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Can Education Reduce Traditional Gender Role Attitudes? *

Noelia Rivera Garrido **

Abstract

The purpose of this paper is to identify if there is a causal relationship between education and traditional gender-role attitudes. In particular, if women have to leave the labor market to take care of the family, and if men have more rights to a job than women when jobs are scarce. In addition, I explore plausible mechanisms through which education affects these attitudes. I use data from the European Social Survey for 14 European countries. My identification strategy exploits educational reforms changing the number of years of compulsory education to obtain a source of exogenous variation that can be used as an instrument for education. The first stage results show that education reforms certainly increase years of schooling, but only for individuals from a low-educated family, in particular women. Results indicate that for this group, one additional year of education significantly reduces the probability of agreeing with women's traditional gender role in more than 11 percentage points.

Keywords: Education, Compulsory schooling reforms, Gender-role attitudes, Gender inequality, Europe.

JEL classification numbers: A13, I21, I24, J16, J24.

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1 Introduction

Sexist perceptions in society, defined as traditional gender-role attitudes, may have negative implications for the economy as a whole. If a majority of the population thinks that women should stay at home, this may result in a low participation of women in the labor market. The loss of this talent can have a negative effect on growth. There is evidence showing that countries in which women participate little in the labor market grow less.¹ According to the European Institute for Gender Equality (EIGE), gender inequality has a strong negative impact on Gross Domestic Product (GDP) per capita in Europe. In particular, higher levels of gender equality could increase GDP per capita up to 9.6% (3.15 trillions of euros) in 2050. Thus, as The Economist (2015) points out, “Sexism is not just wrong. It is also expensive”. Furthermore, sexist attitudes have been found to be associated with several economic outcomes reducing women’s employment rates and increasing gender wage gap (Fortin, 2005).

The Global Gender Gap Report 2017 shows that, although gender equality has improved in the last few years, gender inequality in both economic participation and political empowerment remains very high. The traditional stereotype of women is still prevalent in Europe. According to the Gender Equality Eurobarometer 2017, about 44% of Europeans think that the most important role of a woman is to take care of her home and family. Moreover, data from the European Social Survey 2002-2010 show that about 47% of Europeans think that women have to be prepared to leave the job market to take care of the family and about 23% think that men should have more right to a job than a woman. There are also big differences across countries. While in some countries of Eastern Europe these percentages reach 70% and 50%, respectively, they are much smaller in the Nordic countries.

The purpose of this paper is to identify if there is a causal relationship between education and traditional gender-role attitudes. I study to what extent education explains people’s opinions about the role women should play in society. If indeed education plays a role, educational policies could be implemented to reduce social prejudice. There are several explanations to this kind of

¹See Cuberes and Teignier (2016) for further discussion on this point.

attitudes. Religion (Guiso et al., 2003, Algan and Cahuc, 2006), parental education (Vella, 1994) and intergenerational transmission (Farré and Vella, 2013) have been found to be determinants of gender-role attitudes. It has also been obtained that there is an association between education and gender-role attitudes (Fan et al., 2000). However, as far as I know, it has not been studied which is the causal effect of education on gender-role attitudes.

Identifying whether the correlation between education and other variables can be interpreted as a causal effect is difficult because of the potential endogeneity of education. Numerous studies have dealt with such endogeneity using schooling reforms. Most of them find that changes in compulsory school laws (CSL) are a valid instrument for education, using different reforms for both US and European countries (see Lochner, 2011 for a literature review).

I use data from the European Social Survey (rounds 2, 4 and 5) for 14 European countries. I exploit changes in CSL to deal with the potential endogeneity of education. In particular, I use exposure to these reforms as an instrument for the number of completed years of full-time education. I measure traditional-gender role attitudes by using two questions which are whether “A woman should be prepared to cut down on her paid work for sake of her family” and whether “Men should have more right to a job than a woman when jobs are scarce”.

These opinions are known to be correlated with different socio-economic indicators at the country level. In particular, countries with a greater percentage of people agreeing with these two statements present lower women’s employment rates, lower women’s labor force participation rate, lower percentage of women responsible for supervising other employees, more permissive attitude toward violence and greater inequality between women and men (see Table 1).²

Bertrand et al. (2015) find that the social norm “a man should earn more than his wife” has negative consequences on marriage formation, women’s labor supply and division of home production, among others. Thus, these questions seem to capture specific cultural traits and, because

²See also Appendix A for further details.

Table 1: Correlation Coefficients between the Percentage of People Agree or Strongly Agree with Survey Questions 1-2 and other Socio-Economic Indicators (Country Level)

	Survey Question 1	Survey Question 2
% of women responsible for supervising other employees	-0.4749***	-0.6594***
Women employment rate	-0.5783***	-0.8194***
Women labor force participation rate	-0.6863***	-0.7809***
Attitude toward violence	0.3509	0.3308
Son preference in education	0.7137***	0.8519***
Gender Empowerment Measure (GEM)	-0.7777***	-0.8109***
Gender Gap Index (GGI)	-0.7205***	-0.7172***
Gender Inequality Index (GII)	0.6135***	0.7837***
Gender Equity Index (GEI)	-0.8124***	-0.8679***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Survey data is weighted by using design weights. Attitude toward violence capture the percentage of women who agree that a husband/partner is justified in beating his wife/partner under certain circumstances. Gender Empowerment Measure (GEM) is a composite index measuring gender inequality in political participation, power over economic resources and economic participation and decision-making power. It takes values from 0 to 1. Higher values correspond to higher equality. Gender Gap Index (GGI) measures gender gaps on economic, political, education and health. The index runs from 0 to 1. Higher values correspond to higher equality. Gender Inequality Index (GII) captures gender inequality in health, empowerment and labour market. The index runs between 0 and 1. Higher values correspond to higher inequality. Gender Equity Index (GEI) measures gender disparities in education, economic participation and women empowerment. The index runs from 0 to 100. Higher values correspond to higher equality. Source: ESS (2004, 2008 and 2010), OCDE (2004, 2006, 2008 and 2010), Eurostat (2004, 2008 and 2010), World Economic Forum (2006, 2008 and 2010), Human Development Report (2005 and 2010) and European Institute for Gender Equality (2005 and 2010).

of the strong correlation with gender inequality indices in Table 1, they can be considered as a proxy for women's empowerment.

I find that education reforms increase years of education, but only for individuals from a low-educated family, in particular women. For men and women from a high educated family, the instrument has no power enough to identify the effect of education, in case it exists. Results indicate that, for women from a low-educated family, there is a strong causal effect of education on gender-role attitudes. In particular, one additional year of full-time education decreases the probability of agreeing with the statement that men should have more right to a job than a woman by more than 11 percentage points.

There are several potential explanations behind the mechanism through which education affects attitudes toward gender-role attitudes. First, education could change the way individuals think by promoting more tolerant views toward women and minorities. In order to check this hypothesis, I remove from the sample individuals who attended school under a conservative regime (Spain, Portugal and Germany) which, in principle, did not promote education in gender equality. As expected, I get a stronger effect. When I remove these countries where schooling had the objective of training women to take care of the family and home, the effect on the probability of agreeing with the statement that men should have more right to a job than a woman is bigger (13 percentage points). I also find an effect of a similar size on the probability of agreeing with the statement that women should leave the labor market to take care of the family. Thus, it seems that not only the quantity of education is important, but also quality matters. Second, education could increase economic opportunities for women since more educated people have a higher probability of finding a better job with better wages and labor conditions. Therefore, women will have higher aspirations and, therefore, change their opinions toward the role women should play in society. I find that older women, who have less education and work less than younger women, are more likely to agree with the traditional role of women. It also seems that their job opportunities are also different from those of the younger ones, since a greater proportion of them have jobs that require only low skills.

This paper is organized as follows. Section 2 presents the data used in this analysis. Section 3

discuss the empirical model. Section 4 contains the results. Section 5 discusses the mechanisms through which education could affect gender-role attitudes, section 6 includes some robustness checks and section 7 concludes.

2 Data and Descriptive Statistics

I use data from the European Social Survey (ESS thereafter).³ The ESS is a cross-national survey that contains individual information about attitudes, beliefs and behavioral patterns. Since 2001, it collects data every two years through face-to-face interviews in more than thirty countries.⁴ I use data from waves 2, 4 and 5 (which correspond to the years 2004, 2008 and 2010, respectively) because these are the waves that include the two questions that measure gender-role attitudes. In total, I have data from 32 european countries.

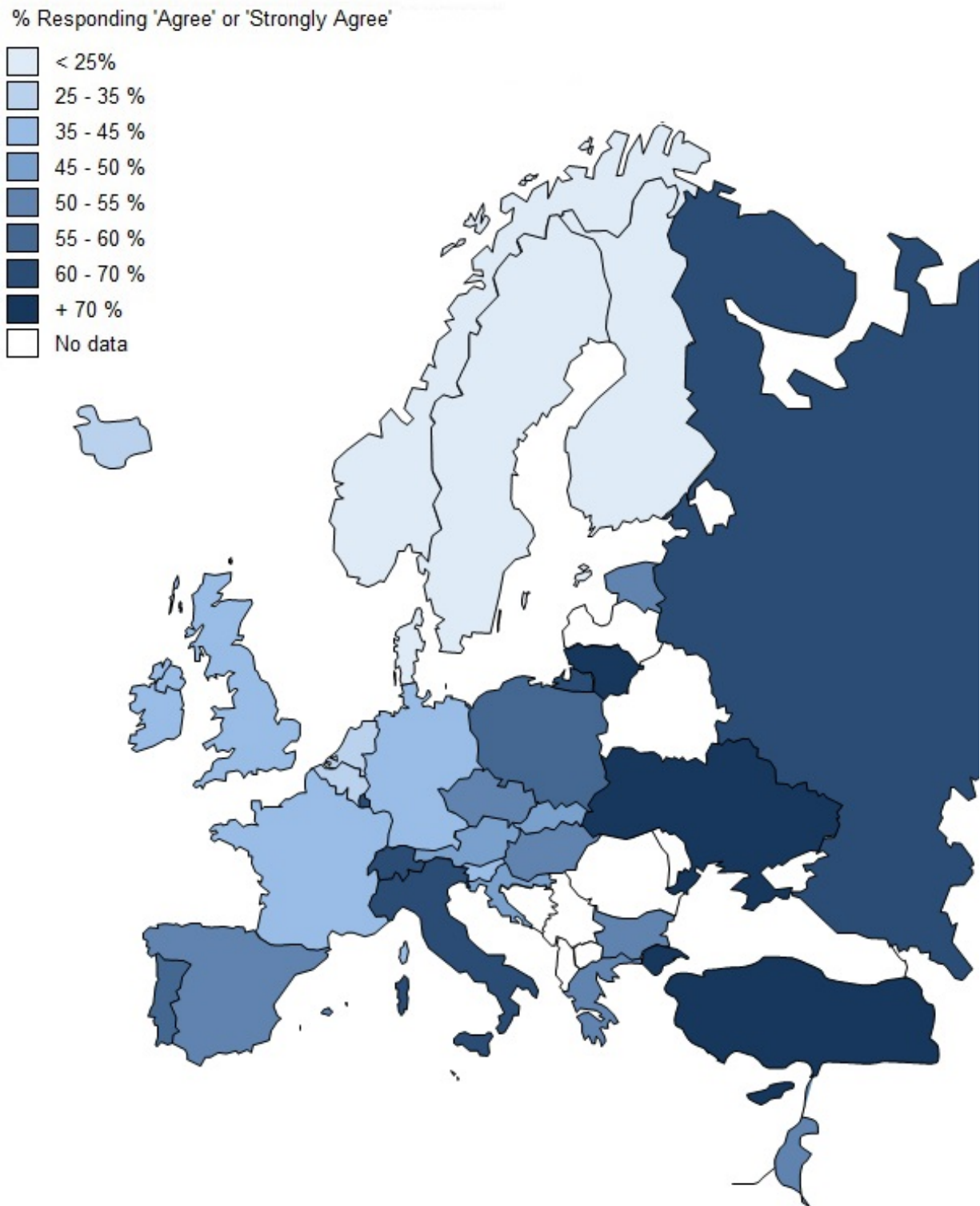
There are two questions in the ESS that measure gender-role attitudes. The first question is whether a woman should be prepared to cut down on her paid work for sake family (Statement 1 thereafter). The second question is whether men should have more right to a job than a woman when jobs are scarce (Statement 2 thereafter). Possible answers to both questions are “Strongly Agree”, “Agree”, “Neither Agree nor Disagree”, “Disagree Strongly” or “Disagree”. I build two dummy variables by using the previous two questions. First, a dummy called “Women Home” that takes value 1 if an individual answers ‘Agree’ or ‘Strongly Agree’ to Statement 1. Second, a dummy called “Men More Rights” that takes value 1 if an individual answers ‘Agree’ or ‘Strongly Agree’ to Statement 2.

