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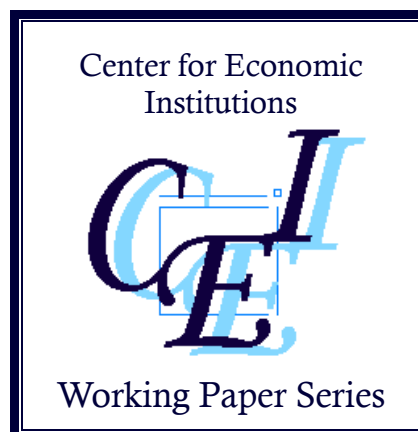# Working Paper Series

"Does education secularize the Islamic population? The effect of years of schooling on religiosity, voting, and pluralism in Indonesia"

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Working Paper Series

Does education secularize the Islamic population?
The effect of years of schooling on religiosity, voting, and pluralism in Indonesia

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Highlight

- Evidence of a causal relationship between individual education and religiosity is limited in developing countries
- We use the 1978 education reform in Indonesia to examine the impact of completed years of education on religiosity in later life
- An additional year of schooling reduces self-reported religiousness and solitary religious acts
- It also reduces the influence of religious factors on voting when they elect the local leaders and the president
- Reform, which promotes the access to education, may have an externality on the political economy in Islamic countries.

Abstract

The association between schooling and religious beliefs has been widely documented in the social science literature. Evidence of a causal relationship is, however, limited, particularly in developing countries where religion still plays a significant role in politics and legislation. To bridge this gap in the literature, the present study uses the across cohort variations in the exposure to 1978 education reform in Indonesia to examine the impact of completed years of education on individual religiosity in later life. The results suggest that attaining another year of schooling reduces self-reported religiousness by four percentage points. Consistent with this finding, it also changes solitary religious acts by reducing the number of times individuals pray and the likelihood that they eat only halal food. Educational attainment, however, has little effect on participation in social religious activities or attitude toward other faiths, although it does reduce the religious influence on voting behavior. These results suggest that a program promoting educational attainment in Islamic countries may have an important impact on individual's religiosity and country's political economy in the long run.

Does education secularize the Islamic population? The effect of years of schooling on religiosity, voting, and pluralism in Indonesia

1 Introduction

Developing countries are home to religions with many adherents, and the number of religious people is expected to grow quickly in the next decades (Pew Research Center, 2017). While a growing literature empirically reveals that socioeconomic factors are causally associated with religiosity in developed countries in the western world, evidence from non-western countries is surprisingly scarce. Notably, the extent to which education affects religiosity is of interest in developing countries, which have been experiencing a dramatic educational expansion for decades. The effect of education on religiosity at the individual level determines how members of society behave and how contemporary society is shaped. Such changes have direct implications for political and economic development, since this relationship may affect an individual's preference toward political parties and could reshape the political landscape (Cesur & Mocan, 2018).

There is no clear theoretical consensus on the extent to which education alters religiosity. The rational consumer model predicts that individuals reduce time-intensive religious activities as they attain higher education because education improves labor market wages and increases the opportunity cost of time for religious practices, such as praying (Azzi & Ehrenberg, 1975). Similarly, the club goods model assumes that religion has all the properties of a collective good, such as excludability and non-rivalry (Berman, 2000). Religious practice is a commitment device or tax for promoting the devout participation, while, at the same time, excluding those with lower participation rates. Once education allows individuals to earn a higher income, demand for the insurance service informally provided by a religious group declines, in turn reducing religious activities (Chen, 2010; Iyer, 2016). Education, however, may also increase religiosity. Education increases individuals' literacy and may help them digest more complex religious literature (Mocan & Pogorelova, 2017). Educated individuals earn more money and increase their monetary contributions to the religious group (Brown & Taylor, 2007). Educated people may also commit to religious activities to increase their status within the community (Buser, 2015). Taken together, education may place both upward and downward pressure on individual religiosity.

In this paper, we examine to what extent education affects religiosity in Indonesia, a Muslim

country in the non-western world, and test the possible underlying causal mechanisms. Specifically, this study aims to examine whether an individual's level of education affects their religious affiliation, solitary and social religious practices, inter-religious trust, and religion's factor in voting behavior. Identifying the causal effects of education on religiosity, however, is empirically challenging, as unobserved determinants of religiosity are likely to be correlated with educational attainment (Cesur & Mocan, 2018). Ordinary least square procedure will provide biased estimates. We utilize exogenous sources of variation that explain education but are uncorrelated with religious behavior to minimize the potential bias.

Recent literature using exogenous variation in education shows that education is likely to reduce religiosity, but evidence for Muslim countries in the non-developing world is relatively limited. In addition, recent studies mostly focus on education's effect on subjective religiosity or solitary religious acts. Dilmaghani (2019) and Hungerman (2014) used the regional variation in the timing of the compulsory education law (CEL) reform to estimate the causal effects of educational attainment on religious identity in Canada, to find that individuals are likely to become non-religious as their education level rises. Similarly, Mocan and Pogorelova (2017) exploited the cross-country variation in the timing of the CEL reform and found that education is negatively associated with religious beliefs and practices in 14 European countries. Arias-Vazquez (2012) reported negative effects of education on the degree of religiosity, using the cross-state variation in the timing of the CEL reform as a natural experiment in the United States. Becker et al. (2017) found that, in Germany, Protestant church attendance was negatively related to advanced-level school attendance rates. In summary, most studies support the secularization hypothesis in the western world. Cesur and Mocan's study (2018) in Turkey is one exception, which studies the association between education and religiosity outside of the western country, and most relevant to the current study. They investigated whether non-Christian people became less religious as they were more educated in Turkey. They reported that education reduced women's religious beliefs and tendency to wear a religious head cover. They also found that education decreased women's tendency to vote for Islamic parties.

The present study used the education reform in Indonesia in 1978 as a source of exogenous variation in education to evaluate the effect of years of education on religious behavior. This reform, in the middle of the academic year, changed the beginning of the academic year from January to July to coincide with the government's fiscal year. All schoolchildren attending primary, secondary, and tertiary school in 1978 were forced to remain in school for six

additional months to progress to the next grade. This reform has been shown to disproportionately increase the highest grade completed by children born before 1972. Those born in 1973 or later were not exposed to this reform, because in 1978 they were preschool aged (Parinduri, 2014, 2017; Samarakoon & Parinduri, 2015). We utilize this cross-cohort variation in exposure to the reform to apply a fuzzy regression discontinuity design to study the effects of education on religious beliefs and behavior at the individual level.

We found that in a country with government intervention in individuals' religious life such as Indonesia, education does not change individuals' religion affiliation, whereas it does reduce religious acts. Education, however, does not reduce participation in social religious practices in Indonesia. Although Islam emphasizes trust and cooperation among group members, we suggest that reduced religiosity is not associated with reduced trust in people or the attitude toward people of other faiths. Education reduces the religious influence on voting behavior. We also observed some variations between genders along with more significant effects of education in urban areas.

Our paper contributes to the education-religiosity nexus in three aspects. First, we provide evidence on the potential mechanism by which education affects religious behavior through the rational consumer and club goods model, while recent studies show the effect of the mechanism of heterogeneous shock in income on religiosity (Buser, 2015; Chen, 2010). We show that education increases the opportunity cost of time-intensive goods consumption, which in turn reduces religiosity. Education makes people more literate and knowledgeable about politics, which leads them to evaluate candidates beyond the religious factor. The mechanism is not held in rural areas, in which alternative consumption is limited. Religion also provides informal insurance so that individuals remain committed to this club good by committing to religious acts. Second, we analyze Indonesia, which hosts the world's largest Muslim population, to complement recent literature that focuses on developed, western, and Christian countries, the results of which cannot be extended to the developing countries (Iyer, 2016). Our results suggest that in a country with government interventions in individuals' religious practice such as Indonesia, and perhaps in other Islamic countries in the developing world, the association between education and change in religious affiliation may not work as smoothly as in western countries. Last, the present study is also the first to examine whether education affects inter-religious trust among Muslims. We show that educational attainment is not associated with attitude toward people of other faiths, suggesting that promoting education does not harm informal cooperation mechanisms and hardly increases the political

or social tension among people of different faiths.

