

# What is the Effect of Schooling on Gender-Egalitarianism? Evidence from the Global South

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## **Abstract**

Compulsory schooling has been a critical state-sponsor policy in developing countries. Among its benefits, demographers and policy-makers have asserted that schooling would accelerate fertility reduction by disseminating gender-egalitarian orientations among students. However, there is still scant evidence that causally identifies the impact of compulsory schooling on gender attitudes. Prior work shows that education is associated with greater gender egalitarianism; yet it is unclear whether this is due to the treatment of education or other selection processes. This paper addresses this challenge by leveraging the implementation of compulsory school reforms in Colombia and Mexico. Using the World Value Survey, I implement a regression discontinuity design that compares cohorts young enough to be affected by these reforms with cohorts that were just too old to have been impacted by these laws. Preliminary findings show that an extra year of schooling does not have a sizable impact on gender egalitarianism, except for beliefs on the value of education for girls. Future analyses will include the cases of Kenya, Malawi and Uganda, to have a greater variation in country-contexts and compulsory reforms.

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# Introduction and Research Questions

The expansion of mass schooling has been one of the most critical state-sponsor policies in developing countries (Hannum and Buchmann 2005; Thornton 2001). In the last decades, the push for achieving “education for all” has resulted in the implementation of compulsory school reforms—both at the primary and secondary levels—across most countries in the global south (Buchmann and Hannum 2001). Scholars and international organizations alike asserted that schooling would accelerate fertility reduction by disseminating gender-egalitarian orientations among students (Caldwell 1976; Mason and Bumpass 1975).

Nonetheless, whether mass schooling transforms gender attitudes and infuses “modern” family ideals is still a subject of theoretical and empirical debate. Classic demographic theories posit that mass schooling impacts gender ideals by portraying the patriarchy family model as retrograde, encouraging women’s aspirations and decision-making, and questioning traditional beliefs and authority structures (Caldwell 1980, Easterlin 1983, Inkeles 1972). Schooling would diffuse these ideas by exposing students to textbooks, western-centric curriculums, and teachers that describe the benefits of western family life (Bledsoe et al. 1999; Caldwell 1982; Caldwell et al. 1988). Both theories rest on the assumption that the relationship between education and gender-egalitarian attitudes is causal.

In contrast, other scholars are skeptical of the effects of mass education, as compulsory reforms have often been implemented at the expense of school quality (Pritchett 2013; World Bank and UNICEF 2009). If cognitive development and literacy are one of the mechanisms that enable the diffusion of gender-egalitarian attitudes (Meyer et al. 1992, Daniels and Bright 1996), and schools are not providing these skills to students, mass education is unlikely to transform gender attitudes.

Empirically, qualitative research in developing contexts has found that mass schooling is associated with changes in individuals’ aspirations, family values and ways of seeing the world (e.g., Basu 1992, Streatfield 1989, Johnson-Hanks 2006). In particular, studies in Southeast Asia and Sub-saharan Africa show that education becomes a fundamental aspect of women’s identity, one that is associated with being school-driven, modern and restrained (Frye 2012; Johnson-Hanks 2006; Streatfield 1985). In addition, observational evidence in China, the U.S and Western Europe indicate that education has the strongest association with gender-egalitarian attitudes (Davis and Greenstein 2009; Shu and Meagher 2018; Shu 2004). In most analyses, this relationship holds for both genders, but it is stronger for women (Davis and Greenstein 2009). However, some argue that the positive association found in

these studies is a product of economic development and not education (Inglehart et al. 2017).

Establishing a causal relationship between schooling and gender attitudes is challenging given that educated individuals may be more prone to exhibit egalitarian gender attitudes due to unobserved differences in their upbringing, socioeconomic opportunities, or peers. Despite the theoretical prominence of this hypothesized relationship, few studies have used methods for causal inference to resolve these sources of endogeneity.

