete their compulsory education decreases when the registration date for primary school occurs within three months of the start of Ramadan. The hindering effect of parental religiosity on girls' schooling is still evident when I estimate the impact on different educational outcomes. Conversely, exposure to increased parental religiosity is negative but statistically insignificant for boys' educational outcomes.

Parents' religious beliefs are significant factors in women's education and policymakers should reckon with the long-term aspects of policies that enhance citizens' religiosity. Policymakers should acknowledge that increased religiosity drives families to adhere to more traditional gender norms, which, unfortunately, leads them to undervalue the importance of educating women and reduces girls' enrollment in schools. I observed significantly lower levels of female education when the starting dates of new school years coincided with Ramadan and when parents' religious beliefs were strengthened during the beginning of their first three grade levels. These results suggest that missing school-girls in Turkey due to their parents' stronger religious beliefs are most likely the result of their parents' beliefs on gender. Increased parental religiosity when children are 6 years old causes considerable gender inequality in the labor market and results in significant inefficiency in the Turkish economy. I found that the participation of women in the labor force in Turkey is not only decreasing but parents' religious beliefs are also reducing the proportion of female income-earners and female professionals in Turkey.

If these women had had access to education, they would have been more likely to be in the labor force and less likely to be unemployed or unpaid family workers, instead holding jobs that would have given them an income. Furthermore, their inclusion in the labor market would attract other women, possibly through their presence inspiring others as well as through the new jobs that some of these women would create. I found that these women were only able to be housewives because they were more likely to have more children. Given that having more children places a greater burden on women under the traditional household division of

labor, I found a higher probability for missing school-girls to be out of the labor force when they became adults.



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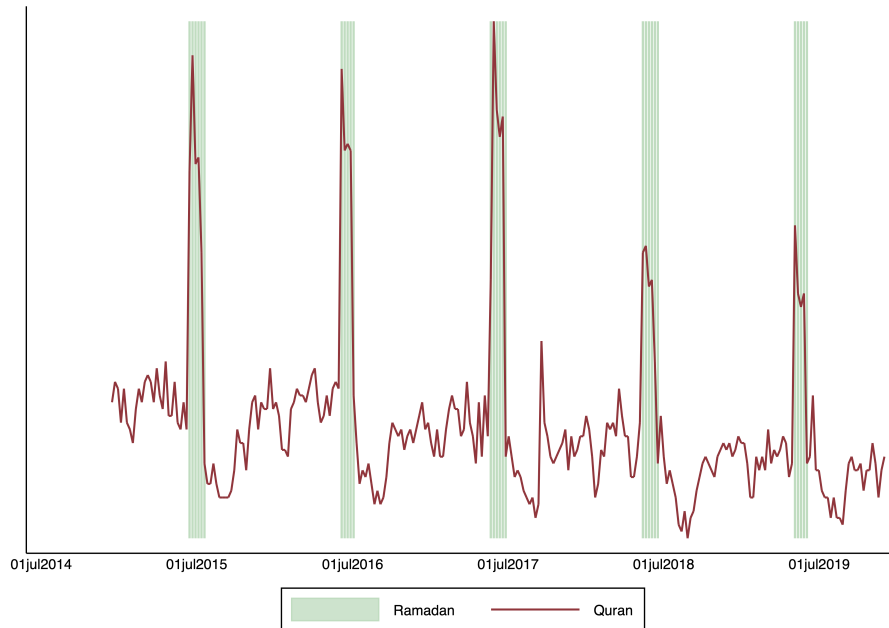
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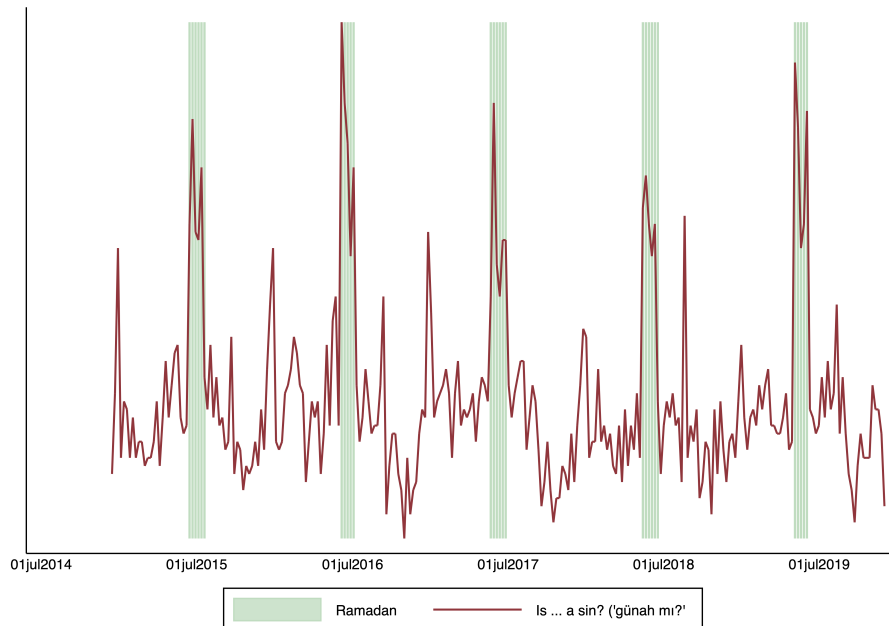
# Figures and Tables

Figure 1: Increased Religiosity on Google Trends

(a) Quran (Holy book) as a search term



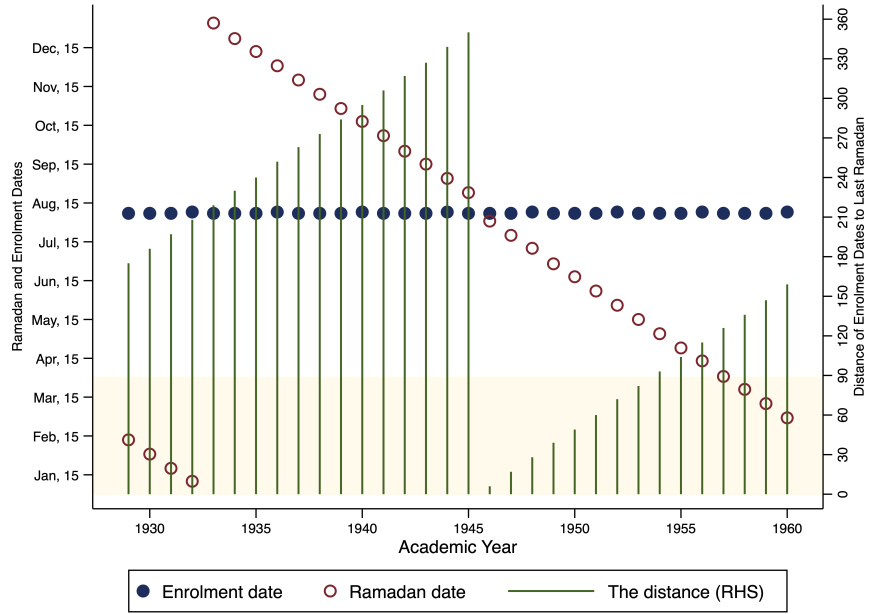
(b) Questions on spiritual implications of acts



