

Education and the Transition to Motherhood: a Comparative Analysis of Western Europe

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Abstract

This study focuses on micro-level interrelationships between the educational trajectories of women and the transition to motherhood. We disentangle the impact of events in one trajectory on events in the other trajectory, from common factors such as aspirations and orientations that simultaneously affect both trajectories. We argue that macro-level institutional and factors are the key ones shaping this interrelationship. To shed light on the empirical relevance of macro-level factors, we adopt an international comparative approach. We apply simultaneous hazard models to individual-level data from Fertility and Family Surveys (FFS) in 11 Western European countries. We find important international differences in micro-level relationships: the mutual influence and the importance of common factors for both processes are weaker where welfare regimes, and in particular social policies that allow role combinations, are stronger.

European Demographic Research Papers are working papers that deal with all-European issues or with issues that are important to a large number of countries. All contributions have received only limited review.

Editor: Maria Rita Testa

Head of the Research Group on Comparative European Demography:
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1. INTRODUCTION

The relationship between educational attainment, enrolment status and the transition to motherhood has been an important topic of discussion in the literature. Typically, the aim of research is to identify the (mutual) impact of events experienced in one trajectory on events related to the other trajectory – for instance, the impact of becoming a mother on educational enrolment, or the impact of leaving education on the transition to first birth. This is usually linked to a causal interpretation that can be related to the impact of policy interventions – in this latter case, the possibility that common unobserved factors lead to biased estimates of the mutual impact has to be taken into account. In our opinion, approaches looking for the mutual impact benefit from taking into account the importance of macro-level factors. Adopting a life course perspective, interrelationships between different trajectories in the life course also depend on the macro-level situation in which individuals live (Giele and Elder, 1998). In other words, we need to put such interdependencies “in context”.

In this paper, we study the interrelationship between the educational careers of women and the transition to motherhood, disentangling the mutual impact due to events taking place in each of the two trajectories from the correlation due to common factors simultaneously affecting both trajectories. According to our theoretical framework, institutional and cultural factors play a crucial role in shaping this life-course interrelationship. To shed light on the empirical relevance of such factors, we adopt an international comparative approach, and we study eleven Western European countries for which comparative retrospective data on education and birth histories have been collected in Fertility and Family Surveys. Our main focus is thus on the macro-level inter-country differences in the micro-level interrelationships. As a modelling strategy, we adopt the simultaneous hazard regression approach proposed by Lillard (1993), and estimate a series of nation-specific models.

The remainder of this paper is structured as follows. In Section 2 we review theories and empirical findings connected to the interrelationship between educational trajectories and the transition to motherhood, by focusing on the mutual impact between the two trajectories, and on the potentially correlated common factors that shape both transitions. In Section 3 we draw our main hypotheses on the interaction between macro-level circumstances and micro-level interrelationships, after outlining the main feature that can be taken as distinguishing Western European nations with respect to the topic of our research. In Section 4 we present and shortly describe the dataset we use, and we present the methods of analysis that we adopt. The results of our analyses are presented and discussed in light of the literature and of our hypotheses in Section 5. Section 6 presents concluding remarks.

2. INTERRELATIONSHIP BETWEEN EDUCATIONAL TRAJECTORIES AND THE TRANSITION TO MOTHERHOOD

Educational attainment and the timing of motherhood play a central role in shaping the life course of women. Moreover, there is an important link between careers in education and the transition to motherhood. In the literature we can find different approaches to this link. In the review of relevant theoretical and empirical achievements that follows we distinguish three hypothesised causal directions. First, we discuss the importance of educational attainment and enrolment in shaping the timing of motherhood. Second, we review the impact of becoming a mother on educational attainment and enrolment. The third direction of causality, considered by a limited number of authors, refers to common factors that underlie both trajectories.

2.1 The impact of educational attainment and enrolment on the transition to motherhood

A classical theoretical approach on the impact of the educational career on the transition to motherhood is based on the New Home Economics, pioneered by Becker (1991, and earlier citations therein; Gustafsson, 2001 provides a more recent review). Becker hypothesises that women who have attained higher educational levels are economically more independent of men, in societies where a traditional division of labour prevails in the household. Higher educational level is considered as a key indicator for the accumulation of human capital. Women with higher education do not feel the pressure of the economic advantages of marriage and are more likely to postpone marriage, and therefore births, than lower educated women. In addition, the opportunity costs of time spent for childcare increase with human capital; therefore highly educated women tend to postpone births and sometimes they may even choose to remain childless. Oppenheimer (1994) criticised the New Home Economics approach by arguing that women with higher education are most likely to find partners with higher education as well. Due to the pooling of resources these women have economic incentives to enter into a union and consequently have a baby soon after the completion of a higher educational degree.

Traditional economic models tended to focus on completed family size, while some authors have explicitly built economic models on the optimal timing of first births (Happel et al., 1984; Gustafsson, 2001). The basic idea in these models is that the focus of decision-making in the transition to motherhood is *timing*, and that opportunity costs of childbearing and subsequent long-term financial consequences of motherhood depend on the age at motherhood. Similar to models on total fertility, these models predict that the higher the woman's educational level the later is her transition to motherhood, which is not necessarily dependent on the fact that the costs of childbearing may be higher at younger ages (Kravdal, 1994).

Happell et al. (1984), and Cigno and Ermisch (1989) as well present neo-classical economic models and empirical results predicting and showing that the accumulation of pre-parental human capital in the educational system has the effect of delaying first births. An additional mechanism that connects educational level and fertility (Cigno and Ermisch, 1989) in such models is that the higher the level of returns to education, the later the transition to motherhood. Gustafsson et al. (2002) have shown that in Germany, Great Britain and Sweden higher-educated women become mothers at a later age, and that they were the first to start postponing first births.