The remainder of the paper is organized as follows. Section 2 provides background information on the Indonesian religion market and 1978 education reform. Section 3 explains the data and identification strategy to draw causal effect of education and religiosity. Section 4 reports the results and potential underlying mechanisms. Lastly, Section 5 offers conclusions.

2   Background

2.1   Religiosity in Indonesia

Indonesia has the largest Muslim population in the world, as 87% of the population is Muslim (Chen, 2012), mainly in Java and Sumatera.[1] While the Constitution guarantees freedom of choice of religion, religious conversions, and the right to worship, the government restricts the choice to six religions: Islam, Protestantism, Catholicism, Hinduism, Buddhism, and Confucianism. This strictness is different from practices in developed countries that allow their citizens to be legally unaffiliated.

Individual religiosity in Muslim Indonesia is relatively high compared with other Islamic countries. In the 2008 survey, 80% of Indonesian Muslims performed daily the five daily obligatory prayers, which was higher than the percentage in other Islamic countries such as Jordan, Egypt, Pakistan, and Turkey (Pew Research Center, 2008). Although the proportion of people who self-report to be religious has remained relatively constant over time, people are performing more religious acts. Data from the Indonesian Family Life Survey (IFLS) show that for respondents who pray daily, the average number of daily prayers increased from 4.8 in 2007 to 5.2 in 2014. In addition, the proportion of individuals who only eat halal foods has also remained high, at over 95%. At least two-thirds of Muslim respondents have attended religious meetings in the past 12 months, particularly in rural areas, and about 75% of respondents regard faith/religion as a factor in mayoral elections. This percentage is higher for women and those who live in rural areas.

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[1] Muslims in Indonesia are mostly Sunni; yet, it is estimated that 1–3 million people are Shia and 200,000–400,000 are Ahmadi (U.S. Department of State, 2016).

2.2   1978 Education reform

The education system in Indonesia has faced several reforms in 20th century. One of the earliest reforms was in 1978, when the government decided to move the start of the academic year from January to July. Prior to 1978, the academic years in Indonesia stretched from January to December. The Ministry of Education and Culture in 1978 changed the school's academic year, such that the 1978 academic year stretched until June 1979 (MPKRI, 1978). This provided six additional months of the instruction time for all school children in that year and was uniformly applied at the national level. As a result, students of 1978 did not finish their studies until June 1979. These additional six months were, however, not accompanied by additional materials. The Ministry of Education rather asked teachers to re-examine and deliver the same materials.

The identification of the current study relies on the idea that the exposure to the additional instruction time may increase the completed years of education. Since most elementary school students enroll the first grade at age seven, people born in 1972 or later were not exposed to the longer school year as they were not attending school at the time of the reform. Analogously, people born in 1971 or earlier experienced the lengthened year if they remained enrolled in school. In summary, depending on their birth year, people were as if randomly exposed to and treated by the reform. We utilized this variation as a source of natural experiment affecting years of educational attainment in our identification strategy to examine the effect of education on religiosity.

Aside from the 1978 reform, two other reforms have reshaped the Indonesian education system in the 20th century. Nevertheless, we argue that identifying variation of the educational attainment of the current study should not be due to the exposure to these educational reforms. First, Indonesia launched a school construction program called SD InPres in 1971 to increase school enrollment by expanding access to elementary school. About 61,000 new elementary schools were built, resulting in a 100% increase in the stock of schools (Duflo, 2001). Yet, the SD Inpres program was not associated with the 1978 reform. Second, the government launched the nine-year compulsory education program in 1994, covering elementary and junior high school (Parinduri, 2014). This compulsory education program is unlikely to apply to those exposed to the 1978 reform, since the youngest student affected in 1978 was in the first grade of elementary school, meaning that he/she would finish senior high school by 1990.

3 Data and Identification

3.1 Data

To study how education affects religiosity, we relied on the fourth and fifth waves of the longitudinal Indonesian Family Life Survey (IFLS) conducted in 2007 and 2014 by the RAND Corporation (Strauss, Witoelar, & Sikoki, 2016; Strauss, Witoelar, Sikoki, & Wattie, 2009). These data cover over 30,000 respondents from 13 of the 27 provinces in Indonesia, where 83% of the Indonesian population resides. The first wave survey was conducted in 1993 and followed up in 1997 and 2003 for the second and third waves, respectively. The survey provides detailed information at the individual, household, and community level covering issues from socio-economic condition and health to risk-averse behavior. The survey, however, just started asking religious behavior questions in the last two waves of the survey. Therefore, we use the last two waves in the current study and pool the data to increase the statistical power.

The IFLS dataset is the only publicly available survey that provides rich information on religiosity, including religious affiliation, traditions and beliefs, the frequency of prayer per day, and consumption of halal food in Indonesia. Respondents were also asked about their feelings about people of other faiths living in neighboring villages. For example, they were asked whether they would rent a room to or allow their children to marry someone of a different faith. They also answered whether they trusted a person with the same religion more. In terms of religious influence on voting behavior, respondents were asked whether they were more likely to vote for a candidate affiliated to the same religion and whether a candidate's religion/religiosity influenced their voting behavior. The survey also provides other key information, including an individual's place of birth, date of birth, and highest grade completed. Appendix B provides the summary statistics of our variables.

3.2 Estimation strategy

To examine whether education affects religious beliefs and behavior, we estimated the following regression model:

$$\text{Y}_{ijt} = \alpha_0 + \alpha_1 S_{ijt} + \alpha_2 X_{ijt} + f\left(yob_j\right) + \lambda_t + \epsilon_{ijt} \ (1)$$

Y_{ijt} is the religious outcome, which contains subjective religious beliefs, objective social religious acts, solitary religious acts, religion as a factor on voting behavior, and inter-religious trust for individual i, born in year j as observed in survey t. Most responses were presented on a Likert scale and transformed into binary responses. Appendix A explains the construction of the variables in greater detail.

S_{ijt} is the education variable represented by continuous years of education completed. This variable was constructed from respondents' answers on their highest grade completed. Based on Indonesia's education system, we assigned the value of six, nine, twelve, and sixteen if respondents' highest education completed are elementary school, middle school, high school, and university, respectively. Analogously, we assigned zero if respondents did not complete elementary school. We further adjust the value by the number of years completed if respondents report the grade of which they were dropped out.

X_{ijt} represents control variables that include urban-rural and gender dummies. $f(yob_j)$ is a cubic function of the respondent's year of birth. λ_t represents the survey fixed effects. ϵ_{ijt} is the error term, and standard errors were clustered at the birth year to accommodate possible correlation among individuals within the same cohort. Samples from two waves of IFLS are pooled to increase the statistical power. We further limit the samples to those born between 1951 and 1992, and aged 20 or older at the time of interview.

As education is likely to be correlated with the error term ϵ, we utilized an arbitrary rule of exposure to the longer school year in 1978–1979 as a potential instrument to explain years of education completed (Parinduri, 2017; Samarakoon & Parinduri, 2015). This strategy relies on a mechanism which assumes that a school year longer by 6 months may increase an individual's years of education. A few studies show the extent to which a one-time school year expansion may increase educational attainment, such as (1) increasing time for students to learn, finish tasks, and cover more curriculum (Patall, Cooper, & Allen, 2010), (2) extending time for teachers to revise materials (Cooper, Nye, & Charlton, 1996), and even lowering the probability of grade repetition (Parinduri, 2014; Pischke, 2007).

