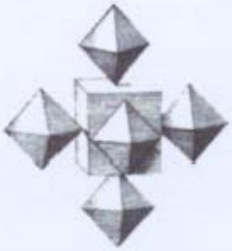

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CULTURAL VALUES, FAMILY DECISIONS AND GENDER SEGREGATION IN HIGHER EDUCATION: EVIDENCE FROM 26 OECD ECONOMIES

by

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University of the Basque Country

Cultural Values, Family Decisions and Gender Segregation in Higher Education: Evidence from 26 OECD Economies

Izaskun Zuazu*

June 11, 2018

Abstract

This paper examines the role of cultural values and family decision-making in the gender distribution of higher education on a panel database of 9 fields of study in 26 OECD countries over 1998-2012. The paper surmises an interplay between family-friendly policies and cultural values that might be associated with gender segregation. Using survey data from the World Value Survey, the results suggest that gender-egalitarian attitudes of females are negatively associated with gender segregation. However, attitudes of males are not associated with significant coefficients. Marriage market indicators, such as the age at first marriage, are positively associated with gender segregation. Finally, family-friendly policies are found to display a positive association with segregation in societies that are attached to traditional gender roles in the labor market. To the contrary, the same policies are negatively associated with segregation in gender-egalitarian societies. These findings are robust to country and field-specific levels of segregation, and remain using alternative specifications and estimation techniques.

Keywords: gender segregation, higher education, cultural values, marriage market, family policies.
JEL: A13, I24, J16

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1 Introduction

The reversal of the gender participation gap in higher education over the last three decades in Western countries came along with the concentration of female and male graduates in specific fields of study. This phenomenon is known as horizontal gender segregation and refers to the over-representation of women and men in certain fields of study. Generally speaking, females are over-represented in care-related and humanistic fields, whereas males dominate technical and scientific fields. A great body of research in economics, sociology and psychology provides a wide variety of social and economic forces that might operate both to perpetuate and to reduce gender disparities in the choice of fields of study in higher education. Yet there is a lack of systematic research to examine whether extant theories of segregation are consistent with actual trends (Mann and DiPrete (2013)).

Empirical evidence suggests that horizontal gender segregation is among the causes of the gender income gap among college graduates (Brown and Corcoran (1997), Bobbitt-Zeher (2007))[1]. In the aggregate, gender segregation in education crucially matters to the skill composition of the future workforce (Altonji et al. (2015)). By artificially shaping the accumulation of human capital, gender segregation in education may influence labor market productivity, and thus be an important determinant of economic growth (Dollar and Gatti (1999), Knowles et al. (2002), Klasen and Lamanna (2009)). Specifically, the scarcity of female graduates in science, technology, engineering and maths (STEM) fields has gained scholarly attention recently (Sassler et al. (2017), Card and Payne (2017), Kahn and Ginther (2017)). Indeed, horizontal gender segregation represents a major concern in educational and labor market policy-making (OECD (2006), EIGE (2014), SheFigures (2012)).

The current paper studies the role of cultural values and family decision-making in horizontal gender segregation in advanced economies. Research on culture in economic behavior finds that cultural values might be decisive for economic decisions of agents (Guiso et al. (2006), Fernández (2011)). More specially, Fortin (2005) provides suggestive evidence on that cultural values are at the heart of gender disparities in labor market outcomes. Economic research also accounts for potential influences of individual decisions regarding the marriage market and family formation plans on educational and labor market choices of women and men (Badgett and Folbre (2003), Goldin (2006), Chiappori et al. (2009), Attanasio and Kaufmann (2017)). Drawing upon these accounts, I surmise that attitudes towards gender roles in the labor market, the marriage market and family-friendly policies might drive gender segregation in higher education. Furthermore, I hypothesize a differential association between family-friendly policies and gender segregation contingent upon gender-egalitarian attitudes.

[1] See Weichselbaumer and Winter-Ebmer 2005 for a meta-study in wage differentials between women and men.

The role of cultural values in previous works on horizontal gender segregation in higher education were absent due to limited availability of precise data on cultural attitudes and empirical methods (Castles and Marceau (1989), England and Li (2006), Charles and Bradley (2002, 2009)). This paper adds to existing empirical models of horizontal gender segregation by including cultural values -measured by survey data-, and family decision-making indicators -using administrative data- as potential factors of gender segregation in a panel data econometric setting. I construct an extensive panel dataset that combines information on country-level segregation (dissimilarity index) and field-specific segregation (association index) in nine fields of study in 26 Organisation for Economic Co-operation and Development (OECD) countries over 1998-2012.

I employ four waves (1995-98; 1999-04; 2005-08; 2010-12) of the World Value Survey (WVS) to measure attitudes of the role of women in the labor market, reproductive rights and religion. Attitudes towards gender roles are measured by the disagreement on the statement *"When jobs are scarce, men should have more right to a job than women."* Regarding attitudes towards reproductive rights, I consider the level of agreement on the question *"Abortion is always justifiable."* I measure religion by the statement *"God is very important in my life."* As of family decision-making, I first add to the empirical model individual choices regarding the marriage market, such as divorce rates and the average age at first marriage. Finally, I consider institutional arrangements to support family formation as potential factors of segregation. I include family-friendly policies measured by the number of weeks of mother-specific and father-specific leaves (Jaumotte (2003)).

There are important limitations of this research that relate widely on the nature of the data employed. Previous research using cohort data finds gender differentials in education and labor market outcomes on the basis of demographics, such as immigration (Alonso-Villar et al. (2012)), socioeconomic status (Bailey and Dynarski (2011), van de Werfhorst (2017)), parents' educational attainment and labor market participation rates (Fernández (2013), Farré and Vella (2013)). However, the data here employed divides graduates solely by gender and field of study, and thus, potential intersections between gender and demographics cannot be considered here.

Notwithstanding the efforts to circumvent causality issues, the results provided below should be tentatively interpreted as partical correlations. The terms "impacts" or "effects" of the explanatory variables intend to ease the interpretation of the results but the reader should feel free to interpret them as partial correlations[2].

The paper is structured as follows. Section 2 describes the patterns of horizontal gender segregation

[2]See Charles and Bradley (2002) for a deeper discussion on causality issues in empirical analysis of the effect of cultural attitudes and social norms in horizontal gender segregation.

at both country and field-specific levels in the countries of the sample. Section 3 specifies panel data econometric models to study the role of cultural values and family decision-making in horizontal gender segregation. Section 4 shows the main empirical results. A final section concludes.

2 Trends of Horizontal Gender Segregation

2.1 Raw Data

I employ administrative data collected from the OECD Education Database on the number of female and male graduates in nine International Standard Classification of Education (ISCED 1997, 1 digit-level) fields of study in 26 OECD countries over 1998-2012[3]. Empirical evidence shows high levels of attrition in gender-atypical choices, specifically in female students (Mastekaasa and Smeby (2008)). I focus on graduate completion rather on enrollment data to alleviate this potential bias. On average, the share of females in higher education over the period considered outnumber that of males, with the exception of Switzerland (44.6%), Turkey (45.5%), Republic of Korea (48.7%), Luxembourg (49.4%). The sample average of the percentage of female graduates have increased by 6 percentage points (pp) over 1998-2012. The share of females has slightly increased in all fields over the period considered, although it varies across fields of study (see Figure A1 in Appendix A1). Women are generally over-represented in education and health and welfare fields rates (75%) and humanities and arts (70%). Social science, business and law, and to a lesser extent services are closer to the overall gender distribution in higher education. Women are under-represented in science and engineering, manufacturing and construction fields (38.8% and 23.2%, respectively).

2.2 Measures of Country-level Segregation

To explore the trends of the distribution of women and male across fields of study in higher education, I employ three alternative nominal measures of gender segregation: widely-used Dissimilarity Index (Duncan and Duncan (1955)), the variation of the dissimilarity index developed in Karmel and Maclachlan (1988) and the Association index (Charles and Grusky (1995)). It is important to stress that the measures of segregation here employed are nominal measures, which in sharp contrast to ordinal measures, do not take into account a hierarchical ordering of the educational system (Semyonov and Jones (1999)).

[3]Table A1 and A2 in Appendix A shows the fields of study and sample countries. See Andersson and Olsson (1999) for an explicit definition of the subfields considered in each of field of study.

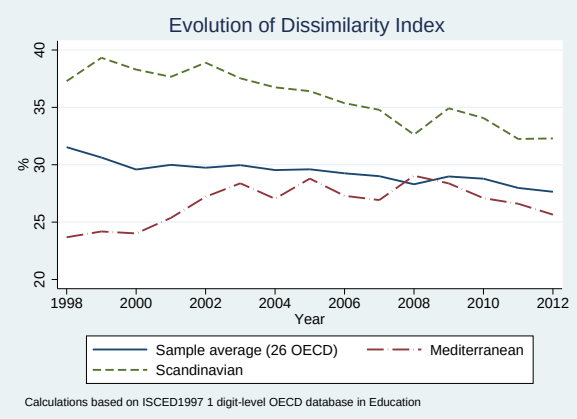
The index of dissimilarity (ID hereafter) was first developed in racial segregation studies by Duncan and Duncan (1955). The ID index is one of the primary measures of segregation applied to the context of gender segregation in labor markets and education, and it has been acknowledged as *the* index of segregation (Watts (1998); Gelbgiser and Albert (2017)). The ID index is given by the following formula:

$$ID = \frac{1}{2} \sum_i \mid \frac{F_i}{F} - \frac{M_i}{M} \mid *100 \tag{1}$$

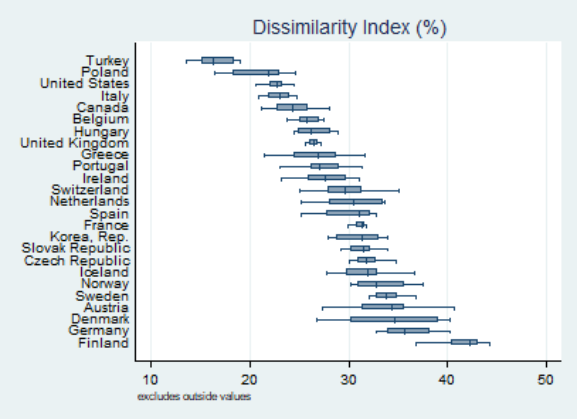
Where F_i and M_i are females and males in field i, F and M are respectively the total of female graduates and total male graduates. Following Duncan and Duncan (1955), the ID index is interpreted as the percentage of women (men) that would have to change fields without replacement in order to make their distribution identical with that of men (women). The index takes values from 0%, indicating total gender integration across fields, to 100%, indicating a complete gender segregation.

The easy interpretation and computation of the ID index come at certain technical costs that have been widely noted in sociology (Charles and Grusky (1995), Watts (1998)). The main flaw of the ID index is its margin-dependency on the share of fields in the overall higher education system. If education systems are dominated by a highly segregated field, the ID would yield higher values than if the dominant field was evenly composed by women and men, and numerous small fields were highly segregated. Therefore, changing trends of fields' share could disguise some patterns in segregation which ultimately obscures cross-national and inter-temporal comparisons. It should be noticed that the shares of graduates in each field over the total graduate body remain stable over the time period analyzed. That said, I employ the ID index in the present analysis to allow for comparisons with existing works on horizontal gender segregation in education (England and Li (2006), Barone (2011), Blau et al. (2013), van de Werfhorst (2017)).

Figure 1.a displays the evolution of the sample averages of the ID index, along with two clusters of countries: Scandinavian countries (Iceland, Finland, Norway and Sweden) and Mediterranean countries (Portugal Italy, Spain and Greece). The differential trends uncovered below give the flavor of the countries disparities regarding segregation levels. Sample average of the ID index has decreased from 31.5% to 27.6% over 1998-2012. A decreasing trend is also shown on average by Scandinavian countries, reducing the index from 37.3% to 32.3%. However, in the cluster of Mediterranean countries the average ID index has increased by 2 pp (23.7% to 25.7%). Economic theories on human capital and cultural change, together with sociological theories of modernization predict less segregation in Scandinavian countries (see Estevez-Abe (2005)). However, Scandinavian countries are among the most segregated higher education systems in the OECD. This observation is also found in existing works on both education and the labor market, namely the Scandinavian paradox (Albrecht et al. (2003), Evertsson et al. (2009), Carlsson (2011)).