The importance of *educational enrolment*, i.e., of the fact of being a student, rather than on the achieved level of education is emphasised by a stream of papers that are mostly based on sociological theories adopting a life-course perspective and on empirical studies based on event history analysis. Using a hazard regression model of the timing of the transition to first union, with educational attainment and educational enrolment as time-varying covariates, Hoem (1986) finds that in Sweden the length of education is more important for the entry (transition rate) into a first union than the level of education. Thus, the length of education *per se* has an impact on the timing of the first birth that is usually linked to an entry into a union. This impact is gender-specific: using U.S. data, Goldscheider and Waite (1986) show that educational enrolment matters more for women than for men. Blossfeld and Huinink (1991) explicitly address the comparison between the role of human capital accumulation and the one of educational enrolment. Blossfeld and Huinink – who adopt a sociological theoretical framework in an empirical study of Germany – focus on the importance of sequencing life-course norms that influence transitions into adulthood on both the transition to the first union and the transition to motherhood (Hogan, 1978; Marini, 1984). Blossfeld and Huinink suggest that "... When a woman is attending school, university ... she is economically highly dependent on her parents. Further, there exist normative expectations in society that young people who attend school are 'not at risk' of entering marriage (and having children)..." With respect to this, educational

enrolment is not just a crude proxy for human capital. It has a direct effect on the life course in so far as during the period of study people concentrate their time and efforts on studying and not on starting family life. Using a different theoretical framework, Kravdal (1994) finds that in Norway the effects of the educational level on the transition to motherhood are small when compared to the effects of being enrolled in education or more specifically work experience. Further theoretical arguments, together with empirical analyses of the impact of school enrollment on young adults' family formation are presented by Thornton et al. (1995), who show that human capital accumulation also influences the choice of marital versus non-marital first union, and by Liefbroer and Corijn (1999).

2.2 The impact of the transition to motherhood on educational enrolment and attainment

Some of the papers we have cited on the impact of educational level and/or education enrolment on the timing of motherhood also rely on the hypothesis that becoming a mother bears considerable costs with respect to the chances of continuing education for women who are currently enrolled in education. Theoretical models and a vast amount of empirical evidence have been developed to show the adverse socioeconomic consequences of motherhood during education. The vast majority of women leave education before becoming a mother (Kiernan, 1980), and this has been confirmed in a comparative study on teenagers in Western Europe (Berthoud and Robson, 2001). Nevertheless, the impact of the transition to motherhood on educational enrolment has been studied in different strands of literature with results that usually converge to an adverse effect of motherhood during education (see, e.g., Hofferth, 1984; Rindfuss et al., 1984; Anderson, 1993; Hoffman et al., 1993; Upchurch et al., 1993; Klepinger et al., 1995).

Most of the literature on the impact of motherhood on education focuses on the United States or Britain, and on teenage years. In more recent studies, adolescent fertility is found to significantly reduce educational

attainment in the U.S. (Klepinger et al., 1999) and in Britain (Hobcraft and Kiernan, 1999; Chevalier and Viitanen, 2003). Nevertheless, it has been shown that early childbearing in general, and not only teenage motherhood, reduces the educational attainment of young women (McElroy, 1996). Looking at time trends, Hofferth et al. (2001) find that differences in rates of drop-out from education among teenage women giving birth are persistent over time in the U.S. This is also consistent with the finding that adolescent girls who experience a non-marital birth tend to reduce their educational expectations (Beutel, 2000).

Berthoud and Robson (2001) focus on Western Europe, analysing data from the European Community Household Panel and comparing the educational attainment of women who became mothers before their twentieth birthday with women who become mothers later in life. They show that in all 13 countries analysed teenage mothers attain lower educational levels, and this although women's access to qualification varies greatly across countries.

2.3 Common (and usually unobserved) factors influencing educational trajectories and the timing of motherhood

Aside from the potential influence of becoming a mother on that woman's educational trajectory, and of leaving school and educational attainment on her transition to motherhood, educational trajectories and the timing of motherhood have common determinants. Such are for example preferences, values and attitudes that may simultaneously shape one's choice in the education domain and in fertility (Buchmann, 1989; Liefbroer, 1999). It is therefore essential, when analysing the potential mutual effects of each trajectory on the other one, to separate such effects from spurious factors that may induce a correlation between the two trajectories. This separation is particularly essential when many of these factors are not observed. Beside the ideational factors mentioned above, other familiar groups of factors are related to the parental family and to individual-level characteristics.

Social class and parental resources in general have an effect on decisions concerning education. The literature on the intergenerational transmission of educational attainment forms the core of research on social mobility – although with a rich debate on causality that does not concern us here (see for example the study on Western Europe by Comi, 2003). Moreover, social class and parental resources also contribute to choices in the domain of household and family formation, including the transition to motherhood. In the literature we reviewed that focuses on the timing of motherhood and on educational trajectories as dependent factors, many authors point out the importance of social class and parental resources (Hobcraft and Kiernan, 1999). Individual-level differences in ability may also play a role: a study on the U.S. has shown that women with lower cognitive abilities have a higher chance of becoming mothers before age 18 (Shearer et al., 2002). Moreover, parental attitudes and values may influence the orientation of children towards career and family and thus their actual behaviour (Barber, 2000).

In addition to factors related to the parental family, individual-level factors may simultaneously affect both domains. We can think of selection effects on aspirations and expectations towards forming a family and educational attainment (Olsen and Farkas, 1988; Geronimus and Korenman, 1992; Ribar, 1994; Hotz et al., 1997; Hakim, 2003). For instance, adolescent girls with low educational expectations are at greater risks of experiencing a non-marital pregnancy in the U.S. (Beutel, 2000). Lesthaeghe and Moors (1993) provide a different perspective in their study of the living arrangements in several European countries. They emphasise the significance of value orientations in shaping people's lives. Persons with more "modern" value orientations are more likely to postpone or even reject marriage and births. So are persons with higher levels of education, since their value systems are bound to be more modern. In general, we may use the perspective based on value orientations by thinking that part of the observed impact of educational enrolment in postponing union formation is due to dependence from unobserved value orientations. Using panel data

from the Netherlands, Janssen and Kalmijn (2002) show that individuals who are career-oriented tend to postpone family formation as well, while family-oriented individuals opt for educational careers that are deemed compatible with family life. Different ideas have been proposed in the literature: Upchurch et al. (2002) hypothesise and find, using U.S. data, negative correlations in the unobserved factors affecting the length of education and the timing of childbirth.