In this paper, I address this gap by leveraging quasi-experimental variation to identify the effect of compulsory school reforms on gender attitudes in Colombia and Mexico (and plan to incorporate the case of Kenya, Malawi, and Uganda). In particular, I use a fuzzy regression discontinuity design to answer three research questions. First, does an additional year of schooling affect gender attitudes later in life? Second, does this effect vary according to students' gender and school quality? Moreover, does the gender gap in years of schooling at the national level play a role in the magnitude of this effect?

## **Gaps in Existing Research and the Present Study**

Scholars have made competing claims about whether mass schooling would have a positive effect on gender-egalitarian orientations. Importantly, policy-makers and scholars alike theorized that the effect of education on greater gender egalitarianism would ultimately lead to a reduction in women's fertility (Caldwell 1976; Goody 1968). However, we lack evidence that causally identifies the impact of education on gender attitudes. Prior work shows that education is associated with greater gender egalitarianism, especially for the case of women, but it is unclear whether this is due to the treatment of education or other selection processes (Shu 2004, Shu and Meager 2018, Spitze and Huber 1980, Thornton et al. 1983). And although there is a vast body of research on the effect of mass schooling on the reduction of fertility, intimate partner violence, and women's decision making in developing countries (Behrman 2015; Weitzman 2017; Pierotti 2013), there is not an assessment of the effects of education on ideational dimensions of gender relations in these contexts.

Beyond identifying whether there is a causal effect of increased schooling on gender attitudes, this paper advances current scholarship in multiple ways. First, this analysis examines whether the effects of schooling on gender attitudes vary between both men and women in adulthood. Previous observational evidence in countries like the U.S. and China suggests that the treatment of schooling on gender orientations would be stronger for women

(Davis and Greenstein 2009; Shu and Meagher 2018; Shu 2004). Second, this paper analyzes whether the level of gender inequality in a country affects the impact of schooling on gender attitudes. In particular, it examines the role of the gender gap in education at the national level at the time of these reforms (Shu 2004). Lastly, this article will also explore the mediating role of school quality. Scholars have argued that mass education is unlikely to transform gender attitudes if schools do not provide literacy and cognitive skills to their students. Given the inability to connect individuals to particular schools, I am considering using country-level measurements of school quality, such as student-teacher ratio and national expenditures on education.

## Research Design

### Data

This article focuses on two major compulsory school reforms enacted in Colombia (1991) and Mexico (1993); in future iterations of this project, I plan to analyze the case of Kenya, Malawi, and Uganda.

The table below describes the characteristics of expansion reforms in Colombia and Mexico, including their year of implementation and cohorts affected. In both countries, reforms were implemented at the lower-secondary level, increasing the total years of schooling up to 10 years in Colombia and 9 years in Mexico.