The exposure to the longer school year is, however, not a deterministic function of an individual's year of birth. Individuals born after 1971 may have gone through the longer school year if they joined primary school early. Meanwhile, older individuals born in 1971 or earlier may not have been affected by the policy if they dropped out before 1978. This setting creates discontinuity in the likelihood of individuals exposed to the longer school year

between 1971 and 1972 cohorts. This fits a fuzzy RD design for our first-stage equation of treatment status, the longer year, using the year of birth as the instrument. Our first-stage equation can be expressed as

$$S_{ijt} = \beta_0 + \beta_1 D_j^{1971} + \beta_2 X_{ijt} + f(yob_j) + \theta_t + \eta_{ijt} \quad (2)$$

where D_j^{1971} is the year of birth dummy that equals 1 if born in 1971 or before, and 0 otherwise.

It is possible that using the quarter of birth or month of birth as the instrument is more accurate than the year of birth. However, information on the year of birth is more reliable than the other two variables for a survey in developing countries like Indonesia. Nevertheless, Parinduri (2014) shows that estimation results are robust across the choice of assignment variables.
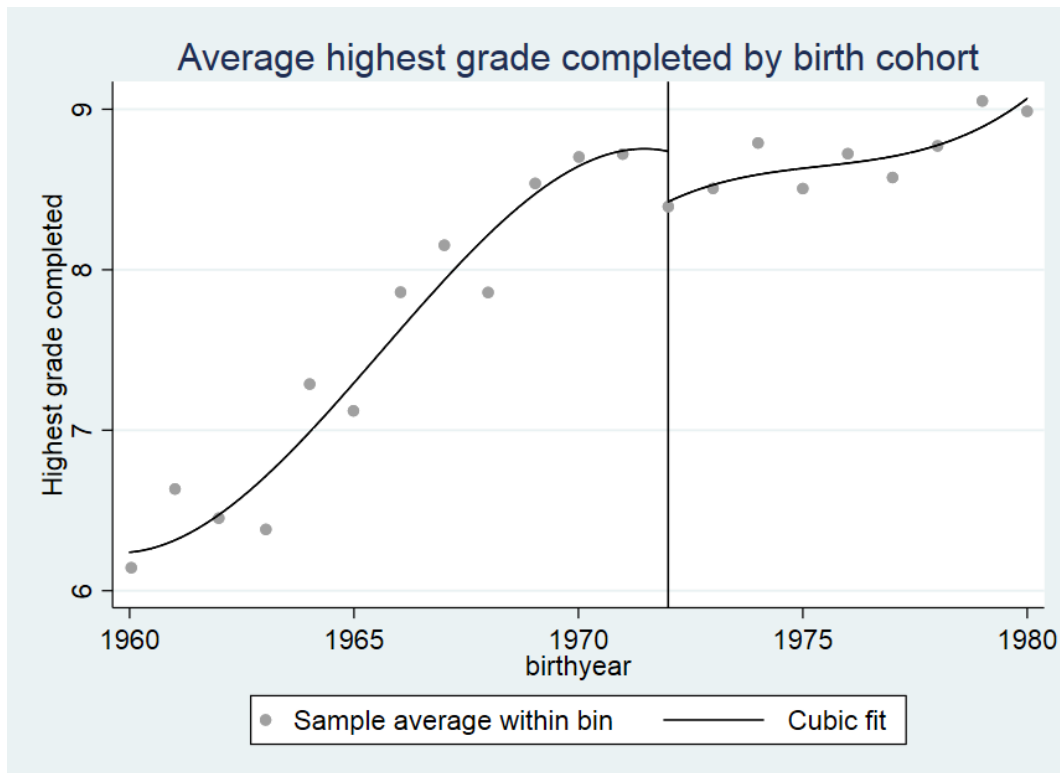
Figure 1. Educational attainment by birth cohort.

Figure 1 illustrates the non-parametric representation of the reduced-form relationship between the highest grade completed and birth cohort. The graph fits a local cubic polynomial of birth year that exhibits a discontinuity in educational attainment near the 1971 and 1972 cohorts. The drop in years of education near the discontinuity are about 0.67 years. This early evidence suggests that the longer school year reform increased the years of

education of treated individuals compared with the cohort not exposed to the reform. We study whether individual religiosity declined among the same cohort in the following section.

The identification strategy also relies on the assumption that the characteristics of the sample around the cutoff point is plausibly similar. To test whether the exogeneous characteristics of the individuals are discontinuous around the threshold, we performed a falsification test using the Javanese population and female population in Figure 2. The figure suggests that there is no clear discontinuity around the cut off, supporting our identification assumption.

Figure 2 Share of Javanese population and share of female population by birth cohort.

4 Results and analysis

4.1 First stage: Effects of the reform on educational attainment
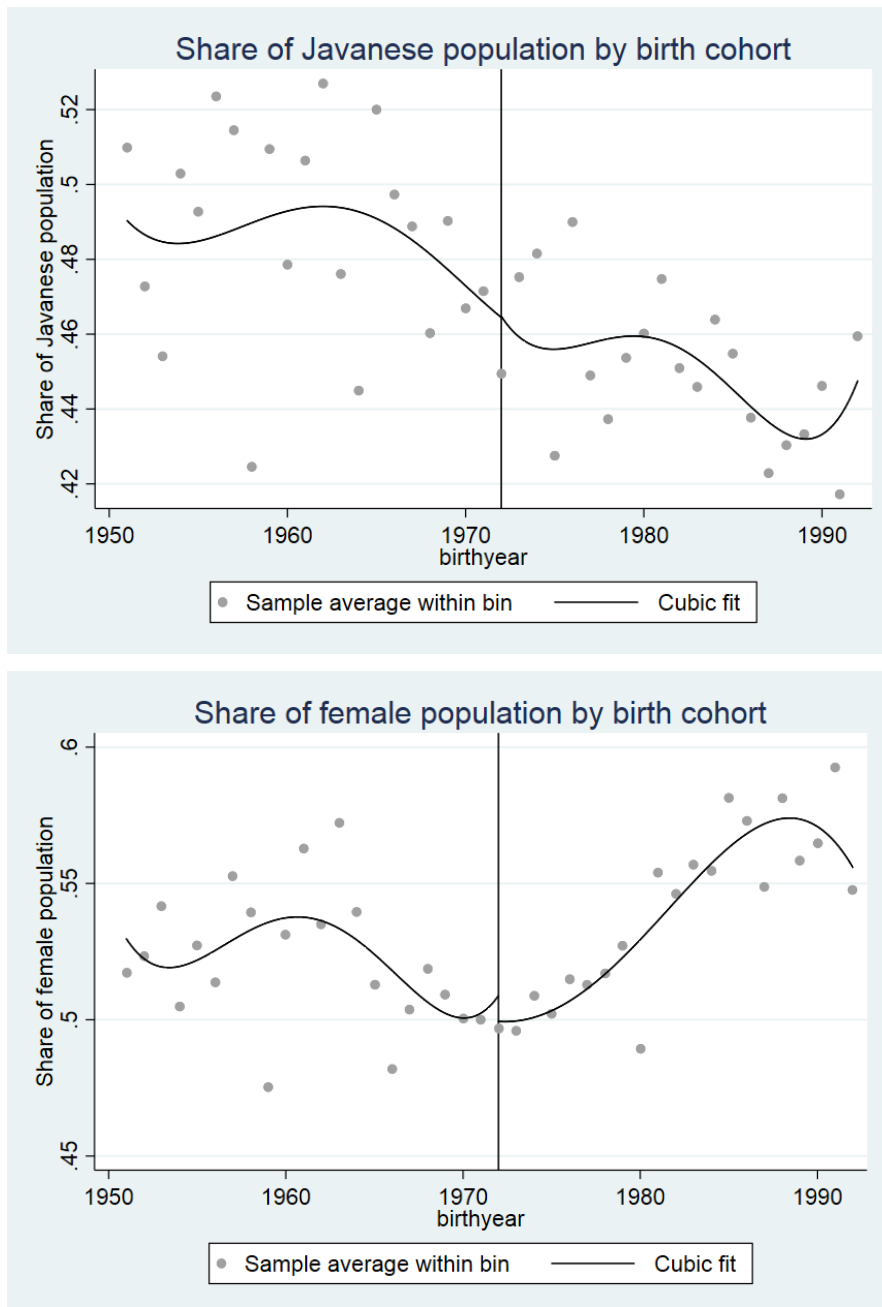
Table 1 reports the first-stage OLS estimates of the reform effects on educational attainment in our sample. The first three columns use years of schooling as the educational attainment outcome but use different normalized year of birth polynomial: local linear polynomial, local quadratic polynomial, and global cubic polynomial, respectively. The last four columns present the policy's effects on the likelihood of completing each level of school, using global year of birth cubic polynomial.

