Education and the transition to fatherhood in Europe: the role of selection into unions

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Abstract

This paper examines the effect of education on the transition to fatherhood, focusing on the interplay with the process of union formation. Earlier studies have typically selected men who are currently living in a union, disregarding the process of how men are selected into unions. We hypothesize that men's educational attainment consistently and positively affects the transition to fatherhood via the process of selection into unions. We apply multiprocess event history analysis to the Generations and Gender Surveys for 10 European countries. Overall, our results show a consistent positive effect of education on the transition to fatherhood. Once the positive effect of education on entry into union is accounted for, the remaining effect of education on transition to fatherhood loses its predictive power. We conclude that men's education matters for their transition to fatherhood chiefly by affecting their rates of union formation.

Keywords: transition to fatherhood, first union, education**,** selection effect.

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1. Introduction

A major fertility trend of the past decades in the West has been the postponement of parenthood. Chief explanations of postponement include the expansion of women's enrolment in higher education and their increased participation in the labor market. More highly educated women, who are also more likely to be active in the paid labor market, tend to make the transition to parenthood at a later age than their lower educated peers – even if the former often catch up at later ages (Sobotka 2004; Mills et al. 2011).

The role played by men's education has received much less attention than women's education. The emphasis on the woman's perspective has usually been justified by the lack of reliable data about male fertility, by the fact that women are the main actors and most reliable reporters of childbearing, and by the high degree of homogamy within couples (Testa, Cavalli and Rosina 2014). If male characteristics are included in models of first births, it is typically along with characteristics of the female partner or in studies regarding the transition to adulthood. We argue that these studies are myopic with regard men's education and their transition to fatherhood for at least two reasons. Firstly, studies that include male characteristics are often limited to men who are already in a union. Secondly, studies using men as unit of analysis (such as those on the transition to adulthood) also include men not in a union but they mostly elude the interplay between union formation and transition to parenthood. We argue and show that men's education has a consistent effect on the timing of fatherhood through affecting the selection into unions: men with higher educational attainment tend to be more attractive on the mating market and therefore exhibit higher rates of union formation. As a result, they also exhibit higher rates of entry into fatherhood.

The interest in the role of male partners' characteristics rises from the fact that, in contemporary societies, parenthood implies parental investment both from women and men. Women, who already since the '1990s are more successful in higher education than men (Vincent-Lacrin 2008) and increasingly participate in the labor market, may require men's active involvement in household work and childcare activities to engage in motherhood (McDonald 2000a; McDonald 2000b; Huinik and Kohli 2014). Consequently, the decision on the timing and number of children is not only confined to one partner but to both partners, who increasingly become more equally involved in the process of parenthood. As

Martin-Garcia (2008, p. 200) points out: "fatherhood no longer means being the only breadwinner of the household, it demands more time and more active role in childcare than ever before". In this context, education plays an important role in shaping gender relations in family formation processes, as well as gender relations in established households (Martin-Garcia 2008; Van Bavel 2012; Goldscheider, Bernhardt and Lappegård 2014).

The role of male partners' has been especially considered to study fertility from a couple's perspective for at least two reasons: (1) "it takes two to tango" (Corijn, Liefbroer, and De Jong Gierveld, 1996), namely the transition to parenthood involves two persons; (2) the level of gender equity in the couple and, consequently, the attitudes and behaviors of partnered men, have been documented to affect fertility in important ways (Thomson 1997; Thomson and Hoem 1998; McDonald 2000; Jansen and Liefbroer 2006; Testa, Cavalli and Rosina 2014; Sullivan et al. 2014). While studying fertility on the couple level remains an important task for the future, the point made in the present paper is that such study is likely to lose out of sight how men's characteristics, including their education, are affecting family formation through the selection into unions. It follows that the analysis of men's family formation is a necessary step to further develop and properly approach fertility from a couple's perspective. The increasing interest towards the way couples approach parenthood draws attention to the role played by each partner's characteristics. However, this may vary according to selection effects occurred at the time of couple's formation. It is therefore important to account for these selection effects as well. The existing literature addressing the relation between family-events has mostly been focusing on women's characteristics (see e.g. Brien, Lillard and Waite 1999; Baizan, Aassve and Billari 2003). To date, there is a lack of studies focusing on the link between men's education and the transition to fatherhood, and the relationship between union formation and fatherhood. This paper aims to fill that gap.