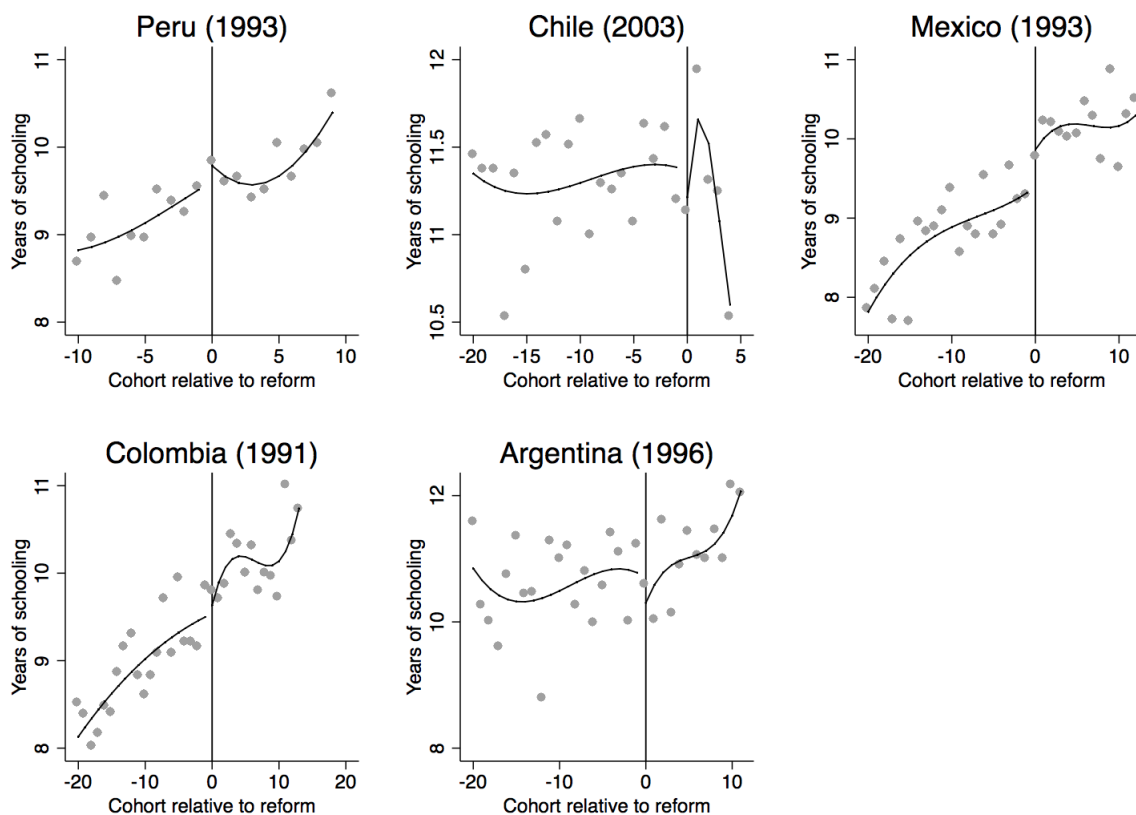
Table 1: School Reforms by Country

Country	Date of Reform	Year Reform Effect	Change in leaving age	Change in years
Colombia	1991	1991	11 to 15	5 to 10
Mexico	1993	1993	12 to 15	6 to 9

To assess how schooling affects gender attitudes in adulthood, I rely on a sample of respondents that were young enough to be affected by compulsory reforms with cohorts that were just too old to have been impacted by these laws. To this end, I pooled data from two waves of the World Value Survey (WVS), collected in Colombia and Mexico between 2005 and 2012. A unique aspect of this data is that it contains a series of questions on gender attitudes in the private and public sphere.

In addition, educational reforms implemented in Argentina, Chile, and Peru were also assessed but were not used in this analysis due to weak first stages (See Figure 1). I provide further details about the first stage estimates in the Findings section.

Figure 1: Compulsory Reforms and Years of Education



## Measures

### *Outcome of Interest: Gender Attitudes*

To measure gender attitudes, I use a series of questions asked in all WVS rounds (See Table 2 below).

Using these questions, I measure gender attitudes both as separate items and additive scales. Prior work comparing attitudinal measures across countries has found that even identical questions may not be directly comparable, as reference points and non-extreme responses may be interpreted differently (Cavaille and Marshall 2019). To circumvent this issue, I re-coded each question as a dummy variable anchored around reference points that

Table 2: WVS Measures

Item	Wording	Response
1	When jobs are scarce, men should have more right to a job than women.	5 point agree-disagree scale
2	On the whole, men make better political leaders than women do	5 point agree-disagree scale
3	A university education is more important for a boy than a girl.	5 point agree-disagree scale
4	On the whole men make better business executives than women do.	5 point agree-disagree scale
5	Being a housewife is as fulfilling as working for pay.	5 point agree-disagree scale

are more likely to be interpreted similarly across countries—a binary outcome for agree or disagree. Using these binary indicators I generated an additive scale of gender attitudes—across and within countries—designed to capture respondents’ latent disposition towards gender egalitarianism. This scale is constructed using the means of the standardized scores across 4 of the 5 items shown in Table 2 (Cotter et al. 2011). In particular, item 5 was excluded from the scale as including it significantly reduced the internal reliability of the scale—indicating this measure does not belong to the same latent construct.