(a) Evolution



(b) By country

Figure 1: Dissimilarity Index

Figure 1.b shows the levels of ID index for each country in the sample. Turkey is the less segregated country of the sample, with an average ID index of 17.1%. The most segregated country is Finland (42.1%), in which ID index remains quite stable during the period 1998-2012.

As suggested in Bettio et al. (2009), no single index of segregation is fully satisfactory. Therefore, I complement the ID index with the country-level segregation measure defined in Karmel and MacLachlan (1988), known as the IP index (IP hereafter)[4], which provides the percentage of women who would have to change fields with replacement to bring about an equal gender distribution across fields of study. The IP index trades the margin-dependency of the field structure of the overall higher education for a mechanical sensitivity on the gender composition of the overall higher education (Watts (1998)).

2.3 Measures of Field-specific Segregation

The above measures provide information on the extent to which higher education systems are gender segregated at a country-level. However, these measures fall short to identify the exact fields that should be integrated or de-segregated to erode gender segregation in higher education. I employ the log-linear modeling approach of Charles and Grusky (1995) to fill this gap. Charles and Grusky's approach define an index, namely the association index (A_i henceforth), which measures the factor by which each field is

[4]The IP index results from the following transformation $IP = 2 * \frac{F}{N} * \frac{1-F}{N} * ID$, where F is the total number of female graduates, M the total of male graduates and N total graduates. Figures A2 and A3 in Appendix A show that IP index trends are similar to that of ID index.

associated to a gender (female or male)[5]. The A_i index is computed as follows:

$$A_i = ln\frac{F_i}{M_i} - [\frac{1}{j} * \sum ln(\frac{F_i}{M_i})] \quad (2)$$

Where ln is the natural logarithm, j is the number of fields (this number is 9 in this analysis, corresponding to the ISCED1997 1 digit-level), F_i is the number of females in field i and M_i is the number of males in field i. The A_i provides a scale of the extent by which each field of study is gender-labeled. Positive values of the Ai indicate that the field is associated with women, values near to zero are interpreted as gender-neutral fields, whereas negative values mean a male association of the field. The index gives the factor by which fields are associated with a specific gender, and higher absolute magnitudes mean higher segregation. The main advantage of this measure is that by using log-linear techniques, the association between gender and field choice is neither affected by the share of each field in different country nor by the share of female among graduates. Hence, it is suitable for cross-country and inter-temporal comparisons. The A_i index comes also at certain computational costs summarized in Watts (1998).

The dissimilarity and association indices are sensitive to the levels of aggregation used in defining fields of study (Reskin (1993); Nelson (2017)). These indices are higher when using narrow categorizations of higher education (e.g. higher dividing higher education in many fields) than using broader categorizations (e.g. dividing higher education in few broad fields). By using a nine-field categorization of higher education, this paper supplements the work of Charles and Bradley (2009) who use four fields of study: math/natural science, engineering, health/other, humanities/social science. Thus, the current paper tackles the disparities among gender-dominated fields, such as humanistic and social sciences fields, that were concealed in previous studies.

Figure 2 shows that the fields of education and health and welfare are on average associated with women, with A_i values around 1. Instead, engineering, manufacturing and construction fields are associated with men and to a greater factor (-1.5). Science and humanities and arts are associated at a similiar factor around an absolute magnitude of 0.5: humanities and arts is associated with females (0.5), whereas science is associated with males (-0.5). These descriptive data are consistent with the two divides already found in the literature, that refer to a care-technical and a humanistic-scientific divides (Barone, 2011). The trends of gender-labeling at the sample average remain stable over 1998-2012, although humanities and arts, services and agriculture are less gender-labeled at the end of the period analyzed (see Figure A4, Appendix A).

Figure 3 provides differences in gender-labeling across OECD countries in the four most segregated fields, namely education (3.a), health and welfare (3.b), engineering (3.c) and science (3.d). The graphs provide

[5]See Charles and Bradley (2002), (2009), Barone (2011), Mann and DiPrete (2013) for existing applications of the index in the context of segregation in education.

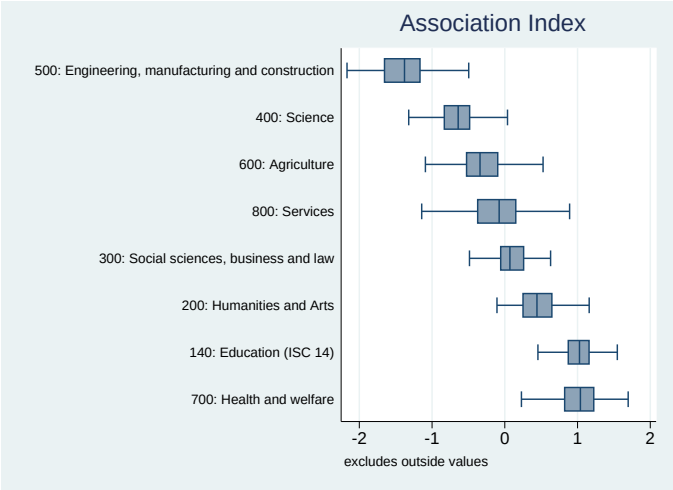
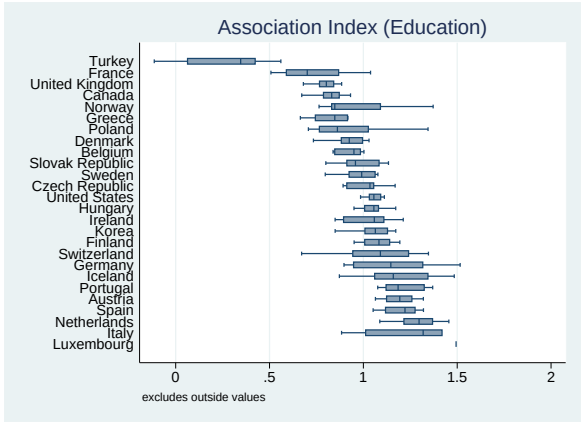


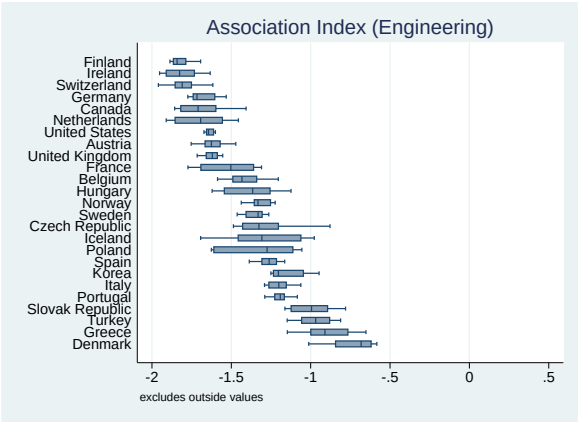
Figure 2: Association Index (sample average)

the range of A_i values that each of the sample country displays over the period 1998-2012. This measure allows for identifying different cross-country patterns in gender-labeling. For instantce, Mediterranean women concentrate more in education fields whereas their Scandinavian counterparts do so in health-related fields. This evidence goes in line with the finding in Alesina et al. (2011) on how gender-labeling of occupations hinges upon a geographical basis, which might be behind the differences in women crowding out in different fields of study in Scandinavian and Mediterranean countries. Ellingsæter (2013) focuses on Scandivanian labor markets to consider a potential relationship between horizontal disparities -i.e. horizontal segregation- and the type of social democratic and welfare state. Disparities in the welfare state expansion experienced in Scandinavian and Mediterranean countries might hint this education-health cleavage in female-dominated fields. Specifically, the transfer of care work from families to the public sector in Scandinavian labor markets, might be a potential driver of cross-country differences in women's concentration by fields of study. Unfortunately, in the lack of survey country-year data on women and men preferences over fields of study, the current paper cannot delve further into the causes behind the different patterns in gender-labeling across countries.

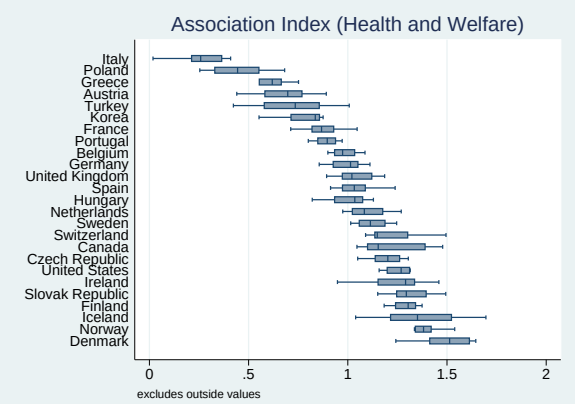
In sum, country-level measures of segregation (ID index) reveal a slight reduction in sample average levels of gender segregation. However, the gender-labeling of fields is persisting over the period considered. On the whole, the above descriptive analysis tends to suggest the already noted slowdown in gender integration in higher education over the 1970-1990 period (England and Li (2006), Mann and DiPrete (2013), Bronson (2014)). These stalled trends in gender-labeling of fields may complement the slowdown in gender convergence in other societal realms since the mid-1990s (see *inter alia* Blau et al. (2006), England (2010, 2011), Olivetti and Petrongolo (2016)).



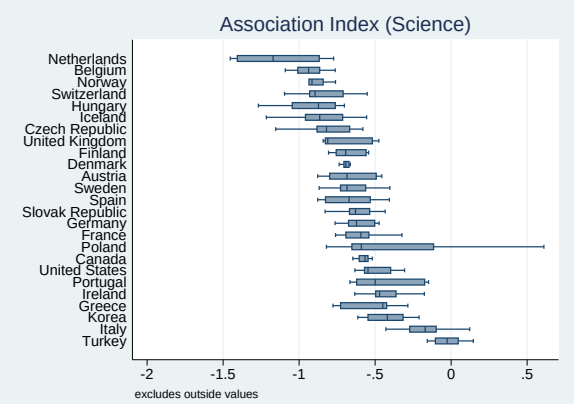
(a) Association in Education



(b) Association in Engineering



(c) Association in Health and Welfare



(d) Association in Science

Figure 3: Association in Most Gendered Fields

3 Cultural Values, Family Decision-Making and Gender Segregation

3.1 Extant Explanations

Social science, psychology and endocrinology research coincide on that gender segregation is unlikely to be drawn by a unique factor. The synthesis of Ceci and Williams (2010) suggests that among the potential factors of segregation, preferences and choices -either free or constrained- seem to play a crucial role for the under-representation of women in math-related fields. The economic literature provides a great body of research on the causes of gender segregation in education, in which discrimination, gaps in career and family aspirations, and social norms seem to crucially matter to gender segregation. Neo-classical economics provide rational choice arguments of gender disparities in educational investments, summarized in Altonji and Blank (1999). Demand-side arguments suggest that women prefer fields that minimize the costs of forced labor market interruption and alleviate work-family conflicts (Becker (1991); Polacheck and Rosenberger (1978)). On the supply-side, Becker's theory of discrimination (1957) suggests that potential mistreatment of women according to their subjective *tastes* of employers enacts a traditional division of labor, in which women and men tend to move into gender-typical occupations. Early explanations also suggest a skill-differential and cognitive gaps between women and men. These often-repeated arguments have lost momentum in the last decades in the face of experimental research showing how gender gaps in risk-taking, competitive-leaning and social beliefs drive gender choices of fields of study (Croson and Gneezy (2009), Buser et al. (2014)).

Newer explanations of horizontal gender segregation emphasize the role of gender identity and social norms. Scholars identify how gender identity may shape the economic behavior of agents (Folbre (1994); Akerlof and Kranton (2000))[6]. The game theory model of Akerlof and Kranton (2000) considers an identity-based utility of behavioral choices of individuals. Following the behavioral prescriptions for the gender assigned to agents produces a form of utility. Affirming one's identity as a "man" or as a "woman" is rewarded, whereas violating the prescriptions evokes anxiety and discomfort, or in other words, dis-utility. An important implication of the model of Akerlof and Kranton (2000) is that allows to define non-pecuniary benefits derived from the choice of educational paths. Thus, individuals have an intrinsic motivation to behave such that they receive a positive evaluation from the society (Humlum et al. (2012)). This logic might explain why certain agents self-select in low-paid occupations, and more generally, how preferences are crucial to our understanding of gender disparities in educational and occupational choices (Eccles and Jacobs (1986), Zafar (2013)).