Specifically, this paper focuses on the effect of men's educational attainment on rates of union formation and the transition to fatherhood, and on the mutual interrelationship between union formation and fatherhood. We hypothesize that there is a consistent positive effect of men's educational attainment on the transition to fatherhood through a positive effect on union formation. To test this hypothesis, we use a simultaneous equations approach to account for the endogeneity of both processes. We replicate the

model in 10 European countries, using data from the Gender and Generations Surveys (GGS), to explore the sensitivity of our hypothesis to different European contexts. Our study has three distinctive features. First, we focus on men as unit of analysis. Second, we propose new theoretical insights on how men's characteristics, in particular education, affect the transition to fatherhood, by considering the interplay between men's union formation and first birth. Third, from a methodological point of view, we approach the study of men's interrelated family processes also using a simultaneous equations modelling framework.

2. Education and men's family formation

The following sections first discuss theoretical insights into the relation between education and family formation. Next, lessons learned from earlier empirical studies are reviewed.

2.1. Theoretical insights

Education involves several dimensions which, directly or indirectly, may affect individuals' family behaviour. Lappegard and Ronsen (2005) discuss enrolment, attainment and field as three core dimensions for fertility. Kravdal and Rindfuss (2008, p. 855) provide a more comprehensive accounting while depicting education as involving aspirations, enrolment, learning, credentials, developing cognitive skills and abilities. Thus, it is not surprisingly that education may impact family formation outcomes (union formation and parenthood, in particular) through mechanisms which may differ between women and men. To enrich the picture, we should also consider the implications of entering in a union and becoming a parent. Union formation creates the basis for a new unit of reference - the couple - where the characteristics, attitudes and desires of each partner interact, shaping the behavior of the couple. Finally, as pointed out by Hobcraft and Kiernan (1995), fertility does not only imply the birth of children, but it also presupposes the care, both in emotional and economic terms, necessary to raise them.

2.1.1. Education and family formation

The New Home Economics approach assumes that members of a family allocate their resources efficiently and rationally between household chores and labor market jobs (see, e.g, Becker, 1991) leading to partner specialization. This specialization strategy increases the interdependency between the

partners and thereby enhances the gains to marriage. A major assumption of the New Home Economics is that men and women have different comparative advantages in household and market activities, and therefore marriage may be seen as a contract between the sexes. Women trade their "expertise" in household activities, whereas men trade their income and market activities. This sort of labor division between the sexes has been called the male-breadwinner model. With increasing women's education and participation in the labor market, however, the male-breadwinner model is eroded and, according to New Home Economics, marriage rates decline and divorce rates increase because women have less to gain from marriage. As indirect consequence of decreasing gains from marriage, the demand for children also decreases.

In general, economists distinguish two types of mechanisms which explain the relationship between education and fertility: the positive income effect and the negative price effect. The income effect accounts for the fact that the more educated people tend to earn a higher income and they are therefore more likely to afford the monetary costs of having (additional) children. The price effect, on the other hand, acts through opportunity costs: highly educated people have high opportunity costs because they have more to lose when they have to devote more time to non-paid activities like childcare and household chores after becoming a parent.

These considerations led Becker and colleagues to predict different associations for men and women between education and fertility. Following the logic of the breadwinner model, the price effect is more characteristic for the relationship between education and fertility among women, since childbearing leads to a reduction of time spent in the paid labor market particularly for women. The income effect predominates among men since they are supposed to be the main breadwinners. This traditional male breadwinner model is reinforced by social and normative gender roles expectations. In societies where women are expected to take the larger share of domestic work, the educational gradient for union formation and fertility is assumed to be negative for women. This is a consequence of the mentioned opportunity costs and women's difficulties in reconciling a job-career with family duties. Men, as far as they are able to economically support a new household, show a positive educational gradient for union formation and fertility. Moreover, while being enrolled in school, women have more difficulty to balance

the role of wife/mother with that of student, so the negative effect of educational enrolment is stronger for women than for men (Blossfeld and Huinik, 1991). On the other hand, if the period of human capital accumulation does not interfere with earning an income to sustain a (potential) family, men should have fewer difficulties to balance the role of husband/father and student, especially in societies with traditional gender roles expectations.