Both the across-country and the within-country scales have high internal reliability<sup>1</sup> (Cronbach  $\alpha = 0.69$ ; Mexico scale  $\alpha = 0.7$ ; Colombia scale  $\alpha = 0.66$ ). In addition, I also generated a factor scale using factor analysis containing the same 4 items (1-4). This procedure revealed these four items belong to the same construct as the first factor has an eigenvalue of 1.58, whereas the second only has a value of 0.15 (less than what is recommended as a threshold to determine the existence of a second factor).

### ***Treatment: Years of Education***

Respondents’ years of education—the treatment variable—was not directly asked in the WVS. Instead, interviewees were asked about their highest educational attainment—a categorical measure—and the age when they reached that level of schooling. Given that coarsened treatments have shown to be sensitive in regression discontinuity designs, the use of a continuous measure as a treatment variable is preferred. Therefore, from these two questions mentioned above, I generated a proxy for years of education. More specifically,

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<sup>1</sup>A Cronbach  $\alpha$  equal to 0.6 or more is considered to be reliable.

for respondents that completed primary, secondary, or tertiary schooling, I allocated the total years of education needed to complete each school transition according to the national educational system. For respondents that attained *some* primary, secondary, or tertiary education, I used the age at which they left the school system to estimate how many years they spent in their last educational transition. In the case the age surpassed the expected maximum age in a cycle—for example, an individual who declared she has some secondary schooling but left the school system at 20—I allocated (*the expected duration of that specific transition* - 1) years of education.

## Identification Strategy

To identify the effects of increased schooling I implement a regression discontinuity design, comparing cohorts young enough to be affected by compulsory reforms with cohorts that were just too old to have been impacted by these laws. Therefore, the treatment consists of being affected by a compulsory reform for individual  $i$  from cohort  $a$  in country  $c$ :

$$reform_{ac} = \begin{cases} 0, & \text{if } birth\ year_{ac} - birth\ year\ first\ affected_{ac} < 0 \\ 1, & \text{if } birth\ year_{ac} - birth\ year\ first\ affected_{ac} \geq 0 \end{cases}$$

Where  $birth\ year\ first\ affected_{ac}$  is the age of the first cohort impacted by a compulsory reform. To estimate the local average treatment effect of increased schooling among students that were just young enough to be impacted by these policies, I estimated the following regression:

$$y_{iac} = \beta reform_{ac} + f(x_{bc}) + \epsilon_{iac} \tag{1}$$

Where  $y_{iac}$  corresponds to the gender attitudes of individual  $i$  and  $f$  is a function of the running variable  $x_{bc}$  equal to  $birth\ year_{ac} - birth\ year\ first\ affected_{ac}$ . This running variable is what determines selection into the treatment group, which is a deterministic function of birth cohort.

In addition, to estimate the local average treatment effect among those students that would have only remained in school because of the compulsory reform, I implement a fuzzy

regression discontinuity design. In this case, I use the reforms to instrument for the total years of schooling completed using a two-stage least squares (2SLS) estimation strategy.

In the first stage, the identifying instrument years of completed schooling $_{iac}$  is regressed on the treatment  $reform_{ac}$ .

$$schooling_{iac} = \alpha reform_{ac} + f(x_{bc}) + \epsilon_{iac} \quad (2)$$

The second stage is a linear probability model where the outcome of interest  $y_{iac}$  is regressed on the predicted value of years of completed schooling $_{iac}$  from the first stage.

$$y_{iac} = \beta schooling_{iac} + f(x_{bc}) + \epsilon_{iac} \quad (3)$$

Both equations are estimated simultaneously. To estimate heterogeneous treatment effects by gender and national context, I will include treatment by covariate interactions in future versions of this project.