Figures 1 and 2 show the percentage of people that agree or strongly agree with Statement 1 and 2, respectively. As can be observed, the percentage of people who agree with these questions is high

³European Social Survey Cumulative File, ESS 1-7 (2016). Data file edition 1.0. NSD - Norwegian Centre for Research Data, Norway - Data Archive and distributor of ESS data for ESS ERIC.

⁴See <http://www.europeansocialsurvey.org> for further information.

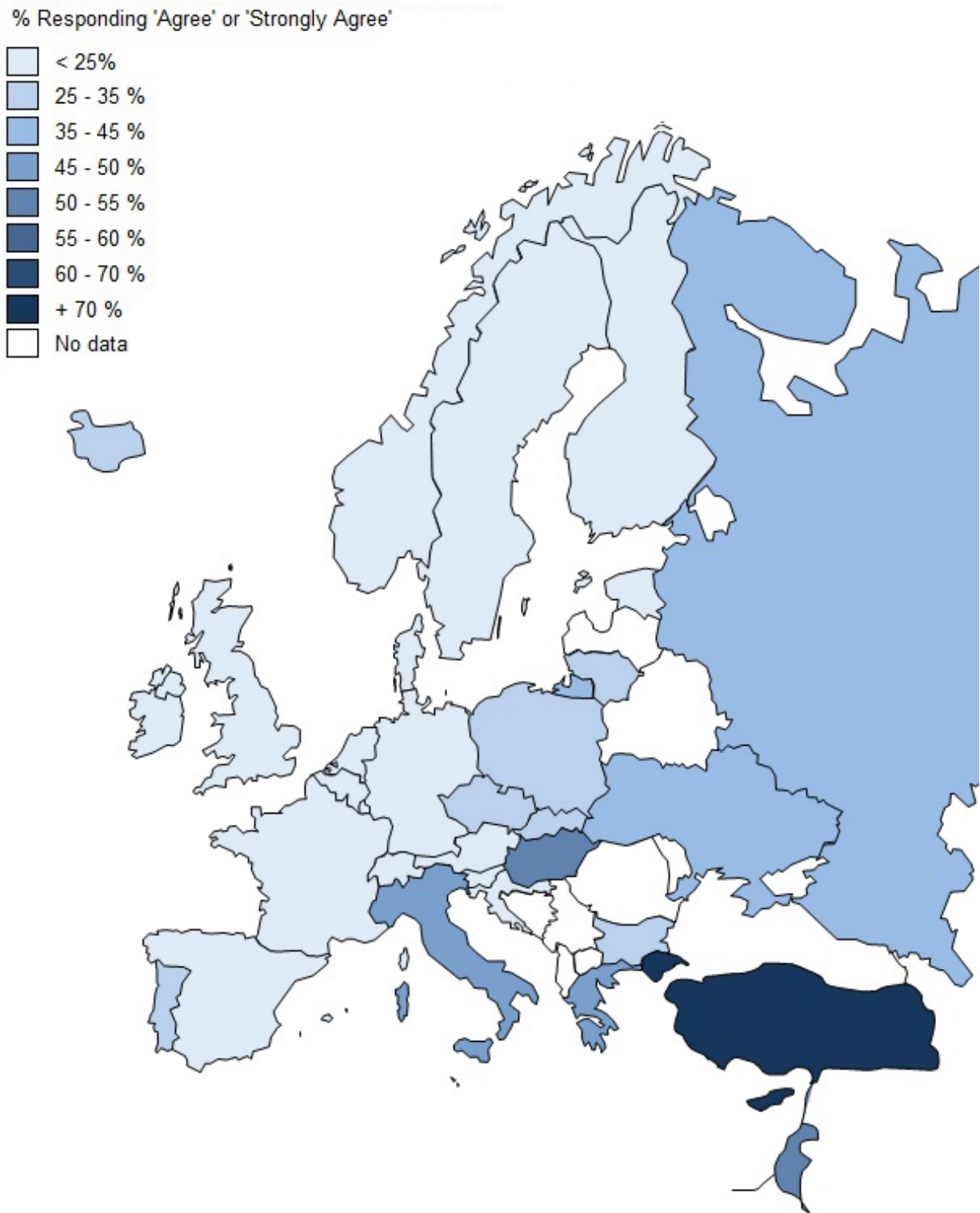
Figure 1: Traditional Gender-Role Attitudes



Survey question: "A woman should be prepared to cut down on her paid work for sake of her family"

Note: The sample is about individuals who are between 29 and 76 years old, were born in the same country where they are interviewed and non students. The sample is restricted to those who answer survey questions 1 and 2. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010) and own elaboration.

Figure 2: Traditional Gender-Role Attitudes



Survey question: "Men should have more right to job than women when jobs are scarce"

Note: The sample is about individuals who are between 29 and 76 years old, were born in the same country where they are interviewed and non students. The sample is restricted to those who answer survey questions 1 and 2. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010) and own elaboration.

in most countries. For both statements, I find low percentages of people agreeing in the Nordic countries, and high percentages in the Eastern countries. The specific country percentages are in Appendix A (Tables A1 and A2). Although in all countries the percentage of people who agree with Statement 1 is higher than with Statement 2, it remains very high in both cases. While more than 70% of people agree with Statement 1 in Lithuania, Turkey, Cyprus and Ukraine, less than 20% of individuals agree with this Statement in Norway, Sweden and Denmark. Furthermore, more than 50% of individuals agree with Statement 2 in Turkey and Hungary, and less than 10% in Finland, Norway, Sweden and Denmark. In addition, the percentage that believes in the traditional role of women in society is similar for men and women.

I restrict the sample to the 14 countries in the ESS for which I have available information about CSL. In particular, I include Belgium, Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Netherlands, Poland, Portugal, Slovakia, Spain and United Kingdom.

Table 2 reports information about the CSL used in this study. As can be seen, all the reforms were implemented at the country level except in the case of Germany where they were implemented at the regional level. These reforms took place between 1956 (Germany) and 1983 (Belgium). These reforms raise the school leaving age, increasing the number of years of compulsory by between 1 and 4 years, depending of the reform. Table 2 also shows the first cohort affected by the reform which goes from 1941 (Germany) to 1969 (Belgium). So, while these reforms affect some cohorts of children, others are exempted. Therefore, for each country, I construct treatment and control groups using the first cohort affected by the reform and a window of 7 years.⁵ Then, the control group is composed by people born up to 7 years before the first cohort affected by the reform and the treatment group is composed by people born up to 6 years after the first cohort affected by the reform including the first cohort affected. To clarify what it means consider the reform in Denmark. In 1971, this reform changed the minimum school leaving age from 14 to

⁵Many authors have used a window of 7 years (see for example Brunello et al, 2013, Crespo et al, 2014 and Mocan and Pogolero, 2017). In the Robustness Check Section I also check the robustness of the results to the use of larger and smaller window.

Table 2: Reforms in Compulsory Education

Country	School entry age	Reform date	Change on Years of Compulsory Education	Change on Minimum School leaving age	First cohort affected by the reform	Source
Belgium	6	1983	8 to 12	14 to 18	1969	(3)(6)(8)(11)(12)(13)
Czech Republic	6	1960	8 to 9	14 to 15	1946	(8)
Denmark	7	1971	7 to 9	14 to 16	1957	(2)(3)(4)(7)(8)(9)(11)(12)(13)
France	6	1967	8 to 10	14 to 16	1953	(1)(2)(3)(5)(6)(7)(9)(11)(12)(13)
Germany						(2)(3)(4)(5)(6)(10)(13)
Schleswig-Holstein	6	1956	8 to 9	14 to 15	1941	
Bremen	6	1958	8 to 9	14 to 15	1943	
Niedersachsen	6	1962	8 to 9	14 to 15	1947	
Saarland	6	1964	8 to 9	14 to 15	1949	
Nordrhein-Westfalia	6	1967	8 to 9	14 to 15	1953	
Hessen	6	1967	8 to 9	14 to 15	1953	
Rheinland-Pfalz	6	1967	8 to 9	14 to 15	1953	
Baden-Wurtemberg	6	1967	8 to 9	14 to 15	1953	
Bayern	6	1969	8 to 9	14 to 15	1955	
Greece	6	1976	6 to 9	12 to 15	1964	(8)(7)(13)
Hungary	6	1961	8 to 10	14 to 16	1947	(2)(13)
Ireland	6	1972	8 to 9	14 to 15	1958	(2)(3)(9)(11)(12)(13)
Netherlands	7	1975	9 to 10	15 to 16	1959	(2)(3)(7)(9)(11)(12)
Poland	7	1961	7 to 8	14 to 15	1952	(2)(13)
Portugal	6	1964	4 to 6	12 to 14	1956	(4)(13)(14)
Slovakia	6	1960	8 to 9	14 to 15	1946	(8)
Spain	6	1970	6 to 8	12 to 14	1957	(2)(3)(4)(6)(9)(11)(12)(13)
United Kingdom	5	1972	10 to 11	15 to 16	1958	(2)(9)(13)

Note: (1)= Albouy and Lequien (2009), (2)= Borgonovi et al. (2010), (3)= Brunello et al. (2009), (4)= Brunello et al. (2013), (5)= Crespo et al. (2014), (6)= D'Hombres et al. (2016), (7)= Fort et al. (2014), (8)= Garrouste (2010), (9)= Gathmann et al. (2015), (10)= Kemptner (2011), (11)= Meyer (2017), (12)= Murtin and Viarengo (2009), (13)= Mocan and Pogolero (2017), (14)= Vieira (1999)

16, increasing years of compulsory education from 7 to 9 (Garrouste, 2010). Hence, the first cohort affected by this reform are individuals born in 1975, since they are 14 years old in 1971. For this country, the control group is composed of those individuals born between 1950 and 1956 and the treatment group is composed of those born between 1957 and 1963. The choice of the window size is based on two considerations. On the one hand, the larger the window, the greater the number of observations which increases the precision of my estimates. On the other hand, if the window is very large, it means I am comparing individuals from very distant cohorts, which could be potentially very different in many respects (See Mocan and Pogolero, 2017, for a similar argument). Therefore, I use a 7-year window which seems to be a good balance between the two previous points.

These reforms imply that children born a few years apart face a different number of years of compulsory education. Then, those affected by the reform should have, on average, more years of education because of the reform.

Figure 3 shows average years of schooling for the treatment and control group. As can be seen, there is an increase in the average years of schooling after the reform, which indicates that these reforms had an impact on average years of schooling.