The estimated coefficients indicate that, consistent with Figure 1, exposure to the longer school year is associated with an increase in educational attainment. In quadratic and cubic polynomial specification, exposure to the longer school year is associated with a sharp increase in educational attainment of 0.7 and 0.6 years on average, respectively. Exposure to the reform also increases the probability that individuals completed middle and high school, but not elementary school and college. Hence, when interpreting the TSLS results presented later, it is worth keeping in mind that the variation that provides the IV estimates is mainly from the margin of middle school and high school. In summary, the results suggest that the reform exogenously increased the educational attainment of school children in 1978.

	(1)	(2)	(3)	(4)	(5)	(6)
	Years of schooling		1 if complete…			
			Primary	Middle	High	College
Policy exposure	0.731***	0.611**	0.006	0.108***	0.102***	-0.002
(1 if born in 1971 or earlier)	(0.152)	(0.277)	(0.032)	(0.032)	(0.027)	(0.002)
Normalized year of birth polynomial:						
Quadratic	V					
Cubic		V	V	V	V	V
R-squared	0.203	0.199	0.116	0.165	0.124	0.006
Observations	33,226	33,226	33,226	33,226	33,226	33,226

Table 1 First-stage results in educational attainment and grade completion. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992, and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial.

4.2 Effects of education on subjective religious beliefs and practices

Table 2 presents the OLS and TSLS estimates of equation (1) on subjective religious beliefs. Columns (1) and (2) provide the effects of individual education on the probability of being Muslim. The remaining columns measure its effects on subjective religiosity for Muslim respondents only. Owing to the endogeneity problem, we use the OLS estimates in Columns (1) and (3) as a descriptive purpose. We find that additional years of education are negatively associated with being Muslim and subjective non-religiosity, statistically significant at the 1% level. A similar result was obtained when the dummy variable of high school completion is used (Appendix C).

	(1)	(2)	(3)	(4)	(5)	(6)
	1 if reported as…					
	Muslim	Muslim	Non-religious	Non-religious	Very religious	Religious
	OLS	TSLS	OLS	TSLS	TSLS	TSLS
Years of education	-0.009***	-0.007	-0.003***	0.016**	-0.021	-0.043*
	(0.001)	(0.011)	(0.000)	(0.008)	(0.014)	(0.024)
First-stage F-statistics	-	49.7	-	42.9	42.9	42.9
Observations	36,736	36,736	33226	33226	33226	33226

Table 2 TSLS regression results for subjective religious beliefs. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview. Samples in Column (3)-(6) is for Islam only. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Now we turn to our analysis on the TSLS estimates. Table 2 reports first-stage F-statistics for the instrument. All first-stage F-statistics passed the size and relative bias tests for weak instruments by Stock and Yogo (2005). Our TSLS estimate suggests that longer years of education affect subjective religiosity but do not lead individuals to switch religions. In Column (2), educational attainment does not affect the likelihood of being Muslim. In contrast, we obtained a negative association between an additional schooling year and reported religiosity, statistically different from zero. In Column (4), we see that an additional year of education reduces the likelihood of being on-religious by 1.6 percentage points. Comparing with the result in Column (3), the OLS estimates were overestimated due to omitted variable bias. Column (6), which uses alternative definition of reported subjective religious beliefs, shows that an additional year of education corresponds to a 4.3 percentage point decrease in the probability of being religious.

Table 3 presents the extent to which an additional schooling year affects religious practices. For the sake of brevity, our analysis onwards will focus on Muslim respondents only. The Muslim respondents were asked about their religious practice, including whether they performed daily prayers, consumed halal food, and joined religious activities during the past 12 months. Each column in Table 3 represents the estimates of the effect of additional years of education on each of those religious acts. We have much fewer response observations for consumption of halal food, as the question was asked in the latest round of IFLS only. We find that more educated people are likely to pray less and eat non-halal food. An additional year of education reduces the probability of praying more five times a day and eating only halal food by 4.4 and 2.2 percentage points, respectively, statistically different from zero at the 10% level. Meanwhile, we find no association between education level and the likelihood of joining a religious activity. Again, the estimates remained robust if the education measurement was changed to the dummy variable of high school completion. Our estimates further suggest that education is likely to reduce individual religiosity at the margin. The estimates in Columns (1) and (2) suggest that more educated people do not abandon their obligation of praying five times per day, but rather reduce the number of daily prayers. Similarly, the result in Column (3) can be interpreted that more educated people may sometimes eat non-halal food. However, they eat halal food in most cases because of its abundance in Indonesia.

	(1)	(2)	(3)	(4)
	1 if….			
	Not praying	Pray >5 times per day	Eat only halal food	Join religious activity during the past 12 months
Years of education	-0.002	-0.044*	-0.022*	-0.017
	(0.009)	(0.027)	(0.012)	(0.026)
First-stage F-statistics	48.31	48.31	47.13	50.21
Observations	33,221	33,221	15,965	29,398

Table 3 Effects of education on solitary religious acts: TSLS estimates. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. Response on whether eating only halal food is available at IFLS 2007 only. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

We further estimated equation (1) on subjective religiosity and solitary religious acts by location (urban/rural) to account for some degree of heterogeneity as presented in the Table 4.

All first-stage F-statistics are larger than the Stock-Yogo's rule of thumb of 10, indicating that our TSLS estimates are less likely to suffer from the bias due to the weak-instrument problem, even for these subsamples.

	(1)	(2)	(3)	(4)
		1 if …		
	Non-religious	Pray >5 times per day	Eat only halal food	Join religious activity during the past 12 months
Urban subsample				
Years of education	0.020*	-0.058**	-0.028**	-0.025
	(0.010)	(0.025)	(0.013)	(0.032)
First-stage F-statistics	37.51	37.05	30.16	35.7
Observations	18,718	16,994	8,568	16,686
Rural subsample				
Years of education	0.009	-0.019	-0.013	-0.003
	(0.008)	(0.045)	(0.015)	(0.043)
First-stage F-statistics	12.28	12.65	17.23	14.87
Observations	14,508	13,216	7,397	12,712

Table 4 Heterogeneity in perceived individual religiosity and acts. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview.,whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

We obtained suggestive evidence that the secularization process through education is more likely to hold in urban rather than rural areas. All estimates of religious behavior for urban sample were statistically different from zero, except for the likelihood of joining religious activity during the past 12 months. Meanwhile, all estimates for the rural sample was statistically insignificant and smaller than respective estimates for the urban sample. The dataset also enables us to obtain heterogeneity analysis between gender, but the results suggest there is no clear heterogeneity between male and female (results are shown in Appendix D).

