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Jan Van Bavel

Jan.VanBavel@vub.ac.be

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Choice of study discipline and the postponement of motherhood in Europe: the impact of expected earnings, gender composition and family attitudes

Jan Van Bavel

(Interface Demography, Vrije Universiteit Brussel, Jan.VanBavel@vub.ac.be)

Abstract

Theory suggests that the subject of graduation may be at least as consequential for fertility behavior as the duration and level of education. Yet, this qualitative dimension of educational achievement has largely been neglected in demographic studies. This papers aims to analyze the mechanisms relating the field of education with the postponement of motherhood by graduated women aged 20 to 40 years across Europe. The second round of the European Social Survey is used to assess the impact of three features of study disciplines that are identified as key to reproductive decision making: the expected earning profile, attitudes towards gendered family roles, and the gender composition. These characteristics are indexed empirically in a way as to maximize exogeneity with respect to the postponement of motherhood by individual women. The results indicate that the postponement of motherhood is relatively limited among graduates from study disciplines where stereotypical family attitudes are prevailing and where a large share of the graduates is female. Both the level of the starting wage and steepness of the earning profile are found to be associated with strong postponement. These results are robust to controlling for the partnership situation and the age at entry into the labor market.

Introduction

In recent decades, women's levels of educational attainment have markedly increased throughout Europe. Their participation in higher education has grown even to the extent that women now form the majority of those enrolled for university degrees in most EU-countries (Eurostat 2007). To varying degrees in different regions of Europe, this catching up in education has also been translated into growing levels of participation in the paid labor market. A major demographic consequence has been the increasing postponement of first births in Europe, depressing both period and cohort total fertility rates. Indeed, it has been shown that postponement of parenthood is strongly related to the extended participation of women in higher education and in the labor market (Sobotka 2004).

Yet, despite all this, women are still heavily underrepresented in the more lucrative and powerful jobs throughout Europe. Although it has been shown that welfare states have been successful in furthering women's labor market participation, they have failed to achieve gender equity with respect to economic achievement, wage levels, or occupational standing. In fact, nations that have been most successful in fostering female labor force participation by means of progressive and developed welfare policies are the very ones that tend to exhibit high concentrations of women in female-typed occupations and low female presence in the most lucrative and powerful positions. This can be explained by the fact that highly developed welfare states tend to host sheltered segments in the labor market with many opportunities for part-time work and parental leave but relatively flat career prospects. Jobs in these segments are typically held predominantly by women and can relatively easily be combined with childcare and housework. As a rule, these welfare states sponsor a big public service sector (Mandel & Semyonov 2006).

The concentration of women's jobs in poorly paid sectors like public administration, nursing, and teaching corresponds to a large degree with the concentration of girls within particular disciplines at colleges and schools. European women have a higher tendency than men to go for a degree in health or personal care (nursing or hairdressing, for example), to be trained as a teacher or to graduate in the humanities. Women pursuing a technical or technological diploma, for example to become a plumber or a civil engineer, are a minority even though wages in these sectors tend to be higher (Brown and Corcoran 1997; Jurajda 2003; Machin and Puhani 2003).

One reason why women are overrepresented in particular fields of education may be that they expect these kinds of studies to lead to jobs that can relatively easily be combined with family life and childcare later on in their life course. Maybe teenage women choose their discipline as a function of their family values and attitudes about women's roles. Predominantly female branches of study may better fit with traditional or stereotypically gendered family norms. Those norms are likely to be connected also with preferences towards family formation and with actual entry into motherhood (Hakim 2000; Lappegård and Rønsen 2005).

A case can be made, therefore, that the field of education is just as relevant for entry into parenthood as the level of education. Yet, this qualitative dimension of educational achievement has largely been neglected by demographers. There is a large body of literature about the connection between the duration and level of education and first births (Marini 1984; Hoem 1986; Rindfuss, Morgan and Swicegood 1988; Blossfeld and Huinink 1991; Kravdal 1994; Blossfeld 1995; Rindfuss, Morgan and Offutt 1996; Liefbroer and Corijn 1999; Martin 2000; Lappegård 2002; Billari and Philipov 2004; Gustafsson 2005; Gustafsson and Worku 2005). However, there are just a few studies published about the relationship between study discipline and entry into motherhood. The handful of studies that have been published concentrate on the population of one nation state. All of these studies suggest that there is

indeed an independent effect of the study discipline that cannot be explained by, and has been found to be more decisive than, the level of educational attainment or the duration of enrollment (Kalmijn 1996; Lappegård 2002; Lappegård and Rønsen 2005; Hoem, Neyer and Andersson 2006a, 2006b; Neyer and Hoem 2008). Yet, the mechanisms behind this effect remain unclear, although the literature mentions several plausible explanations that beg to be researched (Lappegård and Rønsen 2005; Hoem et al. 2006a; Neyer and Hoem 2008).

The aim of this paper is to see how and why the field of education, i.e. the subject of graduation, is related to the postponement of motherhood across 21 European countries. To this end, data are used about graduated women who participated in the second round of the European Social Survey (Jowell and the Central Co-ordinating Team 2005). This survey will be denoted by its shorthand ESS2 from now on. Although ESS2 is a cross-sectional survey, it is argued that the data can still be exploited to find answers to the research question because the field of education is fixed after graduation. In contrast to personal attitudes and values, it does not change as a consequence of childbirth. Therefore, if field of education is correlating with entry into motherhood across Europe, we may assume that the former has causal priority over the latter, even if some common factor affects both the choice of study discipline and the propensity to become a mother. In order to shed light on the underlying mechanisms behind the link between study discipline and first birth postponement, key characteristics of fields of education are entered into the equation. More specifically, I look at the effects of the expected wage profile, norms about gender roles dominating within specific fields of education, gender composition, and the mediating role of marriage and cohabitation.

Three dimensions of education and entry into motherhood

Three dimensions of education have been shown, in national case studies, to be independently related to fertility and fertility postponement (Lappegård and Rønsen 2005): the duration of

educational activity (i.e. the status of still being enrolled in school or college), the level of educational attainment (i.e. the degree obtained after finishing the educational activity), and educational field (humanities, engineering, health care and so on). As to the first dimension, there is ample evidence that women's enrolment in schools and colleges delays their transition to parenthood (e.g. Blossfeld and Huinink 1991; Kravdal 1994; Blossfeld 1995; Liefbroer and Corijn 1999; Hank 2002; Skirbekk, Kohler and Prskawetz 2004; Lappegård and Rønsen 2005). This effect conforms to the sequencing norm that women who are still studying are not yet is the right position to give birth and raise children: in most Western countries, finishing fulltime education counts as one of the key prerequisites for parenthood (Rindfuss et al. 1988; Blossfeld and Huinink 1991; Skirbekk et al. 2004).

There is more discussion about the effect of the second dimension of education, i.e. the level of educational attainment. On the one hand, there are economic theories arguing that a higher level of education represents a higher level of investment in human capital. The accumulated human capital, in turn, paves the way for better jobs, higher salaries and more career opportunities in the labor market. As a consequence, the opportunity costs of entry into motherhood increase because childbirth implies an interruption of activity in the labor market at least for some time. Therefore, higher educated women would be more inclined to postpone or forgo children than lower educated women (Kravdal 1994, 2004; Gustafsson 2001, 2005). Better educated women are expected to enter motherhood at a later stage in their employment careers, when they consider themselves more established in their jobs and when taking a break from the labor market may be perceived as less damaging to their positions. On the other hand, if the wage profile of higher educated women is relatively steep, it may be less costly to have children early in the career rather than late (Lappegård and Rønsen 2005). In addition, college educated women are older when they graduate than women with just a high school diploma. Therefore, the biological and sociological clocks that set limits to the ages at

childbearing may stimulate the higher educated to catch up once they are graduated. In that case, there would be no effect of the level of education on fertility postponement after controlling for graduation and the number of years spent in education (Blossfeld and Huinink 1991; Lappegård and Rønsen 2005).