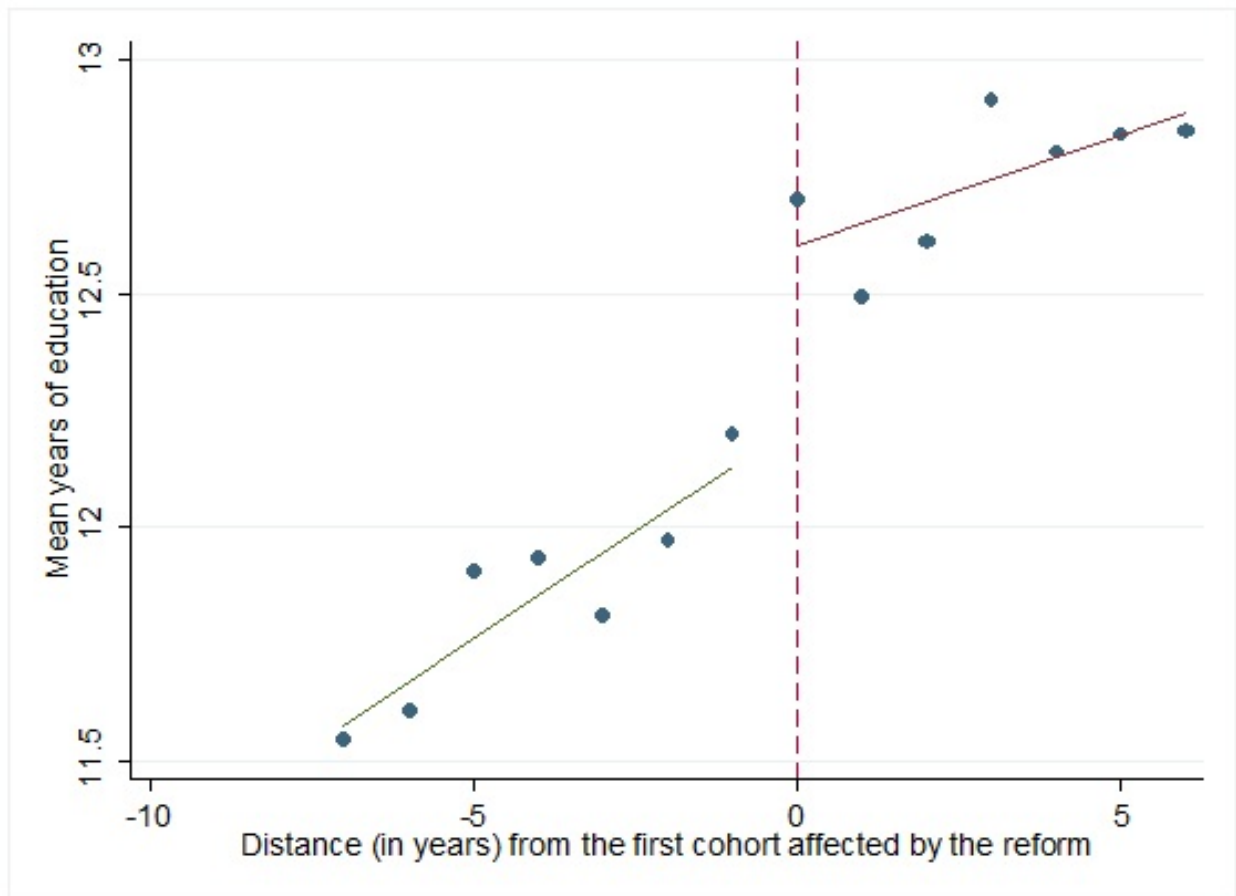
Table 3 presents a similar analysis at the country level. As can be observed again, average years of education are higher for those in the treatment group, that is, those affected by the reforms.⁶

I consider all individuals in the sample aged 29-76 who answer the two questions about gender-role attitude.⁷ I exclude those who were not born in the same country where they are interviewed

⁶I use the number of years of education that the respondent declares correcting for some obvious mistakes in which the number of years of education and the level of education that the respondent declares does not match. In addition, with the objective of increasing the sample size, to those individuals who do not answer the number of years of education but they have their educational level, I assign them the median number of years of education within each educational level, country, gender, round and according to whether it was born before or after the first cohort affected by the reform.

⁷I take this age range because of the way in which I have constructed the treatment and the control group.

Figure 3: Average Completed Years of Full-time Education



Note: The sample is about individuals who are between 29 and 76 years old, were born in the same country where they are interviewed and non students. The sample is restricted to those who answer survey question 1 and 2. Source: European Social Survey (2004, 2008 and 2010) and own elaboration

Table 3: Average Years of Education

Reform	Obs	All	Control (C)	Treatment (T)	Change (T-C)
Belgium, 1983	1093	13.84	13.42	14.30	0.883***
Czech Republic, 1960	1730	12.30	12.02	12.50	0.481***
Denmark, 1971	1087	14.07	13.82	14.29	0.476**
France, 1967	1255	11.888	11.51	12.29	0.778***
Germany, 1956-1969	1054	13.63	13.21	13.96	0.743***
Greece, 1976	1622	12.15	11.56	12.63	1.077***
Hungary, 1961	981	11.93	11.67	12.12	0.449*
Ireland, 1972	1249	13.34	12.97	13.73	0.755***
Netherlands, 1975	1293	13.55	13.06	14.07	1.004***
Poland, 1961	1147	11.82	11.25	12.23	0.978***
Portugal, 1964	1226	7.34	6.88	7.90	1.022***
Slovakia, 1960	1133	12.44	11.77	12.89	1.117***
Spain, 1970	1172	11.61	10.87	12.22	1.351***
United Kingdom, 1972	1381	13.35	12.95	13.70	0.759***

*Note: Treatment group consist of individuals born up to six years after the first cohort potentially affected by an education reform including those born in the first cohort potentially affected. Control group consist of individuals born up to seven years before the first cohort potentially affected by an education reform. The sample is about individuals between 29 and 76 years old who were born in the same country where they are interviewed and non students. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.*

Source: European Social Survey (2004, 2008 and 2010) and own elaboration

because I cannot know in which country they studied. I also exclude those who are still in education.⁸

Table 4 presents the summary statistics (columns 1 to 5) and mean values for treatment and control group (columns 6 and 7). The average value for all variables in the treatment and control groups is similar with some obvious exceptions: years of schooling and age. A detailed description of all variables I use is in the Appendix B.

In an initial analysis, I show some preliminary evidence of the existence of an association between education and traditional gender-role attitudes. For each country, I calculate the percentage of people who agree with the traditional gender-role by level of education.

Figure 4 shows these percentages. The percentage of people who “Agree” or “Strongly Agree” decreases with the education level. This result holds not only in the 14 countries considered in this study but also in the 32 countries for which I have information on gender-role attitudes in the ESS.⁹ Thus, this preliminary result shows that gender-role attitudes are clearly correlated with the level of education. In the rest of the paper I check whether there is a causal relationship between schooling level and gender-role beliefs. In doing so, I use an instrumental variable approach as explained in the following section.

3 Empirical Model

To study the causal effect of education on gender-role attitudes, I adopt a two-equation model. The relation of interest between years of education and gender-role attitudes is given by the following equation (second-stage):

$$y_i = \beta_0 + \beta_1 E_i + \beta_2 X_i + u_i \quad (1)$$

⁸ I consider the non-student those who report not being in school as their main activity in the last 7 days.

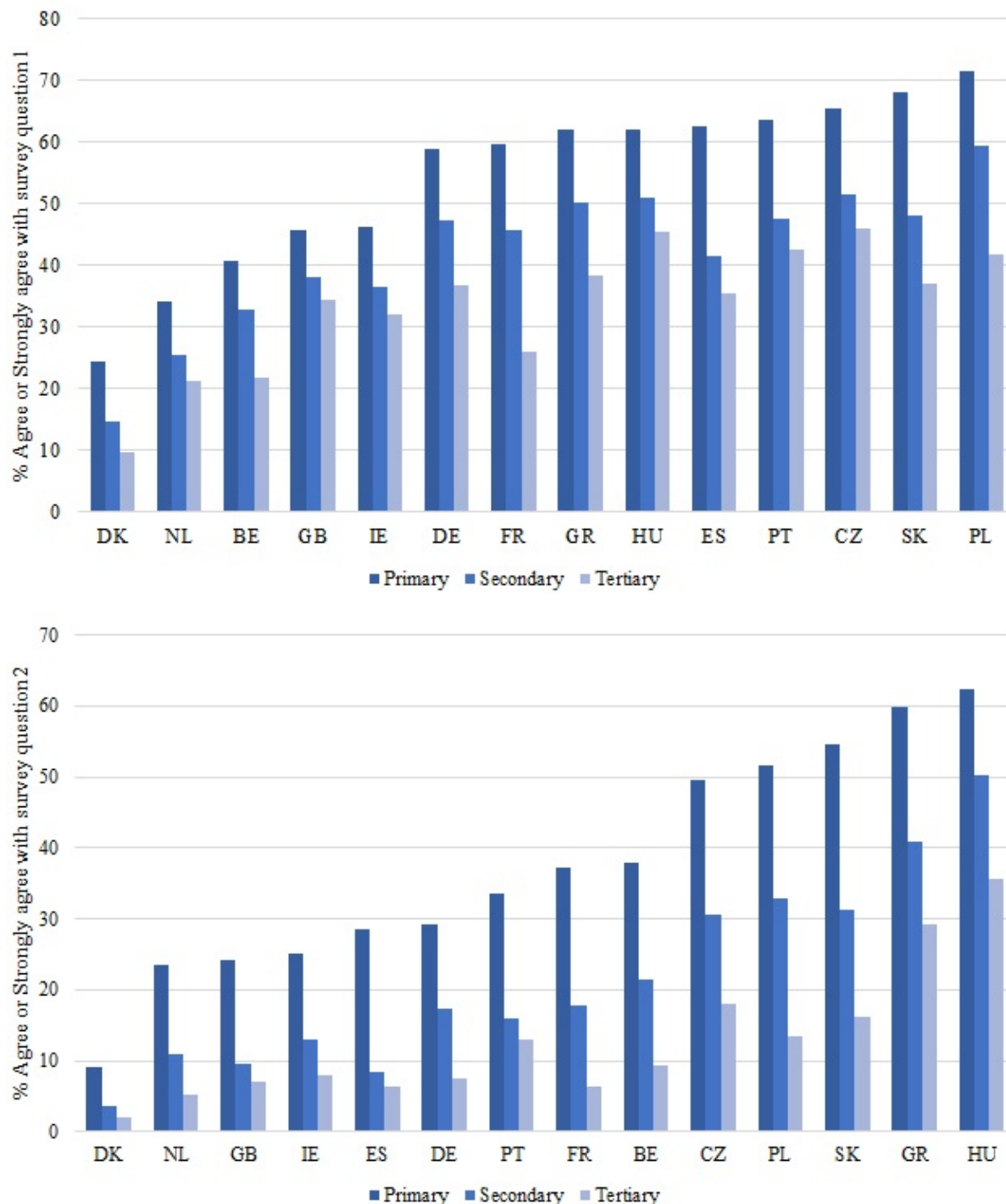
⁹ Percentages available upon request.

Table 4: Summary Statistics

Variable:	Obs.	Min.	Max.	All (Mean)	All (Std. Dev)	Control (Mean)	Treatment (Mean)	T-C (Mean)
Years of Schooling	16358	0	29	12.41	3.92	11.92	12.84	0.91***
Age	16358	29	76	52.71	7.8	56.07	49.71	-6.35***
Female	16358	0	1	0.54	0.49	0.55	0.55	-0.01
No citizen	16358	0	1	0.003	0.06	0.004	0.003	-0.001
Ethnic minority	16358	0	1	0.017	0.13	0.017	0.016	0.001
Father immigrant	16358	0	1	0.036	0.19	0.036	0.036	0.001
Mother immigrant	16358	0	1	0.033	0.18	0.031	0.035	0.005*
Family low educated	16358	0	1	0.61	0.49	0.66	0.57	-0.09***
Mother work at age 14	16358	0	1	0.45	0.5	0.41	0.49	0.08***
Very religious	16358	0	1	0.19	0.39	0.21	0.17	-0.04***
Household Size	16358	1	13	2.69	1.34	2.51	2.85	0.35***
Presence of Children	16358	0	1	0.48	0.50	0.40	0.55	0.15***
Work	16358	0	1	0.60	0.49	0.51	0.68	0.17***
Married	16358	0	1	0.66	0.47	0.68	0.66	-0.02**
Big city	16358	0	1	0.19	0.40	0.18	0.20	0.02***
Affected by the reform	16358	0	1	0.52	0.50	0	1	
Women home	16358	0	1	0.43	0.49	0.44	0.42	-0.02***
Men more Rights	16358	0	1	0.23	0.43	0.24	0.23	-0.02**

Source: European Social Survey (2004, 2008 and 2010) and own elaboration

Figure 4: Share of Individuals that answer Agree' or Strongly Agree' by Level of Education



Note: Survey Question 1: "A woman should be prepared to cut down on her paid work for sake of her family" Survey Question 2: "Men should have more right to job than women when jobs are scarce". Level of education defined as the higher level of education attained: Primary education (ISCED 0-2), Secondary education (ISCED 3-4), Tertiary education (ISCED 5-6). The sample is about individuals who are between 29 and 76 years old, were born in the same country where they are interviewed and non students. The sample is restricted to those who answer both questions. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010) and own elaboration.

where y_i denotes the outcome of interest for individual i (that is, two indicators for whether the individual agrees or strongly agrees with Statements 1 and 2), E_i is years of completed full-time education, X_i is a vector of controls that includes personal characteristics (gender, age, age square, ethnic minority status and an indicator of whether the respondent is a citizen) and family background (mother or father immigrants, a dummy for whether the mother was working when respondent was 14 and an indicator for whether the father and the mother are low educated meaning that both have less than secondary education).¹⁰

I also include survey-wave dummies, country dummies and country-specific time trends by gender, because educational trends are clearly different by gender.¹¹ Stephens and Yang (2014) find that it is crucial to include differential trends across states. In particular, they find that “statistically significant causal estimates become insignificant and, in many instances, wrong-signed when allowing year of birth effects to vary across regions”. Therefore, in order to avoid confounding effects of possible time trends that are affecting both the outcome of interest and education, I control for linear country-specific time trends by gender.¹² To that end, I include a continuous variable that measures time trend, interacted with country and gender dummies.¹³ Equation (1) assumes that the effect of education on gender-role attitudes is homogeneous across individuals. However, it could not be the case. In order to investigate heterogeneous effects, I estimate this equation separately by gender and by parental level of education.