3. THE THEORETICAL FRAMEWORK: AN INTERACTION BETWEEN MACRO-LEVEL FACTORS AND MICRO-LEVEL LIFE COURSE TRAJECTORIES

We now move more explicitly towards the theoretical framework we adopt in this paper; more specifically, we review the reasons why we believe that the interrelationships between educational careers and the timing of motherhood described in Section 2 have to be “put in context”. We argue that there is an interaction between macro-level factors and micro-level interrelationships, and we exploit the heterogeneity of Western European countries to draw hypotheses on this interaction. In our framework there is no “true” individual-level effect of education on the transition to motherhood and vice-versa of motherhood on education, and the common factors may be different and/or have varying weights in different societies. After a brief description of the main components of diversity across Western European societies that are relevant in determining the education-motherhood link, we formulate hypotheses to be tested in the empirical analyses.

3.1 The macro-level scenario: the diverse societies of Western Europe

The interplay between educational careers and the transition to motherhood is formed on the one hand by relatively rigid institutional factors (i.e., the *welfare regime* of a society), as well as by specific policies (i.e., regulations on public spending in education and on maternal leave for students – that is to say, factors that change more rapidly than institutions). On the other hand, this interplay is shaped by long-term cultural differences

that pervade heterogeneous areas such as Western Europe and that have deep historical roots (i.e., norms on the separation of life course domains), as well as by ideational factors that are likely to change more quickly on the historical time scale. All such factors are important in determining actual differences; although each of the four types actually refers to different scholarly traditions (see, e.g., Furstenberg, 2002; Billari, 2004a, 2004b).

As far as institutional factors are concerned, they are of primary interest to scholars interested in studying welfare states, and they are connected to long-term differences between countries resisting to forces that would drive towards a convergence. In particular, the idea that different *welfare regimes* exist, each with specific life course consequences, is the basis of the work of Esping-Andersen (1990; 1999) and Mayer (2001). Breen and Buchmann (2002) have explored the idea that institutions establish a set of opportunities and constraints to which young adults respond and which are primary sources of explanation for international differences in behaviour. In fact, the emergence of modern welfare states is one of the main factors that contributed to the so-called “institutionalisation” of the life course which is mostly concerned with the transition to adulthood, including educational trajectories and the transition to motherhood (Mayer and Müller, 1986). In the literature, an important issue is how many welfare regimes should one use to describe current institutional settings. So far, a principal focus has been on Western Europe and North America, and it is thus relatively straightforward to use the categorisation discussed in the literature. A three-world categorisation was first proposed by Esping-Andersen (1990), who later (1999) left the doors open for a four-world categorisation¹. His typology was based on a wide number of characteristics of a welfare regime.

¹ Esping-Andersen (1999, p. 94) states: “a simple ‘three worlds’ typology may suffice for most of the purposes that this book pursues. The final judgment is not yet in, and we shall in fact see that the distinctiveness of the Southern European

Gauthier (2002) described the typology in terms of family-oriented social policies, and enlarged it with the fourth group of Southern European countries (see also Gauthier, 1996; Neyer, 2003). This four-type categorisation is consistent with Ferrera (1996), Trifiletti (1999) and Mayer (2001) in the more general institutional setting. The four types are the following. 1) *Social democratic welfare regime*, comprising exclusively the Nordic countries and characterised by an individual-based universal welfare support and a high support for working parents. 2) *Liberal market welfare regime*, in which family support is at a low level and oriented towards fighting poverty; market forces induce private orientation to the provision of childcare (this group includes the U.S.A., Australia, Canada, and in Europe the U.K. and Switzerland). 3) *Conservative or continental welfare regime*, characterised by a variety of family policies, specified according to the employment status. In general these family policies still tend to support the traditional division of labour in the family. It includes all countries in Northern and Western Europe except those found in any of the other three types of welfare regime. 4) *Southern European welfare regime*, known also as the familialistic welfare regime. In these countries, family policies exist but they are modest in terms of cash payment, and the compatibility of motherhood and education/work is not promoted. By tradition, the system leaves the support of a young family to parents. This applies to Portugal, Spain, Italy, and Greece. We refer to this typology of welfare regimes as the main macro-level feature in our study. Unfortunately in our data the group of liberal welfare regimes is represented by one country only; for this reason we do not discuss the group in detail. The group of conservative regimes is considerably larger; not surprisingly it is the most heterogeneous group (see e.g. Gauthier, 2002). Each of the welfare regimes affects in a completely different way the whole “package” of interrelations of behaviours in the transition to adulthood – thus including the interplay between educational

countries does make its mark on issues such as post-industrial employment adaptation.”

trajectories and the timing of motherhood² in the life course of women. For instance, social democratic welfare regimes are characterised by a high level of “de-commodification” of women, in that roles of women become considerably less dependent on market forces. Such a policy approach can be expected to raise the compatibility of motherhood and education and lower the mutual impact between these two trajectories.

Other factors such as increased uncertainty during early adulthood and spatial-temporal variability in the returns to education may also explain period trends and differences across space: these types of factors are used in Kohler et al. (2002) who argue that postponement of first births may arise as a rational response to socio-economic incentives. Such factors may explain differences among countries, sudden changes in patterns in a country, and they may trigger changes having long-term consequences. They are, however, unlikely to explain long-term stable differences between societies.