Empirical research has found that the influence of the level of educational attainment on the timing of first births varies by country: in some countries, higher educated women postpone motherhood significantly more, even after controlling for the duration-of-enrollment effect, in other countries there is no or only a small effect. This heterogeneity may be attributed to differences between countries with respect to the opportunity costs of having children: in some countries, paid labor can relatively easily be combined with mothering young dependent children, for example thanks to the availability of cheap and high quality childcare. In those countries, the opportunity costs will be relatively low. Norway may be a case in point. Indeed, Lappegård and Rønsen (2005) provide evidence that higher educated women in that country catch up rapidly after graduation. The opportunity costs of the transition to motherhood will be high, in contrast, in countries having institutional arrangements and cultural norms that imply strong conflicts between paid work and motherhood, like in Germany (Blossfeld 1995; Rindfuss, Guzzo and Morgan 2003).

Diverging wage profiles and heterogeneous opportunity costs of motherhood may also be related to the third dimension of education, i.e. the study discipline. Indeed, different fields of education lead to different occupations and economic sectors, associated with working conditions that may facilitate or hamper the combination of work and family life (Kravdal 1994; Hoem, Neyer & Andersson 2006a). Lappegård and Rønsen (2005) argue that the effect of the *level* of education may operate chiefly through prolonged participation in the educational system; “Having completed education, however, differences in opportunity costs

may first and foremost be reflected through different *fields* of education that lead to different occupations and employment sectors" (p.34).

Not just the economic implications of having obtained a particular qualification may be important for parenthood. There are at least two other reasons why study discipline may affect fertility postponement. Apart from the implications for a woman's wage profile and earning potential, the choice of a subject of study may reflect a person's values and related preferences while at the same time these values and preferences may be molded by being enrolled in a particular discipline with its associated formal and informal subculture. These cultural elements may influence the timing of entry into motherhood. Finally, the branch of study determines to some extent the social environment during the student's formative years. In particular, this includes the extent of sex segregation in the chosen study area, which may bear on the orientation towards family formation.

Only a handful of studies have been published about the effect of study discipline on fertility in Europe. All these studies concentrate on one nation state within Europe. A Dutch study found that women with a degree from the social and cultural sciences had higher first motherhood rates than otherwise comparable women with a business- or technology-oriented degree (Kalmijn 1996). Lappegård (2002) concludes from a large-scale analysis of Norwegian register data that the field of study has a more decisive influence of women's fertility than the level of educational attainment. More specifically, she found that women who graduated in female-dominated disciplines are less likely to remain childless and, after becoming a mother, tend to have more births. Apart from that, women with a high career orientation who are educated to work in health care (like doctors and dentists) appeared to have high fertility as well. Hoem, Neyer and Andersson (2006a, 2006b) conclude that fertility seems to depend more on the field than on the level of education in Sweden as well. Using large-scale official register data, they looked at a cohort of Swedish women who had completed their

reproductive years and found that Swedish women educated for jobs in teaching and health care have much lower permanent childlessness than in any other major grouping. Women educated in arts and the humanities have unusually high proportions permanently childless. A replication study using census data from Austria yielded basically the same result (Neyer and Hoem 2008). Among Swedish women who did become a mother, Hoem et al. (2006b) found that the study discipline mattered for final parity as well. Again, mothers who were trained to become a teacher or a health care professional stand out as having higher ultimate fertility than others. In a more detailed hazard analysis with longitudinal Norwegian data, Lappegård and Rønsen (2005) found that women with a university degree in the humanities and the social sciences have relatively low first birth rates. Women with a degree in engineering or in administration and economics have relatively low first birth rates as well. The authors speculate that low motherhood rates for the first group may be due to an uncertain and relatively unfavorable labor market position, while the second group may be less family oriented and more work oriented at the outset. High first birth rates are found among teachers and health care workers and professionals. Lappegård and Rønsen (2005) conclude that there is no clear-cut relationship between high costs of labor market withdrawal and postponed motherhood, and that preference heterogeneity also plays a role. Yet, just like in the Swedish case, the register data do not contain any information about family values that can be used to explore their role in connecting the choice of study discipline with family formation. The current paper will use the European Social Survey to shed light on the matter.

More specifically, in order to investigate empirically why field of education affects the postponement of motherhood, this paper will assess the effects of three key features of study disciplines that are identified as relevant in the theoretical literature: earning profiles, family attitudes, and gender composition.

Data, methods, and measures

This paper uses data from the second round of the European Social Survey (ESS2). This is an academically-driven cross-sectional social survey that is rigorously concerned with maximizing data quality, response rates, and cross-national equivalence (Jowell et al. 2005, 2007).

Selection of cases

The analysis of postponement of parenthood will be restricted to graduated women aged 20 to 40 years but, for reasons to be explained below, I also use information about family values of students still enrolled in fulltime education and about monthly wages earned by men as well as women with a fulltime job.

As indicated above, school or college enrolment has been consistently found to postpone motherhood. In fact, in some regions the sequencing norm that people should postpone family formation until they have finished their full-time education is so strong that childbirth during full-time educational activity is very rare. Hence, even when enrolment in education is included in a regression equation, estimates for other covariates of entry into parenthood will be biased because the process leading to the first childbirth is likely to be very different for women still enrolled in education as compared to women who have finished full-time education (Mariani 1984; Skirbekk et al. 2004). Therefore, the subsequent analysis is limited to women who have finished full-time education. As a shorthand, they will be called "graduated women" even if some of them will not have obtained their diploma.

Countries and weights

The integrated file of ESS2 edition 2.0 contains survey data for 24 countries. Yet, France had to be dropped from the analysis because the French data do not include information on the field of education. The United Kingdom had to be dropped from the analysis because the

national categories of level of education could not be recoded into the international standard format and was therefore omitted from the international file (see codebook Appendix A3, Variables and Questions, ESS2-2004). Finally, Iceland was also dropped from the analysis for a lack of sufficient cases. So the following analyses are based on ESS2-data for 21 countries (from north to south): Norway, Sweden, Finland, Estonia, Ireland, Denmark, Germany, Poland, the Netherlands, Belgium, Luxemburg, Czech Republic, Slovakia, Ukraine, Switzerland, Austria, Hungary, Slovenia, Portugal, Spain, and Greece. Table 1 gives the unweighted number of graduated women aged 20 to 40 years (age 40 included) available for the analysis of the postponement of parenthood.

In all empirical analyses, cases have been weighted by the ESS2 design weights. These weights take care of differences between countries in sampling design while estimating point estimates and standard errors of model parameters (Häder and Lynn 2007). For two reasons, it was preferred not to also apply the population weights. From a technical point of view, population weights would distort the estimates of the standard errors: standard errors should reflect sampling design rather than population size. From a substantive point of view, the interest lies more in differences between European countries than in estimating some overall European average.

Table 1. Countries included in the analysis and (unweighted) number of graduated women aged 20 tot 40 years in the sample

Country	Code	N	Country	Code	N	Country	Code	N
Austria	AT	329	Greece	GR	390	Portugal	PT	323
Belgium	BE	270	Hungary	HU	240	Slovakia	SK	11
Czech Republic	CZ	431	Ireland	IE	377	Slovenia	SI	170
Denmark	DK	203	Luxemburg	LU	230	Spain	ES	255
Estonia	EE	222	Netherlands, the	NL	305	Sweden	SE	244
Finland	FI	267	Norway	NO	261	Switzerland	CH	374
Germany	DE	372	Poland	PL	285	Ukraine	UA	314

Modeling the postponement of parenthood

ESS2 is a cross-sectional, general purpose social survey that has not been designed for demographic analysis. Yet, the high quality of the data and the exceptional care given to the comparability of the questionnaires across Europe are two decisive reasons to use this body of data. A drawback is that no complete fertility histories are recorded, only the number of surviving children at the time of the survey. Therefore, any children who died are missing. This bias is considered to be minor and is neglected in the subsequent analysis. Fortunately, both children living with the survey respondent and children living in another household are counted.