The problem that I face estimating equation (1) is that education is potentially endogenous because of omitted variables (related to unobservable individual and family characteristics) and reverse causality (for example, it could be that women with traditional gender-role ideas tend to study less). As a result, estimating equation (1) by ordinary least squares (OLS) will produce a

¹⁰In the Robustness Check Section, I check the robustness of the results controlling for religion and other variables that are determined after schooling and may affect the variable of interest. In particular, I include indicators on whether the respondent is married or not, working, living with children, living in a city and the number of people living regularly as members of the household.

¹¹This result is available upon request.

¹²In the Robustness Checks Section, I also control for quadratic and cubic time trend and results remain similar.

¹³Time trend variable is a continuous variable that takes values from 1 to 14 such that each value corresponds to a different cohort within a country. That is, it takes value 1 for the first cohort considered in a country, value 2 for the second cohort considered in a country and so on.

biased estimate of the parameter of interest (β_1).

To address this problem, I use a quasi-experimental identification strategy. I use changes in CSL in different countries as a source of exogenous variation in schooling. This strategy has been extensively used in the literature (see for example Brunello et al, 2009, Murin and Viarengo, 2009, Borgonovi et al, 2010, Brunello et al, 2013, Crespo et al, 2014, Gathmann et al, 2015, and Meyer, 2017). In particular, I use individual's exposure to changes in the number of years of compulsory education as an instrument for reported years of full-time education. The idea is that children born a few years apart are exposed to different years of compulsory education. Then, as I have already mentioned in the previous section, this allows me to construct for each country a treatment and a control group. The assumption for the validity of the identification strategy is that, after controlling for several variables (such as country-specific time trends by gender and other relevant variables), compulsory schooling reforms have not a direct effect on these opinions and it only affects them through its effects on education. The impact CSL on years of education is given by the first-stage equation:

$$E_i = \gamma_0 + \gamma_1 R_{zk} + \gamma_2 X_i + v_i \quad (2)$$

where R_{zk} is a dummy that takes value 1 for those affected by the reform in country z and cohort k and v_i is the error term.

Equation (2) assumes homogeneous effects of the reforms. However, CSL affect individuals who do not study beyond compulsory education. It has been shown that parental education is the best predictor of children's educational attainment (Chevalier, 2004). Then, those children with low educated parents have a higher probability of leaving school after completion of compulsory education and thus have a higher probability of being affected by these reforms. Then, I estimate this equation separately according to the parental level of education. That is, for those whose parents have less than secondary education (low educated family thereafter) and those whose parents have secondary or more than secondary education (high educated family thereafter). In this way I capture possible different effects of CSL, depending on the educational level of parents. In addition, as the probability of remaining in education beyond compulsory education has been tra-

ditionally different by gender, CSL could affect men and women differently. Then, this paper also explores possible heterogeneous effects in the first-stage by gender.

Results from these estimations will indicate for which individuals the model will be able to identify a causal effect of education on gender-role attitudes. That is, if changes in the number of years of compulsory education only affect a particular group of people, the model will be able to estimate the causal effect for this group.

4 Results

The results from the first-stage equation (2) are displayed in Table 5. Results are estimated separately by gender and parental education.

As can be observed, reforms that increase the number of years of compulsory education have a positive and statistically significant effect on the number of years of education. Exposure to these reforms increases in 0.276 (3.3 months) the average number of years of education (column 1, row 1). Columns 2 and 3 are estimated separately for men and women and rows 2 and 3 are estimated separately by parental education. It allows for heterogeneous effects of changes in the number of years of compulsory education according to family background and gender. The effect of CSL is different depending on gender and family background which indicates the importance of including heterogeneity in the first stage. Specifically, exposure to educational reforms increase average years of schooling, but only for women (0.442, about 5.3 months). In addition, educational reforms only have an effect on those individuals with a low educated family. In particular, exposure to the CSL, increases in 0.469 (5.5 months) the average number of years of education for individuals with a low educated family (column 1, row 3). The effect is slightly greater for women (0.525, about 6.3 months) than for men (0.401, about 4.8 months), although this difference is not statistically significant ($p=0.4683$).¹⁴ The F-test statistic is very low when estimate the effect for

¹⁴Brunello et al. (2013) find similar results.

Table 5: First-Stage results

	All	Men	Women
All	0.276*** (0.102)	0.065 (0.165)	0.442*** (0.127)
F-test statistic	7.32	0.15	12.12
P-value	0.0074	0.6943	0.0006
Obs.	16358	7379	8979
High Educated Family	-0.00165 (0.165)	-0.345 (0.262)	0.310 (0.226)
F-test statistic	0.00	1.73	1.88
P-value	0.9920	0.1895	0.1714
Obs.	6295	2979	3316
Low Educated Family	0.469*** (0.125)	0.401* (0.212)	0.525*** (0.143)
F-test statistic	14.06	3.58	13.39
P-value	0.0002	0.0598	0.0003
Obs.	10063	4400	5663

*Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. All regresions control for individual characteristics (gender; non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Standard errors are clustered by country and birth-cohort.*

men who comes from a low educated family (F-test statistic=3.58, p-value=0.0598) which could be indicating that the instrument does not have power enough to estimate the causal effect in this case. Then, for men and women from a high educated family, the instrument has not power enough to identify the effect of education, in case it exists.

Table 6 reports second-stage results, which are estimated using equation (1) and one instrument, a dummy that indicates whether the individual was affected by the reform or not. I show results estimated by OLS using the whole sample (see columns 1 and 4) using the same sample as in the estimation by IV (see columns 2 and 5) and the IV results (see columns 3 and 6).¹⁵

IV estimates the local average treatment effect (so called LATE) which is the effect of education on those affected by educational reforms. Results indicate that, on average, one additional year of education decreases the probability of agreeing with Statement 2 in more than 11 percentage points for those women in a low educated family. That is, about 44% ($0.11/0.25=0.44$) of the mean value of the variable ‘Women Home’ for this group of individuals. The effect of education on the probability of agreeing with the Statement 1 goes in the same direction but it is not statistically significant. However, on the following sections, I show that it becomes statistically significant when I remove some countries or use an smaller window size.

OLS estimates show that there exist a correlation between education and gender-role beliefs which is estatistically significant for the whole sample and all subsamples considered. Results from OLS are in the same direction than IV, although the latter are higher than OLS estimates in both cases (using the whole sample and the restricted sample). It could happen because returns for the subgroup of people that have been affected by the reform and have changed their behavior because of the reform (compliers) are higher than for the rest of people who were not affected.

¹⁵I also show returns to education by using a probit and an IV probit model. Returns to education are similar when estimate by OLS and Probit models (see Table A4 in Appendix A). However, the effect of education on gender-role attitudes is greater when using an IV probit model instead of an IV model (see Table A5 in Appendix A). It could be due to the fact that IV models and IV probit models are estimated under different assumptions.

Table 6: Returns to education (OLS vs IV)

	Women Home			Men more Rights		
	OLS(a)	OLS (b)	IV (b)	OLS(a)	OLS (b)	IV (b)
Average Effect	-0.0160*** (0.000647)	-0.0160*** (0.00110)	-0.0508 (0.0521)	-0.0189*** (0.000607)	-0.0187*** (0.00111)	-0.0296 (0.0439)
By gender and parental education:						
Women-High educated family	-0.0172*** (0.00145)	-0.0179*** (0.00270)	0.118 (0.144)	-0.0180*** (0.00116)	-0.0167*** (0.00203)	0.0726 (0.101)
Women-Low educated family	-0.0183*** (0.00115)	-0.0197*** (0.00203)	-0.0655 (0.0511)	-0.0219*** (0.00107)	-0.0228*** (0.00188)	-0.114** (0.0541)
Men-High educated family	-0.0130*** (0.00147)	-0.0101*** (0.00252)	0.0118 (0.101)	-0.0140*** (0.00118)	-0.0120*** (0.00214)	-0.0500 (0.0824)
Men-Low educated family	-0.0148*** (0.00117)	-0.0133*** (0.00200)	-0.0647 (0.0569)	-0.0203*** (0.00101)	-0.0203*** (0.00174)	0.0499 (0.0731)
Obs.	52233	16358	16358	52233	16358	16358

*Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (a)= Full Sample, (b)= Restricted Sample to a window equal to 7. In columns 3 and 6, years of schooling is instrumented by the number of years of compulsory education and its interaction with family education. Standard errors in parenthesis. All regressions control for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Standard errors are clustered by country and birth-cohort.*

5 Discussion

The problem when using data from different countries and time periods is that it is difficult to find a common mechanism through which education affects attitudes toward the role a woman should play in society. In this Section I propose two potential explanations. First, education could change the way of thinking of individuals by promoting more tolerant views toward women and minorities. If this is the mechanism, then more education makes individuals more tolerant. However, if this additional education that the individuals get does not promote a tolerant view, the effect could be the opposite. That is, more education makes individuals less tolerant. One way of checking this idea is to remove from the sample those reforms that occurred in conservative dictatorships (Spain, Portugal and Germany) which, in principle, do not promote education in gender equality. In this case, the effect of education on gender-role attitudes should be greater. In fact, this is what I obtain. In particular, for women with a low educated family, the effect of education is greater than the one obtained with all the 14 countries (see Tables 7 and 8 for the Statement 1 and 2, respectively).

These tables show the results corresponding to different specifications where I remove from the sample individuals who went to school during a conservative regime. First, I remove individuals born in Portugal between 1949 and 1962 (dictatorship of Salazar), and individuals born in Spain between 1950 and 1963 (Franco's regime). For women from a low educated family, the estimated effect of education on gender-role attitudes goes from 11.4 to 13.1 negative percentage points in case of the Statement 2 (see rows 1 and 2 in Table 8). In case of Statement 1, it becomes statistically significant and goes from 6.5 to 13 negative percentage points (see rows 1 and 2 in Table 7).

Next, I eliminate individuals born in Germany. In this country, educational reforms that increased the number of years of education were implemented at the regional level. Therefore, the treatment and control group are composed of individuals born in different cohorts depending on the

Table 7: Returns to education education (IV) - Woman Home

	All	Low educated family		High educated family	
		Men	Women	Men	Women
Baseline (Table 6)	-0.0508 (0.0521)	-0.0647 (0.0569)	-0.0655 (0.0511)	0.0118 (0.101)	0.118 (0.144)
F-test statistic	7.32	3.58	13.39	1.73	1.88
P-value	0.0074	0.0598	0.0003	0.1895	0.1714
Without ES, PT	-0.0823 (0.0589)	-0.0826 (0.0668)	-0.130** (0.0656)	0.00216 (0.158)	0.0987 (0.117)
F-test statistic	7.24	3.39	10.49	0.73	2.55
P-value	0.0078	0.0669	0.0014	0.3934	0.1122
Without ES, PT Schleswig-Holstein, Bremen	-0.0858 (0.0599)	-0.0803 (0.0679)	-0.130** (0.0642)	0.0112 (0.156)	0.102 (0.126)
F-test statistic	7.03	3.25	10.90	0.74	2.21
P-value	0.0087	0.0730	0.0012	0.3908	0.1392

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. Baseline estimates includes controls for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14), and country-specific time trend by gender. Specifications change across rows according to the first column.