Notes: The data is retrieved from Google Trends data specific to searches from Turkey. The time span of the data is chosen considering the potential effects of the pandemic on the religiosity individuals due to the increased uncertainties. The search terms that I present here are exactly “*Kuran*” and “*günah mı*”, and I retrieved the data showing to what extent these terms were searched in the weeks of 14/12/2014 - 01/12/2019. The green horizontal lines indicate the weeks of the holy month.

Figure 2: Identification Strategies

(a) Distance of Enrollment Periods to Ramadan



(b) Within-region variations of provinces' yearly fasting durations

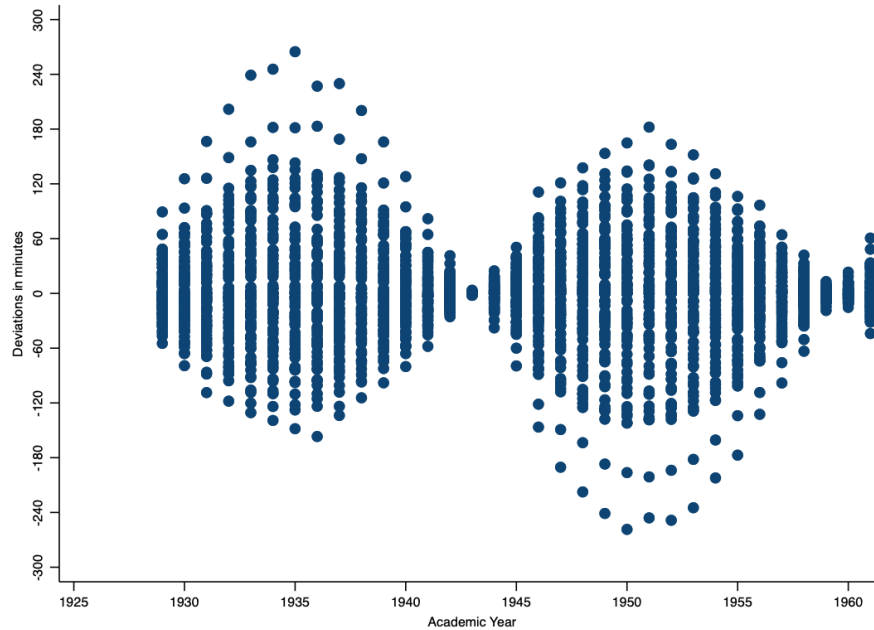
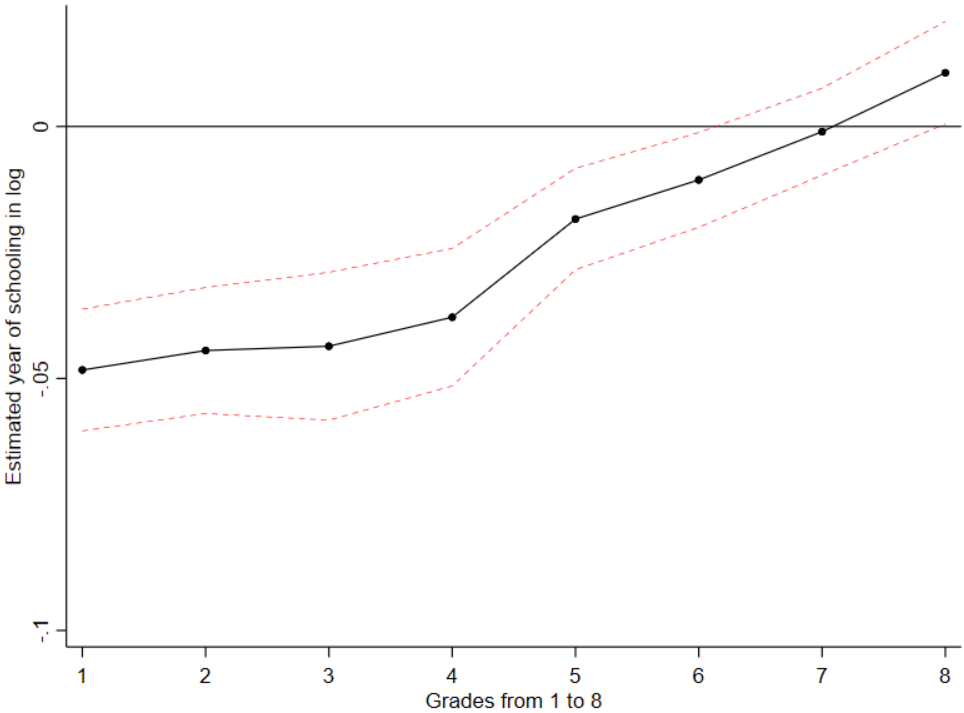


Figure 2a displays the varying distance of the enrolling date to the start day of the most recent Ramadan month over time. The blue circles indicate the mid-day of enrollment periods, i.e., 5 August of the year, while the red circles present the first Ramadan date of the academic year. Finally, the yellow vertical lines show the daily distances of the registration dates to Ramadan, which is mainly exploited in this study. Figure 2b shows the deviation of the provinces' yearly total fasting durations from its regional average of the same year. The fasting durations are in minutes and every dot reflects the observation for each province.