The postponement of parenthood will be modeled in this paper as the probability that a respondent does not yet have any children alive at the time of the survey, not even stepchildren or adopted children. This probability will be modeled as a function of the woman's current age, some of her own characteristics, the country she lives in, and characteristics of the field of education within that country. Put another way, I will be

modeling the multilevel conditional probability that a woman's age at first birth is past her current age:

$$P_{ijk} = \Pr(A_{ijk} > a_{ijk}) = f\left(a_{ijk}, \mathbf{x_{ijk}}, \mathbf{f_{jk}}, c_k\right) \quad (1)$$

where a_{ijk} is the current age of a woman i who graduated in subject j in country k, A_{ijk} her (virtual) age at first childbearing, $\mathbf{x_{ijk}}$ a vector of individual characteristics, $\mathbf{f_{jk}}$ a vector of features of study field j in country k. Finally, c_k is included to capture the effect of living in country k. Note that this definition of the probability of postponement is equivalent to the definition of the survivor function in event history analysis (Courgeau & Lelièvre 1992). Particular in this case is that all observations are censored at the time of the survey. Clearly, this censoring is non-informative as respondents are selected to participate in the survey irrespective of their fertility history.

The multilevel conditional probabilities of postponement will be modeled using logistic regression with random effects on two levels: one on the level of study discipline within country, and another on the country level (Agresti 2002). So the basic structure of the models to be estimated is as follows:

$$\ln \frac{P_{ijk}}{1 - P_{ijk}} = \gamma_{00} + a_{ijk}\varphi + \mathbf{x}'_{\mathbf{ijk}}\boldsymbol{\beta} + \mathbf{f}'_{\mathbf{jk}}\boldsymbol{\gamma}_{\mathbf{01}} + u_{jk} + c_k \quad (2)$$

The parameters to be estimated are: the overall intercept γ_{00}, the slope φ for current age, a vector of fixed effects $\boldsymbol{\beta}$ of the characteristics of individual women, and a vector of fixed effects $\boldsymbol{\gamma}_{\mathbf{01}}$ of characteristics of fields of education within countries. In addition, we estimate the variance of u_{jk}, i.e. the random effect of field of education, and the variance of c_k, i.e. the random effect of country on the level of postponement. Both random effects are assumed to be independently normally distributed. The use of random effects modeling is appropriate because we wish to test effects of group-level variables (Snijders and Bosker 1999). All model parameters were estimated using R's *lmer*-function for random effects modeling, part

of the lme4-package, with the Laplace approximation method (R development Core Team 2006; Bates & Sarkar 2006).

The vector of individual-level covariates $\mathbf{x_{ijk}}$ is purposely limited to indicators for the educational careers of women because these are fixed at the time of graduation. Hence, for graduated women, these cannot be affected anymore by the transition to motherhood. Individual-level indicators for current family values, current activity in the labor market or current wage are not included in the model because they are known to be endogenous to the transition to motherhood. For example, earlier panel studies have found that family values and attitudes do affect entry into parenthood, but also that they tend to become more traditional after entry into parenthood (Morgan & Waite 1987; Moors 1997; Jansen & Kalmijn 2000).

Education

ESS2 asked respondents about the subject of their highest qualification, offering fourteen answering alternatives. As the number of cases in some fields was too small, these were regrouped into nine categories. They are listed in the first column of Table 2, with the original ESS2-classification in the second column and the unweighted number of female graduates in the analyzed sample in the last column.

A number of comments about these categories are in place. First, the category of women trained as teachers is not as clear-cut as we would like. For those who chose to study linguistics, for example, instead of education as their *major* discipline, we cannot distinguish between women who obtained additional qualifications to be a teacher and those who did not. As a result, the group of teachers in this study is not as unambiguous as in the study by Hoem et al. (2006a, 2006b, for example). As a result, there will be many teachers among those who declared that their major study area was in the sciences or the humanities. Second, earlier work suggests that women with a law degree stand apart in terms of their earning potential, possibly affecting fertility behavior through high opportunity costs (Kalmijn 1996; Lappegård

and Rønsen 2005). Therefore, it was decided to create a separate category for this group even if the number of cases in this group is relatively low. Fourth, the category "personal care services" includes vocational training leading to jobs as diverse as cooks, hairdressers, salespersons, or sewers, for example. As a result, heterogeneity within this category is likely to be very large.

Table 2. Fields of education

	Categories in this study	ESS2-categories	N
1.	Teaching, training or education	- Teacher training or education	401
2.	Arts & Humanities	- Art - fine or applied - Humanities	392
3.	Science & Technology	- Technical & engineering, including architecture and planning, industry, craft, building trades, etc. - Science, mathematics, computing etc.	533
4.	Health care	- Medical, health services, nursing, etc.	720
5.	Private and public administration	- Commerce, business administration, accountancy, etc - Public administration, media, culture, sport and leisure studies, social & behavioral studies, etc.	1486
6.	Law and legal services	- Law and legal services	94
7.	Personal care services	- Personal care services - catering, domestic science, hairdressing, etc	702
8.	General or no specific field	- General or no specific field	1370
9.	Other	- Agriculture & forestry - Public order and safety - police, army, fire services, etc - Transport and telecommunications	175

Apart from the field of education, all models will include, as an individual-level covariate, both the level and the duration of education. In order to construct an internationally equivalent and robust classification for the level of the highest degree obtained, the number of categories was reduced to three: low (up to lower secondary schooling), medium (upper- or post-secondary completed but no tertiary), and high (first or second stage of tertiary, i.e. college, polytechnic, and university). The number of years enrolled in education is measured in full-time equivalents, including compulsory schooling but excluding kindergarten years (even if

mandatory). Basic descriptive statistics for all covariates used in the models to be presented are in Table 3.

Table 3. Descriptive statistics of the dependent and independent variables used in the regression analyses

	Mean	SD	Min	Max	N	%
Individual-level variables						
Dependent variable: still childless?						
- 0 = no					3503	62.7
- 1 = yes					2081	37.3
Age	31.6	5.5	20	40	5584	
Level of education						
- low					1228	22.0
- medium					2882	50.5
- high					1534	27.5
Years enrolled in fulltime education	13.3	3.4	0	32	5584	
Years since first cohabiting with current partner	6.6	6.5	0	27	5502	
Married?						
- 0 = no					2551	45.7
- 1 = yes					3033	54.3
Ever had steady job (six months, 20 hours/week)						
- 0 = no					307	5.5
- 1 = yes					5275	94.5
If yes: Age at first steady job	19.9	3.6	3	37	5275	
Characteristics of study fields						
Stereotypical attitude towards gendered family roles	-0.41	0.45	-1.60	0.87	151	
Proportion of women among graduates	0.59	0.23	0.07	1.00	151	
Starting wage relative to country's median, in 100 euros	0.19	4.67	-19.78	15.44	151	
Steepness of the earning profile (slope)	1.03	0.03	0.92	1.17	151	

Attitudes towards gendered family roles

In ESS2, the following five statements were presented to respondents, who were asked to indicate whether they agreed strongly, agreed, neither agreed nor disagreed, disagreed, or disagreed strongly: 1) A woman should be prepared to cut down on her paid work for the sake of her family; 2) Men should take as much responsibility as women for the home and children; 3) When jobs are scarce, men should have more right to a job than women; 4) When there are children in the home, parents should stay together even if they don't get along; 5) A

person's family ought to be his or her main priority in life. These items were used to construct an index of stereotypical attitudes towards family norms. This index was constructed with the complete ESS2-sample, including men as well as women from all ages (ranging from 15 to 102 years). Exploratory factor analysis yielded two factors with eigenvalues above unity. Yet, item analysis showed that item 2 is correlating only weakly with both factors and that it is unable to discriminate between respondents on any attitude scale because about everyone agrees with it (less than 4% disagrees), probably because "taking responsibility" can mean many things, including playing the breadwinner role. Item 5 stands apart as an item that is hardly correlating with the others and that less than 6% disagrees with, irrespective of a progressive or conservative stance towards other items and issues. It was therefore preferred to drop items 2 and 5 from the scale. Confirmatory factor analysis indeed showed that inclusion of these two items results in a poor fit of both a one- and a two-factor model (as judged by the RMSEA-index, see Kline 2005), whatever the exact specification.