Table 8: Returns to education (IV) - Men more Rights

	All	Low educated family		High educated family	
		Men	Women	Men	Women
Baseline (Table 6)	-0.0296 (0.0439)	0.0499 (0.0731)	-0.114** (0.0541)	-0.0500 (0.0824)	0.0726 (0.101)
F-test statistic	7.32	3.58	13.39	1.73	1.88
P-value	0.0074	0.0598	0.0003	0.1895	0.1714
Without ES, PT	-0.0231 (0.0491)	0.0459 (0.0701)	-0.131* (0.0690)	-0.0937 (0.151)	0.0714 (0.0870)
F-test statistic	7.24	3.39	10.49	0.73	2.55
P-value	0.0078	0.0669	0.0014	0.3934	0.1122
Without ES, PT	-0.0193 (0.0498)	0.0463 (0.105)	-0.126* (0.0668)	-0.0833 (0.1425)	0.0909 (0.1014)
Schleswig-Holstein, Bremen					
F-test statistic	7.03	3.25	10.90	0.74	2.20
P-value	0.0087	0.0730	0.0012	0.3908	0.1392

*Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. Baseline estimates includes controls for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Specifications change across rows according to the first column.*

region. In the case of Schleswig-Holstein and Bremen, five and four cohorts respectively, studied some years under the Nazi rule. By removing these two regions together with Spain and Portugal, I find again that the effect of education is greater than the effect obtained when I include all countries in case of the Statement 1 (see row 4 in Table 7) and 2 (see row 4 in Table 8).

To sum up, when I remove individuals who studied under a conservative regime which, in principle, does not promote education in gender equality, the effect of education is bigger. Therefore, it seems that not only the quantity of education is important, but also its quality. However, these estimates are more imprecise than the baseline estimates because sample size is lower and I lose variability in years of compulsory education.

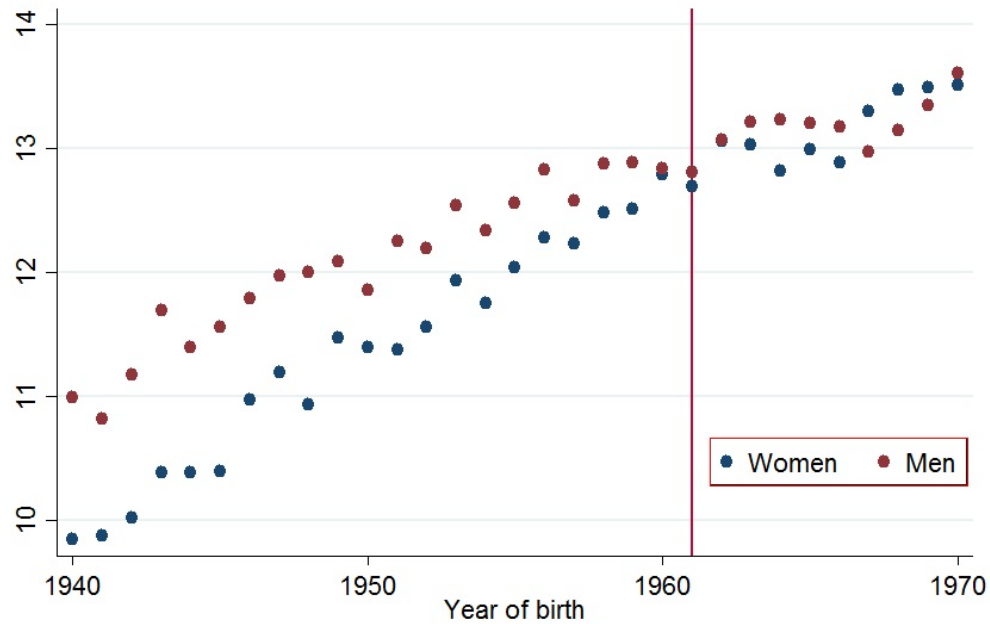
The second explanation is related to education increasing economic opportunities. That is, more educated women have a higher probability of finding a better job with better wages and labor conditions. Therefore, these women would have higher aspirations and then, change their opinions toward the role a woman should play.

Figure 5 shows that since the cohorts born in the 1960s, women converge men in terms of average schooling.

As expected, as younger cohorts of women get more education, the percentage of women with traditional gender-role attitudes decreases. Once women outperform men after the 1960 cohort, attitudes toward the role a woman should play in society do not change much for subsequent cohorts.

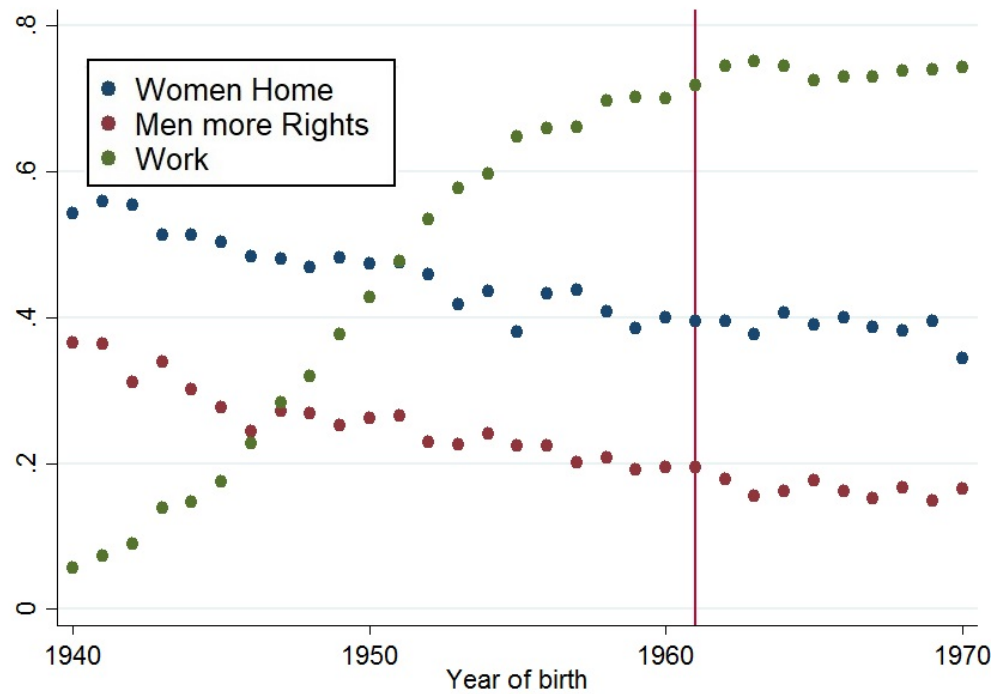
Figure 7 evidences that women with lower levels of education (older women) have a higher proportion of low-skill occupations and a lower proportion of jobs requiring high or medium-high skills in comparison with those with a higher-level of education (younger women). These three

Figure 5: Average years of education by gender



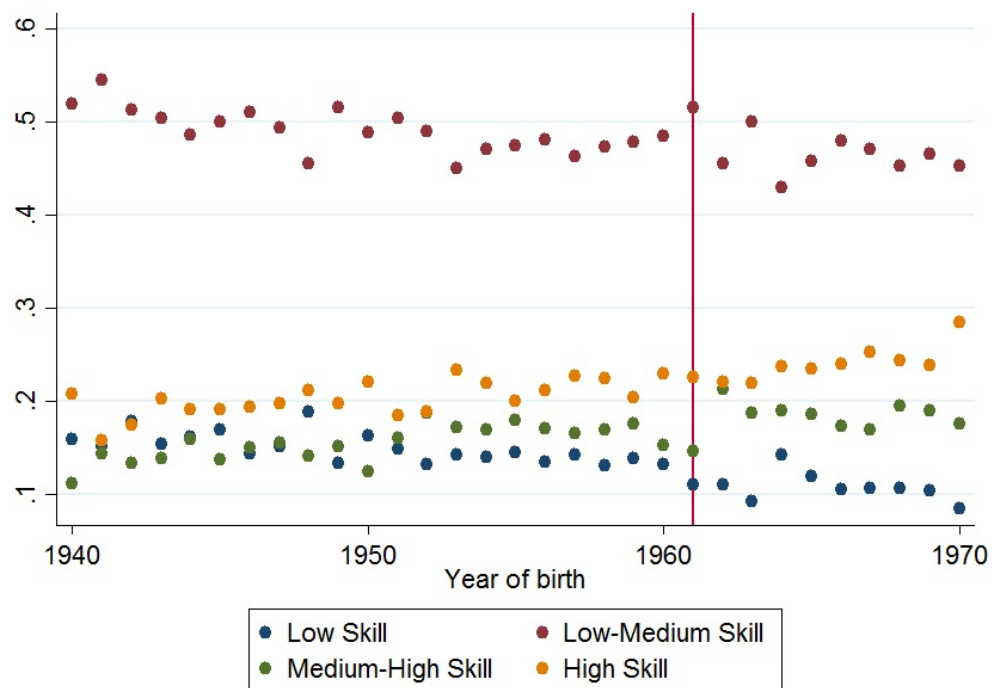
Source: European Social Survey (2004, 2008 and 2010) and own elaboration

Figure 6: Women's traditional gender-role attitudes and employment



Source: European Social Survey (2004, 2008 and 2010) and own elaboration

Figure 7: Jobs by required skills



Source: European Social Survey (2004, 2008 and 2010) and own elaboration

figures together show a pattern that goes along with the previous argument: younger women with higher levels of education and, therefore, better labor market outcomes seem to have changed their opinions about the so-called men's breadwinner role.

6 Robustness Checks

6.1 Removing countries one at time

In order to check whether my results are driven by a particular country, I estimate again the model excluding one country each time. In particular, I focus on those individuals with a low educated family because our instrument has not power enough to estimate the effect on those with a high educated family. Results are in Figure 8.

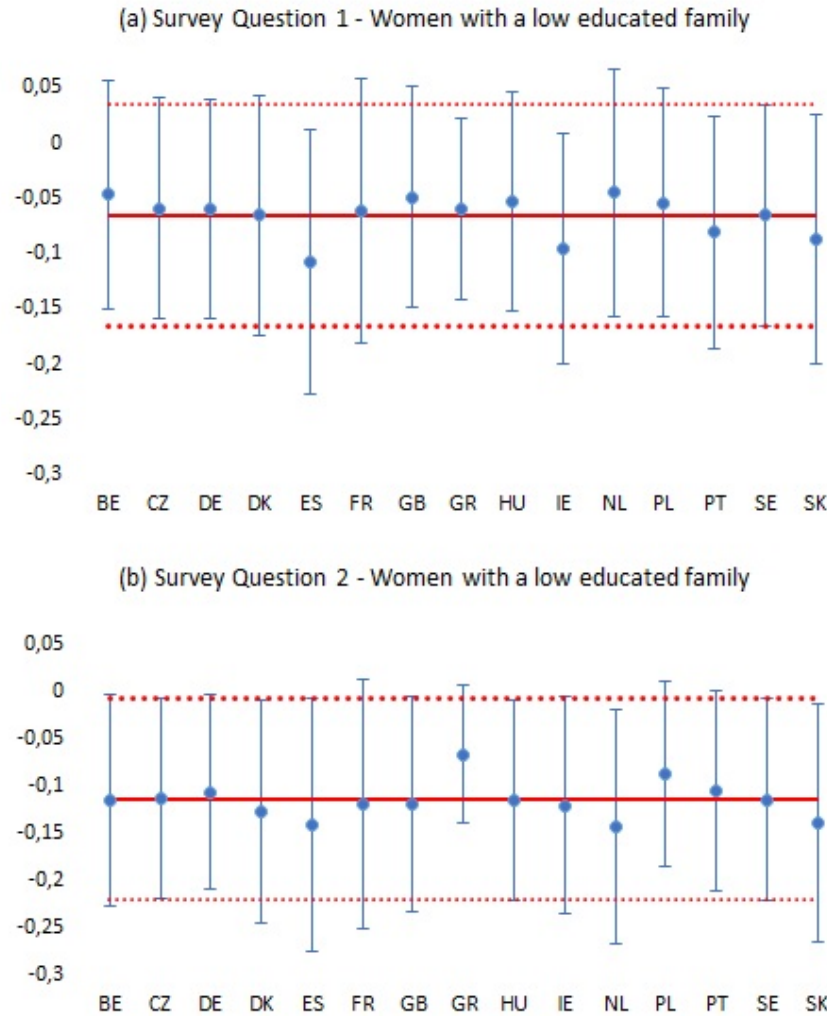
First, with respect to the effect of education on people's opinion about Statement 1 (see Figure 8.a), I find that the results remain negative and become statistically significant when it is estimated without Spain or Ireland. In particular, without these countries the model estimates that one additional year of education decreases the probability of agreeing with Statement 1 in about 10 percentage points which is about 24% ($0.10/0.43=0.24$) of the mean value of the variable 'Women Home' for this group of people.