4.3   Potential mechanisms

How does education economically affect the level of individual religiosity? We suggest two mechanisms. First, we argue that our results arise from the classical rational consumer model; a better education is likely to increase labor productivity and wages earned, thus increasing the opportunity cost. This higher associated cost encourages people to avoid religious acts, particularly time-intensive ones. However, this mechanism may be limited for rural areas,

since the market consumption alternatives for rural individuals are limited compared to urban areas, which results in the low impact on subjective religiosity of education.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			1 if …				Number of hours worked last week	Number of weeks worked last year
	working	employed	primary or secondary sector	tertiary sector	blue collar	white collar		
Years of education	-0.021	0.021	-0.073*	0.073*	-0.064*	0.043*	0.527	1.210
	(0.016)	(0.021)	(0.038)	(0.038)	(0.033)	(0.023)	(1.249)	(0.999)
First-stage F-statistics	48.25	32.15	16.05	16.05	29.82	29.82	27.16	29.82
Observations	33,281	20,964	12,289	12,289	23,728	23,728	23,250	23,728

Table 5 Labor market outcomes. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Based on Chen's (2010) findings on the negative effect of income on religiosity in Indonesia, we tested our rational consumer hypotheses by focusing on regressing the education and labor market outcomes. The estimates in Table 5 suggest that educated people were more exposed to better working opportunities that offered higher wages. An additional year of education completed increased the probability of working in the tertiary sector, statistically significant at a 10% level. We also found qualitatively similar results for urban subsamples in Table 6. Given that the occupational choice is very likely to be associated with the level of the individual income in Indonesia, change in the occupational choice may be one of the potential mechanisms through which longer length of individual education reduces the individual religiosity. In contrast, the results provided the limited supporting evidence for labor market mechanism for the rural subsamples because the estimates for these subsamples were imprecisely estimated. It is, however, inconclusive because this may be possibly due to the smaller samples, and weaker first stage association.

The second mechanism came from the presupposition that individuals may commit to religious activities because of the presence of club goods or positive externalities provided by religious organizations (e.g., mutual insurance raised from charity or mutual aid, credit, job search, spouse search) (Iyer, 2016). The mechanism is presumably weaker for educated people, who are likely to be well informed and can access similar club goods provided by religious organizations in private markets.

To test the club goods mechanism on religiosity, we regressed equation (1) for individuals based on their access to credit. We hypothesized that access to formal credit would reduce

individual dependency on club goods provided by religious organizations. We expected that education would reduce religiosity more in areas with access to credit than in areas without access to credit.

	(1)	(2)	(3)	(4)	(5)	(6)
	Working	Employed	Primary or secondary sector	Tertiary sector	Blue collar	White collar
Urban subsample						
Years of education	-0.018	0.016	-0.080*	0.080*	-0.069	0.030
	(0.015)	(0.026)	(0.045)	(0.045)	(0.043)	(0.020)
First-stage F-statistics	36.97	21.59	11.75	11.75	21.98	21.98
Observations	18,756	11,726	7,134	7,134	13,139	13,139
Rural subsample						
Years of education	-0.024	0.024	-0.058	0.058	-0.051	0.060
	(0.027)	(0.031)	(0.044)	(0.044)	(0.049)	(0.043)
First-stage F-statistics	12.66	10.39	4.99	4.99	8.39	8.39
Observations	14,525	9,238	5,155	5,155	10,589	10,589

Table 6 Heterogeneity in labor market outcomes. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Table 7 provides estimates of education's effect on religious practices for individuals living in areas without access to credit. Although we ideally want to compare the estimates from different subsample, the estimates using the subsample of individuals living in the areas with access to credit is less likely to be reliable possibly due to smaller sample size, and low first-stage F-statistics (supplementary material). Alternatively, we compare the result for those without access in Table 7 with the result under full sample in Table 3.

	(1)	(2)	(3)
		1 if…	
	Pray >5 times per day	Eat only halal food	Join religious activity during the last 12 months
Without access to credit			
Years of education	-0.006	-0.031*	0.015
	(0.127)	(0.016)	(0.026)
First-stage F-statistics	13.84	21.39	16.12
Observations	14009	7514	12301

Table 7 Education and religiosity: Impact of access to credit. Note: IFLS 2007 and 2014 provide

data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

The results partially support our club goods hypothesis despite some limitations. First of all, for praying more than 5 times per day, the point estimate for those who lack the access to the formal credit (0.006) is 86% smaller than the point estimate for the full sample (-0.044). This suggests that the individuals are less likely to reduce the religious activities as they are educated in the village where there is no access to formal insurance. This is consistent with club good hypothesis. Meanwhile, the point estimate for eat only halal food is relatively comparable for both specifications (-0.022 and -0.031). Similarly, the association between level of education and probability of joining religious activity is statistically insignificant for both specifications, and point estimates are close to zero. Therefore, from these empirical evidence, we cannot conclude whether the club good mechanism works in the context of the current study. Therefore, future research should conduct the careful analysis on this point possibly by correcting sufficiently large variety of data on the access to the formal credit with sufficient sample size.

Aside from rational choice and club goods mechanisms, other potential channels are worth considering, although no empirical mechanism is provided in the current study due to the data limitation. Educated people are likely to expand their network, which leads to increased exposure to diverse, non-religious peers and activities particularly in urban areas. In addition, education also induces people to move from rural to urban areas possibly to find the better employment opportunity. Such migration might have changed their social networks, and also surrounding environment, which may partly explain why our results are more robust for urban subsamples, rather than for rural subsamples.

4.4   Education and voting behavior

Table 8 presents our estimates on the extent to which religion affects voting behavior. The first column presents education's effect on propensity in casting a vote in the last presidential election. The rest of the column provides estimates on religious influence in voting behavior. The estimates show the negative relationship between education and the likelihood of voting, yet statistically not different from zero. We also found some evidence of the negative effect of education on religious influence in voting behavior. An additional year of education reduced

voters' likelihood of considering religion as the most or second most important factor when electing a mayor by four percentage points, statistically significant at 10% level.

While we found little impact on voting behavior in general, we obtained suggestive evidence that that a better education reduces a respondent's probability of considering religion when electing a mayor for the urban subsamples. An additional year of education reduced the likelihood of regarding religion as a factor by 6.8 percentage points. We also found that an additional year of education reduced voters' likelihood to regard religion as the most or second most important factor when electing the mayor by 3.5 percentage points.

The rational consumer model may explain our results on the education–voting behavior relationship. Higher educational attainment is likely to increase wages through productivity improvements, and this creates a high opportunity cost for participating in elections. Meanwhile, elections in Indonesia are held on weekdays, and voters are allowed to take a one-day leave to vote. Our results then suggest that the allowance may trigger educated people to consume more leisure time rather than voting.

	(1)	(2)	(3)	(4)	(5)
	1 if the respondent voted in the last presidential election	1 if likely to vote for a candidate with the same religion	1 if the respondent considers religion matter when electing the mayor	1 if religion is …. Factor that the respondent considers when electing the mayor	
				The most important	The most or second most important
Full sample					
Years of education	-0.050	-0.020	-0.037	-0.012	-0.035*
	(0.031)	(0.030)	(0.025)	(0.017)	(0.018)
First-stage F-statistics	48.86	48.25	48.94	47.11	47.11
Observations	33178	33281	33190	15967	15967
Urban subsample					
Years of education	-0.049*	-0.040	-0.068**	-0.002	-0.067***
	(0.028)	(0.032)	(0.032)	(0.022)	(0.024)
First-stage F-statistics	37.71	36.97	37.71	30.17	30.17
Observations	18686	18756	18695	8569	8569
Rural subsample					
Years of education	-0.055	0.019	0.022	-0.026	0.008
	(0.045)	(0.063)	(0.048)	(0.022)	(0.029)
First-stage F-statistics	12.66	12.66	12.71	17.2	17.2
Observations	14492	14525	14495	7398	7398

Table 8 Religious influence on voting behavior. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Higher educational attainment leads to higher literacy, expanding their perspective and stimulating cognitive growth (Meyer, 2017). Obtaining extensive information about all potential candidates leads educated people to evaluate those candidates more objectively, not merely from a religious background. As shown in Table 9, additional years of education increased the likelihood of being able to read Indonesian newspapers and write a letter in Indonesian, yet statistically not different from zero.