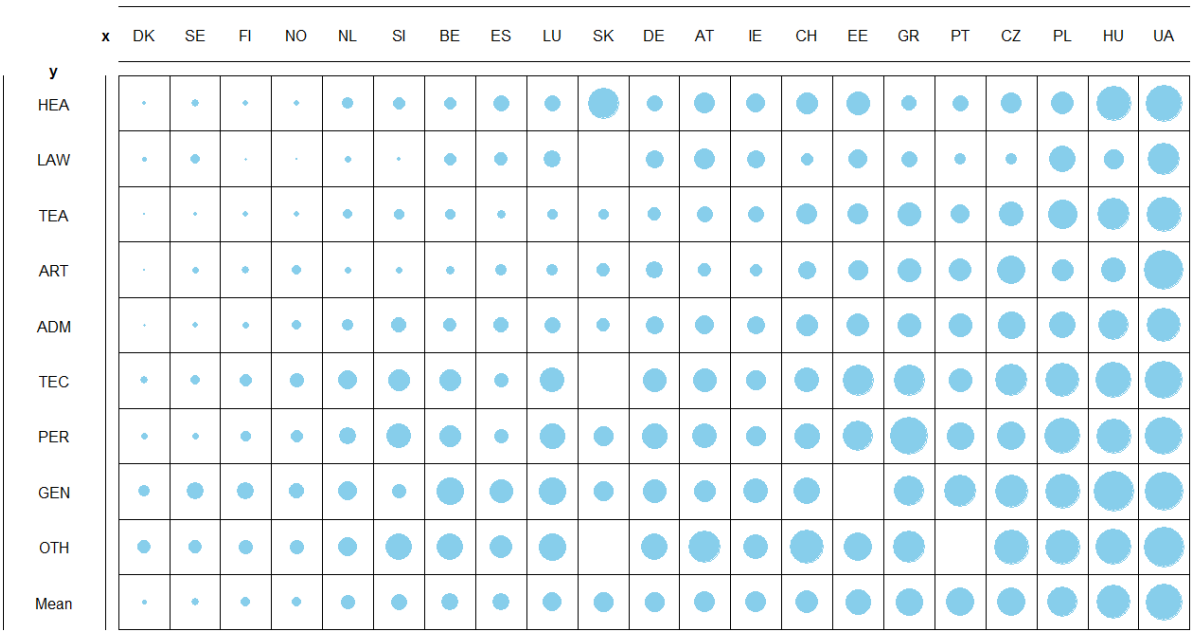
As a result, three items remain in the scale of stereotypical family attitudes (alternatively called "traditional" or "conservative" attitudes): a) a woman should be prepared to cut down on her paid work for the sake of her family; b) when jobs are scarce, men should have more right to a job than women; c) when there are children in the home, parents should stay together even if they don't get along. The (confirmatory) factor loadings from the exactly identified measurement model with one factor and three indicators are, respectively: 0.60, 0.80, and 0.49, which is not great but reasonable. The same holds for the reliability of the scale, as indicated by a Cronbach's alpha of 0.62.

Next, standardized factor scores were calculated for ESS2-respondents of all ages and sexes using multiple regression (Kline 2005). And, finally, these factor scores were averaged per country and field of education. Figure 1 displays these averages in a dot plot: for each combination of country and field of education, the more stereotypical the attitude towards

family roles, the bigger the area of the dot. The bottom line gives the overall averages per country. Clearly, the factor scores confirm the well-known tendency for Scandinavian countries to be more on the progressive side and Southern and Eastern European countries more on the conservative side. Spain, Slovakia, and Slovenia, however, appear in the middle part of the distribution.

The country-gradient is clearly crossed by a study discipline gradient. People trained to work in health care, in legal services, in education, or people with a diploma in arts and the humanities tend to have less stereotypical family attitudes than people with a degree in engineering or the natural sciences, people trained to work in personal care services, or people who obtained a general or "another" degree. Even though there are clearly similarities, the rank order of study fields is not exactly the same in every country. For example, in Sweden and Denmark, teachers have the most progressive attitudes, whereas in Belgium, the Netherlands, or Austria, people trained in arts and the humanities are at the bottom of the distribution. It should also be noted that the field of education is not independent from the level of the degree obtained. Therefore, family attitudes also reflect, to some extent, the level of educational attainment. In most but not all countries, people with "no" or a "general" degree have the most stereotypical attitudes. These tend to be degrees on the low side of the low-high scale of educational attainment. On the other side of the scale, most people with a degree in law and legal services are university graduates. These typically have a more progressive family attitude.

Figure 1. Mean factor scores for stereotypical attitude towards gendered family roles, complete ESS2-sample, by country and field of education



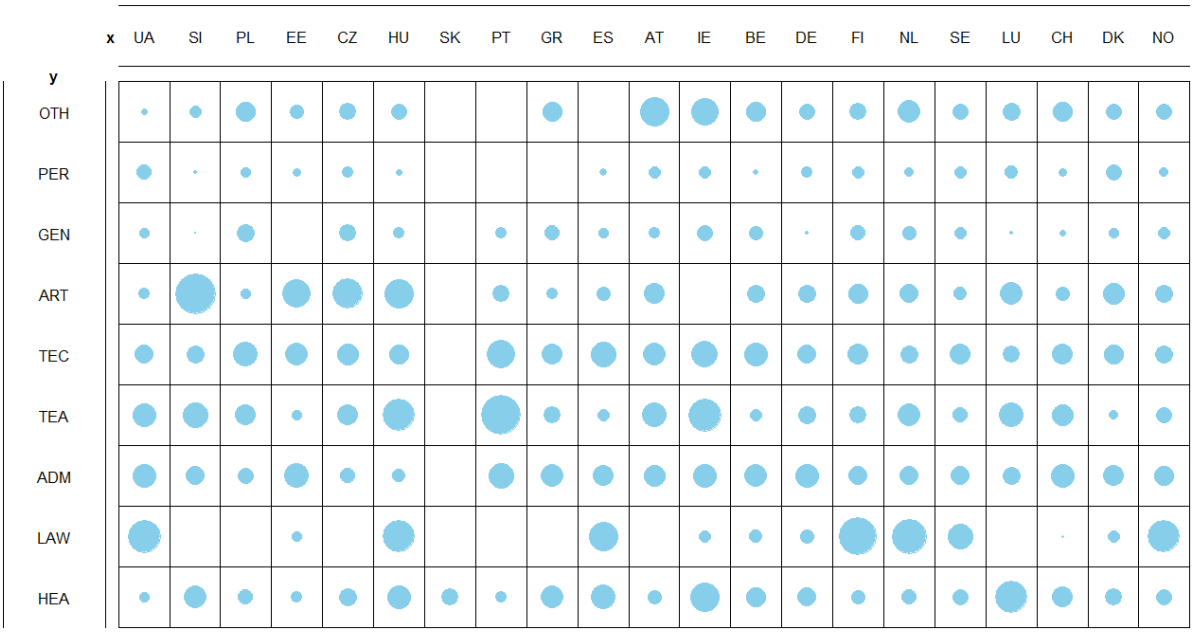
As indicated above, family attitudes and values are known to be endogenous with respect to the transition to parenthood: they tend to change in the conservative direction when people become fathers and mothers (Morgan & Waite 1987; Moors 1997; Jansen & Kalmijn 2000). Therefore, in order to maximize the exogeneity of this covariate, the models presented below include average factor scores for students only, i.e. only people who were still enrolled in full-time education were included in the calculation of the averages for the study disciplines. The downside of this approach is that the averages are less robust because they are based on a more limited number of cases. Therefore, since noise in the independent variables undermines the power to identify their actual effects, the estimates of the slope for family attitudes may be considered to be conservative ones. Including graduates as well as students, however, yields similar results.