Second, with respect to the effect of education on people's opinion about Statement 2 (see Figure 8. b), the estimated effects are similar to my initial results. It can be observed that the effect remains in the same direction and is statistically significant.

6.2 Size of control and treatment groups

In my main specification I include 7 cohorts in the control and treatment groups. Here I check if my results are robust to the number of cohorts I include in these groups. In particular, I consider

Figure 8: Returns to education Education (IV)



Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Red line correspond to the average effect including all countries and its confidence interval is represented by the dotted red line. Blue points correspond to the average effect without a country and its confidence interval is represented by the vertical blue line. All coefficients are estimated by IV using the number of years of compulsory education and its interaction with family education as instrument for the number of years of education. Control variables: individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Standard errors are clustered by country and birth-cohort.

Source: European Social Survey (2004, 2008 and 2010) and own elaboration

windows of 5 and 9 years, respectively. Results are in Table 11 for Statement 1 and in Table 12 for Statement 2.

Returns to schooling remain similar to the baseline specification and that results are not statistically different by using different windows (see rows 2 and 3 in Table 12).

As another robustness check, following Borgonovi et al. (2015) and Meyer (2017) among others, I exclude from the analysis the first cohort potentially affected (FCA) by the reform. The reason is that the extent of this cohort's exposure to the education reform could be unclear. It may happen that not all the individuals in the FCA were truly affected. Then, I estimate again the model removing this cohort. I do this in 2 ways. First, I eliminate the FCA such that treatment group is now composed of only 6 cohorts instead of 7. Second, I remove the FCA and I add another cohort to the treatment group such that it is composed of 7 cohorts. In this last case, I have made two changes from the baseline. After these changes, I find that the results do not change much (see rows 4 and 5 in Table 12). Moreover, returns to schooling are not statistically different from the ones in the baseline.

6.3 Other Checks

In my model I always include linear country-specific time trends separated by gender. I check that my results are robust to including controls for quadratic (see row 2 in Table 11 for the Statement 1 and in Table 12 for Statement 2).

I also estimate the model including additional controls. I control for being very religious, finding similar results. In addition, I control for some characteristics that are determined after

Table 9: Returns to education education (IV): Woman Home

	All	Low educated family		High educated family	
		Men	Women	Men	Women
Baseline (Table 6)	-0.0508 (0.0521)	-0.0647 (0.0569)	-0.0655 (0.0511)	0.0118 (0.101)	0.118 (0.144)
Window equal to 5	-0.0883* (0.0526)	-0.0949* (0.0572)	-0.130** (0.0630)	-0.0416 (0.139)	0.101 (0.125)
Window equal to 9	0.00606 (0.0600)	-0.109 (0.183)	-0.0179 (0.0510)	0.0114 (0.113)	0.127 (0.0978)
Without FCA (1)	0.0314 (0.0902)	-0.0167 (0.0433)	-0.0102 (0.0682)	-0.0182 (0.0682)	0.931 (4.399)
Without FCA (2)	0.0242 (0.0653)	-0.0260 (0.0497)	-0.0252 (0.0567)	-0.0492 (0.115)	0.442 (0.862)

*Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. Baseline estimates includes controls for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Estimates without FCA (1) eliminate the FCA by the reform such that treatment group will be composed by 6 cohorts instead of 7. Estimates without FCA (2) eliminate the FCA by the reform and include another cohort in order to have 7 cohorts in the treatment group. Specifications change across rows according to the first row.*

Table 10: Returns to education (IV): Men more Rights

	All	Low educated family		High educated family	
		Men	Women	Men	Women
Baseline (Table 6)	-0.0296 (0.0439)	0.0499 (0.0731)	-0.114** (0.0541)	-0.0500 (0.0824)	0.0726 (0.101)
Window equal to 5	-0.0665 (0.0440)	0.0363 (0.0634)	-0.172** (0.0791)	-0.0245 (0.0948)	0.0523 (0.0844)
Window equal to 9	0.0269 (0.0513)	0.259 (0.416)	-0.0805* (0.0486)	-0.0421 (0.0858)	0.0981 (0.0747)
Without FCA (1)	0.00339 (0.0745)	0.0295 (0.0594)	-0.125* (0.0690)	-0.0633 (0.0642)	0.798 (3.776)
Without FCA (2)	0.0168 (0.0565)	0.0572 (0.0731)	-0.115** (0.0573)	-0.0810 (0.102)	0.412 (0.779)

*Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. Baseline estimates includes controls for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Estimates without FCA (1) eliminate the FCA by the reform such that treatment group will be composed by 6 cohorts instead of 7. Estimates without FCA (2) eliminate the FCA by the reform and include another cohort in order to have 7 cohorts in the treatment group. Specifications change across rows according to the first row.*

Table 11: Returns to education (IV): Women Home

	All	Low educated family		High educated family	
		Men	Women	Men	Women
Baseline (Table 6)	-0.0508 (0.0521)	-0.0647 (0.0569)	-0.0655 (0.0511)	0.0118 (0.101)	0.118 (0.144)
Cuadratic time trend	-0.0522 (0.0509)	-0.0653 (0.0532)	-0.0655 (0.0478)	0.0101 (0.0909)	0.214 (0.256)
With control for religion	-0.0541 (0.0539)	-0.0630 (0.0585)	-0.0632 (0.0538)	0.0249 (0.100)	0.105 (0.139)
With control for household characteristics	-0.0549 (0.0525)	-0.0632 (0.0566)	-0.0688 (0.0513)	0.0190 (0.102)	0.119 (0.145)
With controls for married, work and big city	-0.0461 (0.0570)	-0.0669 (0.0699)	-0.0628 (0.0537)	0.0116 (0.0927)	0.107 (0.126)
With controls for religion, household characteristics, married, work and big city	-0.0621 (0.0728)	-0.0621 (0.0728)	-0.0635 (0.0559)	0.0263 (0.0921)	0.0977 (0.124)
Controls for region in Germany	-0.0548 (0.0517)	-0.0624 (0.0561)	-0.0642 (0.0505)	0.0358 (0.104)	0.124 (0.157)
Weighted data using survey weights	-0.0837 (0.0683)	-0.251 (0.294)	-0.0719 (0.0642)	-0.127 (0.208)	0.0173 (0.130)
Raw educational data	-0.0418 (0.0413)	-0.0570 (0.0508)	-0.0592 (0.0447)	0.0225 (0.113)	0.0790 (0.0853)

*Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. Baseline estimates includes controls for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Specifications change across rows according to the first row.*

Table 12: Returns to education (IV): Men more Rights

	All	Low educated family		High educated family	
		Men	Women	Men	Women
Baseline (Table 6)	-0.0296 (0.0439)	0.0499 (0.0731)	-0.114** (0.0541)	-0.0500 (0.0824)	0.0726 (0.101)
Cuadratic time trend	-0.0299 (0.0429)	0.0578 (0.0743)	-0.115** (0.0512)	-0.0399 (0.0717)	0.140 (0.180)
With control for religion	-0.0316 (0.0459)	0.0483 (0.0757)	-0.113** (0.0565)	-0.0431 (0.0824)	0.0660 (0.100)
With control for household characteristics	-0.0330 (0.0441)	0.0454 (0.0706)	-0.114** (0.0546)	-0.0451 (0.0816)	0.0746 (0.102)
With controls for married, work and big city	-0.0273 (0.0475)	0.0666 (0.0947)	-0.115** (0.0558)	-0.0524 (0.0748)	0.0617 (0.0846)
With controls for religion, household characteristics, married, work and big city	-0.0313 (0.0505)	0.0641 (0.0985)	-0.114** (0.0579)	-0.0432 (0.0740)	0.0587 (0.0860)
Controls for region in Germany	-0.0283 (0.0434)	0.0480 (0.0717)	-0.112** (0.0533)	-0.0512 (0.0826)	0.0774 (0.109)
Weighted data using survey weights	-0.0632 (0.0534)	0.0413 (0.173)	-0.0978** (0.0435)	0.00481 (0.0949)	0.0382 (0.0990)
Raw educational data	-0.0208 (0.0344)	0.0500 (0.0680)	-0.101** (0.0467)	-0.0706 (0.0999)	0.0490 (0.0610)

*Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. Baseline estimates includes controls for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14) and country-specific time trend by gender. Specifications change across rows according to the first row.*

schooling and may affect the variable of interest. I include controls for household characteristics like the number of household members and an indicator for whether the individual live with children) and some indicators on whether the respondent is married or not, working or living in a city. Further, in row 7, I show results when include all these controls together. Again, results are similar to those obtained in the baseline model (see rows 3-6 in Tables 11 and 12).¹⁶

Finally, I estimate the model including regional fixed effects for Germany. I do this because educational reforms in Germany were implemented at the regional level. Again, the results are similar (see row 7, Tables 11 and 12). Another check is to use the raw educational data, but results practically do not change (see row 9 in Tables 11 and 12). Finally, I reestimate the model adding design and population weights finding that returns to education are not statistically different from the initial results (see row 8 in Tables 11 and 12).¹⁷

7 Conclusions

I study the causal effect of education on gender-role attitudes. In particular, I study whether education reduces the likelihood of agreeing with the statements “A woman should be prepared to cut down on her paid work for sake of her family” and “Men should have more right to a job than a woman when jobs are scarce”. This is a very important issue from the economic point of view, since these opinions are related to women’s employment rate, women labor force participation rate, gender empowerment and domestic violence, issues that, in turn, have a great impact in the economy.

I use an instrumental variable approach, exploiting changes in compulsory schooling laws as a source of exogenous variation in schooling. Results based on data from 14 countries in the European Social Survey indicate that educational reforms increase years of schooling for individuals from a low educated family, in particular women. For this group of people, the model estimates

¹⁶I consider that an individual is very religious when on a scale of 0 to 10 answer 8, 9 or 10 to the question of how religious is.

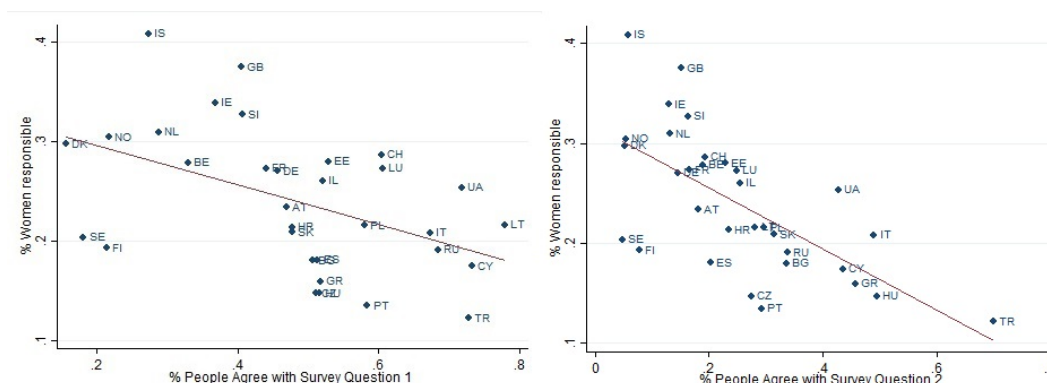
¹⁷The baseline results are estimated without using survey weights because the use of weights in certain cases seems to be unclear (see A. Deaton, 1997). I also check results by including survey weights and results are similar.

that, on average, one additional year of education reduces the probability of agreeing with the second Statement by about 11 percentage points (44%). In addition, when I remove countries where education promoted a traditional role for women, I find that education reduces the probability of agreeing with the second statement by about 13 percentage points (28%). This is quite strong effect. In addition, although I do not find effect for men and high educated women, it does not mean that education has no effect on these individuals since the identification strategy has no power enough to identify the true causal effect in this case.