The presence of long-term cultural continuities shaping the diversity of Western European societies, in particular concerning the strength of inter-generational ties, has been emphasised by scholars looking at differences between Northwestern and Southwestern Europe (Reher, 1998; Micheli, 2000). Reher (1998), in particular, systematically and comprehensively compares historical and current family patterns in Western Europe. He emphasises the existence of a specific Southern European pattern of household formation, relating a cleavage between the two patterns to the times of the late Roman Empire and the early Middle Ages. According to Reher, in Southern Europe, the influence of Muslims raised the importance of kinship and vertical relationships between generations so that the prolonged stay of children in their parent’s home and the caring work of

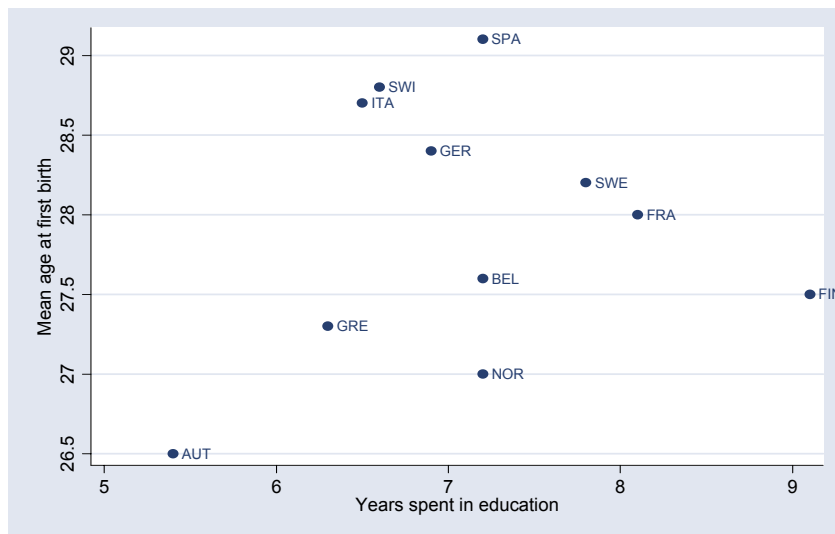
² Welfare regimes cannot be taken as purely exogenous in the long-run perspective (Mayer, 2001). The causal link would then be from the cultural framework to the institutional one, which would mean that in a longer causation chain, long-term cultural differences explain a substantial part of the differences in family and social policies (Pfau-Effinger, 1999; Breen and Buchmann, 2002).

children towards their parents are two faces of the same coin: a “strong” family. In the North, Germanic tradition and the Reformation contributed to the development of a “weak” family. Such differences have contributed to shape institutional frameworks at the societal level, with advantages and disadvantages for various living arrangements (Holdsworth, 2000).

Interpretations based on ideational change, connected to modernisation theories, have become a paradigm for the interpretation of demographic change in Western societies, with the key idea of a *Second Demographic Transition* (van de Kaa, 1987). The emergence of “new” behaviour during early adult years has been taken as one of the signs of the process of individualisation and de-standardisation of the life course, which is used to depict the evolution of Western European and North American societies (Beck, 1992; Buchmann, 1989). This type of view has been defined as the “developmental” view of societies: societies are assumed to develop through stages, and this idea has had an impressive impact on demographic research (Thornton, 2001). Of course, cross-country analyses do not necessarily provide perfect tests for the transition to new situations, because if transitions follow specific sequences, different societies can be found in different stages of such sequence (van de Kaa, 2001). The hypothesis that as the de-standardisation of the life course advances, different trajectories in the life course become less connected with each other, is particularly relevant in this paper.

Pure macro-level cross-country relationships between the length of education (measured by the average number of years spent in education between ages 15 and 29) and the mean age at first birth do not reveal significant patterns. In fact, Figure 1 shows that the correlation between the two indicators is low (the correlation coefficient 0.19), although it has a positive sign as expected from micro-level motivations.

Figure 1 Macro-level relationship between average years spent in education between ages 15 and 29 and mean age at first birth, 11 Western European nations (2001). Sources: OECD (2003), Council of Europe (2003). Note: mean age at first birth is for 1997 for Belgium and Italy, 1999 for Greece, and 2000 for Spain.



3.2 Macro-micro interactions or why can education-motherhood interrelations differ in different societies? Our two main hypotheses

We are now in the position to formulate hypotheses to be tested empirically, by linking the theoretical approaches reviewed in Section 2 to the above reflections on diversity among Western European countries. For the purpose of drafting the hypotheses we focus more specifically on (1) the mutual impact of each trajectory on the other one; and (2) the weight and direction of common factors for both trajectories. At the macro-level, we focus on the grouping of countries by welfare regimes (social-democratic, conservative, and Southern European), and on the progression towards a de-standardisation of life courses (higher in the Nordic countries).

We consider first higher education. The flexibility of educational systems with respect to the possibility of completing educational degrees at a slower pace varies in Europe. Extended family support (typical for instance of Southern Europe) or high-level and generalised public transfers (typical of the Nordic countries) may allow the postponement of the completion of education when other events such as conception and childbirth could potentially induce a drop-out from education and thus accelerate the end of education. This may be an important difference from the situation in the U.S. and the U.K. (both liberal market welfare regimes) that has been discussed at length in the literature, as pointed out in Section 2. In some countries, it is customary for students to take longer than required to complete university education. A survey of university students in several European countries has recently shown that in Sweden and Italy over 30% expect to complete their degree at least one year later than the required time; the percentage is smaller in France (17%) and Germany (10%), while it is below 5% in Switzerland, Portugal, UK, and Ireland (Brunello and Winter-Ebmer, 2003). Longer times spent to earn a degree with respect to the time required for it may be explained by the presence of stricter employment protection, or a lower university wage gap, both decreasing the incentives to postpone the end of education. A higher share of public expenditure helps in limiting the negative enrolment effects of liquidity constraints, allowing students to delay college completion (Brunello and Winter-Ebmer, 2003). This leads to the following hypothesis on the mutual impact of educational enrolment on the timing of first birth and vice-versa:

H1: The impact of being enrolled in education on the timing of first birth, and of the conception leading to first birth on educational enrollment (controlling for common factors) is larger in societies where the educational system provides less support to either role combinations or a postponement of the end of education. That is, it should be higher in countries belonging to the conservative continental and liberal cluster.