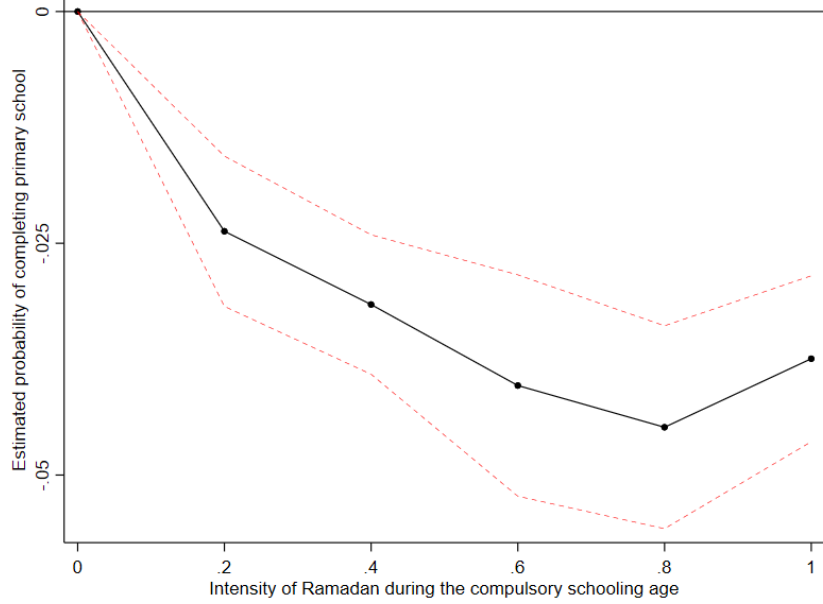
Figure 3: The Effects on Females' Education of Exposure to Ramadan in Different Grades from 1 to 8



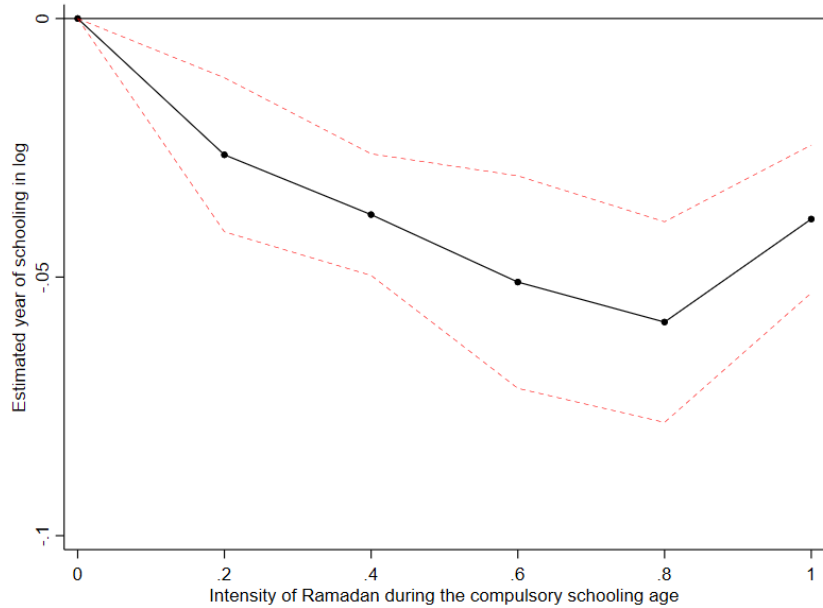
Notes: I apply a non-linear approach by calculating the separate estimates for the effect of Ramadan distances to each school-start dates for the grades from 1 to 8. The estimated effects for the girls on their completed year of schooling in percentage changes rely on the specification presented in the equation 1. The bullets in each value of x-axis present the point estimates of the distance-effect for each school-start dates to Ramadan. The dashed lines indicate the estimates within 95 percent of confidence interval.

Figure 4: Intensity of Exposure to Ramadan during the Schooling Age

(a) Its effects on girls' chance to complete primary school



(b) Its effects on girls' completed year of schooling (in log)



Source: 1985, 1990, and 2000 Census of Turkey; Sample of birth-cohorts 1923-1955. Notes: After determining to which extent the individuals were exposed to increased parental religiosity during their schooling age by the calculations of daily distances of their first dates in each academic year to Ramadan, I group individuals by how many times the starting dates were coinciding to 3 month-period since the start of Ramadan. Given the existence of 6 possible degrees of exposure, i.e., never exposed to Ramadan, the exposures to Ramadan by 0.2, 0.4, 0.6, 0.8 times as well as full exposure to Ramadan during the entire compulsory schooling age, I estimate the differential effects of Ramadan by the extent of the exposure. The estimates are relative and compared to the never-exposed individuals (1923-1932 and 1944-1955 borners), given their prevalence in the sample as the highest. The specifications are as in the equation 2. The blue dots show the point estimates for each degree of exposure and the red dashed lines are for their boundaries within 95 percent of confidence interval.

Table 1: Ramadan, and Saliense of Religiosity and Traditional Gender Norms

Gender norm indicators:	Family decisions	Education preferences	Women in politics
2nd month after Ramadan	-0.0396** (0.0153)	-0.0443*** (0.0132)	0.00901 (0.0154)
3rd month after Ramadan	-0.0632*** (0.0226)	-0.0734*** (0.0207)	0.0221 (0.0267)
4th month after Ramadan	-0.0575** (0.0232)	-0.0737*** (0.0221)	0.0705** (0.0271)
5th month after Ramadan	-0.0763*** (0.0285)	-0.0677*** (0.0238)	0.0728** (0.0293)
Observations	14,290	14,326	12,891
R-squared	0.130	0.058	0.031
Religiosity indicators:	Praying	Wearing headscarf	Fasting
2nd month after Ramadan	-0.0273* (0.0142)	0.00506 (0.0134)	0.0170 (0.0119)
3rd month after Ramadan	-0.0573** (0.0274)	0.00210 (0.0332)	0.0214 (0.0241)
4th month after Ramadan	-0.0432* (0.0227)	0.00438 (0.0221)	0.0315 (0.0205)
5th month after Ramadan	-0.0885*** (0.0263)	-0.0472* (0.0256)	-0.000818 (0.0221)
Observations	14,349	14,361	14,280
R-squared	0.108	0.315	0.082

Source: Demographic and Health Survey of Turkey; 2008, 2013. Notes: The sample consists of ever-married women aged between 15 and 49 years. Gender norms indicators are a dummy variable showing that women agree to the following statements: “*Important family decisions should be made by husbands*”, “*University education is more important for males than females*”, “*Women should be more involved in politics*”. Likewise, religiosity indicators take value of 1 if women carry out the respective religious behavior either regularly or irregularly, as opposed to never. Respondents are monthly grouped by the distance of interview dates to the ending Ramadan, and the reference category is the interviews that are held in the subsequent month of Ramadan. Estimations are conditional on several characteristics, such as age in intervals, mother tongue, education level of the women, parental education levels, marital status, and number of children in categories, as well as spatial characteristics, such as province and type of the residential area. Linear models with many levels of fixed effects are applied and standard errors are clustered at province level. Number of clusters is 81 for all regressions. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 2: Effects of Parental Religiosity on Education Levels of Men and Women