We also used the argument of the club goods model through the subjective religiosity mechanism as another potential pathway. Since we did not empirically test the mechanism, this discussion is speculative. To increase voting participation, the government usually asks the Eulama Council (Majelis Ulama Indonesia) to persuade people to vote by releasing a fatwa on elections. The fatwa may produce less impact as educational attainment increases, as educated people are less likely to commit to a religious organization. Similarly, the club goods motive may work on the result of religious influence on voting behavior. Religious organizations in Indonesia often persuade people to vote. Though the largest religious organizations are less likely to direct the vote based only on religion, some fringe organizations encourage people to vote for an Islamic mayor. As educated people are less affiliated to religious organizations, this channel also explains the secularization effect of education in voting behavior.

	1 if able to…	
	read an Indonesian newspaper	write a letter in Indonesian
Years of education	0.001	0.013
	(0.020)	(0.019)
First-stage F-statistics	48.21	12.84
Observations	33,280	17,314

Table 9 Effect of education on literacy. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. Response on the ability to write a letter in Indonesian is available at IFLS 2014 only. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

4.5 Education and inter-religious trust

We further examined whether having a better education is associated with tolerance toward people of different faiths. IFLS asked the respondents five questions about their objection toward living with someone of a different faith. The estimates in Table 10 suggest that education had limited effects on peoples' attitude toward others with different faiths.

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Heterogeneity analysis, presented in Appendix D, also provided a similar result. Most specifications showed a negative sign, but not statistically significant.

	(1)	(2)	(3)	(4)	(5)
	1 if feel no objection if someone with a different faith …				
	lives in your village	lives in your neighborhood	rents a room from you	marries one of your close relatives	builds a house of worship in your community
Years of education	-0.037	-0.017	-0.040**	-0.019	0.026
	(0.023)	(0.016)	(0.019)	(0.013)	(0.020)
First-stage F-statistics	48.25	48.25	48.25	48.25	43.1
Observations	33,281	33,281	33,281	33,281	33,281

Table 10 Effects of trust in and attitude toward people of different faiths. Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Our estimate indicates that despite reducing individual religiosity, education, by itself, does not harm inter-religious trust. Our dataset did not provide information on the potential mechanism underlying this result, so discussions on it remain speculative. As inter-religious trust is also associated with the presence of community social capital (Gert Pickel & Gladkich, 2012), our estimates may suggest that individuals are unlikely to reduce their commitment toward inter-religious trust to enjoy the benefits of broader community club goods, regardless of their educational attainment.

We also perform some robustness checks presented in Supplementary Materials to conserve some spaces. Table A1 provides a robustness test on subjective religiosity to changes in polynomial order, bandwidth selection, and cohort selection (by dropping cohorts as the source of fuzziness). The first nine columns present bandwidth selection. The longest bandwidth is 22 to ensure that at least the youngest respondents have completed senior high school. The eighth column uses all-religion samples instead of Muslim only. The last two columns omit the 1972 and 1972–1973 cohorts. These bandwidth changes and cohort exclusions are then estimated by using three different year-of-birth polynomials: local linear, quadratic, and cubic order.

Our estimates are relatively robust across polynomial order, bandwidth selection, and model specification. All the estimates are positive; however, the point estimates change across specifications in the range of 0.01 to 0.02 and varies at significance level. We find that estimates for higher polynomial order are likely to provide less statistically significant results under shorter bandwidth selection presumably because of the overfitting problem.

Analogously, estimates for local linear polynomial trend are more precise for narrower bandwidth, but not for larger bandwidth. We remain obtaining comparable estimates for the all-religion sample and cohort selection.

Table A2 provides a robustness test on subjective religiosity and performing praying by changes in clustering at individual level. The test show that our estimates for first-stage and second-stage regressions are relatively robust. We remain obtaining some evidence that the policy exposure is associated with the educational attainment and negative impact of years of education on religiosity. We also perform a robustness check using local linear year-of-birth polynomial in Table A3. We obtain similar coefficients despite statistically insignificant due to larger standard errors.

5   Conclusions

Scholars argue that education not only increases working opportunity and improves expected wage, but also alters an individual's preferences on various aspects, including religious behaviors. However, existing studies examining education's effect on religiosity are focused on Christian countries in the developed world. In this study, we examined to what extent education affects religious behaviors, from individual religiosity to religion-led voting behavior, in the context of a Muslim country in the developing world, where education expansion has taken place only in recent decades.

This study used the 1978 education reform in Indonesia, with the highest Muslim population in the developing world, to examine the causal impact of completed years of education on religiosity in later life. Education is likely to reduce individual religiosity, but education by itself is insufficient to change individual religious affiliation. Those with higher education levels are more rational, and more likely to disregard religion as the basis of their voting behavior. There is suggestive evidence that the effect is more evident in urban areas. The educational effect is, however, limited in trust toward individuals of other religions.

Our study is the first to provide empirical evidence of the potential underlying mechanisms by which education reduces people's religiosity. Our analysis confirms the existence of rational consumer choice for religious practice, even in Muslim-majority countries such as Indonesia. Education increases the opportunity cost of time, which reduces the time available for religious practice. The club goods model also partly explains our results, as education is also likely to improve financial access and thus reduce dependence on religion-based

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financial provisions.

Our results further provide implications for the political economy in Indonesia. Education is not harmful to inter-religious trust and tolerance. Educated people are more informed and objective, and their religious affiliation is less likely to affect their voting preference. The result perhaps partly explains the decreasing trend in the electoral gains of Islamic parties in the last decade (Tanuwidjaja, 2010).

Nevertheless, our results do not imply that the effect of education-led secularism can be generalized to all developing or Muslim countries. The Indonesian context is perhaps different from the situation in Muslim countries in the Middle East that apply much stricter religious rules. Similarly, the results would be implausible if they are generalized to developing countries in Africa that are mainly Christian. In addition, different settings for natural experiments analyzing education reform in other developing or Muslim countries are likely to affect the results. These are issues that need to be addressed by future research.

Data availability statement:

The data that support the findings of this analysis are held by The RAND Corporation.

Restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are available for free from the RAND website for researchers who apply for and meet the criteria for access. Legal access agreements do not allow the sharing of datasets to unregistered researchers.

Appendix A: Definition of the dependent variables

Islam: equals 1 if the respondent is a Muslim, 0 otherwise.

Non-religious: equals 1 if the respondent believes he/she is not religious, 0 otherwise. The variable is constructed from the question "How religious are you?" The response is on a four-point Likert scale, from 1 for very religious to 4 for not religious. The non-religious variable then takes 1 if the response is 4, and 0 otherwise.

Very religious: equals 1 if the respondent believes he/she is very religious, 0 otherwise. The variable is constructed from the question "How religious are you?" The response is on a four-point Likert scale, from 1 for very religious to 4 for not religious. The very religious variable then takes 1 if the response is 1, and 0 otherwise.

Religious: equals 1 if the respondent believes he/she is religious, 0 otherwise. The variable is constructed from the question "How religious are you?" The response is on a four-point Likert scale, from 1 for very religious to 4 for not religious. The religious variable then takes 1 if the response is less than 3, and 0 otherwise.

Not praying: equals 1 if the respondent does not pray at all, 0 otherwise. The variable is constructed from the question "How many times do you pray each day?" The respondent chose one of four possible outcomes: number of times he/she prays, not every day, do not practice, and refuse to answer. The variable takes 1 if the respondent chooses "do not practice" and 0 if he/she chooses "not every day" or fills in the number of times he/she prays.