[6]For a generic, theoretical approach see also Bénabou and Tirole (2007)

Economic literature on the role of cultural values in economic behavior complements our understanding of the potential causes horizontal gender segregation (Guiso et al. (2006)). The intergenerational transmission of gender norms are found to explain gender differences in individual preferences in the labor market (Blau et al. (2013), Fernández et al. (2004)) and educational choices (Humlum et al. (2017), van de Werfhorst (2017)). One may consider that the utility -pecuniary and non-pecuniary- gained by gender-typical choices defined in Akerlof and Kranton's model are shaped by gender stereotypes and cultural values that dictate attitudes towards gender roles in a society[7]. Cultural values that reinforce gender-essentialist ideals -i.e. widely shared beliefs that women are better at care, nurturing, and human interaction whereas men excel at abstract thinking, problem solving, and analysis-, might shape gendered identities of individual men and women (Sikora and Pokropek (2012), Charles et al. (2015)). Adding to this rationale, cross-country and epidemiological studies relate gender-equality and gaps between girls and boys in math performance (Guiso et al. (2008), Nollenberger et al. (2016), Kahn and Ginther (2017)). Consequently, one might consider that cultural values potentially determine -either direct or indirectly- the extent of gender segregation across fields of study.

The role of cultural values and family decision-making in gender-typical choices of fields have been somehow absent in previous international comparisons, primarily due to the lack of accurate data on social norms and attitudes towards gender roles. Existing empirical approaches to horizontal gender segregation are either cross-country analysis (England and Li (2006), Charles and Bradley (2009)) or country-specific (Humlum et al. (2017), van de Werfhorst (2017)). The aim of this section is to fill this gap by employing survey data on cultural values and administrative data on family decision-making of advanced economies in a panel data econometric setting.

3.2 Empirical Strategy

I propose a fixed-effects model to study the role of cultural values and family decision-making indicators in horizontal gender segregation. I first attempt to evaluate the extent to which attitudes towards gender roles in the labor market, reproductive rights and religion exert an effect in segregation. I second evaluate whether indicators of the marriage market have explanatory power on the levels of segregation across fields of study in higher education. A final step of the empirical analysis considers whether state support for family formation has an indirect effect in segregation levels that hinges upon the attitudes towards

[7] In a sense, identity and culture economics come in a lockstep so long as the former defines non-pecurniary benefits of choosing a gender-typical fields and the latter dictates the way fields of study are gender-labeled.

gender roles in the labor market.

$$ID_{ct} = \beta_0 + CV'_{ct}\beta + MM'_{ct}\beta + +FP'_{ct}\beta + X'_{ct}\beta + \gamma_t + \alpha_c + u_{ct}$$
$$c = country; t = year \tag{3}$$

where ID_{ct} is the dissimilarity index in country c in year t, γ_t and α_c are time fixed-effects and country fixed-effects respectively, whereas u_{ct} is the error term. The primary set of variables of interest are included in CV_{ct}, which refers to measures of cultural values, MM_{ct} regards marriage market indicators and FP_{ct} captures different forms of institutional support for family formation (i.e. family-friendly policies). X_{ct} refers to country time-varying characteristics of the economic structure, the labor market and educational systems that have been empirically informed to drive segregation in previous research.

I construct an extensive panel dataset with information on dissimilarity and association indices for 26 OECD economies over the 1998-2012 period. The first step of this analysis focuses on country-level segregation by using as the benchmark dependent variable the ID index, while the IP index will serve as robustness check. A second step studies whether the results at country-level segregation hold when using field-specific measures of segregation (A_i). Table 1 provides the summary statistics over the period considered.

3.3 Main Explanatory variables

Cultural Values

I employ four waves (1995-98; 1999-04; 2005-08; 2010-12) of the World Value Survey (WVS) to measure cultural values towards gender roles in the labor market, views on reproductive rights and religion.

Attitudes towards gender roles:

Drawing on Guiso et al. (2003), Fortin (2005) and Azmat et al. (2006), I operationalize gender-egalitarian attitudes by means of the share of WVS respondents who disagree on the statement *"When jobs are scarce, men should have more right on a job that women"* (% Disagree Men First)[8]. The transformation from traditional to egalitarian attitudes towards gender roles paved the way to the convergence of female and male educational investment and labor market outcomes (Fortin (2005), Mandel and Semyonov (2006)). On this account, one might expect sex-stereotypes to be positively associated with segregation. However, this argument is contested by the observation of highly segregated education systems in gender-egalitarian

[8]I have also considered other WVS questions, such as the *"A university education is more important for a boy than for a girl"*. Disagreement with this statement is likewise %Disagree Men First, associated with a negative effect in segregation. This alternative model is available upon request.

Table 1: Summary Statistics of Main Covariates

	Mean	Std. Dev.	Min.	Max.	N
Dependent Variables					
ID index	29.83	5.688	10.547	44.233	285
IP index	14.419	2.82	5.273	21.231	285
Association Index					
Education	1.05	.26	.34	2.05	99
Humanities and Arts	.43	.25	-.11	.82	99
Social Science	.10	.21	-.23	.63	99
Science	-.68	.28	-1.45	-.13	99
Engineering	-1.44	.26	-1.96	-.91	99
Agriculture	-.28	.30	-1.06	.43	99
Health and Welfare	1.00	.28	.26	1.49	99
Services	-.05	.26	-.87	.55	99
NKOU	-.01	.44	-1.43	.71	51
Cultural Values (WVS)					
% Disagree Men First	61.643	19.506	24.019	93.619	189
% Pro-Choice	10.986	7.602	1.25	45.771	189
% God Important	23.172	16.638	7.532	75.78	188
% Disagree Men First (fem)	64.675	18.948	28.364	95	182
% Pro-Choice (fem)	10.892	8.099	0.942	47.096	182
% God Important (fem)	27.673	18.273	8.163	78.358	181
% Disagree Men First (male)	57.818	21.043	14.379	92.247	182
% Pro-Choice (male)	11.274	7.455	1.338	44.288	182
% God Important (male)	18.53	15.82	4.573	73.225	181
% Disagree Men First gap	1.187	0.295	0.971	2.366	182
% Pro-Choice gap	0.926	0.221	0.303	1.469	182
% God Important gap	1.713	0.559	1.033	3.748	181
Marriage Market					
Divorce rate	2.167	0.687	0.4	3.8	278
Fertility	1.594	0.29	1.076	2.23	278
Marri. Age Fem.	28.339	2.048	23.3	32.8	265
Marri. Age Males	30.892	2.078	25.9	35.9	258
Age mum	29.498	1.082	26.4	31.4	272
Family Policies					
TPL	59.439	52.671	0	164	278
LML	17.666	8.275	0	52	278
PLJP	75.785	57.019	0	156	278
Paid Father	4.164	7.312	0	52	278
Control Variables					
Pop. density	142.32	132.518	2.734	505.562	285
% Employees	83.625	7.495	58.904	93.498	285
% Services	67.321	7.36	49.171	82.964	285
% LF Female	44.692	3.156	25.852	48.575	285
% Prof. Female	49.424	7.415	30.51	64.707	285
Size Grads	11.569	1.471	5.823	15.012	285
Diversification	19.1	16.042	0	60.004	285
% Graduates Fem.	57.254	5.673	25.391	67.5	285
Score gap	0.991	0.013	0.961	1.038	278
Field Weight	.12	.1	.00	.46	843

Country averages using sample in Column 1 (Table 2)

countries, such as the patterns shown for Scandinavian countries in Section 2.

Scholars note that gender disparities that have clear, well-defined hierarchical structures are more easily undermined than horizontal ones (Goldin (2006), Shavit et al. (2007)). Thus, horizontal segregation can reconcile to a greater extent gender-egalitarian and gender-essentialism values[9].

Reproduction rights:

Drawing on Inglehart et al. (2017), I consider that the shift from pro-fertility to individual-choice norms can provide women with higher agency to monitor their educational investments and family formation design. The use of contraceptive technology transformed female work of the cohorts born after World War II (Goldin and Katz (2002)), as more control over their reproduction reduced womens' future work-family conflicts. My prior is that more favorable attitudes towards reproductive rights may be associated with a convergence between women and men in higher education. I proxy attitudes towards reproductive rights by the share of WVS respondents who agree equal to 10 in a 0-10 scale on that *"Abortion is always justifiable"* (% Pro-choice).

Religiosity:

The set of cultural values includes the share of WVS respondents who assess equal to 10, on a 0-10 scale, that *"God as very important in their life"* (% God Important). By so doing, I attempt to control for potential correlations beween religious beliefs and gender segregation. This statement is present in the four WVS waves employed here, whereas other alternative religion-related WVS questions were asked in fewer waves. Guiso et al. (2003) use also WVS data and associate religion with higher intolerance towards gender-egalitarian values and more conservative gender attitudes. Appendix A includes the average levels of cultural values for the sample of countries and their correlations with dissimilarity index (Figure A5) and gender differences on cultural values (Figure A6).

Marriage Market

Family formation plans are found to impact on the share of women in math-related fields (Ceci and Williams (2010, 2015)). Indeed, Pepin and Cotter (2018) suggest that gender-egalitarian values in the labor market might be countervailed by gender-essentialist ideals and traditional family decisions in affluent societies. I surmise family decision-making to have potential segregative effects, and approach to these features from an individual dimension -marriage market-, and from an institutional dimension -family-friendly polices.

[9]This idea corresponds to the "separate-but-equal" gender beliefs that are further explored in Charles and Bradley (2009) and England (2010).

Goldin (2006) accounts for a quiet revolution that transformed American women's horizon, identity and decision-making in the aftermath of World War II. Divorce laws, increasing age of marriage and motherhood, and reducing fertility were among the underpinnings of this quiet revolution, namely the revolutionary indicators. A crucial implication of this revolution in gender segregation is that it transformed the women's role in the labor market from a job-focus to a career-design. As divorce rate and age of marriage increased, Goldin argues, a greater fraction of women and men' lives would spend married reduces, and economic independence becomes more valuable. The identity of women changed towards a career oriented, and ultimately, divorce rates contributed to an insurance-based motive for college investment. Based on Goldin (2006), rising average age of marriage would imply women to be more serious in college, plan for an independent future, and form their identities before marriage and family. I make use of the revolutionary indicators, in Goldins parlance, such as divorce rate (Divorce rate, OECD Family database) and the average age of marriage of females (Marri Age Fem, OECD Family Database), in the set of potential explanatory variables of sex segregation in higher education.

Based on Goldin's arguments, one might expect both increasing divorce rates and age of marriage to be associated with integrative effects. However, other studies of the marriage market and gender-typical choices in the labor market suggest otherwise. Badgett and Folbre (2003) found that gender conformity in occupational position is rewarded for women and men in the marriage market, leading to a trade-off between the returns of majors in the labor market and the marriage market[10]. Along these lines, recent empirical research finds that labor market and marriage market are important determinants of college enrollment: the former has larger effects on males decision and the latter is more relevant in the case of women (Attanasio and Kaufmann (2017)).