	Formal degree holder			Literate			Year of schooling in log		
	(1) Baseline	(2) Treatment (Distance)	(3) Treatment (Duration)	(4) Baseline	(5) Treatment (Distance)	(6) Treatment (Duration)	(7) Baseline	(8) Treatment (Distance)	(9) Treatment (Duration)
Female	-0.323*** (0.0137)			-0.320*** (0.0145)			-0.669*** (0.0267)		
Religiosity			-0.267 (0.473)			-0.110 (0.438)			-0.594 (0.875)
Fem*Religiosity		-0.0432*** (0.00385)	-0.200*** (0.0183)		-0.0272*** (0.00339)	-0.106*** (0.0150)		-0.0692*** (0.00711)	-0.294*** (0.0318)
Provincial Birth-cohort FE	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Region-specific Birth-cohort FE	No	No	Yes	No	No	Yes	No	No	Yes
Census-year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gender-specific census-year FEs	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Trend*Gender*Province	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	2,152,031	2,152,031	2,152,031	2,151,949	2,151,949	2,151,949	2,151,876	2,151,876	2,151,876
R-squared	0.282	0.292	0.291	0.276	0.293	0.291	0.314	0.324	0.323

Source: 1985, 1990, and 2000 Census of Turkey; Sample of birth-cohorts 1923-1955. Notes: Share of formal degree holders is 0.61 and the standard deviation is 0.49. Literacy rate of the sample is 0.70 and the standard deviation is 0.46. Distance is a dummy switching on when the individuals' enrollment date coincides to the first three months after the beginning of Ramadan. Duration refers the log of total fasting hours in provinces at the year that individuals must enroll in primary school. Standard errors are in parenthesis, clustered at province level (N=81). \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table 3: Robustness Checks

	Distance			Fasting hour in log form		
	(1)	(2)	(3)	(1)	(2)	(3)
Religiosity				-0.271	-0.313	-0.276
				(0.473)	(0.476)	(0.476)
Female*Religiosity	-0.0301***	-0.0302***	-0.00857**	-0.192***	-0.192***	-0.222***
	(0.00283)	(0.00287)	(0.00375)	(0.0185)	(0.0185)	(0.0259)
Provincial Birth-cohort FE	Yes	Yes	Yes	No	No	No
Regional Birth-cohort FE	No	No	No	Yes	Yes	Yes
Gender-specific Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Trend*Gender*Province	Yes	Yes	Yes	Yes	Yes	Yes
GDP per capita*Female	Yes	Yes	Yes	Yes	Yes	Yes
Provincial Income*Female	No	Yes	Yes	No	Yes	Yes
5-year Birth-cohort*NUTS2*Female	No	No	Yes	No	No	Yes
Observations	2,152,031	2,152,031	2,152,031	2,152,031	2,152,031	2,152,031
R-squared	0.292	0.292	0.295	0.291	0.291	0.294

Source: 1985, 1990, and 2000 Census of Turkey; Sample of birth-cohorts 1923-1955. Notes: Distance is a dummy switching on when the individuals' enrollment date coincides to the first three months after the beginning of Ramadan. Duration refers the log of total fasting hours in provinces at the year that individuals must enroll in primary school. Standard errors are in parenthesis, clustered at province level (N=81) \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4: Estimated Consequences of Parental Religiosity in Adult Life

	Labor force	Income-earner	Professional jobs	Married
Female*Ramadan	-0.0120** (0.00510)	-0.0282*** (0.00485)	-0.00632** (0.00303)	0.0303*** (0.00370)
Female	Yes	Yes	Yes	Yes
Provincial Birth-cohort FE	Yes	Yes	Yes	Yes
Trend*Gender*Province	Yes	Yes	Yes	Yes
5-year Birth-cohort*Region*Female	Yes	Yes	Yes	Yes
GDP per capita*Female	Yes	Yes	Yes	Yes
Provincial Income*Female	Yes	Yes	Yes	Yes
Observations	752,562	752,562	752,562	752,562
R-squared	0.276	0.545	0.043	0.057

Source: 1985 Census of Turkey; Sample of birth-cohorts 1923-1955. Notes: Ramadan is a dummy switching on when the individuals' enrollment date coincides to the first three months after the beginning of Ramadan. Standard errors are in parenthesis, clustered at province level (N=81). \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

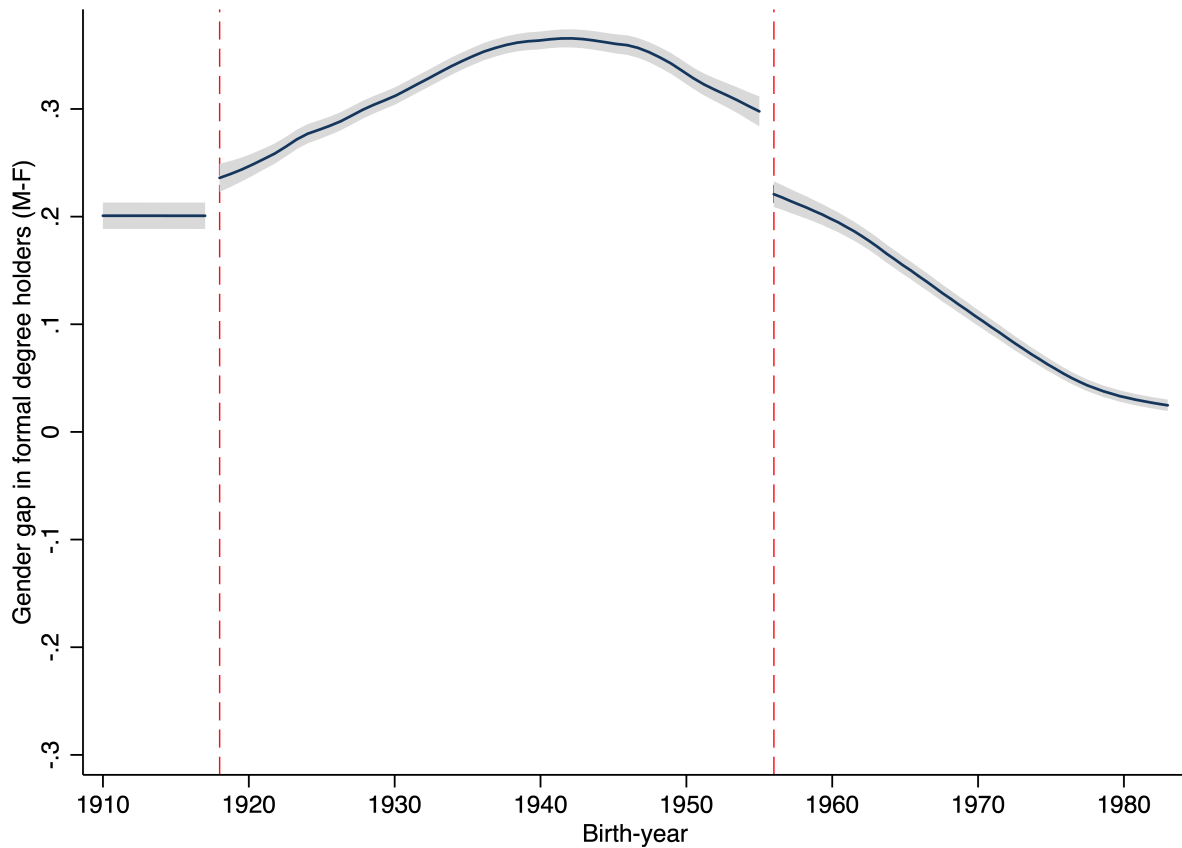
Table 5: Estimated Consequences of Parental Religiosity in Adult Life Using Fasting Hours