Two assumptions are needed for this analysis to yield causal estimates. First, the instrument must predict treatment but should fulfill the exclusion restriction assumption— affecting the outcome only through the treatment (Angrist and Pischke 2009; Gerber 2012). In other words, compulsory school reforms should affect gender attitudes only via the extra time students spend in the school system, and not through other alternative paths. For instance, if these reforms also changed the gender composition of classrooms or they explicitly intended to increase gender equality in the school system, the exclusion restriction might have been violated. My review of these policies does not indicate these alternative paths took place in Colombia and Mexico, but I plan to present more robust evidence for this claim in future versions of this paper. The second assumption is that reforms must not reduce the educational attainment of any student—also known as monotonicity. This assumption seems plausible as it is unlikely that students respond to this policy by actually completing less schooling.



# Preliminary Findings

## First Stage Results: The effect of Compulsory Schooling on Years of Education

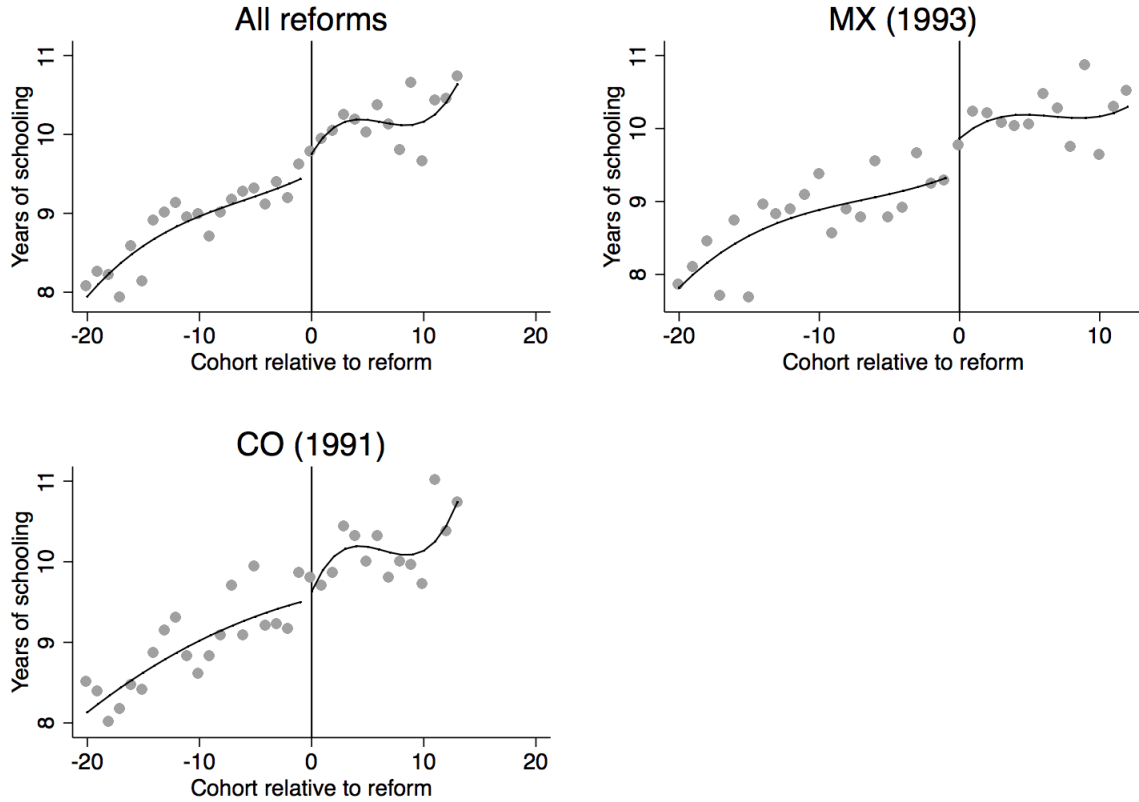
To examine if the implementation of compulsory school reforms increased the years of education of affected cohorts, I regressed total years of schooling on exposure to these reforms (the running variable). In Mexico, students exposed to compulsory schooling have 0.1 (p-value  $< 0.000$ ) more years of schooling, while in Colombia they have 0.089 (p-value  $< 0.000$ ) more years (See Table 3). These estimates consider all cohorts exposed to the reform, not only those that are close to the cutoff (If I restrict the window to observations closer to the cutoff the size of the effect increases). Across countries, we can see that being exposed to compulsory reforms increases schooling in 0.097 (p-value  $< 0.000$ ) years of education. These estimates demonstrate that these reforms significantly increase the average years of schooling among affected cohorts.