Family-Friendly Policies

I build upon labor economics literature to link family policies with potential effects on gender differences in educational choices. Family-friendly policies, such as maternity leaves, parental leaves and childcare leaves, are forms of state childcare provision designated to boost female participation by reducing work-life conflicts and facilitate family-life (Jaumotte 2003). However, the net effect of this policies is nowhere close to being clear-cut: proponents cheer the facilitation of this political arrangements to combine careers and motherhood for women and altering social gender attitudes towards modern values. To the contrary, these policies may incur in a loss of work experience of women and in higher costs of hiring childbearing-

[10]See also Badgett and Folbre (1999) for an overview of educational attainment in the linkage between marriage market and gender-atypical occupational choices.

age females, and thus encouraging statistical discrimination (Blau et al. (2013), Olivetti and Petrongolo (2017)). Drawing on these conflicting views, I consider a potential association between family-friendly policies and the choice of field of study by women and men. I follow Jaumotte (2003, 2004) and proxy institutional childcare support by using OECD data on the length of maternity leave (LML), parental leave with job protection (PLJP), total parental leave (TPL), and father-specific paid leave (Paid father). Recall that the data employed does not allow to consider a causal effect from family policies to gendered choices of students. Nonetheless, the inclusion of these policies in the empirical strategy might capture societal demands towards work-family balance and upgrading women's role in the labor market, and serve us to consider its potential correlation with gender educational choices.

$$\begin{aligned} ID_{ct} = \beta_0 + \beta_1 \%DisagreeMenFirst_{ct} + \beta_2 FamilyPolicy_{ct} + \\ + \beta_3 \%DisagreeMenFirst * FamilyPolicy_{ct} + MM'_{ct}\beta + \beta + \gamma_t + \alpha_c + u_{ct} \\ c = country; t = year \end{aligned} \tag{4}$$

I finally surmise that the potential association between family-friendly policies and gender segregation in education depends on the level of cultural values. One may consider that in more gender-egalitarian societies, women and men might be less likely to establish a traditional division of household work. In that cases, if female work-family burdens are reduced, gender might be less salient in the choices of fields of study in higher education. Consequently, a potential side-effect of family policies might be a convergence in women and men' educational choices and a reduction in horizontal gender segregation. Nonetheless, as explained in Olivetti and Petrongolo (2017), the identification of the causal effect of family policies in segregation is fraught by several challenges which forces a cautious interpretation of these results.

3.4 Control Variables

The term X_{ct} is a vector of economic, labor market and education systems variables at country c at time t. I first include the population density (Pop. density), measured by the number of people per square kilometer of land area (World Bank dataset), to keep constant potential foreign and multicultural influences in city dwellers behavior in contrast to rural areas that might be more attached to traditional values of family and religion. Economic structural changes of post-industrial economies are everywhere associated with an expansion of the service sector (Olivetti and Petrongolo, 2016) and found to partially offset the integrative effects of gender-egalitarian cultural values (Charles and Bradley, 2002 pag 576). This leads to the creation of jobs particularly suited to women's preferences, resulting in rising female

employment and facilitating changes in social norms (see Goldin (1990, 2006), Olivetti and Petrongolo (2014), Ngai and Petrongolo (2017)). To control for these fundamental changes in the economic structure, I employ the share of employees (in contrast to own-account workers) in total employment (% Employees) and the weight of employees in the service sector to total employment (% Serv. Economy), both collected from ILO-LABORSTA dataset.

Gender disparities in labor market outcomes provide newcomers of higher education with information on labor market pay-offs of educational choices (Xie and Shauman (1997)). In that sense, upgrading female occupational status may predispose women to seek training in male-dominated fields, such as engineering or science, since they perceive more labor market opportunities (Polachek (1987), Ramirez and Wotipka (2001)). To capture this potential integrative mechanism, I include the percentage of professionals who are women (% Prof. Fem) based on the International Standard Classification of Occupations (ISCO-88) by ILO-LABORSTA[11].

The set of control variables includes three main features of higher education systems. First, the share of graduates to total population (Size Grads, OECD Education Database and World Bank). As overall participation in higher education increases, the elite luster of universities and higher education fades off. Thus, a smaller share of students will possess an elite identity and sense of self-efficacy, which are required for transgressing cultural gender norms (Charles and Bradley, 2009). Similarly, the second education systems' control is female participation, measured by the percentage of females in the overall graduate student body (% Graduates Fem). Sociologic research is inconclusive on whether the dominance of females in overall higher education has an integrative or segregative impact[12]. Third, the expansion of vocational studies in higher education has been found to increase gender segregation (Brunello and Checchi (2007), Blossfeld et al. (2015), Hillmert (2015)). I control for the breadth of vocational education by means of the share of graduates in ISCDE1997 level 5 Type B in the total higher education (Diversification).

Finally, I attempt to rule out potential segregative effects of gender disparities in academic performance by including the female to male ratio[13] of secondary education performance in math and science domains (Score gap). I employ the panel database provided in Quality of Education Database of Altinok et

[11]The share of females in professional occupations and in the labor force have been used in extant studies to proxy gender attitudes. However, these variables fall short to capture the nuances of gender attitudes (Humlum et al. (2017)), an issue that is specially worrisome in the case of Scandinavian countries were historically high female participation in the labor market might be a weak signal of gender norms.

[12]As women's presence in higher education becomes normal, less female students might regard themselves as exceptional women or pioneers and they will be less likely to opt for male-dominated fields (Charles and Bradley, 2009). On the contrary, if vertical and horizontal gender ascription move together according to common social conditions (England and Li (2006)), women's representation in higher education and field segregation should be positively related.

[13]For the sake of consistency, all the gender gaps in this paper are computed by the ratio of female to males.

al (2014). The authors develop a new methodology to combine the math and science scores by the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS). Whenever possible, Altinok et al. database focuses on math scores, although takes into account growth rates of scores in science for countries which did not took part to an evaluation in maths.

4 Empirical Results

I estimate the model in (3) using the within-group estimator. Breusch and Pagan post-estimation test confirms the presence of conditional heteroskedasticity in the data. Therefore, I relax the usual requirement of independently distributed residuals. I employ cluster standard errors at country-level to allow residuals to be correlated within but uncorrelated between countries (Cameron and Miller (2015)). Hausman test' initial hypothesis -that the individual-level effects are adequately modeled by a random-effects model- is resoundingly rejected.

Among other post-estimation tests, I take issue of outliers by identifying observations with very large leverage or squared residuals. To do so, I re-estimate the fixed-effects models using Ordinary Least Squares (OLS) with country and time fixed-effects and employ the lvr2plot Stata command to graphically identify and analyze separately high leverage observations (Cox, 2004). Finally, a potential caveat on the validity of the estimation regards the relationship between the dissimilarity index and the share of graduate females in higher education. Employing the Two Step Least Squared (2SLS) and the number of women in parliaments to instrument the share of female graduates (see Stockemer and Byrne (2011) for a justification of this instrument), corroborate the main results of the paper. Indeed, post-estimation tests of the 2SLS approach fail to reject the hypothesis that the share of females graduates is an exogenous covariate.

Column 1 in Table 2 provides results on the control variables and serve to review extant empirical works on horizontal gender segregation. Population density (Pop density) is associated with a positive and significant coefficient once cultural values are controlled. The share of employees (% Employees) and service sector (% Serv. Economy) are associated with positive coefficients, although the latter is not significant. The sign of these covariates go in line with previous literature on the segregative effects of rising service sectors and economic modernity (Ma (2009), Charles (2011)). The coefficient associated with % Prof Fem is consistent with the finding of Ramirez and Wotipka (2001) on the integrative effect of upgrading female status in the labor market.

The size of the graduate body to total population (Size Grads) is not significantly associated with segrega-

tion, whereas the breadth of vocational education (Diversification) is positively related with segregation, as in Hillmert (2015). The result on the share of graduates who are females (% Graduates Fem) is consistent with England and Li (2006) on that female participation and intergration across fields of study are positively related. The academic performance gap between females and males in math and science (Score gap) is associated with a strong, positive coefficient: female out-performance in secondary education is associated with higher levels of segregation[14].

[TABLE 2 HERE]

Cultural Values:

Column 2 (Table 2) shows estimates on cultural values. % Disagree Men First has a negative and significant coefficient, suggesting that gender-egalitarian views of gender roles in the labor market might be negatively related with horizontal gender segregation. Pro-choice attitudes of the overall population are not statistically significant. % God Important is negative and significantly related with segregation. This result is inconsistent with the prediction that more religiosity enacts a traditional role of women in the society (Algan and Cahuc (2006)). However, this finding can support previous evidence on the link between religiosity and higher income per capita and economic growth (Guiso et al. (2003)[15]. A tentative interpretation of this striking result is that religious societies promote a more traditional participation of females in the labor market. Therefore, religion may promote less segregated higher education choice through enacting a consumption-based acquisition of education by women. Women might be encouraged to choose male-dominated fields of study in religious societies because they will, later in their life-time, play a traditional role in the labor market. It is beyond the scope of the current paper to push further the results associated with religion[16].

Following Fortin (2005), Columns 3 and 4 consider separately female and male cultural values, respectively. It turns out that female attitudes towards the three cultural features here tested -% Disagree Men First, % Pro-Choice and % God Important- are statistically related with gender segregation. However, in the case of male attitudes, only % God Important is statistically significant. This result might show that behavioral choices of women rather than that of men drive segregation. As suggested in England

[14]Using Altinok et al. (2014) database allows for including 285 observations whereas using PISA data the number of observations shrinks to 121. Models using PISA do not substantially modify the main results. These models are available form the author upon request.

[15]See further insights in the religion effect in Esping-Andersen (1999), Algan and Cahuc (2006)

[16]I specify supplementary models to delve deeper into this effect. I analyze in a cross-country setting with information of religion ascription in 1997 provided in Hall and Jones (1999). The main results of the paper remain in these specifications and are available upon request.

and Li (2006), it seems that women are more likely to engage in male-dominated fields that men in female-dominated fields.

Pro-choice attitudes of females are weakly and negatively associated with horizontal gender segregation. This potential correlation might corroborate the arguments of Goldin (2006) regarding more serious engagement in education as women have more discretion over reproduction decisions. This results might also go in line with recent research on a positive mechanism between abortion laws and educational investments (González et al. (2018)).

Due to this different effects of female and male's attitudes on segregation, Column 5 includes the female to male ratio of the three cultural values measured in the current analysis -% Disagree Men First, % Pro-Choice and % God Important-, to study whether the distance between female and male attitudes matters to segregation. These gaps seem to lack of explanatory power over segregation. Both female and male considerations on religion are statistically significant and associated with a reducing effect on segregation.

To summarize the resutls so far, the estimates suggest that gender-egalitarian attitudes and religion display significant negative associations with horizontal gender segregation. The result regarding % Disagree Men First aligns perfectly with the findings in Fortin (2005) in the context of female labor market participation[17].

[TABLE 3 HERE]

Marriage market effects:

Column 1 in Table 3 associates divorce rates with a positive and statistically significant coefficient, and fertility, which is negative and not significant. Columns 2 and 3 include the average age at first marriage of women and men, respectively. Both variables seem to have similar a association with segregation, although male average age at first marriage is slightly less significant. A tentative explanation of this finding might go along the lines of Badgett and Folbre (2003), who find that women and men are penalized in the marriage market for non-gender-conforming behavior.

To dig deeper on individual family choices, I explore the effects of the age of motherhood (Age mum, OECD Family Database). Likewise increasing the age at first marriage, Age mum is associated with a segregative and significant effect. However, this variable do not identify exactly the age at first child, and might not identify when exactly a female mother face a potential interruption of her educational career. Due to this caveat, Column 4 includes the age of first marriage instead age of motherhood, along with

[17]Note that Fortin (2005) employs the proportion of respondents who agree on the statement *"scarce jobs should go to men first"* and finds a negative association with the employment status of women.

the previous cultural values of females (% Disagree Men First (fem), % Pro-Choice (fem) and % God Important (fem)). The estimates of this model suggest that increasing the age at first marriage display significant positive associations with gender segregation, as well as confirms the above findings on cultural values.

Family-Friendly Policies:

Columns 1 to 4 (Table 4) show estimates of the four different family-friendly policies, along with cultural values and marriage market. Family policies refers in Columns 1 to 4 respectively to total parental leave, length of maternity leave, parental leave with job protection and father-specific paid leave (Paid Father). None of these policies are significantly associated with horizontal gender segregation. Nonetheless, parental leave with job protection and length of maternity leave have a positive coefficient, whereas father-specific paid leave and total parental leave have a negative one.

[TABLE 4 HERE]

Columns 5 to 8 (Table 4) test for a potential interplay between family-friendly policies and gender-egalitarian cultural values in horizontal gender segregation. This conjecture is expressed by the interaction between family policies and females' attitudes (Family Policies * % Disagree Men First (fem)), in which all the considerations on interactive models in Brambor et al (2006) are assured in the specification. Out of the four family-friendly policies, only father-specific policies (Paid Father) and its interaction with females' attitudes (β_3) are significant. Therefore, the marginal effect of each of the constitutive terms hinges upon the levels of the other term. Appendix B Table B1 provides the marginal effects of the paid father family policy in segregation at various levels of the gender-egalitarism (% Disagree Men First (fem)). As females' attitudes become more gender-egalitarian, measured in terms of higher levels of % Disagree Men First (fem), family policies are negatively related with segregation. More specifically, when females' attitudes are below a 60% (% Disagree Men First (fem)), father-specific family policies are positively related with gender segregation. However, when females' attitudes are above this threshold, this correlation becomes negative. For instance, when % Disagree Men First (fem) is equal to 60%, the estimate point would imply that a 1 standard deviation increase in the family policy might decrease segregation about 0.6 standard deviations. Nevertheless, these results should be accurately considered as partial correlations.