	Labor force	Income-earner	Professional jobs	Married	Nb. children	Housewife
Fasting hour	-0.764*	0.0432	0.193	-0.188	0.881**	1.477**
	(0.457)	(0.476)	(0.197)	(0.174)	(0.423)	(0.590)
Female*Fasting hour	-0.221***	-0.227***	-0.0641***	0.0616***		
	(0.0249)	(0.0195)	(0.0112)	(0.0159)		
Female	Yes	Yes	Yes	Yes	Yes	Yes
Regional Birth-cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Trend*Gender*Province	Yes	Yes	Yes	Yes	Yes	Yes
5-year Birth-cohort*Regional*Female	Yes	Yes	Yes	Yes	Yes	Yes
GDP per capita*Female	Yes	Yes	Yes	Yes	Yes	Yes
Provincial Income*Female	Yes	Yes	Yes	Yes	Yes	Yes
Observations	752,562	752,562	752,562	752,562	357,169	357,602
R-squared	0.275	0.544	0.041	0.055	0.157	0.037

Source: 1985 Census of Turkey; Sample of birth-cohorts 1923-1955. Notes: Fasting hour refers the log of total fasting hours in provinces at the year that individuals have to enroll in primary school. Standard errors are in parenthesis, clustered at province level (N=81). \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

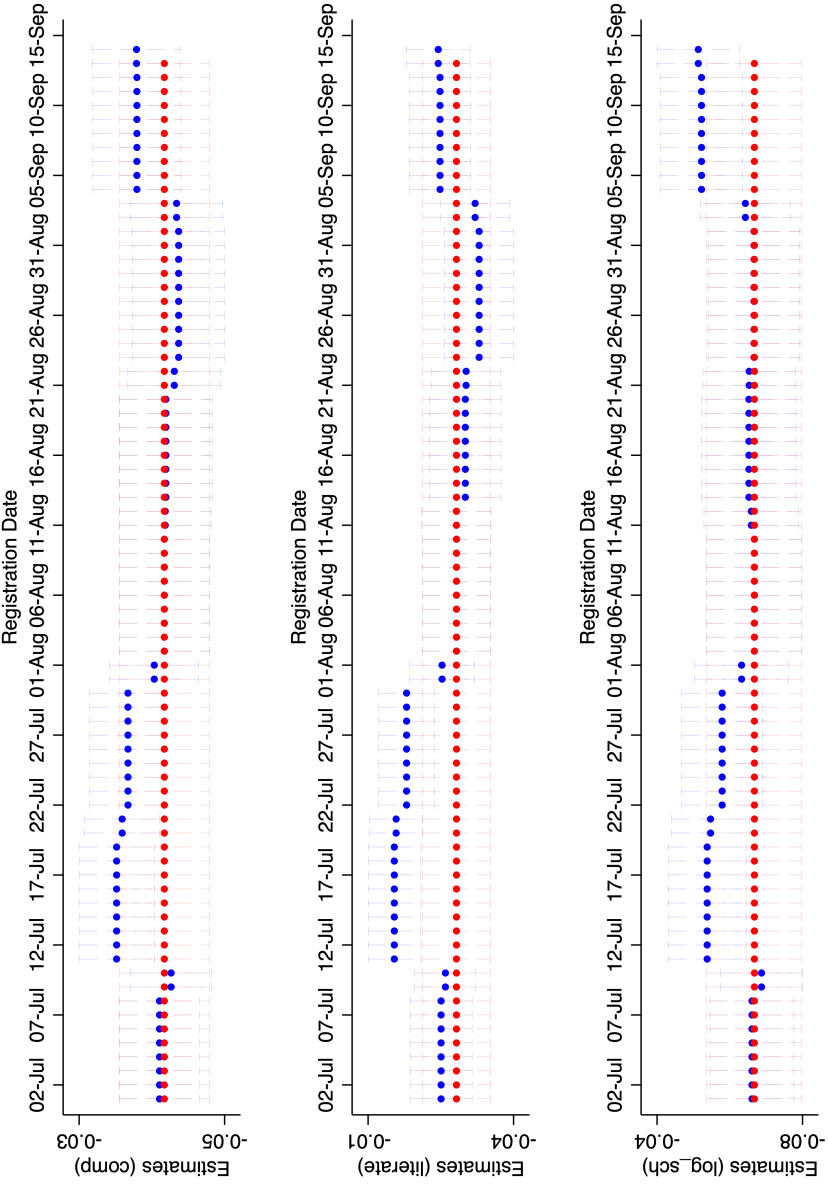
## A.1 Appendix

Figure A.1: Gender gap in formal degree holders over time



Source: 1985, 1990, 2000 Census of Turkey. Notes: Data is aggregated and consists of birthplace and birthyear specific gender gap in the share of degree holders. The graph shows the predictions from the kernel-weighted local polynomial regressions for the different education system: The schools were gender segregated for 1910-1918 borders, and it became gender-mix after on. Those born after 1955 has experienced higher deterrence by the introduction of 1961 Constitutional Law. Hence, the discontinuities roughly present the effects of these policy changes on the gender gap in the share of degree-holders.