Table 3: The Effect of Compulsory Reforms on Years of Schooling

	Mexico (1993)	Colombia (1991)	All
Reform	0.104	0.089	0.097
SE	0.003	0.004	0.003
p-value	0.000	0.000	0.000
t-value	30.97	24.72	39.49
Constant	9.71	9.77	9.75
Observations	3555	3765	7320

The positive effect of these reforms on years of education is visually represented in Figure 2. We can see there is a noticeable discontinuity in years of schooling after the cutoff, reflecting a jump in schooling for cohorts that were closer to the implementation of reforms. It is important to note that the discontinuity is sharper for the case of Mexico, which is consistent with the greater size of the reform coefficient in Table 3.

Figure 2: Compulsory Reforms and Years of Education



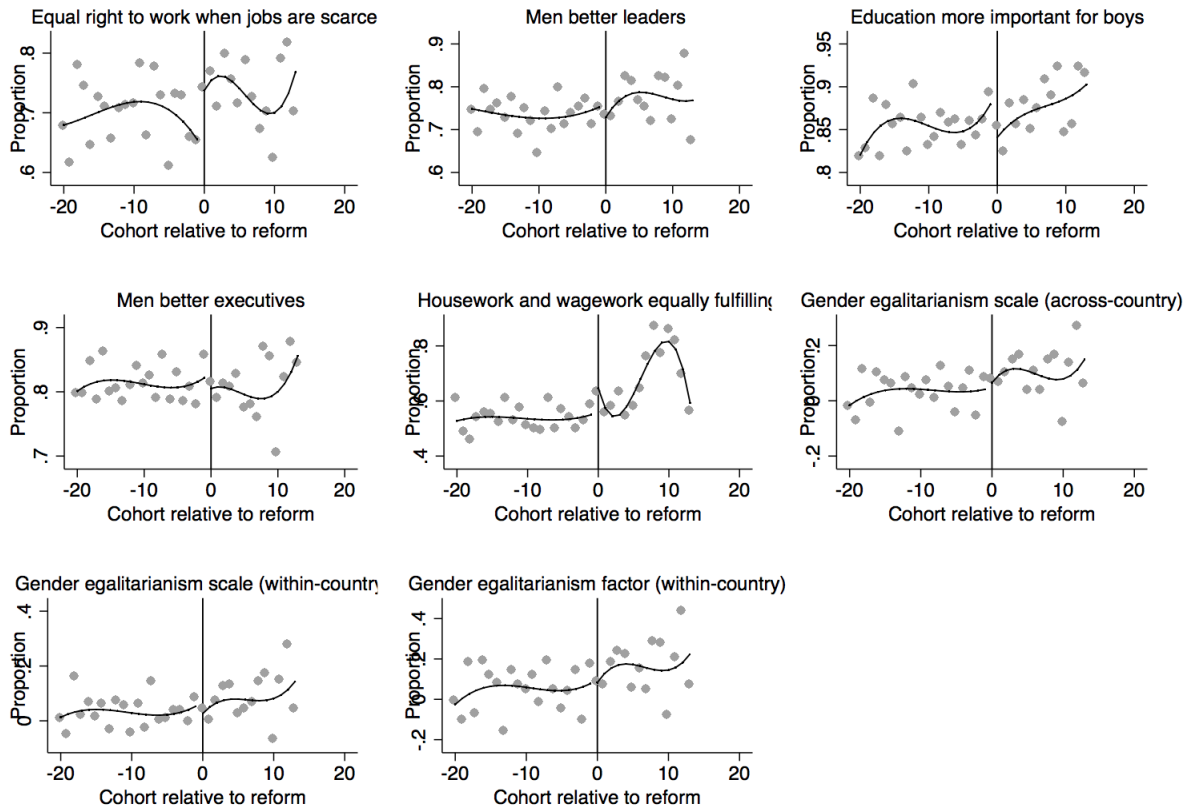
Importantly, these compulsory reforms can be used as instruments to assess the effect of schooling on gender attitudes only if the first stage fulfills certain conditions. The instrument is considered relevant if its corresponding p-value is lower than 0.0016, or if its t-value is larger than 3.2, or if its F-value is greater than 10 (Stock et al. 2002). At least two of these three conditions were fulfilled in the case of Mexico, Colombia, and the pooled data.