In Section 2.3 we have discussed some potential factors that are supposed to simultaneously shape the educational trajectory and the timing

of motherhood. Many of these factors, in particular those related to individual-level value orientations and cognitive abilities are unobserved, especially as in our comparative study we need to make reference to retrospective survey data. We can cast some assumptions here on the different direction of the impact of such unobserved factors in different societies. In societies where the de-standardisation of life courses has progressed and has also been a target of public policies (i.e., in the Nordic countries), we assume that individuals have progressively introjected in their own view of life courses the quasi-independence of life course trajectories and perceive them as less related to each other (see, e.g., Heckhausen, 1999). This is expected to be less the case in other welfare regimes. We therefore formulate the following hypothesis.

H2: The correlation between unobserved factors affecting the length of education and time-to-motherhood is lower in societies with more pronounced de-standardisation of life courses and welfare systems that do help the compatibility of motherhood and education (namely, social-democratic welfare regimes).

4. DATA AND METHODS

In the following part of this paper we discuss methods that are adequate to test the two hypotheses, as well as the data we use. In fact, we first start with the data, including some descriptive analyses, and then discuss the methods.

4.1 Data: Fertility and Family Surveys

We use data from the series of Fertility and Family Surveys (FFS) that were carried out at the end of the 1980s and the 1990s with the cooperation of the Population Activities Unit of the Economic Commission for Europe of the United Nations. The surveys asked for timing of life course events, and they allow building event histories for education and union. We use data on the life course of women in reproductive age for Austria,

Belgium (Flanders only), Finland, France, West Germany, Greece, Italy, Norway, Spain, Sweden, and Switzerland³. We thus cover the four welfare regime types outlined in Section 2.2 as follows: the social-democratic Nordic type (Finland, Norway, and Sweden)⁴; the conservative type (Austria, Belgium, France, Western Germany); the liberal type (Switzerland⁵); the Southern European type (Greece, Italy, and Spain). Table 1 gives the sample size and the year of survey in each country.

Table 1 Sample size and year of the Fertility and Family Survey for each country

	Year of survey	sample size (females)
Austria	1995-96	4581
Belgium	1991-92	3235
Finland	1989-90	4155
France	1994	2941
Germany	1992	3005
Greece	1999	3049
Italy	1995-96	4824
Norway	1988-89	4018
Spain	1995	4021
Sweden	1992-93	3318
Switzerland	1994-95	3881

Note: sample size after cleaning

³ We did not include in the analyses countries from Central and Eastern Europe because in these countries interrelationships between education and family formation are expected to be subject to specific factors connected to the transition towards a market economy and a democratic society.

⁴ The samples in Norway and Sweden included women born in specified years, as follows: Norway: 1945, 1950, 1955, 1960, 1965, and 1968; in Sweden: 1949, 1954, 1959, 1964, 1969.

⁵ The surveys for Canada and the USA did not include information for the dates of completion of educational levels and hence could not be used.

Table 2 informs about the mean ages at completion of the second and third educational levels, as well as at the end of education where also its standard deviation is displayed⁶. It also gives the share of respondents who have achieved the third educational level. This information can be derived also from Table 17 in the Standard Country Reports (SCR) issued by the Economic Commission for Europe for each one of the countries where the FFS was held. Our results may deviate a little because of cleaning procedures necessary for running the model. The table exposes the countries grouped according to the classification of welfare regimes.

Table 2 Level and duration of education: descriptive statistics from the sample (countries grouped according to the welfare regime typology)

	Level 2	Level 3		Duration of education	
	mean age	mean age	share, %	Mean age	st. dev.
Finland	23.4	28.4	7.5	22.8	6.9
Norway	20.5	25.5	21.6	21.7	5.6
Sweden	21.1	26.6	31.5	24.1	7.2
Austria	18.7	24.6	9.3	18.7	4.3
Belgium	19.7	23.3	6.4	19.0	2.8
France	18.1	23.2	13.5	18.7	3.9
Germany	20.5	25.2	6.0	19.9	3.8
Switzerland	20.6	26.9	7.9	22.3	6.1
Greece	19.5	24.1	15.1	19.6	4.3
Italy	19.0	25.8	9.6	19.5	7.0
Spain	19.7	25.3	6.9	19.0	5.4

Note: age at completion of educational level 1 is around 15 years; educational histories begin at age 15 of the respondent and hence this age is unknown where education ended at a lower age.

⁶ The table contains different data from the ones displayed in Figure 1 as they refer to different groups of individuals.

The observed data reveal diverse patterns of educational enrolment among the selected countries. For example the share of women who have completed the third level of education in Finland is considerably lower than that observed in Sweden. These results are close to the ones observed for the whole population (Table 2 in the Standard Country Reports of the FFS). Some deviations are due to the way diverse levels of education are compared among countries.

The FFS used the ISCED system (International Standard Classification of Education) that is not necessarily fully compatible to a country's classification system. Length of education is helpful for the identification of educational levels and was used for a check in our classification. The three levels we use in the analyses are defined as follows:

- Level 1 (basic): in school till about age 14;
- Level 2 (secondary): about 3 additional years. This level includes also additional education that cannot be considered as university level education or its equivalent.
- Level 3 (higher, or university level): Completed university or equivalent level of education.

The Greek file gives a country-specific distribution by educational level. We aggregated university levels unacknowledged by the state as well as higher specialised schools such as theatre schools with the second level; the mean age of completion of education in these two categories was found lower than that for the completion of regular universities.

The table allows for inferences that are relevant to our study, particularly where the third educational level is considered. The mean age at its completion is slightly higher in the Scandinavian countries, as it is also revealed from current OECD statistics. The mean age at end of education is also comparatively high (given the higher shares of those who completed the third level), as well as its standard deviation. The prevalence of family support in Southern Europe (Italy and Spain) seems to have lead to a comparatively high mean age at completion of the third level, with Greece

apparently as an exception. Finally, there is a salient difference where France and Belgium (Flanders) on the one hand and the German-speaking countries on the other are considered: in the former two countries the third level is achieved at an earlier age. In general, the observed data indicate the existence of clusters of European countries with respect to length of higher-level education that are not far from the welfare-state classification of Esping-Andersen.