Figure A.2: Differing Period for Enrolment and The Effect on Female Education



Source: 1985, 1990, 2000 Census of Turkey. Notes: It plots the coefficients for which the enrollment date varies daily bases from 1st of July to 14th of September and where the specification relies on the equation 2. The blue diamonds denote the point estimates for each respective enrollment date shown in x-axis and the blue spikes show these estimates within 95 percent of confidence interval. The ones in red respectively present for the main finding presented in Table 2.

Table A.1: The Estimated Effects on Completing Primary School within the Same Census Year

	1985		1990		2000	
	Distance	Duration	Distance	Duration	Distance	Duration
Religiosity	-	0.128 (0.575)	-	-0.530 (0.485)	-	-0.415 (0.509)
Female*Religiosity	-0.0387*** (0.00405)	-0.175*** (0.0183)	-0.0427*** (0.00460)	-0.203*** (0.0189)	-0.0489*** (0.00431)	-0.228*** (0.0209)
Observations	752,562	752,562	744,534	744,534	654,935	654,935
R-squared	0.285	0.283	0.299	0.297	0.298	0.296
Provincial Birth-cohort FE	Yes		Yes		Yes	
Trend*Gender*Province	Yes	Yes	Yes	Yes	Yes	Yes
Regional Birth-cohort FE		Yes		Yes		Yes

Source: 1985, 1990, and 2000 Census of Turkey; Sample of birth-cohorts 1923-1955. Notes: Outcome variable is a dummy showing whether the individual could complete primary school. Distance is a dummy switching on when the individuals' enrollment date coincides to the first three months after the beginning of Ramadan. Duration refers the log of total fasting hours in provinces at the year that individuals must enroll in primary school. Standard errors are in parenthesis, clustered at the province level. The number of clusters differ by the census years, as the total number of provinces increased over time from 67, to 73 and 81. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A.2: Timing of the Exposure, and Number of Exposures

	Formal Degree	Log(Year of Schooling)
Female* one-time exposure*1933 (exposure at Grade 5)	-0.00998** (0.00454)	0.00437 (0.00821)
Female* one-time exposure*1943 (exposure at Grade 1)	-0.0373*** (0.00545)	-0.0567*** (0.0101)
<i>F value of Wald test (coef_1933= coef_1943)</i>	<i>22.25</i> <i>(0.0000)</i>	<i>32.95</i> <i>(0.0000)</i>
Female* two-times exposure*1934 (exposure at Grade 4 and 5 )	-0.0184*** (0.00474)	-0.00786 (0.00828)
Female*two-times exposure*1942 (exposure at Grade 1 and 2 )	-0.0407*** (0.00455)	-0.0587*** (0.00745)
<i>F value of Wald test (coef_1934= coef_1942)</i>	<i>16.87</i> <i>(0.0001)</i>	<i>24.00</i> <i>(0.0000)</i>
Female*three-times exposure*1935 (exposure at Grade 3, 4 and 5 )	-0.0421*** (0.00805)	-0.0505*** (0.0142)
Female*three-times exposure*1941 (exposure at Grade 1, 2 and 3 )	-0.0363*** (0.00542)	-0.0483*** (0.00966)
<i>F value of Wald test (coef_1935= coef_1941)</i>	<i>0.57</i> <i>(0.4500)</i>	<i>0.02</i> <i>(0.8823)</i>
Female*four-times exposure*1936 (exposure at Grade 2, 3, 4 and 5 )	-0.0308*** (0.00574)	-0.0314*** (0.0102)
Female*four-times exposure*1940 (exposure at Grade 1, 2, 3, and 4)	-0.0507*** (0.00668)	-0.0698*** (0.0119)
<i>F value of Wald test (coef_1936= coef_1940)</i>	<i>7.90</i> <i>(0.0062)</i>	<i>8.76</i> <i>(0.0040)</i>
Female*five-times exposure*1937 (exposure at Grades from 1 to 5)	-0.0311*** (0.00572)	-0.0252** (0.00957)
Female*five-times exposure*1938 (exposure at Grades from 1 to 5)	-0.0441*** (0.00528)	-0.0474*** (0.00894)
Female*five-times exposure*1939 (exposure at Grades from 1 to 5)	-0.0344*** (0.00543)	-0.0388*** (0.00894)
<i>F value of Wald test (coef_1937= coef_1938= coef_1939)</i>	<i>3.08</i> <i>(0.0510)</i>	<i>2.08</i> <i>(0.1318)</i>
Province FE	Yes	Yes
Birth-cohort FE	Yes	Yes
Census-year FEs	No	No
Provincial Birth-cohort FE	Yes	Yes
Gender-specific census-year FEs	Yes	Yes
Trend*Gender*Province	Yes	Yes
Observations	2,152,031	2,151,876
R-squared	0.292	0.324

Source: 1985, 1990, and 2000 Census of Turkey; Sample of birth-cohorts 1923-1955. Notes: It examines whether the timing of exposure to Ramadan matters in parental decision on girls' educational attainment by differentiating the individuals regarding their number of exposures to Ramadan during the school start dates and the grade that they experienced this exposure. The estimates are based on the reference group consisting of the never-exposed individuals, of which starting date is too far from Ramadan, i.e., 1923-1933 borners and 1944-1955 borners. Linear models with many levels of fixed effects are applied and standard errors are clustered at province level (N=81). \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A.3: Potential Mechanism: Income Effects of Religious Fasting

	(1) Provincial Income	(2) Provincial Income	(3) Provincial Income
Fasting durations	-0.0346 (0.0727)	-0.0497 (0.0582)	0.202 (3.298)
Observations	2,673	2,673	2,574
R-squared	0.000	0.953	0.971
Region-specific Year FE	No	No	Yes
Trend*Province	No	Yes	Yes

Notes: Province-level incomes for the years between 1929-1961 come from [Asik, Karakoc, and Pamuk \[2020\]](#). Provincial income refers to an index showing to what extent province-level income has deviated from the national income per capita. Total duration of religious fasting and provincial incomes are in log. Standard errors are clustered at province level (N=81).  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