Traditional gender roles expectations also reinforce the sex-segregation on the labor market. This segregation is usually mirrored by the choice of the educational field. As Van Bavel (2010) pointed out, the field of study may affect family attitudes and career prospects, which in turn affect the timing of the transition to parenthood. In particular, some educational fields (like engineering) lead to male-dominated occupations. These occupations will often imply a working environment which is less conducive to childbearing and- rearing (Hoem et al. 2006, Van Bavel, 2010).

As gender roles expectations change over time, most likely the sex-segregation in the field of study will also change. Since the last decades of the twentieth century and the first decades of the twenty-first, gender inequalities at macro and micro levels have changed. For instance, gender education inequalities reversed, since the 1990s, in most of the OECD countries: higher proportion of women than men enrolled and achieve tertiary education (see, e.g., Vincent-Lancrin 2008). Women participate more and more in the labor market and, though to a lesser extent, men are more and more involved in household chores and childcare (see, e.g., England, 2010).

Oppenheimer (1994) pointed out that women's labor market participation increases the family budget, and, as a consequence, it also increases women bargaining power in the family. She argued that women's employment may be viewed as an adaptive strategy for diversifying the family resources and to raising their economic standard of living. An efficient strategy, then, would be to substitute the male breadwinner model by the dual earner model. In societies where the dual earner model prevails, the relationship between education and family formation processes may change for both sexes. As Oppenheimer (1988, 1994) noted, for economic reasons, women with high earning potentials may become more attractive on the mating market than low educated women. Both women and men may have more bargaining power and more information to decide about their future stable relationship once they

have a foothold in the labor market and a relatively certain economic situation. Unions created at an earlier stage of the life course (e.g. during high school) may be more at risk to break down because preferences and expectations become clearer after the period of schooling (Oppenheimer, 1988).

In this framework, men's economic situation is relevant for the process of family formation and a positive income effect is still expected for those with high education and good career prospects. But, once highly educated women become more attractive than low educated the relationship between education and fertility may be also driven by an income effect for women. Moreover, highly educated women may dampen opportunity costs by externalizing the unpaid household work (Kravdal, 2007), or by more equally sharing household chores with the partner, who presumably is also highly educated and perhaps more inclined to be involved in household activities (about the positive relation between father's education and involvement in childcare see, e.g. Sullivan et al., 2014). In line with this theoretical argument, Huinik and Kohli (2014, p.1301) argue that "the opportunity costs for men also rise, because men are under pressure to intensify their engagement in parenting and housework if they want to persuade their female partners to engage in motherhood".

In general, men and women may self-select themselves in or out of education and more specifically in a determined field of study according to the gender roles that society expects from them. To the extent that the male-breadwinner model is eroded, the multifaceted impact of education on the transition to parenthood tends to become more similar for men and women. However, partnership formations, in general, and educational assortative mating, in particular, play a role in shaping couples' fertility: both for women and men the effect of their own education on fertility also depends on the partner's education.

A gender imbalance in education on the couple level may enhance the role of men as main provider of the household if he is more highly educated than she (Martin-Garcia, 2008). The picture changes as far as individuals are homogamously matched, or if the couple is characterized by reversed gender imbalance in education (Van Bavel, 2012). In more gender-egalitarian societies, the relationship between education and fertility for men may also take on a socio-cultural dimension. A man may be selected to become father of the child for his more general human skills in addition to the economic resources. Men with low earning potentials, not very attractive to highly educated women, may enhance their position on the

mating market by being "good fathers", i.e. by showing the will and ability to be involved in household chores and child-rearing tasks (Van Bavel, 2012). As a consequence, the effects of educational attainment, educational field, and so on, also depend upon the partner characteristics, either from a male or female point of view. That implies that the relationship between selection at union formation and timing of fertility, first birth in particular, has an effect on the relationship between timing of first birth and education, as we will further explain.