Appendix

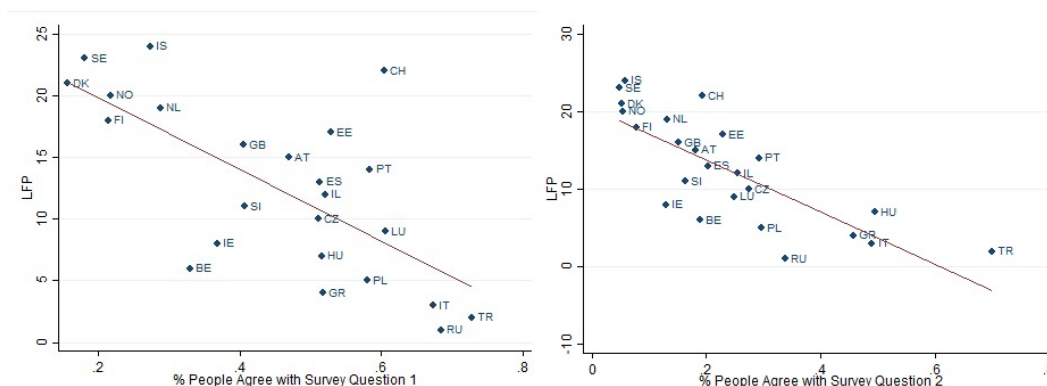
A: Figures and Tables

Figure A1: Gender-Role Attitudes and the Percentage of Women Responsible for Supervising other Employees



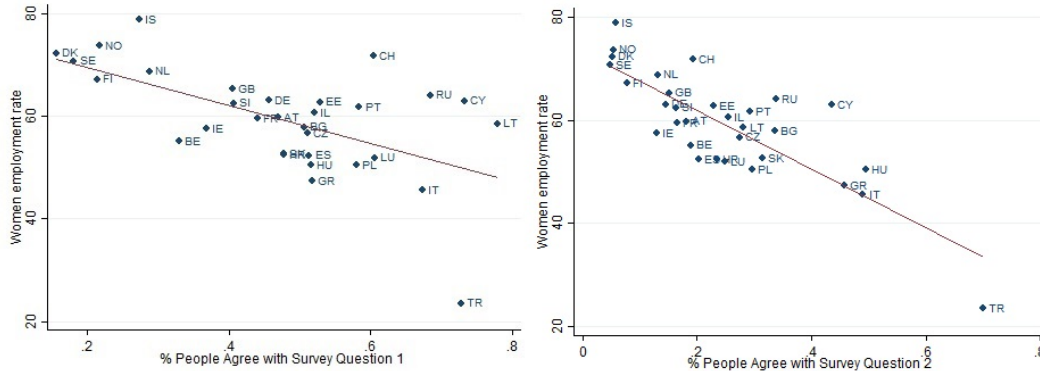
Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010) and own elaboration

Figure A2: Gender-Role Attitudes and Women Labour Force Participation Rate (LFP)



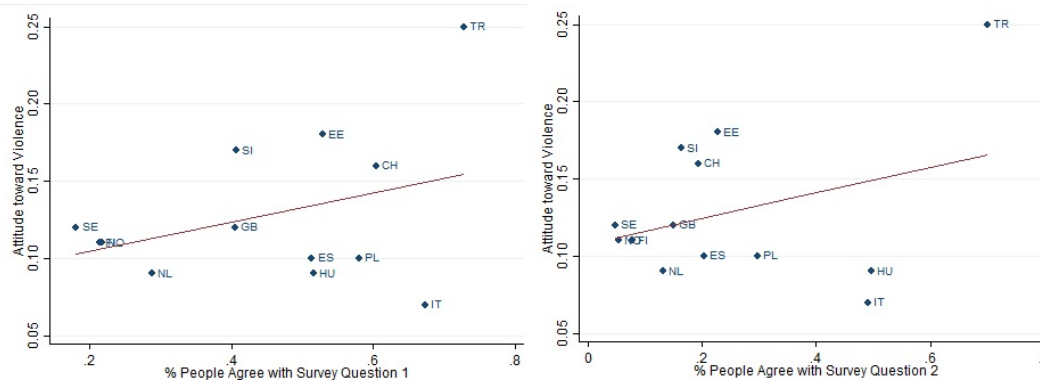
Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010), OCDE (2004, 2008 and 2010) and own elaboration

Figure A3: Gender-Role Attitudes and Women Employment Rate



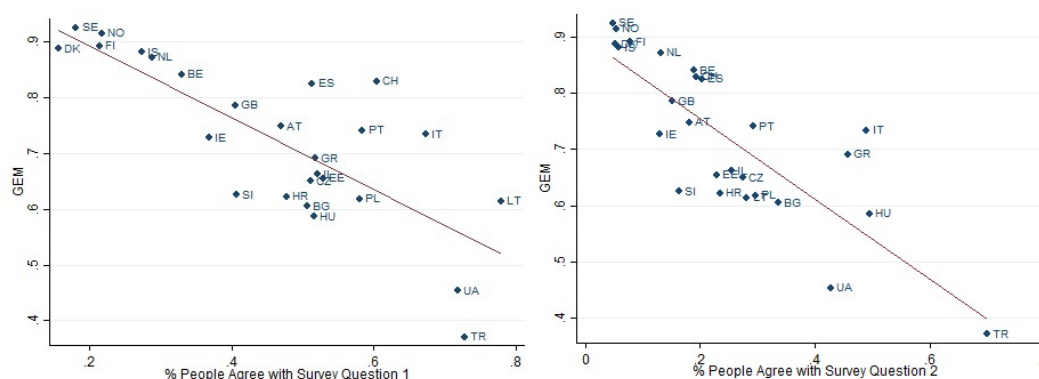
Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010), OCDE (2004, 2008 and 2010), Eurostat (2004, 2008 and 2010) and own elaboration.

Figure A4: Gender-Role Attitudes and Attitude toward Violence



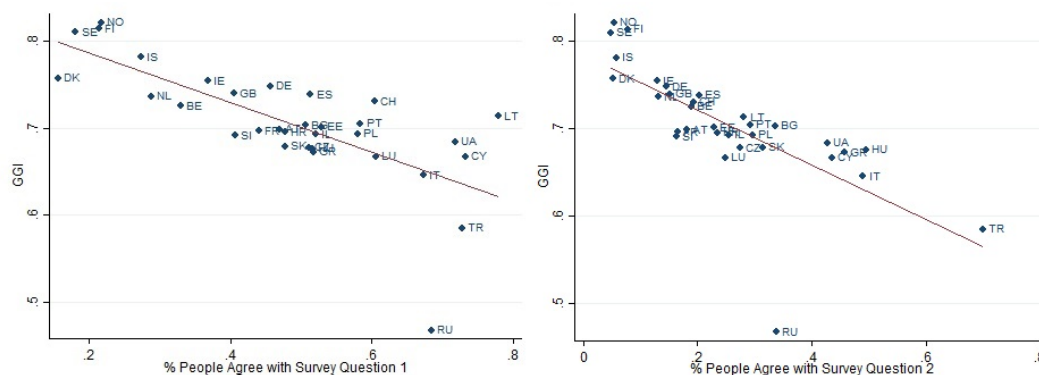
Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Attitude toward violence capture the percentage of women who agree that a husband/partner is justified in beating his wife/partner under certain circumstances. Source: European Social Survey (2004, 2008 and 2010), OCDE (2014) and own elaboration.

Figure A5: Gender-Role Attitudes and Gender Empowerment Measure (GEM)



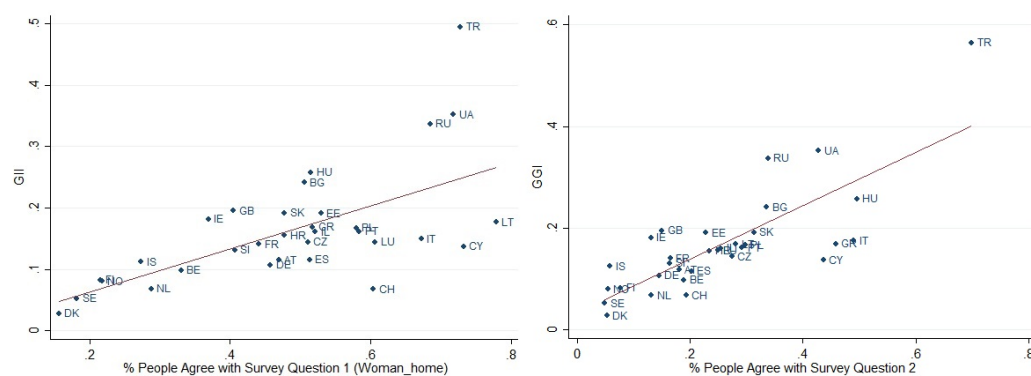
Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family”
Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Gender Empowerment Measure (GEM) is a composite index measuring gender inequality in political participation, power over economic resources and economic participation and decisin-making power. It takes values from 0 to 1. Higher values correspond to higher equality. Source: European Social Survey (2004, 2008 and 2010), OCDE (2006) and own elaboration.

Figure A6: Gender-Role Attitudes and Gender Gap Index (GGI)



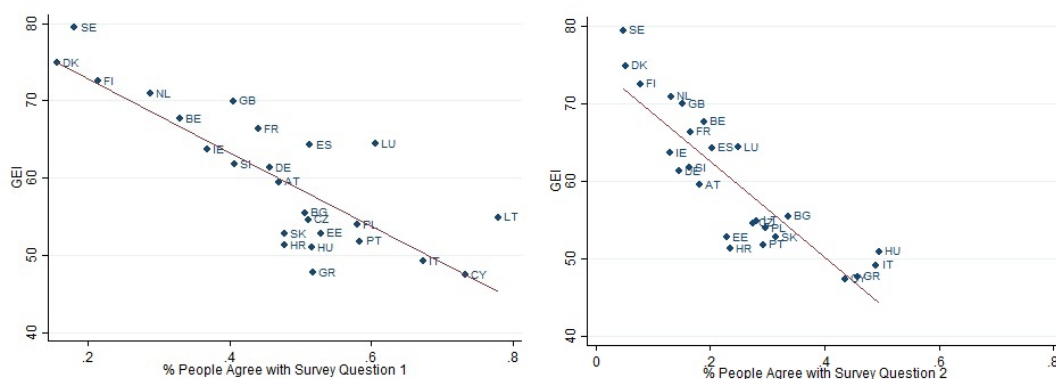
Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Gender Gap Index (GGI) measures gender gaps on economic, political, education and health. The index runs from 0 to 1. Higher values correspond to higher equality. Source: European Social Survey (2004, 2008 and 2010), Worl Economic Forum (2006, 2008 and 2010) and own elaboration.

Figure A7: Gender-Role Attitudes and Gender Inequality Index (GII)



Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Gender Inequality Index (GII) captures gender inequality in health, empowerment and labour market. The index runs between 0 and 1. Higher values correspond to higher inequality. Source: European Social Survey (2004, 2008 and 2010), Human Development Report (2005 and 2010) and own elaboration.

Figure A8: Gender-Role Attitudes and Gender Equity Index (GEI)



Note: Survey Question 1: “A woman should be prepared to cut down on her paid work for sake of her family” Survey Question 2: “Men should have more right to job than women when jobs are scarce”. Weighted data using design weights. Gender Equity Index (GEI) measures gender disparities in education, economic participation and women empowerment. The index runs from 0 to 100. Higher values correspond to higher equality. Source: European Social Survey (2004, 2008 and 2010), European Institute for Gender Equality (2005 and 2010) and own elaboration.