Pray fewer than five times per day: equals 1 if the respondent prays fewer than five times a day, 0 otherwise. The variable is constructed from the question "How many times do you pray each day?" The respondent chose one of four possible outcomes: number of times he/she prays, not every day, do not practice and refuse to answer. The variable takes 0 if the respondent prays five times per day, and 1 otherwise.

Eat only halal food: equals 1 if the respondent eats only halal food, 0 otherwise.

Join religious activity during the past 12 months: equals 1 if the respondent joined a religious activity at least once during the past 12 months, 0 otherwise.

Feel no objection if someone with a different faith lives in your village/lives in your neighborhood/rents a room from you/marries a close relative/builds a house of worship in your community: equals 1 if the respondent feels no objection, 0 otherwise. The variable is constructed from the response to the question "How do you feel if someone from a

different faith from you …?" The response is on a four-point Likert scale from "strongly object" to "no objection at all." The variable takes 1 if the response is "no objection" or "no objection at all," and 0 otherwise.

Likely to vote for a candidate with the same religion: equals 1 if the respondent is likely to vote for a candidate with the same religion. The variable is constructed from the response to the question "In an election, having a candidate with the same religion as yours makes […] vote for him/her." The response is on a five-point Likert scale ranging from "very likely to "very unlikely." The variable takes 1 if the response is "very likely" or "somewhat likely," and 0 otherwise.

Consider religion when electing a mayor: equals 1 if the respondent considers religion to be a factor when electing a mayor, 0 otherwise.

Religion is the most important factor when electing a mayor: equals 1 if the respondent considers religion to be the most important factor in a mayoral election, 0 otherwise. The variable is constructed from the questionnaire item "Mention the three most important factors you consider when electing a bupati/mayor."

Religion is the most or second most important factor when electing a mayor: equals 1 if the respondent considers religion to be the most or second most important factor in a mayoral election, and 0 otherwise. The variable is constructed from the questionnaire item "Mention the three most important factors you consider when electing a bupati/mayor."

Appendix B: Descriptive statistics for all variables

Summary statistics by the exposure to 1978 reform

	All		1951-1971 cohort		1972-1992 cohort	
Religiosity	mean	s.d.	mean	s.d.	mean	s.d.
Religious	0.77	(0.42)	0.84	(0.37)	0.73	(0.45)
Non-religious	0.03	(0.17)	0.02	(0.13)	0.03	(0.18)
Islam	0.91	(0.29)	0.90	(0.30)	0.91	(0.29)
Catholic	0.01	(0.10)	0.01	(0.12)	0.01	(0.10)
Protestant	0.04	(0.19)	0.04	(0.19)	0.04	(0.18)
Hindu	0.04	(0.21)	0.04	(0.21)	0.04	(0.21)
Religious act						
Pray <5 times per day	0.21	(0.41)	0.12	(0.33)	0.26	(0.44)
Eat only Halal food	0.97	(0.17)	0.97	(0.16)	0.97	(0.17)
Joined religious activity during last 12 months	0.60	(0.49)	0.71	(0.45)	0.53	(0.50)
Attitude to other faith						
1 if feel no objection if someone with other faith						
Lives in the same village	0.75	(0.43)	0.74	(0.44)	0.75	(0.43)
Lives in neighborhood	0.50	(0.50)	0.46	(0.50)	0.53	(0.50)
Rent a room from you	0.38	(0.49)	0.36	(0.48)	0.39	(0.49)
Build a worship in a village	0.59	(0.49)	0.61	(0.49)	0.58	(0.49)
Marry one of your close relatives	0.31	(0.46)	0.35	(0.48)	0.29	(0.46)
Voting behavior						
1 if likely to vote if the candidate's religion is same	0.65	(0.48)	0.66	(0.47)	0.65	(0.48)
1 if the religion is the most important factor when vote	0.23	(0.42)	0.26	(0.44)	0.21	(0.41)
1 if the religion is the most or 2nd most important factor when vote	0.42	(0.49)	0.45	(0.50)	0.40	(0.49)
1 if consider the candidate's religion in electing Mayor	0.76	(0.42)	0.81	(0.40)	0.74	(0.44)
Demographic variables						
Age	36.44	(10.49)	47.65	(6.75)	29.97	(5.73)
Share of female	0.52	(0.50)	0.51	(0.50)	0.44	(0.50)
Years of education	8.55	(3.43)	7.28	(3.62)	9.28	(3.09)
1 if completed	0.85	(0.36)	0.72	(0.45)	0.92	(0.27)
Primary school (6th grade)	0.58	(0.49)	0.41	(0.49)	0.67	(0.47)
Middle school (9th grade)	0.37	(0.48)	0.26	(0.44)	0.43	(0.50)
High school (12th grade)	0.01	(0.08)	0.00	(0.06)	0.01	(0.09)
College (16th grade)	0.01	(0.08)	0.00	(0.06)	0.01	(0.09)
Share of rural	0.44	(0.50)	0.43	(0.50)	0.44	(0.50)
N	36679		13420		23259	

Appendix C: Effects of high school completion on subjective religious beliefs and solitary religious acts

Table C.1. Effects on subjective religious beliefs

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	TSLS	OLS	TSLS	TSLS	TSLS
	1 if Islam	1 if Islam	Non-religious	Non-religious	Very religious	Religious
1 if completed high school	-0.031***	-0.041	-0.002	0.103**	-0.190**	-0.277**
	(0.004)	(0.077)	(0.002)	(0.048)	(0.088)	(0.122)
First-stage F-statistics	-	62.7	-	54.9	54.9	54.9
Sample	All	All	All Islam	All Islam	All Islam	All Islam
Observations	36,736	36,736	33226	33226	33226	33226

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Clustered standard errors are reported in parentheses and clustered at the birth-of-year level. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. Sample is for Muslim only. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Table C.2. Effects on solitary religious acts

	(1)	(2)	(3)	(4)
	1 if not praying	Pray 5 times per day	Eat only halal food	Join religious activity during the past 12 months
1 if completed high school	-0.013	-0.249**	-0.149***	-0.091
	(0.044)	(0.112)	(0.053)	(0.133)
First-stage F-statistics	37.3	37.3	46.8	56.6
Observations	33,221	33,221	15,965	29,398

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Clustered standard errors are reported in parentheses and clustered at the birth-of-year level. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. Sample is for Muslim only. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Appendix D: Additional result in heterogeneity analysis

Table D.1. Effects of education on solitary religious acts, gender heterogeneity

	(1)	(2)	(3)	(4)
	1 if …			
	Non-religious	Pray >5 times per day	Eat only halal food	Join religious activity during the past 12 months
Male subsample				
Years of education	0.018	-0.044	-0.016	-0.010
	(0.012)	(0.033)	(0.014)	(0.020)
First-stage F-statistics	35.83	36.04	24.67	37.56
Observations	15,801	13,669	7,717	13,843
Female subsample				
Years of education	0.014	-0.051	-0.029**	-0.025
	(0.015)	(0.037)	(0.012)	(0.058)
First-stage F-statistics	13.51	13.47	21.28	13.96
Observations	17,425	16,541	8,248	15,555

Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Table D.1 presents the effects of education on solitary religious acts by gender. We obtained a negative relationship between education and religiosity remains at gender-based subsample levels yet we lose significance in all specifications except eating halal food for the female subsample. An additional year of education reduced women's likelihood of eating halal food by 3.0%, significant at a 5% level. Since the point estimates were relatively comparable with the full-sample analysis, losing the significance was driven by higher estimated standard error due to losing the power.

Some evidence on religiosity activities for female subsamples can possibly indicate that education leads women to allocate more time to outside activities and join more extensive networks (Cesur and Mocan, 2018). This mechanism is presumably stronger for Muslims in a developing country such as Indonesia, where women traditionally spend more time at home for family responsibilities (Babbitt, Brown, & Mazaheri, 2015; Duflo, 2012).