Figure 4 plots the marginal effects of one additional week of paid leave for fathers. The y-axis corresponds to the marginal effect of Paid Father in segregation, whereas the x-axis is the level of % Disagree Men First (fem). As the x-axis variable increases, the potential marginal effect of Paid Father reduces and turns out

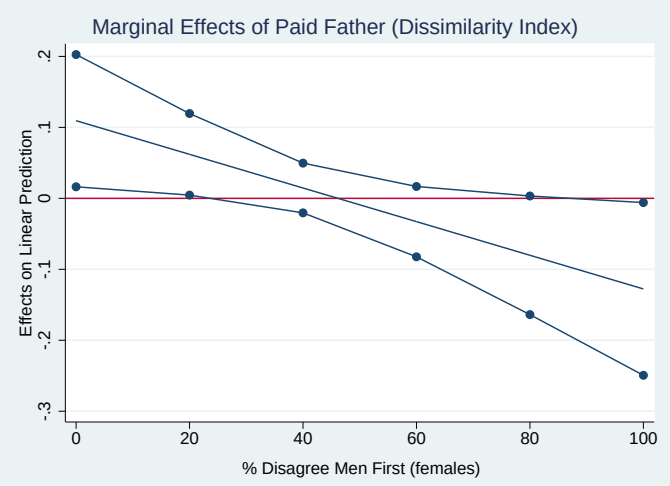


Figure 4: Marginal Effects of Family Policies (ID)

to be negative. The confidence intervals at 95% reveal that the interaction is not statistically significant for values between 40%- 60% of the variable of gender-egalitarian females' attitudes. Nonetheless, existing studies on the effects of family policies on female employment pinpoint that cross-country estimates generally differ from those at micro-level (Olivetti and Petrongolo, 2017). Thus, the validity of these results at a micro-level should be interpreted with extreme caution.

4.1 Sensitivity Analysis

I check the validity of the results using alternative estimation techniques, specifications and measures of country-level segregation. First, I exploit the cross-country variation of cultural values and family decision-making. The within-group technique employed in previous estimations is the most appropriate for the purpose of this analysis, since it allows for controlling for unobserved idiosyncrasy that might drive gender segregation. However, I test here whether the above fixed-effects results hold when focusing on cross-country differences in segregation rather than within-country segregation. Pooled OLS estimates corroborate the explanatory power of the covariates when including country fixed effects, as well as country-time fixed effects (Table B2, Appendix B).

As another robustness check, I employ the IP index (Karmel and MacLachlan, 1988) as an alternative measure of gender segregation at country-level (Columns 2-5 of Table B2, Appendix B). Using this alternative index of segregation, the coefficients associated to the main explanatory variables and controls are similar to the previous results. These alternative specifications and estimation techniques are conclusive on that cultural values, marriage market and family policies might be related with gender segregation in

higher education.

4.2 Field-of-Study Segregation

The last step of this paper studies the relationship between cultural values and family decision-making and field-specific levels of segregation. The empirical strategy in equation (5) uses as dependent variable the association index (A_{ict}) of each field i, in country c in year t. Recall that positive values of the association index (A_{ict}) mean female over-representation of the field, negative values mean male over-representation and values close to zero mean gender neutrality. As we saw in Section 2, the feminized fields are education, humanities and health and welfare, whereas masculinized fields are engineering, science and agriculture. Services and social science are to a varying degree gender neutral. The interpretation of the coefficients associated with the regressors entails a sly examination: it should consider before-hand whether the field at stake in the left-hand-side (A_{ict}) is a female-dominated or male-dominated. That is, the which field is (A_{ict}) computed for how each field is historically gender-labeled. Positive coefficients associated with the explanatory values in feminized fields would mean a positive relation with gender segregation so long as it means a perpetuation of females in female-dominated fields. Negative values of the same coefficients would mean a negative relation between the regressor and gender segregation. Considering masculinized fields, positive values associated with the regressors would mean a negative correlation with segregation, whereas negative values would mean a positive correlation with segregation.

To alleviate potential omitted variables bias issues, I include the share of graduates in each field of study to the overall graduate body in the set of control variables ($FieldWeight_{ict}$). However, data availability at field-of-study level is scarce, which limitates the accuracy of the estimation and ultimately the interpretation of the following results[18].

$$\begin{aligned} A_{ict} = \beta_0 + \beta_1 \%DisagreeMenFirst(fem)_{ct} + \beta_2 PaidFather_{ct} + \\ + \beta_3 \%DisagreeMenFirst(fem) * PaidFather_{ct} + CV'_{ct}\beta + MM'_{ct}\beta \\ + FieldWeight_{ct} + X'_{ct}\beta + \gamma_t + \alpha_c + u_{ct} \\ i = field; c = country; t = year \end{aligned} \tag{5}$$

where A_{ict} is the gender association of field i in country c and year t, γ_t are time fixed-effects, α_c is the idiosyncratic term of countries. The main explanatory variables in this model are females' attitudes towards

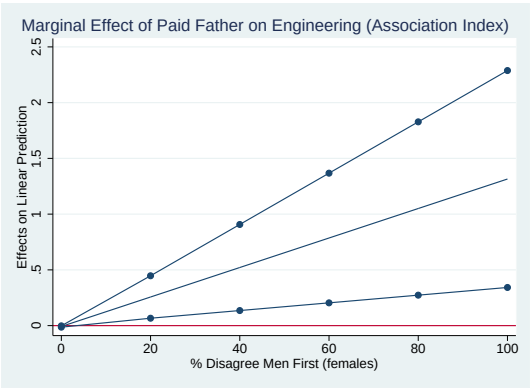
[18] Available from the author are OLS estimations using field-specific index of segregation as dependent variable (association index) and controlling for time-invariant dummies, such as tuition fee discrimination across fields, early tracking as suggested in Hanushek and W ößmann (2006), funding scheme model for tertiary education, *inter alia* other institutional features. The main results of the paper remain in these alternative models.

gender roles in the labor market ($\%DisagreeMenFirst(fem)_{ct}$), family-friendly policies ($PaidFather_{ct}$) and their interaction. CV_{ct} and MM_{ct} are the set of cultural values (reproductive rigths and religion) and marriage market and X_{ct} the previous set of control variables.

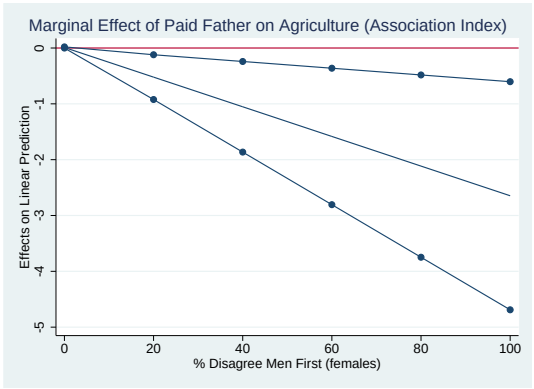
[TABLE 5 HERE]

Table 5 shows within-group estimates of the field-specific model, where Columns 1-9 refer to each of the field of higher education. I place special emphasis in the coefficients of the constitutive terms and the interaction. These terms are statistically significant in the cases of humanities and arts (Column 2), engineering (Column 5) and agriculture (Column 6). The marginal effects of father-specific leave in these three fields of study are plotted in Figures 5 a), b) and c), that refer to the potential marginal effect of one additional week of that policy ($PaidFather_{ct}$) at different levels of females' attitudes towards gender roles in the labor market ($\%DisagreeMenFirst(fem)_{ct}$).

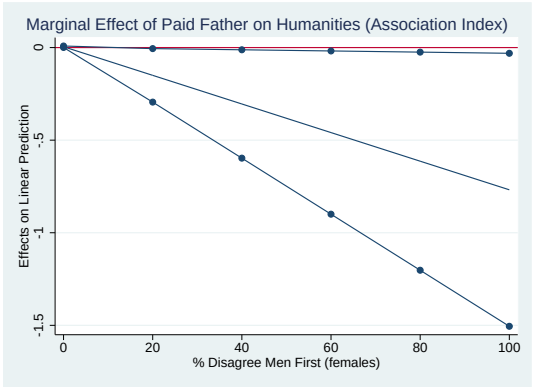
The sign of the coefficient of family-friendly policies is positive in the case of humanities, meaning that



(a) Engineering



(b) Agriculture



(c) Humanities and Arts

Figure 5: Marginal Effects of Paid Father (A_{ict})

father-specific leaves might be related with a feminization of the field when female attitudes towards gender roles are more traditional. As females' attitudes become more gender-egalitarian, family friendly-policies are related with less feminization of humanities and arts. In the case of engineering, $PaidFather_{ct}$ is found to display a positive association with the masculinization of the field. However, as females' attitudes become more gender-egalitarian, $PaidFather_{ct}$ is found to display a negative association with the masculinization of the field.

The interaction is also significant in the case of agriculture (Column 6). Agriculture is male-dominated in the sample of countries, although is less gender-labeled than the fields of humanities and arts and engineering. The coefficient of $PaidFather_{ct}$ is positive and significant, meaning that family policies are negatively related with gender segregation in agriculture. However, as gender-egalitarian attitudes of females increase, family policies become positively related with gender segregation in agriculture.

Females' attitudes towards reproductive rights do not seem to be significatively related with the gender-labeling of fields. The previous country-level results of religion do not remain when considering field-specific segregation in humanities and arts, but presist in the case of agriculture. Columns 2 and 6 (Table 5) estimate religion as significantly and positivelty related with feminization of humanities and agriculture. To the contrary, religion is also positively related with higher feminization of agriculture, and this, less segregation. The results at field-specific levels support the country-level estimates and pinpoint to humanities and arts, engineering and agriculture as key fields of the potential drivers of segregation in the total higher education. Ultimately, they provide suggestive evidence on a plausible relationship between cultural values and family-friendly policies in horizontal gender segregation.

5 Conclusion

The persisting levels of gender segregation across fields of study in Western countries seem at odds with the rise of female participation in higher education. This observation has worried social scientists over the last decades, and it is particularly puzzling against the backdrop of affirmative action and anti-discrimination policies, the triumph of gender-egalitarian ideals and economic development in OECD countries. Existing literature has emphasized individual gender gaps -preferences and aspirations, foreseeing of family obligations- and external factors -economic structure, discrimination-, which imply increasing or decreasing effects in horizontal gender segregation. This paper complements extant works by focusing on cultural values and family decision-making as potential determinants of gender segregation across fields of study in advanced economies.

I propose panel data econometric models to study the relationship between cultural values, the marriage

market and family-friendly policies with horizontal gender segregation. I employ four waves of the World Value Survey (WVS) to proxy three dimensions of culture and consider their potential effect in gender segregation across fields of study. Egalitarian attitudes towards gender roles in the labor market, measured by the disagreement with the statement *"When jobs are scarce, men should have more right to a job than women"*, are found to be negatively associated with gender segregation in higher education. Strikingly, more religiosity, measured as the proportion of WVS respondents how state that *"God is very important in their lives"*, is also negatively associated with gender segregation. Favorable attitudes towards reproductive rights, measured by the agreement with *"Abortion is always justifiable"*, are considered in the analysis but do not found a robust association with gender segregation. The main results suggest that cultural females' attitudes might play a role in gender segregation, whereas males attitudes are not found to be significant.

Finally, the estimates uncover a significant association between family-friendly policies and gender segregation that is contingent upon gender-egalitarian attitudes of females. Family-friendly policies are associated with an integrative effect in higher education in societies above a certain level of females' attitudes towards gender roles in the labor market. However, the same policies are positively related with segregation in less gender-egalitarian countries. Focusing on field-specific segregation measures, the results suggest that country-level results might be driven by the fields of humanities and arts, engineering and agriculture. Both country and field-of-study levels results consistently suggest a potential interplay between cultural values and family policies on gender segregation in higher education.