Table A1: Ranking of Individuals Responding ‘Agree’ or ‘Strongly Agree’ by Country

Rank	Country	Share percentage		
		All	Women	Men
1	Lithuania	78.19	77.51	79.62
2	Cyprus	75.15	72.79	77.61
3	Turkey	75.06	73.96	76.17
4	Ukraine	72.91	70.67	77.01
5	Italy	68.87	68.33	69.47
6	Russia	68.61	67.15	70.67
7	Luxembourg	63.91	63.96	63.86
8	Switzerland	61.29	62.08	60.41
9	Portugal	59.96	59.25	61.03
10	Poland	59.78	58.95	60.69
11	Greece	53.18	48.89	58.83
12	Spain	52.43	52.89	51.95
13	Hungary	52.30	50.19	54.87
14	Czech Republic	52.06	50.24	54.00
15	Israel	51.54	49.58	53.99
16	Estonia	51.08	52.00	49.80
17	Bulgaria	50.79	49.50	52.51
18	Croatia	49.66	47.26	52.47
19	Austria	49.30	48.66	50.14
20	Slovakia	49.04	48.95	49.13
21	Germany	44.72	44.57	44.88
22	France	43.75	44.83	42.53
23	Slovenia	42.39	43.00	41.96
24	United Kingdom	40.54	44.08	36.54
25	Ireland	39.20	40.00	38.12
26	Belgium	31.48	34.66	28.13
27	Netherlands	27.81	27.38	28.32
28	Iceland	27.37	32.29	22.83
29	Finland	20.37	20.91	19.82
30	Norway	19.84	21.56	18.26
31	Sweden	15.03	15.37	14.70
32	Denmark	14.03	15.13	12.94
	All	46.70	47.16	46.14

Note: The Survey question is “A woman should be prepared to cut down on her paid work for sake of her family”. The sample is about individuals who are between 29 and 76 years old, were born in the same country where they are interviewed and non students. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010) and own elaboration.

Table A2: Ranking of Individuals Responding ‘Agree’ or ‘Strongly Agree’ by Country

Rank	Country	Share percentage		
		All	Women	Men
1	Turkey	73.54	70.46	76.88
2	Hungary	50.17	48.74	51.91
3	Italy	49.58	49.20	49.99
4	Greece	47.28	41.28	55.17
5	Cyprus	46.93	41.81	52.15
6	Ukraine	43.02	39.91	48.71
7	Russia	36.58	30.94	44.53
8	Poland	34.70	32.64	36.93
9	Bulgaria	32.58	26.07	41.26
10	Slovakia	32.20	29.81	35.29
11	Czech Republic	30.70	25.11	36.65
12	Portugal	29.91	28.54	31.98
13	Israel	27.47	23.29	32.70
14	Lithuania	26.20	22.29	34.40
15	Estonia	24.64	22.76	27.30
16	Croatia	24.31	19.16	30.51
17	Luxembourg	23.63	25.44	22.03
18	Austria	23.27	20.66	26.74
19	Belgium	22.18	24.98	19.23
20	Switzerland	21.04	22.74	19.10
21	Spain	19.83	18.89	20.80
22	Slovenia	19.74	20.86	18.34
23	France	19.74	21.29	18.00
24	Ireland	16.61	15.52	18.05
25	United Kingdom	15.94	16.81	14.95
26	Germany	15.12	14.30	15.91
27	Netherlands	14.36	15.48	13.03
28	Iceland	13.68	14.06	13.59
29	Finland	8.39	8.84	7.93
30	Norway	5.36	5.20	5.52
31	Sweden	4.05	4.20	3.90
32	Denmark	3.97	3.96	3.98
	All	25.85	24.54	27.40

Note: The Survey question is “Men should have more right to a job than women when jobs are scarce”. The sample is about individuals who are between 29 and 76 years old, were born in the same country where they are interviewed and non students. Weighted data using design weights. Source: European Social Survey (2004, 2008 and 2010) and own elaboration.

Table A4: Returns to education education (OLS vs Probit)

	Woman Home		Men more Rights	
	OLS (b)	Probit (b)	OLS (b)	Probit (b)
Average Effect	-0.0160*** (0.000647)	-0.0203*** (0.000626)	-0.0187*** (0.00111)	-0.0159*** (0.000642)
By gender and parental education:				
Women-Low educated family	-0.0179*** (0.00270)	-0.0218*** (0.00112)	-0.0167*** (0.00203)	-0.0146*** (0.00115)
Men-High educated family	-0.0197*** (0.00252)	-0.0156*** (0.00134)	-0.0228*** (0.00188)	-0.0132*** (0.00151)
Women-High educated family	-0.0130*** (0.002147)	-0.0198*** (0.00125)	-0.0120*** (0.00214)	-0.0175*** (0.00148)
Men-Low educated family	-0.0133*** (0.00200)	-0.0238*** (0.00119)	-0.0203*** (0.00174)	-0.0183*** (0.00116)
Obs.	16358	16358	16358	16358

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parenthesis. (b)=Restricted Sample to a window equal to 7. All regressions include controls for individual characteristics (gender, non citizen, ethnic minority), family background (father immigrant, mother immigrant, family low educated, mother work at age 14), religion (Christian, Islamic, other religion, being very religious), household characteristics (household size, presence of children), others (work, married, big city) and country-specific time trend by gender. Standard errors are clustered by country and birth-cohort.

Appendix

B: Variable Description

Age: Variable that indicates the age of the respondent. Age comes from variable agea, which registers the answer to the question: Age of respondent, calculated.

Affected by the reform: Dummy variable that takes value 1 if the respondent belongs to the treatment group and 0 if belongs to the control group.

Big city: Dummy variable that takes value 1 if the respondent lives in a big city. It is generated from variable domicil, which registers the answer to the question: Which phrase on this card best describes the area where you live? (A big city/ Suburbs or outskirts of big city/ Town or small city/ Country village/ Farm or home in countryside/ Refusal/ Don't know/ No answer).

Compulsory education (years): Variable that indicates the number of years of compulsory education that the individual has to attained.

Ethnic minority: Dummy variable that takes value 1 if the respondent belongs to an ethnic minority group in the country. It is generated from variable blgetmg, which registers the answer to the question: Do you belong to a minority ethnic group in [country]? (Yes/ No/ Refusal/ Don't know/ No answer).

Family low educated: Dummy variable that takes value 1 if both father and mother have less than secondary education (ISCED 0-2). It is generated from the variablesedulvfa (rounds 2, 4 and 5) which registers the answer to the question: Fathers highest level of education (Not possible to harmonise into 5-level ISCED/ ISCED 0-1/ ISCED 2/ ISCED 3/ ISCED 4/ ISCED 5-6/ Other, Refusal/ Dont know/ No answer),edulvlma (rounds 2, 4 and 5) which registers the answer to the question: Mothers highest level of education (Not possible to harmonise into 5-level ISCED/ ISCED 0-1/ ISCED 2/ ISCED 3/ ISCED 4/ ISCED 5-6/ Other, Refusal/ Dont know/ No answer),eiscedf (round 8) which registers the answer to the question: Fathers highest level of education (Not possible to harmonise into ES-ISCED/ ES-ISCED I/ ES-ISCED II/ ES-ISCEDIIIb/ ES-ISCEDIIIa/ ES-ISCED IV/ ES-ISCED V1/ ES-ISCED V2/ Other/ Refusal/ Dont know/ No answer),eiscedm (round 8) which registers the answer to the question: Mothers highest level of education (Not

possible to harmonise into ES-ISCED/ ES-ISCED I/ ES-ISCED II/ ES-ISCEDIIIb/ ES-ISCEDIIIa/ ES-ISCED IV/ ES-ISCED V1/ ES-ISCED V2/ Other/ Refusal/ Dont know/ No answer).

Father immigrant: Dummy variable that takes value 1 if the father of the respondent is immigrant. It is generated from variable facntr, which registers the answer to the question: Was your father born in [country]? (Yes/ No/ Refusal/ Dont know/ No answer).

Female: Dummy variable that takes value 1 if the individual is a woman. Female is generated from variable gndr, which registers the answer to the question: Code sex, respondent (Male/ Female/ No answer).

Household size: This variable contains the number of people living regularly as member of household. It is generated from variable hhmmb, which registers the answer to the question: Including yourself, how many people - including children - live here regularly as members of this household?

Married: Dummy variable that takes value 1 if respondent is legally married. Married is generated from variables marital, martlfr, maritala and marsts. Marital (round 2 for all countries except France), Maritalb (rounds 5 and 8) and Martlfr (round 2 only for France) registers the answer to the question: Could I ask about your current legal marital status? Which of the descriptions on this card applies to you? (Married/ Separated/ Divorced/ Widowed/ Never married/ Refusal/ Don't know/ No answer). Maritala (round 4) registers the answer to the question: Could I ask about your current legal marital status? Which of the descriptions on this card applies to you? (Married/ In a civil partnership/ Separated (still legally married)/ Separated (still in a civil partnership)/ Divorced/ Widowed/ Formerly in civil partnership, now dissolved/ Formerly in civil partnership, partner died/ Never married and never in civil partnership/ Refusal/ Don't know/ No answer). Marsts (rounds 5 and 8) registers the answer to the question: This question is about your legal marital status not about who you may or may not be living with. Which one of the descriptions on this card describes your legal marital status now? (Legally married/ In a legally registered civil union/ Legally separated/ Legally divorced/civil union dissolved/ Widowed/civil partner died/ None of these (NEVER married or in legally registered civil)/ Not applicable / Refusal/ Don't know/ No answer).

Men more Rights: Dummy variable that takes value 1 if the respondent is Agree or Strongly Agree about if men should have more right to job than women when jobs are scarce and 0 if answer Neither Agree nor Disagree, Disagree or Disagree Strongly. This variable comes from mnrgtjb, which registers the answer to the question: When jobs are scarce, men should have more right to a job than women (Agree strongly/ Agree/ Neither agree nor disagree/ Disagree/ Disagree strongly/ Refusal/ Don't know/ No answer).

Mother immigrant: Dummy variable that takes value 1 if the mother of the respondent is immigrant. It is generated from variable mocntr, which registers the answer to the question: Was your father born in [country]? (Yes/ No/ Refusal/ Dont know/ No answer).

Mother work at age 14: Dummy variable that takes value 1 if the mother of the respondent was working when the respondent was 14. It is generated from variable emprm14 which registers the answers to the question: When you were 14, did your mother work as an employee, was she self-employed, or was she not working then? (Employee/ Self-employed/ Not working/ Mother dead or absent/Refusal/ Dont know/ No answer).

Non citizen: A dummy variable that takes value 1 if the respondent is citizen of the country. It is generated from variable ctzcntr, which registers the answer to the question: Are you a citizen of [country]? (Yes/ No/ Refusal/ Don't know/ No answer).

Presence of children: Dummy variable that takes value 1 if respondent lives with children at household grid. It is generated from variable chldhm, which registers the answer to the question: Children living at home or not (Respondent lives with children at household grid/ Does not/ Not available).

Very religious: Dummy variable that takes value 1 if the respondent answer 8, 9 or 10 on a scale of 0 to 10 to the question of how religious is. This variable is generated from the variable rlgdgr which registers the answer to the question: Regardless of whether you belong to a particular religion, how religious would you say you are?

Women Home: Dummy variable that takes value 1 if the respondent is Agree or Strongly Agree about if woman should be prepared to cut down on paid work for sake of family and 0 if answer

Neither Agree nor Disagree, Disagree or Disagree Strongly. This variable comes from *wmcprwk*, which registers the answer to the question: Woman should be prepared to cut down on paid work for sake of family (Agree strongly/ Agree/ Neither agree nor disagree/ Disagree/ Disagree strongly/ Refusal/ Don't know/ No answer).

Work: A dummy variable that takes value 1 if the respondent has been working on the last 7 days. Work is generated from variable *pdwrk*, which registers the answer to the question: which of these descriptions applies to what you have been doing for the last 7 days? In paid work (or away temporarily) (employee, self-employed, working for your family business) (Not marked/ marked).

Years of schooling: Variable that contains information about the number of years of full-time education that the respondent has completed satisfactory correcting for some obvious mistakes in which the number of years of education and the level of education that the respondent declares does not match. It is generated from the variable *eduyrs*, which registers the answer to question: How many years of full-time education have you completed? For round 2. About how many years of education have you completed, whether full-time or part-time? Please report these in full-time equivalents and include compulsory years of schooling for rounds 4, 5 and 8. In addition, with the objective of increasing the sample size, to those individuals who do not answer the previous question, I assign them the median number of years of education within each educational level (*edulvla* and *edulvlb*), country, gender, round and according to whether it was born before or after the first cohort affected by the reform.

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