Earning profiles

Earning profiles for study disciplines were determined by running a series of simple OLS-regressions of the log of monthly gross wages on seniority in the work force, i.e. the total number of years respondents had been in paid work. The intercepts of the regressions represent the starting salaries, i.e. for people without any working experience. The slopes represent the steepness of the earning profiles, i.e. how the log of the monthly salary increases by year of working experience. The earning potential is a function of both the intercept and the slope. Separate regressions were run for each discipline within each country, but only for the respondents who indicated that they were doing fulltime paid work for at least 35 hours a week as their main current activity. The oldest cohorts who had worked for more than 20 years were excluded from the analysis because their profiles might not be relevant anymore for our study population. In the multilevel models of postponement of motherhood, both the intercepts and the slopes are introduced in exponentiated format in order to restore the natural scale of earnings in Euros.

Figure 2 gives the relative expected earnings, based on these regressions, after ten years of seniority in the labor market by country and field of education. The expected earnings are expressed as deviations from each country's median in order to neutralize the high diversity in wage levels between countries and in order to focus on the diversity between study disciplines. The expected earnings tend to be highest for people who studied law or health care. They tend to be lowest for people with a "general" or "other" diploma or for people who were trained to work in personal care services. However, the diversity between countries in the rank order of the earning potential of study disciplines is perhaps the most striking feature of this graph. For example, in some countries, teachers or people who graduated in the arts and humanities have an unexpectedly high earning potential. Of course, we should bear in mind that these differences also reflect sampling error.

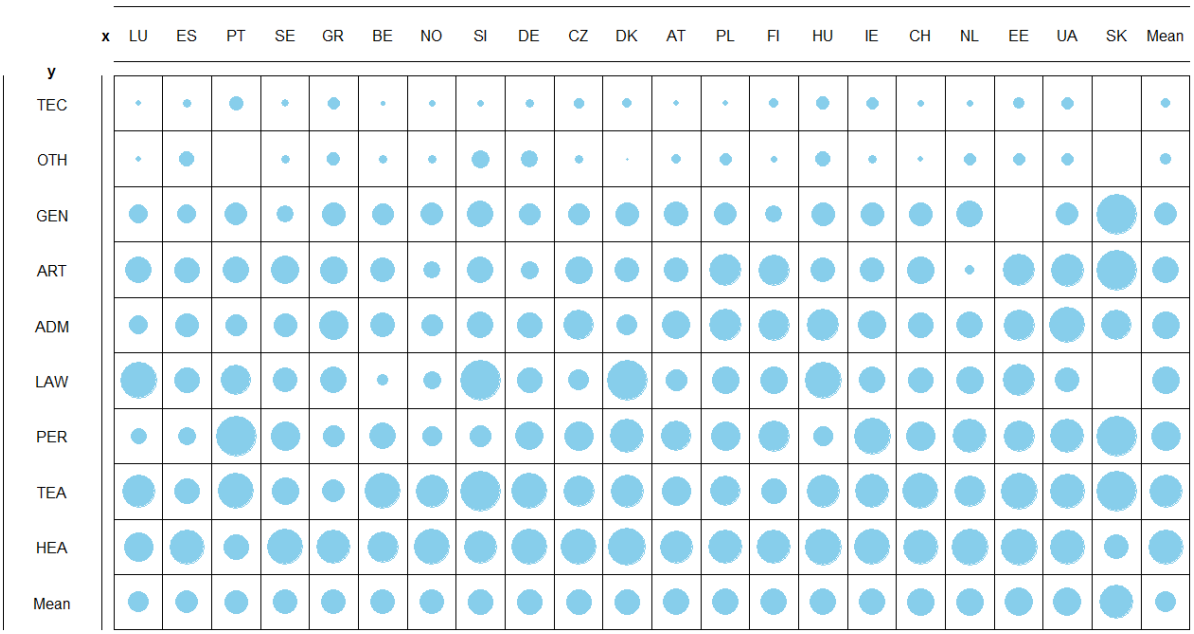
Figure 2. Relative expected earning after ten years of seniority in the labor market, by country and field of education; expressed as deviation from each country's average (see text)



Gender composition

Lappegård (2002) found that Norwegian women who graduated in female-dominated disciplines are less likely to remain childless and, after becoming a mother, tend to have more births. In order to test whether a similar effect exists across Europe on the postponement of first births, I calculated the proportion of women among ESS2-respondents between 20 and 40 years old who obtained a degree in each of the nine study disciplines and 21 countries. Again, these calculations were carried out separately by country. Figure 3 displays these proportions in a dot plot.

Figure 3. Proportion of women among 20 to 40 year olds in ESS2 by field of education and country



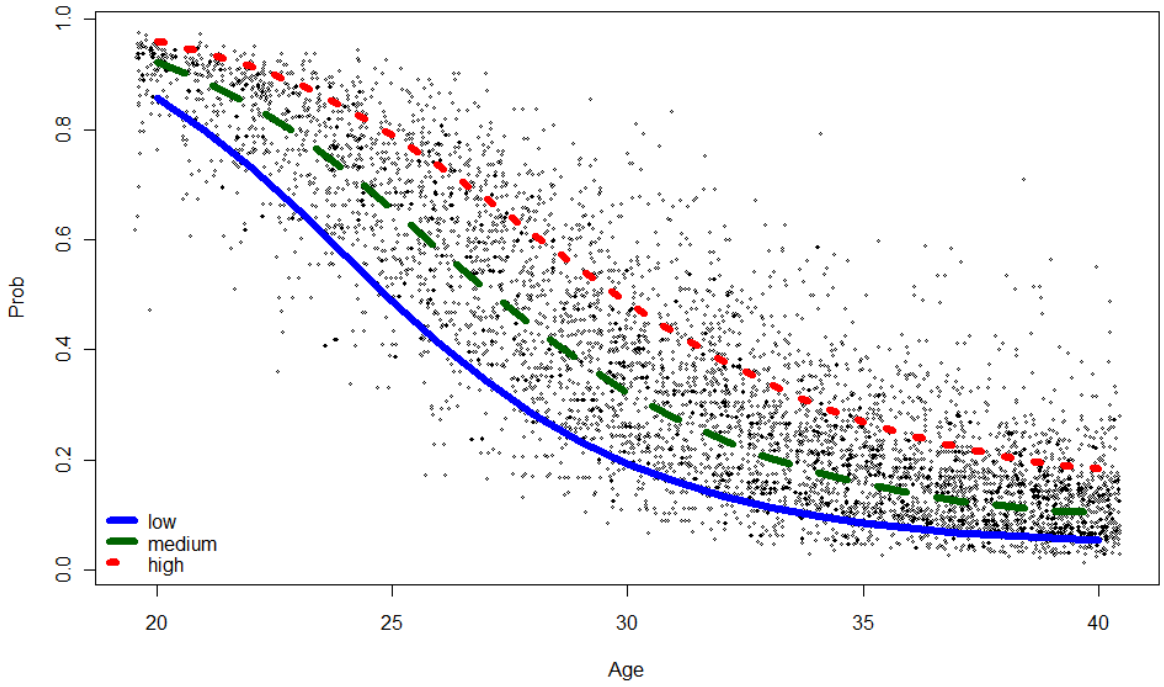
The gradient is dominated by study field rather than country: the means per country across disciplines do not vary greatly, but the means per study field across countries do. Teaching and health care are the two most strongly female-typed study disciplines, with 80 and 86% of women among all graduates, respectively, averaged across countries. Third are studies in personal care services, counting 72% female graduates. Among graduates in the natural sciences and technology-oriented disciplines, women are a minority (23% on average). The residual category of "other" disciplines is male-dominated as well (28% women only).

Results

Model I describes the postponement of first births as a function of the number of years enrolled in fulltime education and the level of the degree eventually obtained. Model estimates are displayed in Table 4. As expected, on average across Europe, the longer the number of years enrolled in school and the higher the level of the degree obtained, the higher

the probability that a woman has not yet become a mother at a given age. Figure 4 illustrates the effect of the level of educational attainment on the fitted postponement probabilities.