## Reduced Form Results: The Effect of Compulsory Schooling on Gender Attitudes

Figure 3 shows the reduced form effects of an increase in years of schooling on gender-egalitarian attitudes among pre and post-reform cohorts. The biggest positive effects are found in the proportion of respondents that believe there is an “equal right of men and women to work when jobs are scarce,” and the idea that housework and wage-work are equally fulfilling. Also, there is a reduction in the proportion of respondents that agreed

with the statement that “education is more important for boys.” These estimates were calculated using third-order polynomials at either side of the reform (Cattaneo et al. RD robust package).

Figure 3: Years of Education and Gender Attitudes



However, as Table 4 shows, none of these changes in gender attitudes are statistically significant across or within countries. The only exception being the statistically significant reduction in the belief that “education is more important for boys” (p-value < 0.05) in the case of Colombia.

## Next Steps

These preliminary results indicate that an extra year of schooling does not have a sizable impact on gender egalitarianism, except for Colombia where education reduces the belief

Table 4: Reduced Form Estimates

	Att Jobs	Att Politics	Att Educ	Att Bussiness	Att Housewife	S.Across	S.Within	F.Within
<b>Mexico (1993)</b>								
Reform	0.098	-0.062	-0.037	-0.028	-0.045	-0.040	-0.047	-0.111
SE	0.082	0.069	0.059	0.067	0.072	0.120	0.125	0.190
p-value	0.2322	0.3704	0.5362	0.6732	0.5307	0.7378	0.7052	0.5588
Bandwidth	4	4	5	4	5	4	4	4
Observations	848	838	1037	845	1025	830	849	812
Outcome mean	0.75	0.79	0.80	0.82	0.71	0.07	0.08	0.10
<b>Colombia (1991)</b>								
Reform	0.197	0.005	-0.063	-0.064	0.025	0.081	-0.099	0.031
SE	0.142	0.052	0.031	0.041	0.056	0.142	0.075	0.250
p-value	0.1660	0.9222	0.0432	0.1205	0.6526	0.5673	0.1862	0.9025
Bandwidth	3	6	7	7	7	5	8	4
Observations	237	1587	1733	1731	1718	344	1888	269
Outcome mean	0.68	0.73	0.90	0.80	0.47	0.10	0.03	0.19
<b>All</b>								
Reform	0.098	-0.010	-0.042	-0.060	0.000	0.013	-0.060	-0.106
SE	0.057	0.042	0.027	0.040	0.056	0.093	0.072	0.164
p-value	0.0857	0.8101	0.1243	0.1308	0.9933	0.8852	0.4061	0.5180
Bandwidth	5	5	7	4	4	5	5	4
Observations	1411	2346	3065	1931	1906	1366	2378	1081
Outcome mean	0.72	0.76	0.86	0.81	0.57	0.07	0.05	0.12

that “education is more important for boys” (p-value < 0.05). However, this analysis is only a first look into the effects of education on gender attitudes, and several analytical steps must be completed before more definitive conclusions may be drawn.

First, I plan to run second-stage analyses which will yield the effects of one more year of schooling for those students that in the absence of the reform would not have attended secondary education. Second, I will incorporate new measures of gender attitudes found in the Demographic Health Surveys. Third, I plan to extend this analysis to Kenya, Uganda, and Malawi, since all these countries implemented significant compulsory schooling reforms in the 90’s and these cohorts are included in the DHS surveys. Lastly, once all these analyses are completed I plan to delve into the national-level characteristics that can potentially explain heterogeneity in these results, such as the gender gap in education and school quality indicators.

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