2.1.2. Selection effects and reverse causality

Individuals' life courses are characterized by interrelated events. As a result, individuals' resources are invested in different, and often competing, life domains (Huinink and Kohli 2014). Individuals are heterogeneous in the ways they invest resources in different life domains. This heterogeneity implies that life course analysis has to account for selection effects. For instance, the observed link between education and fertility is also affected by unobserved factors, i.e. heterogeneity not possible to measure, that lead individuals who are more inclined to form a family to spend less time in education, accelerating the processes of union formation and childbearing.

Next to that, the interrelationship between events complicates the distinction between cause and effect of processes, where causal arrows are often running in both directions. The relationship between education and family formation, for example, is not only a one-way causal direction, where a certain education dimension affects the timing of parenthood. The causal relationship can also run in the other direction. Especially for women, being pregnant may affect negatively the chance of finishing a degree and of choosing a particular educational field of study, which may be compatible with the role of mother (Tesching, 2012). Since men tend not to be as directly involved in the child-rearing process as women, the educational career is much less affected by the transition to fatherhood. The male partner may either prefer to find a remunerable job, or to invest in high remunerable education fields in order to facilitate his participation in the labor market.

In general, while the educational and employment trajectories are more institutionalized, the decisions related to family formation processes leave a wider margin to the individual choice, which,

however, is far from being a constraints-free choice (Huinik and Kohli 2014). From a male point of view, finding a suitable partner is a necessary prerequisite to become a father. Once a man finds a partner, the duration of the union and partner's characteristics strongly affect the chances that the man becomes a father. Women, for their part, face biological constraints in the timing of parenthood to a greater extent than men. In both cases, however, the occurrence of one event (e.g. first union) will accelerate the occurrence of the other (e.g. parenthood). For individuals who want to form a new family, enter in a co-residential union may be considered as the first step to accelerate the family building process. Similarly, a pregnancy may enhance the formation of a co-residential union (Baizan et al. 2003). Even in this case, the interrelationship of events is enriched by the fact that individuals are heterogeneous in observed (e.g. socio-economic background) and unobserved factors (e.g. personality traits, physical aspect) that lead to experience such events at different moments in life. In general, men may self-select, or are selected by women, into unions and consequently those selected into unions are more likely to experience fatherhood (Lappegard and Ronsen, 2013). Men willing to have a child may want to enter into a first union with a suitable partner as soon as possible. The reverse case, when men know about the pregnancy of the partner, the likelihood of union formation may depend on the degree of commitment established in the relationship. The man would be less willing to invest resources in a child who he does not recognize as his own child. In addition, especially in disadvantaged strata of society, in case of a pregnancy, young males' behaviour may be characterized by the "hit-and-run" strategy. Namely, letting decide the woman to keep the child or not, but without guaranteeing any level of commitment from his side (see e.g. Anderson 1989).

Education represents an observable factor which explains part of the differential behaviour between individuals in the timing of family events. Overall, highly educated individuals, either women or men, tend to postpone the formation of a new family for at least two reasons: (1) they spend more time enrolled in the educational system; (2) after graduation they need time to establish their position in the labor market. Moreover, investments of resources in domains different from family processes may lead highly educated to develop other interests which may reinforce postponement of family formation (see, e.g, Kravdal 2007; Huinik and Kohli, 2014).

However, being highly educated does not have the same implications on the mating market for men and women. For men, being highly educated can work as a jolly card on the mating markets: it may be perceived as an attractive feature to both highly and low educated women. Highly educated men are attractive primarily for their income potential but, perhaps as an added value, from a cultural perspective as well because they tend to show gender-egalitarian attitudes. This added value may be particularly relevant for highly educated women with career aspirations on the labor market. Basically, a higher attractiveness on the mating markets (all else equal) means a faster transition to first union, which may enhance the transition to fatherhood. For women, being highly educated may represents a jolly card on the mating markets in those contexts where gender egalitarian attitudes and the dual-breadwinner model are more widespread. Basically, where men may accept being the lower educated of the couple or where men accept the fact that they may not be the only (and the highest) contributor to family resources.