Figure 4. Fitted postponement probabilities by age (dots), and expected postponement probability as a function of age and level of educational attainment (lines), model I*



*Regression lines are for women who were enrolled in fulltime education for 10 (low level), 12 (medium) or 16 years (high).

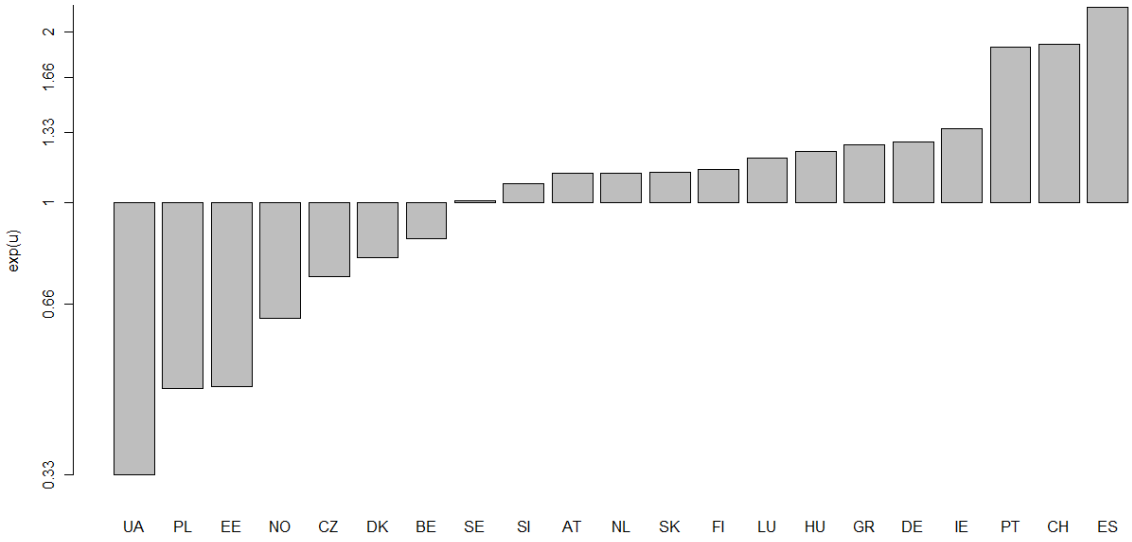
Table 4. Multilevel logistic regression models of the postponement of first births among European women aged 20-40 years

	Model I		Model II		Model III		Model IV		Model V	
	b	*SE*	b	*SE*	b	*SE*	b	*SE*	b	*SE*
Intercept	0.793 ***	0.228	0.862 ***	0.235	-6.336 ***	1.909	-6.211 **	2.149	-6.519 **	2.231
Individual covariates										
(Age - 20)	-0.411 ***	0.027	-0.413 ***	0.027	-0.388 ***	0.026	-0.192 ***	0.031	-0.222 ***	0.032
(Age - 20)²	0.009 ***	0.001	0.009 ***	0.001	0.008 ***	0.001	0.001	0.001	0.002	0.001
Level of education (ref.=low)										
- medium	0.492 ***	0.107	0.485 ***	0.109	0.288 **	0.102	0.421 ***	0.116	0.400 ***	0.120
- high	0.780 ***	0.135	0.783 ***	0.139	0.530 ***	0.133	0.731 ***	0.155	0.595 ***	0.161
Years enrolled in fulltime education	0.100 ***	0.013	0.096 ***	0.014	0.086 ***	0.013	0.065 ***	0.016	0.056 ***	0.016
Years since first cohabiting with current partner							-0.331 ***	0.025	-0.329 ***	0.025
(Years since first cohabiting...)²							0.012 ***	0.001	0.012 ***	0.001
Married? (1=yes, 0=no)							-1.008 ***	0.104	-1.061 ***	0.107
Ever had steady job X...									-0.559 †	0.308
... Age at first steady job									0.050 ***	0.013
Characteristics of study fields										
Stereotypical gendered family roles attitude					-0.464 ***	0.114	-0.310 *	0.127	-0.329 *	0.131
Proportion of women among graduates					-0.585 **	0.211	-0.530 *	0.237	-0.406 †	0.242
Starting wage relative to country's median, in 100 euros					0.045 ***	0.012	0.054 ***	0.014	0.051 ***	0.014
Steepness of the earning profile (slope)					7.378 ***	1.858	7.786 ***	2.093	7.904 ***	2.168
Standard deviations of random components										
- Country-level	0.498		0.497		0.100		0.101		0.103	
- Field of education by country			0.223		0.269		0.271		0.276	
Deviance	5590		5585		5618		4323		4130	
N (women)	5584		5584		5584		5502		5286	

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

By including a random intercept on the country level, model I explicitly allows the extent of postponement to vary by country. Figure 5 shows the country-level variation in postponement. Net of the effect of differences in the composition of these countries in terms of duration and level of education, women postpone most strongly in Spain, Switzerland, and Portugal. The least likely to postpone, after controlling for age as well as the level and duration of education, are women in Ukraine, Poland and Estonia.

Figure 5. Empirical Bayes estimates of country-level random effects in model I (labels on the vertical axis are exponentiated values that can be interpreted as factor effects)



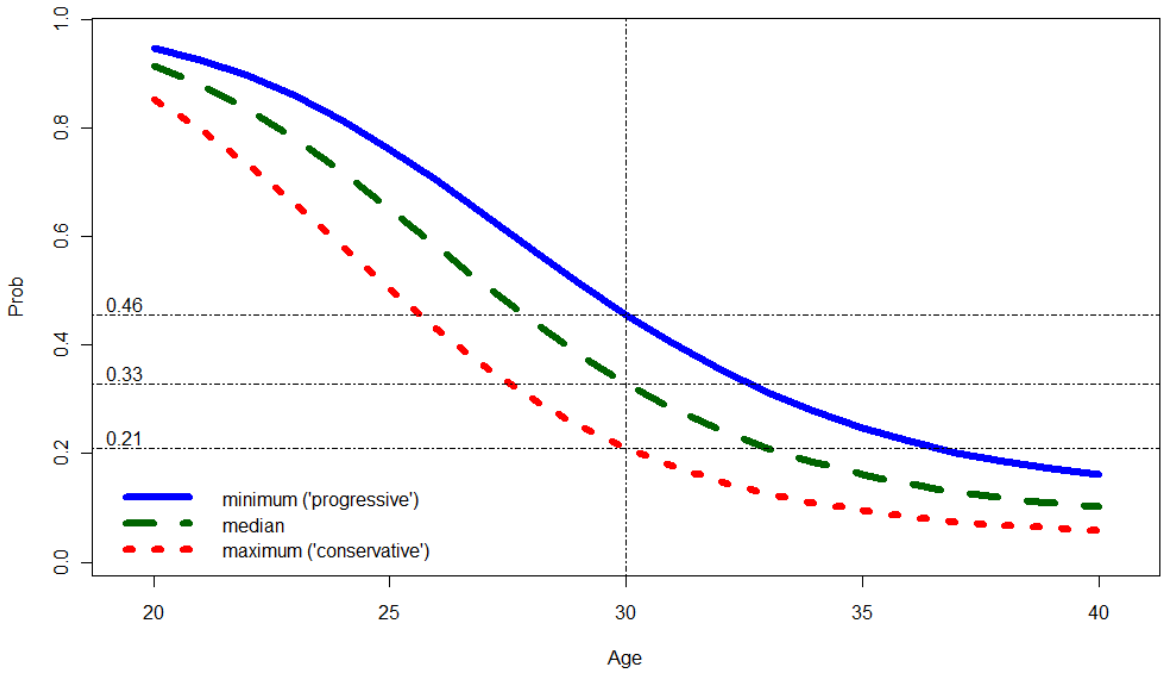
Model II introduces random intercepts at the level of fields of education within countries. The estimated standard deviation of these random intercepts (u_{jk} in equation (2)) is 0.22 on the logit scale, as compared to 0.49 for the random effects at the country level (c_k in equation (2)) – the latter remains about the same as compared to model I. The one extra parameter

estimated in model II yields a decrease of the deviance statistic of 5.173, which is statistically significant (according to the chi-squared test with one degree of freedom, $p < .05$).