Table 3 informs about the mean ages of the other time-dependent processes included in the analysis. Start of first work is the earliest of these three events in the life of the young female adults in all the countries. The mean ages of first birth and first union are standing close, revealing thus the close relationship between these two events. Europe seems much more homogeneous with respect to these events as compared to completion of educational levels.

Table 3 informs also on the share of conceptions resulting in first births delivered before the end of education, in percent to all conceptions leading to a first birth. We consider conceptions because it is during the months of pregnancy that a decision can be taken to interrupt the education. There is an enormous difference among the groups of countries. Apparently this share is much higher in the Nordic countries as compared to any other country. Switzerland, with its liberal welfare regime, follows ahead of familistic Southern Europe and the conservative welfare regimes, where the share of conceptions before the end of education is less than 10% (in Belgium - Flanders, end of education is registered at the time of completion of an educational degree). These shares indicate a considerably lower interdependency between the two life-course paths in the Scandinavian countries.

Table 3 Mean age at first birth, first union, and start of first work; and share of conceptions resulting in first births before end of education: descriptive statistics from the sample (countries grouped according to the welfare regime typology)

	Mean age at 1 st birth	Mean age at 1 st union	Mean age at start of work	Conceptions before end of education, %
Finland	23.4	22.2	18.3	31
Norway	22.4	21.4	18.3	30
Sweden	23.7	21.0	18.7	41
Austria	22.5	21.5	18.7	12
Belgium	23.3	21.8	19.4	4
France	23.0	21.3	18.4	9
Germany, West	23.2	21.6	18.6	12
Switzerland	25.2	23.1	19.2	16
Greece	23.1	22.0	20.9	12
Italy	23.9	23.0	20.1	13
Spain	23.7	22.9	18.5	11

4.2 Methods: estimation of country-specific simultaneous-hazard regression models

We are studying two trajectories in the life course. We want to focus both on their mutual impact (and on the country-level differences in such an impact, i.e., Hypothesis (1)), and on the potentially correlated and unobserved determinants that affect both processes (again, also on the country-level differences in such a correlation, i.e., Hypothesis (2)). This task is connected to what is known in the literature on life course analysis as modelling parallel and potentially interdependent trajectories in the life courses. There has been a considerable debate in the related literature as to whether one needs to address such trajectories simultaneously (sometimes this has been referred to as the "system" approach), or whether it is sufficient

to model the processes separately by adequately conditioning on relevant aspects of the past history of each trajectory (Blossfeld and Rohwer, 2003). In this paper we follow the general “multiprocess” approach outlined by Lillard (1993), and we model the two trajectories using a system of two hazard regression equations that include potentially correlated unobserved heterogeneity components. We interpret such an unobserved heterogeneity as including all factors we believe have an influence on the processes under study and that remain unchanged during the part of the life course considered here, i.e., till the end of education or the conception leading to first birth, whichever comes later.

Our modelling approach is similar to the one used by Upchurch et al. (2002) in a study of non-marital childbearing in the United States – although their modelling of educational enrolment uses a discrete-time approach. Our strategy to use simultaneous hazard equations with potentially correlated unobserved heterogeneity for comparative analyses and to draw hypotheses on the main components of the model is similar to the one adopted by Baizán et al. (2004) in a comparative analysis of union formation and childbearing in Sweden and West Germany.

More specifically, we model time to the end of education and time to conception ending in a first birth using a system of hazard equations:

$$\begin{aligned}
 \log h_B(t) &= \alpha'_0 + A_B(t) + [\alpha'_1 E_L(t) + \alpha'_2 E_E(t)] + \alpha'_3 C_T(t) + \alpha'_4 S + \\
 &\quad + \alpha'_5 R + \alpha'_6 U(t) + \alpha'_7 W(t) + \varepsilon \\
 (1) \quad \log h_E(t) &= \beta'_0 + A_E(t) + [\beta'_1 B(t)] + \beta'_2 C_T(t) + \beta'_3 U(t) + \beta'_4 W(t) + \eta
 \end{aligned}$$

where:

- $h_B(t)$ and $h_E(t)$ denote correspondingly the hazard of the duration till the conception ending into a first birth (starting at age 15) and the hazard of the duration to end of education (starting at age 10);

- $A_B(t)$ and $A_E(t)$ denote age, variables represented by a linear spline with knots every two years and starting at age 15 for the conception and age 10 for the end of education;

- $C_T(t)$ is a variable denoting cohort. We distinguish three cohorts: born before 1960, born between 1960 and 1969, and born after 1969. The first one is the base. In Finland the cohorts are delineated as born before 1950, between 1950 and 1959, and after 1959. In Norway the oldest cohort comprises women born before 1960, the middle cohort consists of those born in 1960, and the youngest one of those born after 1960. In Sweden, the oldest is before 1959, the middle from 1959 to 1964, and the youngest after 1964.

- $E_L(t)$, $E_E(t)$ and $B(t)$ are time-varying covariates denoting level of education, end of education, and time of conception leading to a first birth. Three levels of education are considered, namely lower than secondary, completed secondary, and higher than secondary. The level of education is entered in the model using dummy variables that consider the impact of the second level with respect to the first, and of the third level with respect to the second.

- S is a continuous time-independent variable denoting the number of children born alive by the respondent's mother.

- R is a qualitative time-independent variable denoting the size of settlement where the respondent resided at age 15. It has three levels defined according to the number of inhabitants: less than 10,000; 10,000 to 99,999; 100,000 and more. The third one is the base.

- $U(t)$ and $W(t)$ are time-varying covariates denoting entry into first union (either marriage or non-marital union), and start of first paid work.

- ε and η are normally distributed unobserved characteristics of the individuals with variance equal to one and correlation ρ (which is equal to the covariance, and has to be estimated). We fix the variance to one because

events are not repeatable, and the variance of the unobserved heterogeneity component cannot be identified⁷:

$$(2) \quad \begin{pmatrix} \varepsilon \\ \eta \end{pmatrix} = N \left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right)$$

The model is estimated by full maximum likelihood, using the aML package (Lillard and Panis, 2000), separately for each national sample.