Table D.2. Gender heterogeneity in voting behavior

	(1)	(2)	(3)	(4)	(5)
	1 if the respondent voted in the last presidential election	1 if likely to vote for a candidate with the same religion	1 if the respondent considers religion matter when electing the mayor	1 if religion is …. Factor that the respondent considers when electing the mayor	
				The most important	The most or second most important
Male subsample					
Years of education	-0.029	-0.060	-0.045	0.017	0.002
	(0.022)	(0.038)	(0.030)	(0.032)	(0.029)
First-stage F-statistics	35.87	35.89	36.02	24.63	24.63
Observations	15789	15838	15791	7718	7718
Female subsample					
Years of education	-0.086	0.045	-0.028	-0.042	-0.074**
	(0.060)	(0.047)	(0.031)	(0.027)	(0.036)
First-stage F-statistics	13.98	13.5	13.92	21.2	21.2
Observations	17389	17443	17399	8249	8249

Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Table D.3. Heterogeneity in attitude toward different faiths

	(1)	(2)	(3)	(4)	(5)
	1 if feel no objection if someone with a different faith …				
	lives in your village	lives in your neighborhood	rents a room from you	marries one of your close relatives	builds a house of worship in your community
Male subsample					
Years of education	-0.002	0.017	-0.002	-0.005	0.046**
	(0.021)	(0.020)	(0.022)	(0.021)	(0.023)
First-stage F-statistics	22.75	22.75	22.75	22.75	22.75
Observations	15,838	15,838	15,838	15,838	15,838
Female subsample					
Years of education	-0.056	-0.038	-0.073	0.004	-0.007
	(0.047)	(0.041)	(0.049)	(0.038)	(0.038)
First-stage F-statistics	6.362	6.362	6.362	6.362	6.362
Observations	17,443	17,443	17,443	17,443	17,443
Urban subsample					
Years of education	-0.005	0.008	-0.035	0.008	0.036
	(0.022)	(0.019)	(0.023)	(0.021)	(0.022)
First-stage F-statistics	24.07	24.07	24.07	24.07	24.07
Observations	18,756	18,756	18,756	18,756	18,756
Rural subsample					
Years of education	-0.043	-0.015	-0.011	-0.023	0.006
	(0.039)	(0.037)	(0.039)	(0.036)	(0.034)
First-stage F-statistics	9.416	9.416	9.416	9.416	9.416
Observations	14,525	14,525	14,525	14,525	14,525

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Clustered standard errors are reported in parentheses and clustered at the birth-of-year level. Control variables include urban-rural

dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. Sample is for Muslim only. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

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Supplementary materials

Table A1. Robustness test: bandwidth specification, polynomial trend, and cohort exclusion

	Dependent variable: 1 if the respondent believes he/she is non-religious, zero otherwise									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Bandwidth							All religion	Cohort exclusion	
	22	21	20	19	18	17	16		1972	1972-1973
Local linear polynomial										
Years of education	0.018	0.019	0.019*	0.021*	0.020**	0.020**	0.018**	0.016*	0.020*	0.019*
	(0.012)	(0.012)	(0.011)	(0.011)	(0.010)	(0.009)	(0.008)	(0.009)	(0.011)	(0.011)
First-stage F-statistics	21.62	22.29	22.68	23.18	25.34	29.15	33.57	28.01	24.76	26.54
Observations	34,652	33,988	33,226	32,399	31,534	30,626	29,735	36,679	32,203	31,275
Quadratic polynomial										
Years of education	0.017**	0.017**	0.015*	0.011*	0.009	0.007	0.008	0.013*	0.020**	0.023**
	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.009)	(0.010)
First-stage F-statistics	52.54	50.33	54.76	56.06	51.71	47.57	38.38	59.92	42.25	33.28
Observations	34,652	33,988	33,226	32,399	31,534	30,626	29,735	36,679	32,203	31,275
Cubic polynomial										
Years of education	0.020*	0.019**	0.017**	0.012**	0.011*	0.008	0.009	0.015**	0.016**	0.014**
	(0.011)	(0.010)	(0.008)	(0.006)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)	(0.006)
First-stage F-statistics	39.64	41.18	48.78	55.16	54.43	52.77	44.74	56.45	66.91	85.13
Observations	34,652	33,988	33,226	32,399	31,534	30,626	29,735	36,679	32,203	31,275

Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992, and aged 20 or older at the time of the interview, whose religion is Islam, except for Column (8). *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial.

Table A2. Robustness test, clustering at individual level

First-stage regression: policy exposure and educational attainment

	(1)	(4)	(5)	(6)	(7)
	Years of education	1 if completed…			
		Primary	Middle	High	College
Policy exposure	0.611***	0.007	0.108***	0.102***	-0.002
(1 if born in 1971 or earlier)	(0.109)	(0.011)	(0.017)	(0.016)	(0.002)
R-squared	0.199	0.116	0.165	0.124	0.006
Observations	33,281	33,281	33,281	33,281	33,281

Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at individual level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Second-stage regression: Years of education and religiosity

	(1)	(2)
	Non-religious	Pray >5 times per day
Years of education	0.016*	-0.044**
	(0.008)	(0.020)
First-stage F-statistics	50.53	50.65
Observations	33,226	33,221

Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at individual level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Table A3. Robustness test: Years of education and religiosity, local linear polynomial

	(1)	(2)	(3)	(4)	(5)	(6)
	Years of education		Non-religious	Pray >5 times per day	Eat only halal food	Join religious activity during the past 12 months
Policy exposure	0.249	0.460***				
(1 if born in 1971 or earlier)	(0.172)	(0.086)				
			0.016	-0.053	-0.047***	-0.064
Years of education			(0.051)	(0.088)	(0.015)	(0.073)
Normalized year of birth polynomial:						
Linear (1951-1992)	V					
Linear (1967-1976)		V	V	V	V	V
1st-stage F-statistics	-	-	10.4	10.5	9.62	12.1
Observations	33,281	9,128	9,110	9,116	4,746	8,219

Note: IFLS 2007 and 2014 provide information. Samples are limited to those born between 1951 and 1992, and aged 20 or older at the time of the interview. whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Table A4. Education and religiosity, with access to credit subsample

	(1)	(2)	(3)
		1 if…	
	Pray >5 times per day	Eat only halal food	Join religious activity during the last 12 months
Years of education	-0.016	-0.111	-0.012
	(0.058)	(0.293)	(0.114)
First-stage F-statistics	3.19	0.16	1.82
Observations	8,179	3,581	7,565

Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.

Table A5. Labor market outcomes, heterogeneity by gender

	(1)	(2)	(3)	(4)	(5)	(6)
			1 if …			
	Working	Employed	Primary or secondary sector	Tertiary sector	Blue collar	White collar
Male subsample						
Years of education	-0.0005	0.047	-0.064**	0.064**	-0.050**	0.035
	(0.019)	(0.032)	(0.031)	(0.031)	(0.024)	(0.027)
First-stage F-statistics	35.89	25.69	18.15	18.15	28.24	28.24
Observations	15,838	12,378	7,327	7,327	14,347	14,347
Female subsample						
Years of education	-0.047	-0.046	-0.113	0.113	-0.109	0.076
	(0.052)	(0.070)	(0.130)	(0.130)	(0.106)	(0.077)
First-stage F-statistics	13.50	7.11	1.26	1.26	3.81	3.81
Observations	17,443	8,586	4,962	4,962	9,381	9,381

Note: IFLS 2007 and 2014 provide data. Samples are limited to those born between 1951 and 1992 and aged 20 or older at the time of the interview, whose religion is Islam. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors clustered at the birth-of-year level are reported in parentheses. Control variables include urban-rural dummy, gender, and survey fixed effects. The regressions include cubic birth-of-year polynomial. First-stage F-statistics represent Kleibergen-Paap F-statistic for weak instrument identification test.