Model III introduces four characteristics of study disciplines within each country as independent variables: prevailing attitudes towards gendered family norms, the proportion of women among graduates, expected earnings for starters in the labor market, and the steepness of the earning profile.

First, women who graduated in a study discipline where stereotypical attitudes towards gendered family roles prevail are significantly less likely to postpone their first births. Figure 6 illustrates the effect across the range of family attitudes observed among students in different countries and fields of education. The expected percentage of women still childless at age 30 is 33% for medium educated women who graduated in a country and discipline were family attitudes are at their median value (which happens to be arts & humanities in Austria). In the country-discipline combination with the most stereotypical attitudes (i.e. teachers in the Czech Republic), the expected proportion still childless at age 30 is only 21%. On the progressive extreme of the range (i.e. among law students in Norway), the expected proportion is 46% at age 30. So, family attitudes prevailing in study disciplines make a difference of at most 25 percentage points. (All proportions were calculated for medium-educated women who were enrolled for 12 years and who have all other covariates at the median value).

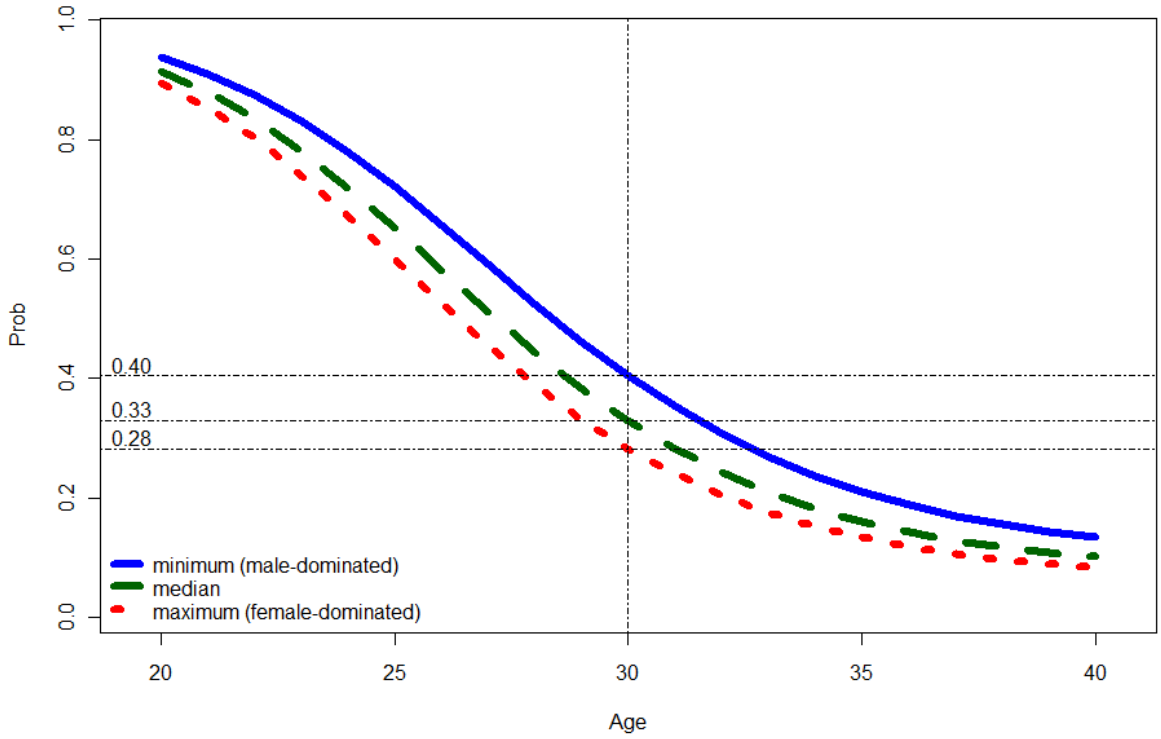
Figure 6. Expected postponement probabilities by age and stereotypical attitudes towards gendered family norms prevailing in study disciplines*



* Expected probabilities for medium-educated women who were enrolled in education for 12 years; all other covariates set at their median value

The impact of the proportion of women among graduates from the nine study fields within the 21 countries is also statistically significant: the more female-dominated the study field, the less inclined graduates are to postpone motherhood. Figure 7 plots the survival curves across the range of values observed for this covariate. At the minimum proportion of women of 7% ("other" disciplines in Denmark), the expected proportion still childless at age 30 is 40%. At the other side of the extreme, i.e. among teachers in Slovenia, where all 20- to 40 year old graduates in the sample are women, the expected proportion childless at age 30 is 28% only. So, in this sample, the gender composition makes a difference in terms of postponement of parenthood of maximum 12 percentage points.

Figure 7. Expected postponement probabilities by age and the proportion female among graduates from study disciplines*



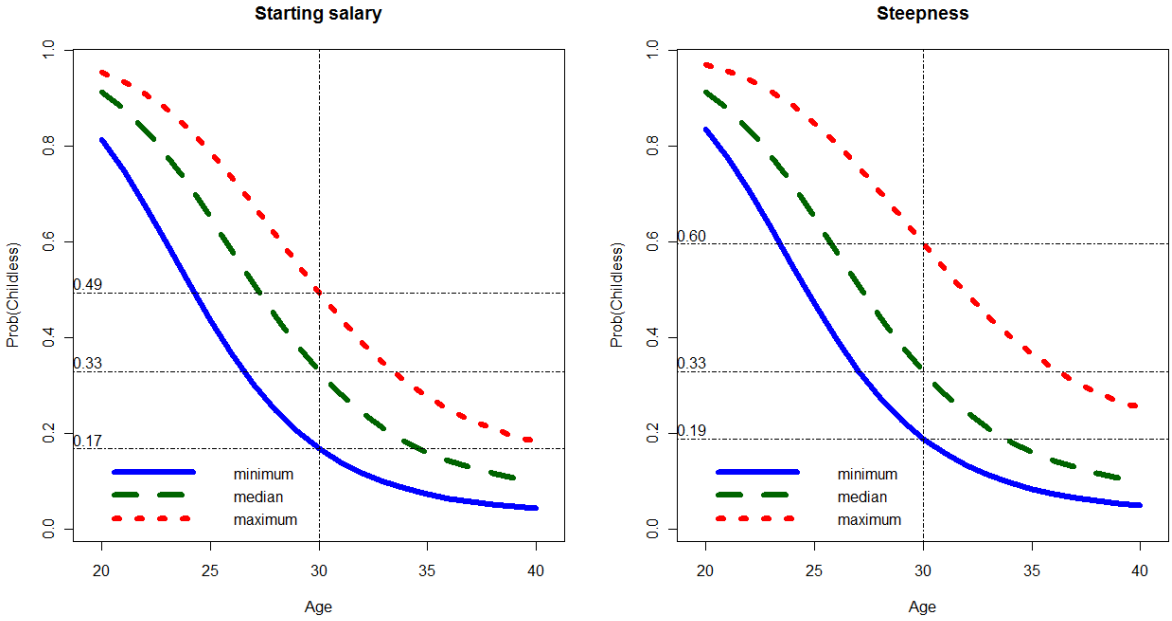
* Expected probabilities for medium-educated women who were enrolled in education for 12 years; all other covariates set at their median value

Finally, as to the earning profile, both the starting wage and the steepness of the earning profile make a statistically significant difference. Recall that the earnings for starters who have no seniority in the labor market (for convenience called "starting wages") are expressed as deviations from the median for their country. Overall, study disciplines with a high earning potential are associated with more postponement. Both the starting wage and the steepness of the profile work in that direction. The left hand panel of Figure 8 shows that the probability of postponement is estimated at 17% for medium educated, 30 year old women with a starting wage at the lowest level observed in this sample. For their peers who earned the maximum wage at the start of their paid work, postponement at that age is model to be 49%, which

makes a difference of about 32 percentage points. In isolation, however, the starting wage is a bad indicator for the relative earning potential, because study disciplines with a relatively low starting wage may have a sharply rising earnings profile. An extreme case in point is law students in Switzerland, who have the lowest relative starting salary in this sample but who also have the highest slope for seniority. In contrast, law graduates in Norway have the highest relative starting salary of all country-discipline combinations, but they have a less than average slope for seniority. The right hand panel of figure 8 suggests that the slope may have a greater impact on postponement than the starting wage, given the range of values observed in this sample. The difference in expected proportions childless at age 30 for the steepest as compared to the flattest earning profile is 41 percentage points (60% – 19%).