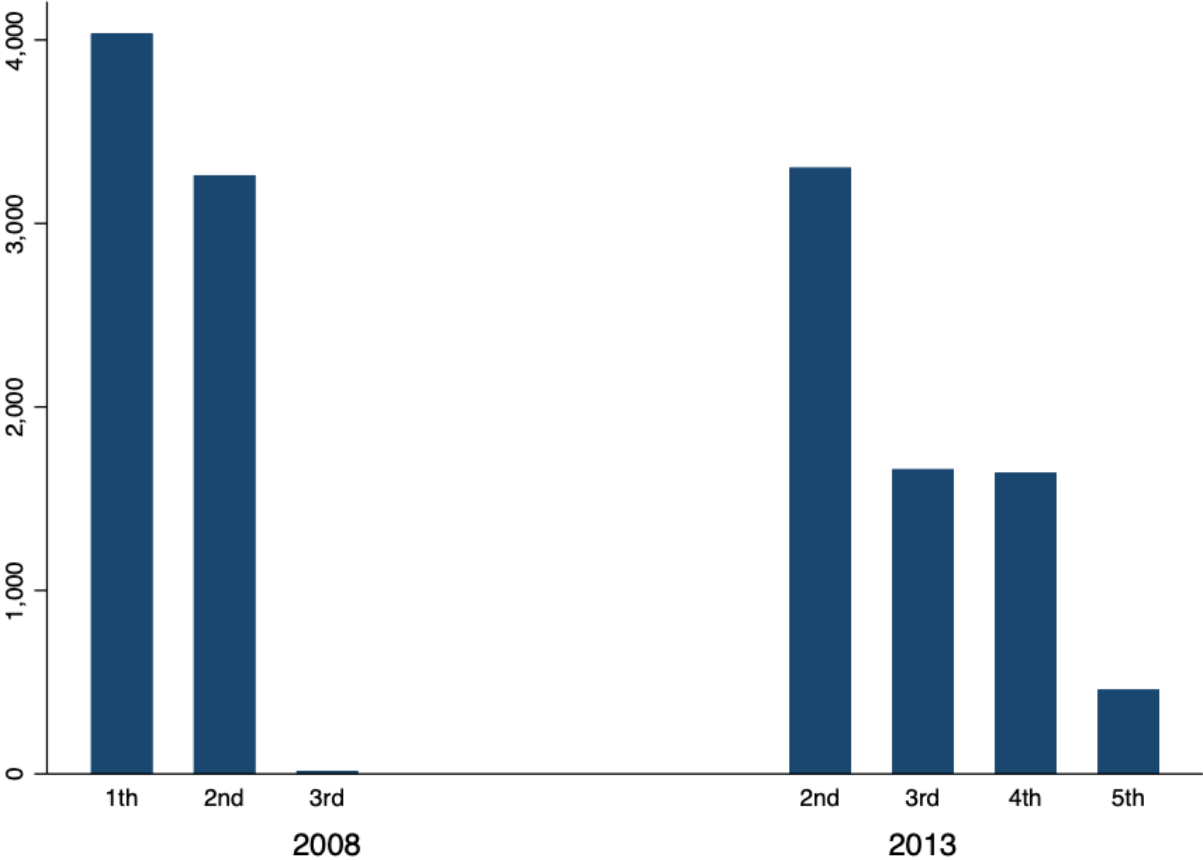


## B.1 Supplementary Materials

**Demographic Health Survey of Turkey.** I measure the gender norms and the religiosity of women using the data from Demographic and Health Survey Program of Turkey conducted in 2008 and 2013. The data collects extensive information on the demographic characteristics of women, and it is representative at NUTS-2 level, so it allows for a greater span of the same cohort. Because collecting an extensive information from the field brings heavy workloads to interviewers, they usually complete the data collection period in 3-4 months. What is more, fall seasons are the usual period for collecting data. In short, DHS dataset enables to consider an extensive length of the observable characteristics that are closely related to religiosity and gender norms as well as to examine the time-varying effects of Ramadan. Figure B.1 shows to which extent the interviews conducted in 2008 and 2013 are monthly far from the ending date of Ramadan.

The target population of the survey started to include the single women in the respective age group in 2013, due to the upward trend of the age at first marriage. Before 2013, the sample was consisting of the ever-married women aged between 15 and 49. Therefore the data collection period is shorter in 2018 than 2013, as depicted in Figure B.1. To balance the sample characteristics across the waves, I drop the single women, however, their inclusion does not change the results qualitatively. Also, I drop women born abroad to minimize the measurement error of covariates. Note that they are in total 262 number of observations, hence constituting 1.8 percent of the raw data. The summary statistics of the sample used in this study are reported in Table B.1.

Figure B.1: The distribution of interviews with respect to their monthly distances to Ramadan



Source: Demographic and Health Survey of Turkey, 2008 and 2013.

Table B.1: Summary statistics from Demographic and Health Survey of Turkey

Variable	Mean	Std. Dev.	Min	Max	Obs
Perform prayer	0.794	0.404	0	1	14303
Wearing headscarf	0.760	0.427	0	1	14315
Religious fasting	0.934	0.248	0	1	14234
University education is more important for males than females	0.123	0.328	0	1	14327
Important family decisions should be made by husbands	0.171	0.377	0	1	14258
Women should be more involved in politics	0.801	0.399	0	1	12868
1st month after Ramadan	0.280	0.449	0	1	14327
2nd month after Ramadan	0.457	0.498	0	1	14327
3rd month after Ramadan	0.117	0.321	0	1	14327
4th month after Ramadan	0.114	0.318	0	1	14327
5th month after Ramadan	0.032	0.176	0	1	14327
No education	0.156	0.363	0	1	14327
Primary education	0.615	0.487	0	1	14327
Secondary and the higher	0.229	0.420	0	1	14327
Non-Turkish	0.225	0.418	0	1	14327
Turkish	0.774	0.418	0	1	14327
Mother tongue: Not administered	0.000	0.008	0	1	14327
Younger than 30	0.312	0.463	0	1	14327
Age between 30 and 39	0.380	0.485	0	1	14327
Older than 39	0.308	0.462	0	1	14327
Mother: Illiterate	0.555	0.497	0	1	14327
Mother: Literate but no formal education	0.236	0.425	0	1	14327
Mother: Have a formal education	0.178	0.382	0	1	14327
Mother's education: DK	0.030	0.172	0	1	14327
Father: Illiterate	0.177	0.382	0	1	14327
Father: Literate but no formal education	0.375	0.484	0	1	14327
Father: Have a formal education	0.380	0.485	0	1	14327
Father's education: DK	0.068	0.251	0	1	14327
Single	0.050	0.218	0	1	14327
Married	0.950	0.218	0	1	14327
Urban	0.731	0.444	0	1	14327
No children	0.117	0.321	0	1	14327
One child	0.241	0.428	0	1	14327
Two children	0.329	0.470	0	1	14327
More than two children	0.313	0.464	0	1	14327