The time-independent variables for the number of children born alive by the respondent's mother, S, and the size of settlement at age 15, R, are known to have an effect on timing of first births. The time-dependent variables for entry into first union, U(t), and start of first paid work, W(t), are standard ingredients in the literature.

5. RESULTS AND DISCUSSION

Table 4 displays the results from the estimation of nation-specific models (1). The upper part of the table gives the results for the hazard regression model related to the transition to motherhood (actually, the time of the conception leading to first birth). The lower part of the table gives the results for the hazard regression model related to educational enrolment (actually, the time to the conclusion of education). In the lowest row, we find the estimates of the correlation coefficient between unobserved factors affecting both transitions. We first consider the effect of selected variables for each of the two transitions, starting with the timing of motherhood.

As already noticed in the literature, the impact on the timing of motherhood of educational enrolment is usually more important than the effect of educational level (Hoem, 1986; Blossfeld and Huinink, 1991; Kravdal, 1994). Concluding educational enrolment has a statistically

⁷ In other studies, sensitivity analyses have been carried out on this assumption (Baizán et al., 2003).

significant effect in all countries, in that it speeds up the transition to first birth (the hazard is almost doubled as education finishes for the country with the lowest coefficient, Spain, and it is multiplied by four for the country with the highest coefficient, Belgium). On the contrary, differences between educational levels are statistically significant only in some of the countries. Our results thus support the findings in the literature that emphasise that the incompatibility between education and motherhood is more important than differentials between educational levels. Only in Austria and France there is a statistically significant gradient between the three educational levels considered (as well as in Greece where the p-value for educational level 2 versus level 1 is around 0.06), and in Finland and West Germany there is no statistically significant difference between educational levels, once controlling for enrolment. In all other countries the effect of human capital is restricted to the completion of the second educational level only, and therefore it cannot be stated that the higher the human capital, the longer the postponement of the first birth, once a control is included for the end of education. We thus confirm the importance of educational enrolment over a wide set of nations belonging to different regimes, and even more important, after controlling for the factors which potentially affect both educational enrolment and the timing of motherhood and which could bias the estimation of this effect reported so far in the literature cited.

Table 4 Results of country-specific simultaneous hazard models

	FI	NO	SE	AT	BE	FR	DE	CH	GR	IT	ES
TIME TO MOTHERHOOD (TIME TO THE CONCEPTION LEADING TO THE FIRST BIRTH)											
<i>Educational level</i>											
-Level 2 vs level 1	-0.11	-0.46	-0.59	-0.46	-0.24	-0.56	-0.16	-0.27	-0.19	-0.42	-0.55
-Level 3 vs level 2	-0.15	-0.05	0.00	-0.33	0.02	-0.61	0.13	0.13	-0.16	0.17	-0.32
<i>Educational enrolment</i>											
-No longer enrolled	0.75	1.02	0.90	1.17	1.75	1.50	1.52	1.02	1.26	0.79	0.68
<i>Time-dependent variables</i>											
First union	2.33	2.01	2.34	1.63	2.72	2.63	1.85	2.36	3.13	3.86	3.85
First job	0.37	0.43	0.04	-0.04	-0.23	-0.12	-0.13	0.01	-0.23	-0.34	-0.32
<i>Time-independent variables:</i>											
Cohorts:											
- middle vs. old	-0.59	-0.71	-0.63	-0.28	-0.29	-0.73	-0.09	-0.57	-0.25	-0.47	-0.46
- young vs. old	-1.23	-1.16	-1.07	-0.62	-0.9	-1.05	-0.81	-1.55	-0.88	-1.20	-0.77
Siblings	0.08	0.06	0.12	0.08	0.08	n.a.	0.14	0.10	0.02	0.10	0.05
Settlement:											
- small vs. large	n.a.	0.37	0.12	0.27	n.a.	n.a.	0.17	-0.03	0.21	0.00	0.23
- average vs. large	n.a.	0.26	0.14	0.08	n.a.	n.a.	0.15	-0.09	0.09	0.14	0.24
TIME TO THE CONCLUSION OF EDUCATION											
<i>Time-dependent variables</i>											
First birth (conception)	-0.60	-0.60	-0.83	0.22	0.80	0.43	0.27	-0.71	0.10	-0.60	-0.56
First union	0.14	0.18	0.17	0.03	-0.01	0.00	0.46	0.06	0.25	-0.15	-0.09
First job	0.05	0.11	-0.30	2.15	drop	0.45	1.36	-0.76	0.55	0.35	0.66
<i>Cohorts:</i>											
- middle vs. old	-0.06	0.08	0.50	-0.51	-0.41	-0.7	-0.40	-0.05	-0.48	-0.33	-0.62
- young vs. old	-0.18	0.17	0.84	-0.97	-0.95	-1.4	-0.35	-0.20	-1.06	-0.83	-1.34
ρ	0.03	0.07	-0.24	-0.07	0.24	0.05	0.28	0.39	0.33	0.08	0.21

Notes:

(1) Age dependence is controlled using piecewise-Gompertz splines.

(2) Boldface indicates p-values lower than 0.05.

(3) n.a. : data not available for this variable in this country.

(4) drop : too few transitions before the end of education.

In terms of differences between the four groups of welfare regimes, the impact of educational enrolment is systematically higher in conservative/continental-welfare states. This is in accordance with our first hypothesis (H1), as these welfare regimes do allow less flexibility for the combination of both roles, a combination that is comparatively less problematic because of support provided either by the welfare state in social-democratic countries or by the family in Southern European societies.