To conclude, it should be stressed that these findings are based on macro-level data. The results of family-friendly policies in segregation provided here contrast to the lack of explanatory power of the exact same policies in labor market outcomes in previous studies (Olivetti and Petrongolo (2017)). There are potential mechanisms driving horizontal gender segregation that cannot be controlled for, such as the effect of socioeconomic status, educational attainment and gender-stereotyped labor market behavior of parents or country of origin. Hence, an interesting topic for future research is to explore whether the results here hold in micro-level contexts. This could be made by using cohort data that may enable us to control for demographics and parental transmission of attitudes towards gender roles in the labor market.

Table 2: Cultural Values

Dependent variable: Dissimilarity Index					
	(1)	(2)	(3)	(4)	(5)
Pop. density	0.111	0.231***	0.222***	0.210***	0.159*
	(0.070)	(0.058)	(0.063)	(0.063)	(0.084)
% Employees	0.550**	0.552***	0.551***	0.594***	0.698***
	(0.228)	(0.162)	(0.167)	(0.179)	(0.198)
% Serv. Economy	0.069	0.078	0.102	0.081	0.166**
	(0.068)	(0.105)	(0.084)	(0.116)	(0.075)
% Prof. Female	-0.231***	-0.410***	-0.374***	-0.420***	-0.367***
	(0.070)	(0.080)	(0.072)	(0.091)	(0.105)
Size Grads	2.893	2.428	2.558	2.174	3.376
	(1.994)	(2.048)	(2.092)	(2.210)	(2.850)
Diversification	0.118***	0.103***	0.100***	0.108***	0.090***
	(0.024)	(0.018)	(0.019)	(0.019)	(0.026)
% Graduates Fem	-0.114***	-0.106***	-0.103**	-0.105**	-0.114**
	(0.032)	(0.036)	(0.037)	(0.036)	(0.041)
Score gap	91.006***	91.150***	93.661***	91.038***	91.634***
	(18.691)	(26.324)	(25.492)	(27.380)	(29.034)
% Disagree Men First		-0.047*			
		(0.023)			
% Pro-Choice		-0.083			
		(0.051)			
% God Important		-0.246***			
		(0.057)			
% Disagree Men First (fem)			-0.074**		
			(0.031)		
% Pro-Choice (fem)			-0.065*		
			(0.034)		
% God Important (fem)			-0.248***		
			(0.072)		
% Disagree Men First (males)				-0.035	

				(0.036)	
% Pro-Choice (males)				-0.106	
				(0.074)	
% God Important (males)				-0.190***	
				(0.058)	
% Disagree Men First (gap)					0.749
					(4.377)
% Pro-Choice (gap)					0.083
					(2.351)
% God Important (gap)					0.708
					(0.578)
Constant	-111.433***	-109.891***	-111.545***	-113.050***	-132.195***
	(29.851)	(32.939)	(32.644)	(33.435)	(31.579)
N	278	181	181	181	181
R^2	0.404	0.558	0.554	0.542	0.502
No. of Groups	26	18	18	18	18
log-likelihood	-541.013	-295.157	-296.120	-298.440	-306.058
Within R-squared	0.404	0.558	0.554	0.542	0.502
Between R-squared	0.006	0.026	0.029	0.024	0.026
Overall R-squared	0.014	0.018	0.020	0.016	0.017

Clustered standard errors in parentheses at country-level

Time fixed-effects included in all the models but not reported

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 3: Marriage Market

Dependent variable: Dissimilarity Index					
	(1)	(2)	(3)	(4)	(5)
Divorce rate	1.417**	1.235*	1.178*	1.715***	0.693
	(0.614)	(0.640)	(0.622)	(0.557)	(0.518)
Fertility	-1.854	-2.508	-2.456	0.011	-2.087
	(1.860)	(1.737)	(1.621)	(1.739)	(1.933)
Pop. density	0.106	0.110	0.111	0.135**	0.218***

	(0.064)	(0.069)	(0.066)	(0.057)	(0.070)
% Employees	0.532**	0.540***	0.541***	0.533***	0.609***
	(0.200)	(0.187)	(0.184)	(0.175)	(0.142)
% Serv. Economy	0.046	-0.001	-0.002	0.077	0.039
	(0.063)	(0.070)	(0.071)	(0.058)	(0.078)
% Prof. Female	-0.251***	-0.232***	-0.233***	-0.242***	-0.401***
	(0.069)	(0.071)	(0.068)	(0.068)	(0.085)
Size Grads	3.046	2.746	2.821	1.955	2.300
	(1.882)	(1.700)	(1.699)	(1.708)	(2.170)
Diversification	0.108***	0.108***	0.108***	0.110***	0.099***
	(0.025)	(0.027)	(0.026)	(0.027)	(0.025)
% Graduates Fem	-0.118***	-0.127***	-0.128***	-0.129***	-0.111***
	(0.029)	(0.030)	(0.029)	(0.032)	(0.035)
Score gap	87.117***	85.885***	85.247***	73.614***	90.617***
	(20.126)	(19.552)	(18.654)	(19.884)	(28.189)
Marri age (fem)		0.976*			0.678**
		(0.495)			(0.246)
Marri age (males)			1.052*		
			(0.537)		
Age mum				2.005**	
				(0.885)	
% Disagree Men First (fem)					-0.108**
					(0.048)
% Pro-Choice (fem)					-0.061*
					(0.035)
% God Important (fem)					-0.271**
					(0.105)
Constant	-102.784***	-124.711***	-128.825***	-155.863***	-121.719***
	(30.944)	(35.268)	(34.542)	(31.823)	(34.098)
N	271	255	255	266	168
R^2	0.425	0.456	0.466	0.443	0.585
No. of Groups	26	26	26	26.000	18
log-likelihood	-523.144	-485.698	-483.459	-508.627	-269.830

Within R-squared	0.425	0.456	0.466	0.443	0.585
Between R-squared	0.009	0.020	0.021	0.008	0.044
Overall R-squared	0.014	0.016	0.017	0.007	0.013

Clustered standard errors in parentheses at country-level

Time fixed-effects included in all the models but not reported

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 4: Family Policies

Dependent variable: Dissimilarity Index								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	TPL	LML	PLJP	**Paid Father**	TPL	LML	PLJP	**Paid Father**
Family Policy	0.006	-0.061	0.060	-0.014	0.014	-0.372	0.118	0.109**
	(0.011)	(0.098)	(0.042)	(0.025)	(0.049)	(0.048)	(0.263)	(0.119)
Family Policy					-0.000	0.006	-0.001	-0.002**
*%Disagree Men First (fem)					(0.001)	(0.005)	(0.001)	(0.001)
% Disagree Men First (fem)	-0.110**	-0.105**	-0.102**	-0.109**	-0.090	-0.241	-0.007	-0.106**
	(0.047)	(0.048)	(0.047)	(0.049)	(0.157)	(0.154)	(0.202)	(0.049)
% Pro-choice (fem)	-0.067*	-0.056	-0.052	-0.058	-0.070*	-0.068	-0.060*	-0.059
	(0.036)	(0.037)	(0.034)	(0.035)	(0.039)	(0.041)	(0.031)	(0.034)
% God Important (fem)	-0.273**	-0.263**	-0.244**	-0.276**	-0.268**	-0.278**	-0.271***	-0.274**
	(0.105)	(0.107)	(0.105)	(0.107)	(0.122)	(0.122)	(0.084)	(0.107)
Divorce rate	0.684	0.652	0.760	0.638	0.628	0.800	0.833	0.663
	(0.518)	(0.478)	(0.521)	(0.521)	(0.615)	(0.474)	(0.554)	(0.527)
Marri Age (fem)	0.686**	0.673**	0.676**	0.670**	0.703**	0.597*	0.727**	0.556**
	(0.255)	(0.237)	(0.259)	(0.250)	(0.289)	(0.292)	(0.299)	(0.244)
Fertility	-1.666	-1.980	-2.294	-2.177	-1.576	-2.701	-2.204	-1.590
	(2.292)	(1.929)	(2.009)	(1.931)	(2.431)	(2.199)	(1.967)	(2.020)
Pop. density	0.213***	0.229***	0.208***	0.229***	0.210**	0.241***	0.210***	0.215**

	(0.070)	(0.061)	(0.069)	(0.076)	(0.073)	(0.066)	(0.068)	(0.079)
% Employees	0.599***	0.621***	0.634***	0.604***	0.594***	0.609***	0.638***	0.561***
	(0.137)	(0.156)	(0.142)	(0.142)	(0.151)	(0.154)	(0.142)	(0.140)
% Serv. Economy	0.052	0.027	0.071	0.042	0.043	0.029	0.083	0.000
	(0.075)	(0.083)	(0.084)	(0.076)	(0.062)	(0.083)	(0.090)	(0.072)
% Prof. Female	-0.401***	-0.395***	-0.401***	-0.405***	-0.405***	-0.370***	-0.415***	-0.396***
	(0.085)	(0.089)	(0.084)	(0.088)	(0.085)	(0.082)	(0.086)	(0.088)
Size Grads	2.297	2.428	2.381	2.245	2.249	2.216	2.320	2.057
	(2.187)	(2.268)	(2.187)	(2.197)	(2.259)	(2.243)	(2.229)	(2.206)
Diversification	0.100***	0.098***	0.101***	0.098***	0.101***	0.095***	0.104***	0.100***
	(0.026)	(0.025)	(0.025)	(0.025)	(0.026)	(0.026)	(0.025)	(0.025)
% Graduates Fem	-0.108***	-0.105***	-0.107***	-0.110***	-0.108***	-0.105***	-0.105***	-0.113***
	(0.033)	(0.033)	(0.033)	(0.035)	(0.033)	(0.035)	(0.033)	(0.034)
Score gap	89.640***	90.675***	97.347***	90.862***	89.783***	94.131***	98.495***	84.503***
	(28.025)	(28.296)	(27.591)	(28.250)	(28.456)	(27.419)	(28.749)	(28.918)
Constant	-121.062***	-123.568***	-137.984***	-122.388***	-121.398***	-117.457***	-147.667***	-106.193***
	(33.245)	(33.601)	(33.702)	(34.303)	(34.249)	(34.799)	(45.265)	(33.546)
N	168	168	168	168	168	168	168	168
R^2	0.586	0.586	0.591	0.586	0.586	0.591	0.592	0.595
No. of Groups	18	18	18	18	18	18	18	18
log-likelihood	-269.649	-269.602	-268.622	-269.662	-269.615	-268.585	-268.350	-267.803
Within R-squared	0.586	0.586	0.591	0.586	0.586	0.591	0.592	0.595
Between R-squared	0.048	0.040	0.073	0.041	0.049	0.032	0.087	0.038
Overall R-squared	0.015	0.011	0.024	0.011	0.016	0.007	0.029	0.010

Clustered standard errors in parentheses at country-level

Time fixed-effects included in all the models but not reported

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 5: Association Index and Paid Father