Source: Demographic and Health Survey of Turkey; 2008, 2013

Table B.2: Balance Test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Distance	Distance	Distance	Distance	Distance	Distance	Distance	Distance
Age between 30-39	-0.274							-0.170
	(0.363)							(0.386)
40 or more	-0.421							-0.255
	(0.452)							(0.475)
Non-Turkish		1.092						1.052
		(0.976)						(0.934)
Single			0.895					0.821
			(0.639)					(0.631)
Primary education				-1.108				-0.759
				(0.710)				(0.589)
Secondary or higher				-0.830				-1.297
				(0.865)				(0.790)
No children					0.992*			0.651
					(0.501)			(0.503)
One child					0.732**			0.519*
					(0.307)			(0.307)
Three or more children					0.536			0.384
					(0.372)			(0.419)
Literate mother without any diploma						-1.857***		-1.494***
						(0.654)		(0.533)
Mother with a formal education						3.291***		3.431***
						(1.034)		(1.089)
Illiterate father							-0.645	-0.313
							(0.599)	(0.619)
Literate father with a formal education							-1.776*	-0.818
							(0.912)	(0.850)
Observations	14,382	14,382	14,382	14,382	14,382	14,382	14,382	14,382
R-squared	0.686	0.686	0.686	0.686	0.686	0.688	0.686	0.688
F-test	0.465	8.582	1.962	1.408	2.619	4.168	1.313	3.477

Source: Demographic and Health Survey of Turkey; 2008, 2013 Notes: Outcome variable is daily distance of the interview dates with respect to the ending date of the most recent Ramadan. Reference categories of the covariates are the most prevalent ones in the sample. Hence, the reference person is non-educated, Turkish woman who is born to an illiterate mother and literate but non-schooled father, and who is younger than 30 years, and having two children. The estimates are condition on the province- and year-fixed effects and the type of residential area that the woman lives. Standard errors are clustered at province level (N=81) in all regressions. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Supplementary Results from Census Data.** The summary statistics of the pooled data of census and by census year are reported in Table B.3 and Table B.4, respectively.

Table B.3: Summary Statistics

	Mean	SD	Min	Max	Obs
Female	0.48	0.50	0	1	2,152,031
Year of birth	1942.44	9.23	1923	1955	2,152,031
Literate	0.70	0.46	0	1	2,151,949
Compulsory	0.61	0.49	0	1	2,152,031
Years of schooling	4.09	3.92	0	18	2,151,876
Labor force	0.62	0.48	0	1	2,152,031
Income earner	0.42	0.49	0	1	2,152,031
Professional jobs	0.06	0.23	0	1	2,152,031
Married	0.89	0.32	0	1	2,152,031
Housewife	0.53	0.50	0	1	1,043,387
Number of children	4.82	2.94	0	40	1,028,057
Provincial income, indexed	91.98	49.42	29.40	326.50	2,152,031
National income per capita	1329.41	283.66	712.11	1814.01	2,152,031
Ramadan	0.26	0.44	0	1	2,152,031
Average daily fasting hour	12.47	1.79	9.18	15.17	2,152,031
Total hourly fasting duration of the year	387.16	55.63	284.64	470.33	2,152,031

Source: 1985-1990-2000 Census of Turkey; Sample of birth-cohorts 1923-1955.

Table B.4: Summary Statistics by Census Year

<b>1985</b>					
	Mean	SD	Min	Max	Obs
Ramadan	0.26	0.44	0	1	752,562
Fasting hour	12.41	1.81	9.18	15.17	752,562
Female	0.48	0.50	0	1	752,562
Age	43.01	9.37	30	62	752,562
Degree-holder	0.60	0.49	0	1	752,562
Literate	0.70	0.46	0	1	752,562
Years of schooling	4.01	3.82	0	15.00	752,512
Labor force	0.68	0.47	0	1	752,562
Income-earner	0.47	0.50	0	1	752,562
Professional jobs	0.06	0.23	0	1	752,562
Married	0.92	0.28	0	1	752,562
Number of children	4.90	3.07	0	24.00	357,169
Housewife	0.53	0.50	0	1	357,602
National income per capita	1318.29	288.04	712.11	1814.01	752,562
Provincial income per capita	91.98	49.42	29.40	326.50	752,562
<b>1990</b>					
	Mean	SD	Min	Max	Obs
Ramadan	0.25	0.43	0	1	744,534
Fasting hour	12.44	1.80	9.18	15.17	744,534
Female	0.48	0.50	0	1	744,534
Age	47.76	9.32	35	67	744,534
Degree-holder	0.62	0.49	0	1	744,534
Literate	0.69	0.46	0	1	744,534
Years of schooling	4.12	3.95	0	15	744,429
Labor force	0.65	0.48	0	1	744,534
Income-earner	0.45	0.50	0	1	744,534
Professional jobs	0.06	0.23	0	1	744,534
Married	0.90	0.30	0	1	744,534
Number of children	4.94	2.87	0	40	344,272
Housewife	0.54	0.50	0	1	358,325
National income per capita	1324.86	286.18	712.11	1814.01	744,534
Provincial income per capita	91.79	49.15	29.40	326.50	744,534
<b>2000</b>					
	Mean	SD.	Min	Max	Obs
Ramadan	0.26	0.44	0	1	654,935
Fasting hour	12.57	1.75	9.18	15.17	654,935
Female	0.50	0.50	0	1	654,935
Age	56.83	8.92	45	77	654,935
Degree-holder	0.60	0.49	0	1	654,935
Literate	0.71	0.45	0	1	654,853
Years of schooling	4.15	3.99	0	18	654,935
Labor force	0.52	0.50	0	1	654,935
Income-earner	0.33	0.47	0	1	654,935
Professional jobs	0.06	0.23	0	1	654,935
Married	0.84	0.37	0	1	654,935
Number of children	4.61	2.87	0	26	326,616
Housewife	0.52	0.50	0	1	327,460
National income per capita	1347.37	274.70	712.11	1814.01	654,935
Provincial income per capita	92.19	49.73	29.40	326.50	654,935

Source: 1985, 1990, and 2000 Census of Turkey; Sample of birth-cohorts 1923-1955.