Most of the other variables in the equation for the hazard of first birth have statistically significant effects that are in the expected direction. The number of siblings is included as a control variable that captures some factors related to the family of origin; the higher the number of siblings, the earlier the transition to motherhood. Some community effects are captured by another control variable, the size of settlement. This is somewhat more significant in Southern Europe; on the average, first births appear earlier in smaller settlements. The timing of first union usually precedes a conception leading to a first birth; this is particularly explicit in the Southern European countries (although the interpretation of this impact should not be considered as causal here, see Baizán et al., 2003, 2004). Postponement of the first birth in younger cohorts as compared to the two older ones reflects the overall process of the postponement of childbearing observed in Europe during the last decades (see Kohler et al., 2002). Having started work accelerates timing of first birth in the Nordic countries, and this is consistent in general with the social-democratic welfare idea of allowing the combination of work and motherhood (Gauthier, 1996, 2002; Neyer, 2003), as well as with the importance of the acquisition of human capital through work (Kravdal, 1996). In conservative welfare states the impact of having entered the labour market on the transition to motherhood is negative but not statistically significant with the exception of Belgium. On the contrary, in Southern Europe entering the labour market before motherhood postpones first births; this might be connected with the apparent problems of compatibility of work and motherhood in those countries (Kohler et al., 2002). Again, however, we

should not consider estimates of the effect of working on the timing of motherhood as representing causal effects, as we did not control for potentially spurious factors.

We now come to the transition out of education (second half of Table 4). We first analyse the impact of motherhood on educational enrolment. Becoming a mother has a statistically significant impact in all countries with the exception of Greece. Interestingly, however, the direction of this impact is different. Coefficients are negative in the Nordic countries, where public policies favour the combination of roles of mother and student: becoming a mother reduces the hazard of leaving education by about 54% in Sweden (where the impact is greatest) and by about 45% in Finland and Norway. These coefficients are negative also in Italy and Spain, with the same level of magnitude as in Finland and Norway. Contrary to reports in the existing literature that mostly focuses on liberal market countries such as the U.S. and Britain, in the Nordic countries and in Southern European countries becoming a mother while studying has the impact of prolonging education. This is likely to happen for two different reasons, although we cannot distinguish between them. In the Nordic countries, the welfare may allow the compatibility of motherhood and education, allowing the postponement of the end of education to a later stage, possibly after a maternity leave. In Southern European countries, family resources are likely to buffer this situation, and the duration of education may be prolonged in accordance. Unlike other liberal welfare regimes, Switzerland resembles Italy, while conservative continental countries all have a positive and statistically significant coefficient; similarly to what is usually found for U.S. and Britain, becoming a mother speeds up the end of education, and it is likely to lower educational attainment correspondingly. Our results are thus consistent with the first hypothesis H1.

Looking at other variables that influence the transition out of education, we notice that the entry into first union speeds up the end of education in the three Scandinavian countries. The effect of starting to work in these countries also differs from the rest of Europe: in the Nordic

countries it is either not statistically significant (in Finland and Norway), or negative (in Sweden), while it is positive and significant everywhere else with the exception of Switzerland. Cohort effects are in all countries, with the exception of Sweden, towards an expansion of the duration of education.

We now look at the last row of Table 4 which contains the estimates of the coefficient of correlation between the unobserved, time-constant factors that simultaneously affect both transitions. In Finland and Norway the correlation between such factors is not statistically significant; while in Sweden such correlation is even negative (factors that are likely to speed up the transition to motherhood are related to those prolonging educational enrolment). In the remaining countries the correlation is either insignificant or positive (with the highest levels for Greece and Switzerland). These results are in accordance with our second hypothesis H2, in which we assumed that the higher the level of welfare support for combining motherhood and educational enrolment, and the higher the de-standardisation of life course trajectories, the lower the correlation between factors simultaneously affecting both trajectories. However, this issue deserves further confirmation using other data sources.

6. CONCLUDING REMARKS

In this paper we studied the links between educational enrolment and the transition to motherhood from a life course perspective, considering the two processes as parallel and potentially interdependent. The mutual impact of educational enrolment and attainment on the timing of motherhood and of becoming a mother on educational enrolment has been analysed by also allowing for unobserved factors affecting both transitions that are potentially related. A key idea is that these life-course interdependencies are mediated by the macro-level context: in our paper by the different welfare regimes that characterise the countries of Western Europe. Moreover, there is no “true effect” of education on the transition to motherhood or vice versa that would not depend on the context. Research investigating such effects by

now has not focused on the possible importance of macro-level factors in determining the magnitude, and even the sign, of the effects.

Our hypothesis that the interrelationship between motherhood and educational enrolment is stronger in societies where the compatibility between these two parallel processes finds less support either by welfare policies or by the families has been substantially confirmed by our analyses. Nevertheless, leaving education has important effects on the transition to motherhood in all countries, and only the magnitude of such effect differs; in general, this effect is higher than the corresponding effect of educational level and this is in accordance with the findings of the literature. In the U.S. and Britain one finds a negative impact of motherhood on educational enrolment and attainment; our findings that in the Nordic countries, in Italy and Spain becoming a mother has on the contrary the effect of prolonging education (although not necessarily improving educational attainment) is probably linked to the different ages at motherhood that are at stake. Usually the literature on the U.S. and Britain concerns teenagers, and in the 11 countries included in our empirical analyses teenage pregnancy is far below the levels of the two Anglosaxon countries.

Our empirical findings support the second hypothesis as well, although with a few exceptions. We found a higher correlation between unobserved factors affecting the two trajectories in countries with welfare states that encourage the compatibility of the role of mother and of student to a lesser extent, and in countries where the de-standardisation of life courses has progressed less; inversely, in the Nordic countries, exhibiting the highest level of life course de-standardisation, we found either no correlation or a negative one.

Some caution is, however, required. More analyses with different datasets, possibly including a larger number of countries with liberal market welfare states are necessary to confirm our findings. Nevertheless, the Fertility and Family Survey data we used allowed us to maximise the comparability of the data, an issue that is crucial in comparative research.

Acknowledgements

We thank Øystein Kravdal and the participants to a presentation at the Department of Economics and Quantitative Methods of the University of Pavia for comments and suggestions on preliminary versions of this paper. Billari acknowledges the support of the Vienna Institute of Demography.

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