Dependent variable: Association Index									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Educ	Hum & Arts	Soc. Sci	Science	Eng.	Agri.	Health	Serv	NKOU
Paid Father	0.002	0.005**	0.005*	0.003	-0.008**	0.010*	0.002	0.000	0.091
	(0.005)	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.002)	(0.004)	(0.235)
% Disagree Men First (fem)	-0.113	0.410*	-0.432	-1.108**	-0.482	2.657*	0.144	1.061*	12.850**
	(1.017)	(0.222)	(0.474)	(0.496)	(0.930)	(1.268)	(0.795)	(0.601)	(4.476)
Paid Father * % Disagree Men First (fem)	-0.003	-0.008*	-0.006	-0.003	0.013**	-0.027**	-0.002	-0.007	-0.081
	(0.007)	(0.004)	(0.004)	(0.006)	(0.005)	(0.010)	(0.004)	(0.007)	(0.313)
% Pro-Choice (fem)	-0.023	0.448	-0.172	-0.690	1.036	1.764	-0.656	-2.200	2.534
	(1.330)	(0.343)	(0.513)	(1.020)	(0.861)	(1.141)	(0.910)	(1.269)	(8.719)
% God Important (fem)	-1.228	0.624**	-0.390	0.648	-0.892	2.558**	-0.566	-0.140	41.636
	(1.111)	(0.277)	(0.366)	(0.528)	(0.870)	(1.190)	(0.732)	(0.479)	(32.819)
Divorce rate	-0.050	-0.025	-0.039	0.054	0.017	-0.175*	-0.064	0.057	-0.130
	(0.058)	(0.023)	(0.028)	(0.050)	(0.043)	(0.093)	(0.039)	(0.062)	(0.227)
Marri Age (fem)	-0.225**	0.032	-0.037	-0.060	-0.077	-0.085	-0.022	0.132*	-0.141
	(0.100)	(0.058)	(0.040)	(0.048)	(0.075)	(0.108)	(0.036)	(0.068)	(0.776)
Fertility	0.390*	-0.085	0.077	0.202*	0.599**	-0.041	-0.057	-0.589**	-0.815
	(0.215)	(0.083)	(0.068)	(0.099)	(0.209)	(0.251)	(0.146)	(0.211)	(4.210)
Field weight	-5.620**	0.944	-0.881	1.117	1.125	-22.700*	1.424	-6.167*	16.492
	(2.416)	(0.706)	(0.994)	(1.682)	(1.703)	(10.961)	(1.655)	(2.993)	(13.884)
Pop. density	0.009	-0.004	0.005	-0.025***	0.006	0.022	-0.012**	0.012	0.031

	(0.009)	(0.003)	(0.004)	(0.007)	(0.007)	(0.013)	(0.005)	(0.011)	(0.039)
% Employees	0.056*	-0.001	0.001	0.006	0.019	-0.063	0.009	-0.031	0.047
	(0.027)	(0.012)	(0.016)	(0.027)	(0.026)	(0.042)	(0.015)	(0.022)	(0.297)
% Serv. Economy	0.028**	-0.000	0.001	-0.011	0.012	-0.034**	-0.003	-0.010	0.088**
	(0.011)	(0.004)	(0.006)	(0.007)	(0.011)	(0.015)	(0.007)	(0.008)	(0.039)
% Prof. Female	-0.002	0.002	0.002	0.026**	0.001	-0.011	-0.001	-0.025	0.099
	(0.012)	(0.006)	(0.006)	(0.009)	(0.009)	(0.017)	(0.008)	(0.016)	(0.111)
Size Grads	-0.782	0.095	-0.132	0.321*	-0.065	0.455	0.053	-0.439**	1.507
	(0.509)	(0.137)	(0.154)	(0.171)	(0.116)	(0.298)	(0.243)	(0.183)	(1.324)
Diversification	0.005	-0.001	0.005***	-0.003	-0.008**	-0.002	0.004	0.001	-0.015
	(0.005)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.004)	(0.017)
% Graduates Fem	0.020	-0.006	0.010	-0.016	-0.003	-0.021	-0.015	-0.005	0.063
	(0.021)	(0.012)	(0.011)	(0.019)	(0.017)	(0.034)	(0.016)	(0.018)	(0.067)
Score gaps	0.182	0.549	1.023	-5.176**	-2.080	2.627	1.711	8.581***	-10.853
	(2.165)	(1.059)	(1.602)	(1.784)	(2.261)	(3.281)	(1.183)	(2.871)	(14.024)
Constant	-0.714	-0.371	-0.746	10.068***	-0.792	2.768	1.970	-8.492*	-27.672
	(5.227)	(2.704)	(2.659)	(2.781)	(5.009)	(4.275)	(2.909)	(4.452)	(36.525)
N	99	99	99	99	99	99	99	99	51
R^2	0.604	0.495	0.501	0.614	0.527	0.552	0.530	0.593	0.692
No. of Groups	16	16	16	16	16	16	16	16	11
log-likelihood	111.779	192.826	185.290	134.942	154.095	97.953	157.390	128.076	23.475
Within R-squared	0.604	0.495	0.501	0.614	0.527	0.552	0.530	0.593	0.692
Between R-squared	0.171	0.090	0.182	0.061	0.017	0.016	0.137	0.000	0.108
Overall R-squared	0.092	0.144	0.215	0.011	0.002	0.040	0.175	0.007	0.144

Clustered standard errors in parentheses at country-field level

Time fixed-effects included in all the models but not reported

Educ (Education); Hum & Arts (Humanities and Arts); Soc. Sci (Social Science); Eng. (Engineering, manufacturing and construction); Agri. (Agriculture)

Health (Health and Welfare); Serv (Services); NKOU (Not known or unespecified)

* $p < .1$, ** $p < .05$, *** $p < .01$

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Appendices

Appendix A

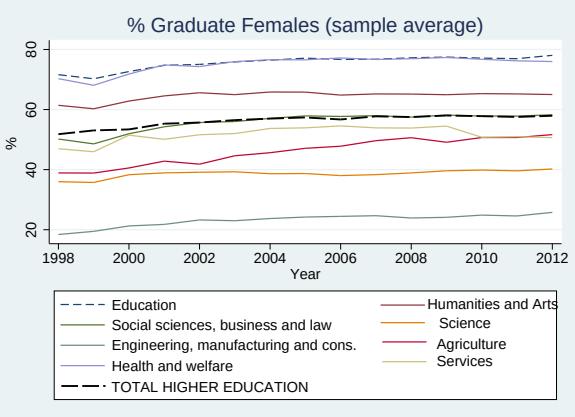
Table A1: ISCED 1997 1 digit-level

Code	**Field of Study**
140	Education
200	Humanities and Arts
300	Social sciences, business and law
400	Science
500	Engineering, manufacturing and construction
600	Agriculture
700	Health and welfare
800	Services
990	Not known or unspecified

Table A2: Sample Countries

Country	Average ID index	Baseline model	WVS data	Ass. Models	Ass. Models (NKOU)
Austria	34.10	yes			
Belgium	26.00	yes			
Canada	24.39	yes	yes	yes	yes
Czech Republic	31.98	yes	yes		
Denmark	35.23	yes			
Finland	42.05	yes	yes	yes	
France	31.15	yes	yes	yes	
Germany	36.37	yes	yes	yes	yes
Greece	26.60	yes			
Hungary	26.36	yes	yes	yes	
Iceland	32.37	yes			
Ireland	27.46	yes			
Italy	23.13	yes	yes	yes	yes
Korea, Rep.	30.62	yes	yes	yes	
Luxembourg	10.55	yes			
Netherlands	31.14	yes	yes	yes	yes
Norway	33.81	yes	yes	yes	yes
Poland	20.22	yes	yes	yes	yes
Portugal	27.95	yes			
Slovak Republic	31.36	yes	yes		
Spain	30.41	yes	yes	yes	yes
Sweden	34.20	yes	yes	yes	yes
Switzerland	30.13	yes	yes	yes	yes
Turkey	17.07	yes	yes	yes	yes
United Kingdom	26.50	yes	yes	yes	yes
United States	22.91	yes	yes	yes	yes

Sample countries vary in models due to data requirements, first column provides dissimilarity index averages for countries in baseline model (Column 1 Table 2), countries using WVS data. Ass models refer to the field-specific models using association index for the first 8 ISCED1997 fields and for "not known or unespecified (NKOU)".



"Not known or unspecified" (NKOU) is not displayed in the graph

Figure A1: Share of Graduate Females

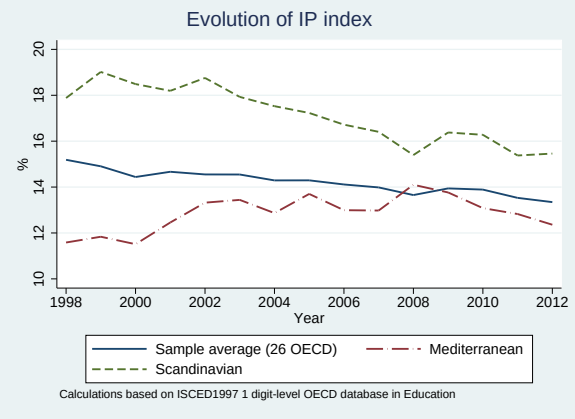


Figure A2: Evolution of IP Index

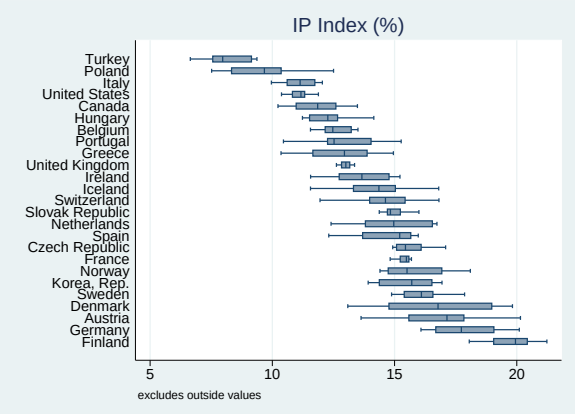


Figure A3: IP index by Country

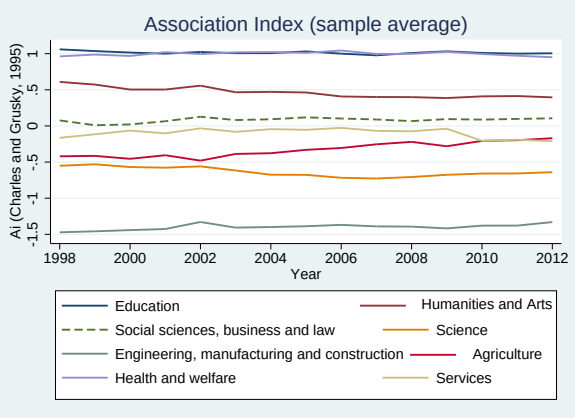


Figure A4: Evolution Association Index

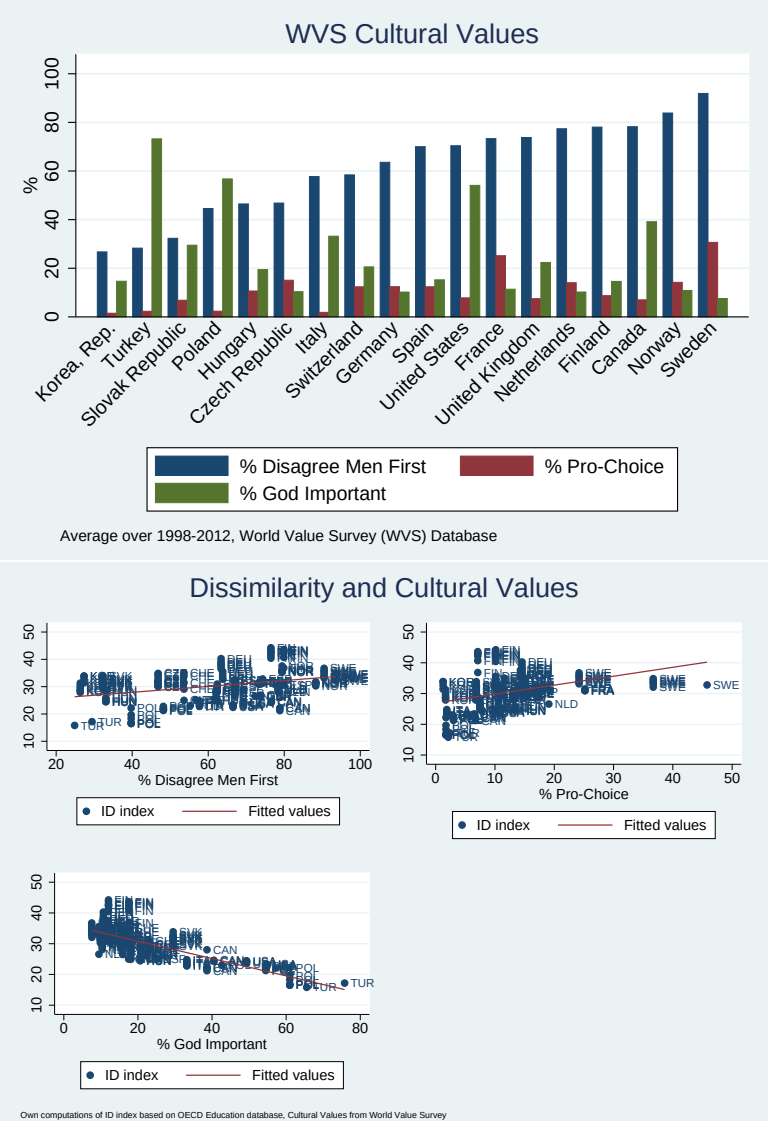


Figure A5: Cultural Values (WVS)