Do characteristics of study fields exert their impact on entry into motherhood only indirectly through the rate of partnership formation and marriage or do they remain significant after controlling for partnership situation? To address this issue, model IV includes the number of years since first cohabiting with the current partner, if any (otherwise, this covariate is set to zero), and a dummy variable indicating whether the respondent is married or not. The models presented so far did not include individual-level covariates on the partnership situation because cohabitation and marriage may be strongly endogenous to entry into parenthood (Lillard 1993; Brien, Lillard and Waite 1999; Baizán, Aassve and Billari 2003). The strong and significant slopes for partnership situation in model IV therefore do not represent unidirectional causal effects on the postponement of first births.

Figure 8. Expected postponement probabilities by age and (a) expected earnings for starters in the labor market (left); (b) steepness of the earning profile (right)*



* Expected probabilities for medium-educated women who were enrolled in education for 12 years; all other covariates set at their median value

Cohabitation with a partner is negatively associated with the postponement of motherhood. Yet, as found in earlier work (Lillard and Waite 1993), couple time has a curvilinear rather than a linear effect on childlessness. During the first years of cohabitation the likelihood of still being childless goes down. As the significant second-order polynomial term indicates, couples who are still childless after a number of years of cohabitation are subsequently increasingly more likely to remain childless. After including this polynomial, the second-order polynomial term for current age, which was significant in the earlier models, is not significantly different from zero anymore. Formal marriage is clearly associated with a higher rate of entry into parenthood.

All effects of the characteristics of study disciplines remain significant after controlling for partnership situation. The effects of family attitudes and gender composition weaken

somewhat but remain significant. The estimated effects of the earning profiles, if anything, become slightly stronger.

Finally, activity in the labor market is also part of the bundle of careers in the life course that may affect the timing of the first birth on the one hand and may be affected by actual or intended parenthood on the other hand. Again, for reasons of endogeneity, activity status was left out of the previous models. However, it may be argued that the earning profiles of fields of education only affect the postponement of first births through the timing of entry in the labor market. In order to check whether this is the case, Model V adds the age that women started to work in their first jobs. Respondents in the survey were instructed only to count jobs that lasted for at least six months during which they worked at least 20 hours a week. This variable is included in the model through a product term: women who never had such a job were coded with zeros for the "ever job" dummy variable. For women who did report to ever have had such a job, the dummy was multiplied with the age at entry. Obviously, the "ever job" and the "age at entry" variables should never be interpreted in isolation. More specifically, the slope for the age at entry variable describes how the effect of work experience changes per unit increase of age at entry. For a woman who entered her first job at the age of 20, the effect of work experience on the logit is estimated at -0.559 + 0.050 x 20 = 0.441. For a woman who entered at the age of 25, the effect is -0.559 + 0.050 x 25 = 0.691. For any age at first job above age 11, the effect of activity in the labor market on postponement is positive. The higher the age at taking the first job was, the stronger the expected postponement.

The effect of the earning profiles of study disciplines within countries hardly change at all after inclusion of entry into the labor market. Both the starting wage and the steepness continue to work in the same direction and with similar strength as before. So, it can be concluded that there is a direct effect of expected earnings on the postponement of first births.

Not surprisingly, inclusion of entry into the labor market weakens the effect of a high level of educational attainment somewhat, as well as the effect of the duration of enrollment. This suggests that the effect of the level and duration of education to some extent operates indirectly through the age at entry into the labor market. The effect of family attitudes on the level of study disciplines, if anything, regains some strength. The effect of the sex composition of fields of education weakens and remains significant only at the alpha = .10 level. It should also be noted, however, that the power to detect effects in model V is severely weakened due to a reduction of the sample size (which is, in turn, due to non-response for the items about first job experience).

Conclusion

In recent decades, women have been catching up in terms of their enrollment in higher education to the extent that they now are the majority of those enrolled for university degrees in most EU-countries. Yet, women are still strongly underrepresented in the more lucrative and powerful jobs throughout Europe. Women tend to end up predominantly in segments of the labor market characterized by relatively low and flat earning profiles. Typically, jobs in these segments can relatively easily be combined with mothering young children.

This paper aimed to see how the selection of study discipline affects the postponement of motherhood in Europe through the attitudes towards gendered family roles that are associated with disciplines, the sex composition of graduates, and the expected earnings. Maybe women tend to be overrepresented in particular study disciplines because they think that these will lead to jobs that facilitate the combination with parenthood. This selection will be related to attitudes held about the family roles of men and women and about their respective priorities at home and in the paid labor market. Women selecting fields of education characterized by relatively stereotypical views about gendered family roles were expected to make the

transition to parenthood sooner than women selecting fields were more liberal views prevail. Studies leading to more lucrative jobs and a steep earning profile are typically more difficult to combine with parenthood and may therefore be associated with a more pronounced postponement of parenthood.

In order to test these hypotheses, data from the second round of the European Social Survey about graduated women aged 20 to 40 years were used, covering 21 European countries. Multilevel logistic regression was used to model the probability that a woman is not yet mothering any children as function of her own educational characteristics, her country, and characteristics of the study discipline she graduated in. Study disciplines were treated as nested within countries, i.e. characteristics of study disciplines were calculated separately by country, and the random effect of study discipline in each country were estimated independently from the random effect of belonging to a country.

The results indicated that women who graduated in a study discipline where stereotypical family attitudes are prevailing are indeed significantly less likely to postpone their first births. In line with that finding, it also appeared that the more female-dominated the field of education the less inclined graduates are to postpone motherhood. A high earning potential of a study discipline appeared to be associated with strong postponement. Both the expected starting wage and the steepness of the earning profile have that effect. Women with a degree in a field where fulltime working graduates are expected to have relatively high earnings at the time of entry in the labor market are significantly more likely to delay their first births than women who expect to have a low income during their first working years. The effect of the slope of the earnings profile with work experience works in the same direction: if a woman holds a degree where an additional year in the labor market is associated with a strong increase in monthly earnings, she is expected to postpone more than when here expected earnings rise to a lesser degree with seniority. Given the range of starting wages and slopes

with seniority observed in this sample, it appears that the effect of the steepness of the earning profile is stronger than the effect of the starting wage.

These effects of characteristics of study fields within countries are largely independent of the partnership situation. Cohabitation and marriage are clearly associated with faster entry into parenthood, but controlling for this hardly changes the effects of family attitudes, gender composition, and earning profile. The effect of the latter, if anything, becomes slightly stronger. The effects of family attitudes and gender composition weaken just slightly.

Inclusion of the timing of entry into the labor market in the model weakens the estimated effect of a high level of educational attainment, as well as the effect of the duration of enrollment in fulltime education. The effect of family attitude, as a characteristic of field of education, if anything, becomes somewhat stronger. The estimates for earning profiles hardly change at all, while the effect of gender composition is weakened but continues to work in the same direction.

In sum, the choice of study discipline appears to exert a clear effect on the postponement of motherhood in Europe. This paper has identified four channels through which this effect is operating: the expected starting wage, the steepness of the earning profile, the gender composition, and the family attitudes prevailing in study disciplines and countries. The latter variables were constructed in a way to maximize the exogeneity of the characteristics of study disciplines. Therefore, the effects presented in this paper should hardly be biased by reverse causation.

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