Table A3: Data Sources

Variable	Description	Data Source
Dissimilarity Index	Own computations of the index in Duncan and Duncan (1955) based on ISCED1997 1 digit-level data on female and male gratuates	OECD Education Database
IP index	Own computations of the index in Karmel and MacLachlan (1988) based on ISCED1997 1 digit-level data on female and male gratuates	"
Association Index	Own computations of the indices in Charles and Grusky (1995) based on ISCED1997 1 digit-level data on female and male graduates	"
Population Density	Number of people per square kilometer	World Bank data
% Employees	Share of employees to total employment using the International Classification of Status in Employment (ICSE-93)	ILO-LABORSTA
% Service Economy	Share of employment in service sector to total employment using the International Standard Classification of Occupations (ISCO-88)	"
% Prof. Female	Share of females in the occupational status of "professionals" (ISCO-88: group 2)	"
Size Grads	Share of total graduates in higher education to total population in percentages	OECD Education Database, World Bank
% Graduates Fem.	Share of females in total graduates in higher education	ILO-LABORSTA
Score gap	Female to male ratio of mean scores in PISA, TIMSS and PIRLS international tests from Quality of Education Database	Altinok et al. (2014)
% Disagree Men First	Share of respondents who disagree on the statement *"When jobs are scarce, men should have more right on a job that women"* to total respondents	World Value Survey (WVS)
% Pro-Choice	Share of respondents who agree equal to 10 on a 0 to 10 scale that *"Abortion is always justifiable"*	"
% God Important	Share of respondents who say that *"God is important in her life"* equal to 10 on a 0 to 10 scale that	"

Table A4: Data Sources Explanatory Variables in Alternative Models (cont.)

Variable	Description	Data Source
Divorce rate	Number of divorces during the year per 1,000 people	OECD Family Database
Marri. Age Fem.	Average age of first marriage (females)	”
Marri. Age Male	Average age of first marriage (males)	”
Age Mum	Average age of mothers at childbirth	”
Fertility	Total number of births per woman	World Bank
TPL	Total length of paid maternity and parental leave (weeks)	OECD Employment Database
LML	Length of maternity leave (weeks)	OECD Family Database
Paid Father	Length of paid father-specific leave (weeks)	OECD Employment Database
PLJP	Length of parental leave with job protection (weeks)	OECD Employment Database

Appendix B

Table B1: Average Marginal Effects of Paid Father at Different Levels of WVS

% Disagree Men First (fem)	dy/dx	robust s.e.	z	p-value
0	.11	.048	2.30	0.021
20	.062	.029	2.12	0.034
40	.015	.018	0.82	0.414
60	-.033	.025	-1.30	0.194
80	-.08	.043	-1.88	0.060
10	-.128	.062	-2.06	0.040

Marginal effects plotted in Figure 5

Sensitivity Check

Table B2: IP index

	(1)	(2)	(3)	(4)	(5)
Depent variable:	ID	IP	IP	IP	IP
Paid Father	0.109**				0.058**
	(0.051)				(0.026)
% Disagree Men First (fem)	-0.106*		-0.056***	-0.074**	-0.073***
	(0.052)		(0.018)	(0.026)	(0.028)
Paid Father *	-0.002**				-0.001**
% Disagree Men First (fem)	(0.001)				(0.001)
% Pro-Choice (fem)	-0.059		-0.048*	-0.049**	-0.047**
	(0.037)		(0.023)	(0.020)	(0.021)
% God Important (fem)	-0.274**		-0.114***	-0.124**	-0.127**
	(0.114)		(0.036)	(0.055)	(0.059)
Divorce rate	0.663			0.415	0.384
	(0.563)			(0.278)	(0.300)

Marri Age (fem)	0.556**			0.233*	0.162
	(0.261)			(0.130)	(0.139)
Fertility	-1.590			-0.997	-0.730
	(2.158)			(1.059)	(1.127)
Pop. density	0.215**	0.080*	0.132***	0.124***	0.125***
	(0.084)	(0.040)	(0.035)	(0.038)	(0.046)
% Employees	0.561***	0.297**	0.321***	0.352***	0.324***
	(0.150)	(0.127)	(0.094)	(0.083)	(0.089)
% Serv. Economy	0.000	0.048	0.034	0.007	-0.014
	(0.077)	(0.036)	(0.043)	(0.038)	(0.037)
% Prof. Female	-0.396***	-0.111***	-0.173***	-0.182***	-0.180***
	(0.094)	(0.035)	(0.033)	(0.038)	(0.043)
Size Grads	2.057	0.642	0.564	0.430	0.259
	(2.357)	(1.099)	(0.932)	(0.939)	(1.033)
Diversification	0.100***	0.060***	0.054***	0.052***	0.052***
	(0.027)	(0.014)	(0.010)	(0.013)	(0.015)
% Graduates Fem	-0.113***				
	(0.037)				
Score gap	84.503**	44.324***	44.368***	43.817***	40.568***
	(30.898)	(8.931)	(12.002)	(12.944)	(14.080)
Constant	-76.590**	-63.676***	-61.313***	-64.848***	-39.081***
	(31.303)	(14.913)	(14.827)	(16.503)	(14.864)
N	168	278	181	168	168
R^2	0.960	0.397	0.540	0.564	
No. of Groups		26.000	18.000	18.000	18.000
log-likelihood	-267.803	-354.789	-172.806	-157.144	
Within R-squared		0.397	0.540	0.564	0.578
Between R-squared		0.013	0.042	0.058	1.000

Overall R-squared	0.024	0.031	0.023	0.958

Clustered standard errors in parentheses at country-level

Time fixed-effects included in all the models but not reported

Column 1 shows pooled OLS estimates using dissimilarity index as dependent variable, including country fixed-effects

Columns 2 - 5 use IP index as dependent variable

IP index models omit the share of females in total graduates to alleviate potential endogeneity issues

* $p < .1$, ** $p < .05$, *** $p < .01$

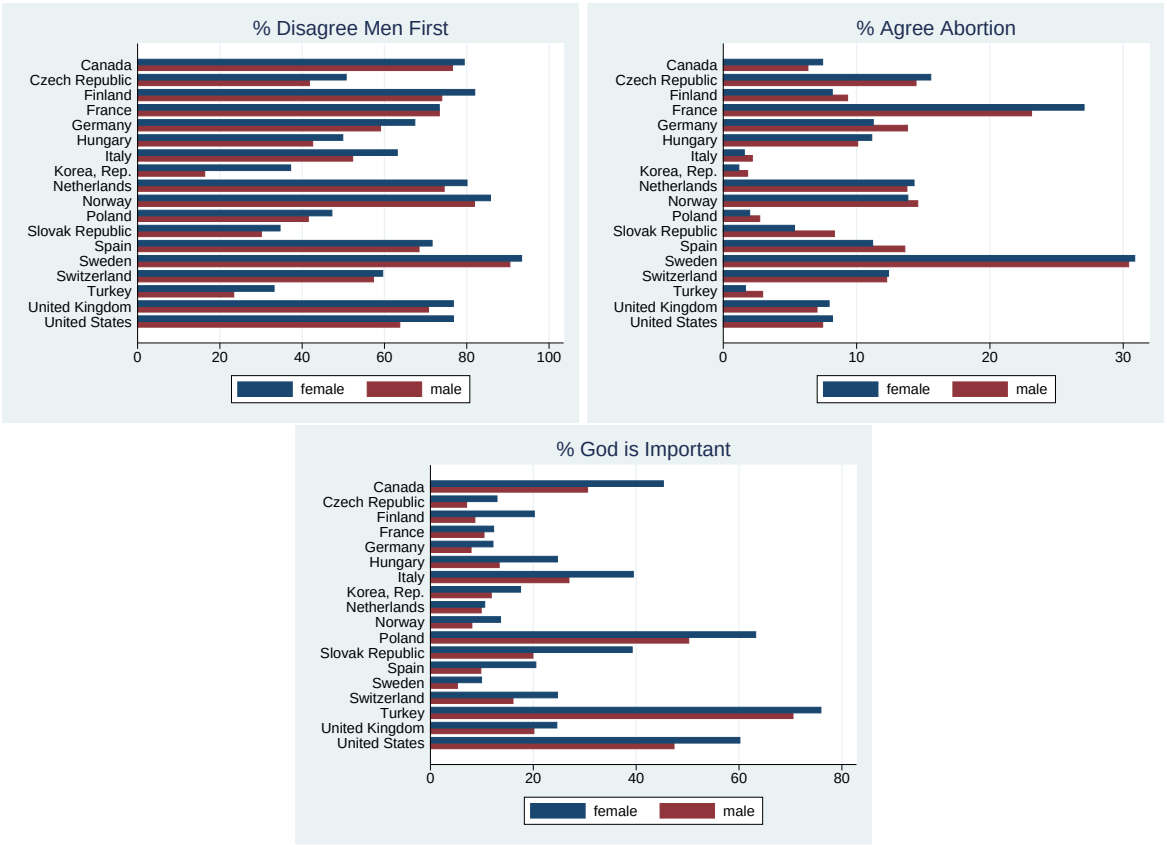


Figure A6: Gender Differences in Cultural Values

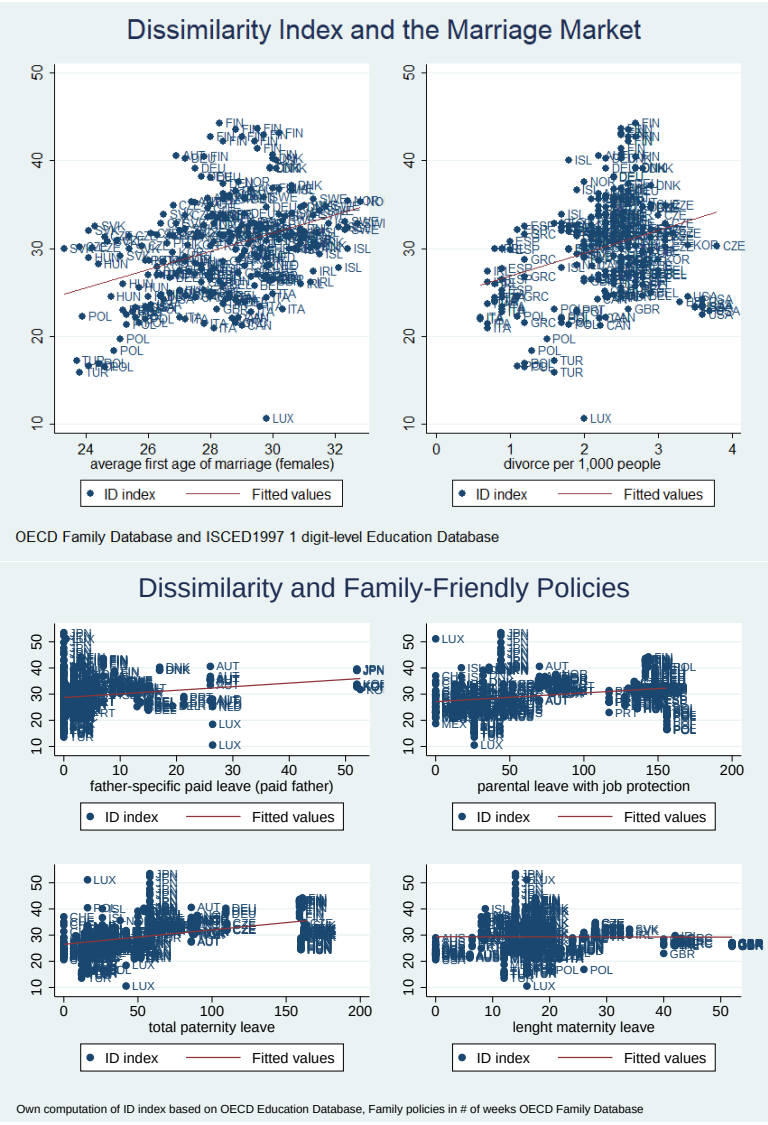


Figure A7: Family Decision-Making