2.2. Earlier empirical findings

In life course research about the transition to adulthood, men, as well as women, are taken separately as unit of analysis, often looking at how the occurrence, order and timing of events vary among individuals with different characteristics (see, e.g., Liefbroer and Corijn 1999; Corijn and Klijzing 2001). Next to that, men are also included in studies that focus on fertility from a couple's perspective. Such studies often attempt to identify whose partners' characteristics are stronger predictors for couples' transition to parenthood.

Studies about the transition to adulthood consistently show that enrolment in education delays entry into first union and parenthood, both for men and women (Blossfeld and Huinik 1991; Corijn and Klijzing 2001). The difficulties in combining student and parental role, jointly with normative cultural norms, tend to delay the formation of a new family (Blossfeld and Huinik 1991). An additional relevant finding is that enrolment delays parenthood more than union formation. The negative effect on the rate of entry into parenthood has been found to be stronger negative for women than for men (Liefbroer and Corijn 1999; Corijn and Klijzing 2001; Winkler-Dworak and Toulemon 2007).

The reported effects of educational attainment show more inconsistencies between empirical studies compared to the effect of enrolment. Some studies found that high educational attainment accelerates union formation, including marriage, for men (Goldscheider and Waite 1986; Winkler-Dworak and Toulemon 2007). Studies collected by Corijn and Klijzing (2001) indicate that highly educated men showed a positive rate of entry into union especially in late adulthood (see e.g. the case of France, Italy, the Netherlands, Poland and Spain). Kalmijn (2011) showed that, in Europe, men with better career prospects and position on the labor market have higher chances of forming a union and getting married, while unmarried cohabitation was related to a lower socioeconomic position. This finding is consistent with Oppenheimer's (2003) thesis that the rise of cohabitation can partly be explained by a deterioration of men's socio-economic positions. In addition, Kalmijn (2013) showed that the effect of men's education is more positive in more gender-egalitarian countries, a result that would not follow from a purely economic hypothesis. Indeed, according to the economic theoretical perspective, in countries where gender egalitarian attitudes are widespread, women also work and the effect of being highly educated man (attractive just for his income) should be not strongly positive. According to the cultural perspective, in contrast, the effect of being a highly educated man (attractive because tend to show gender egalitarian attitudes) is strongly positive in gender egalitarian contexts (Kalmijn 2013).

For women, Liefbroer and Corijn (1999) showed that the educational attainment significantly delayed the transition to first union in the Netherlands and Flanders (Belgium), for individuals born between 1961 and 1965. Whereas in France, Winkler-Dworak and Toulemon (2007), dealing with cohorts from the 1970s and early 1980s, showed that being a highly educated woman accelerated the rate of experiencing the first union, in West Germany for older cohorts (1929-1951) it had no significant effect for the transition to first marriage (Blossfeld and Huinik 1991).

The literature regarding the transition to parenthood suggests even more marked differences between men and women, even if in both cases the results are mixed. Corijn and Klijzing (2001) found that in several Western European countries the effect of educational level on the transition to first birth was negative for men as well as women, but for the latter having a stronger effect. A negative relationship implies that more highly educated individuals tend to postpone the entry into parenthood more than the

low educated, a positive relationship goes in the other direction: highly educated experiencing earlier the transition to parenthood. In France, the effect of educational attainment on the transition to fatherhood has been found to be significantly positive, but tends to follow a U-shape for the transition to motherhood, implying that both low and highly educated women had a higher rate of first birth compared to the medium educated (Winkler-Dworak and Toulemon 2007). Blossfeld and Huinik (1991) found with German data that the effect of educational attainment becomes positive after controlling for woman's attachment to the labor market. Such a finding may imply that the negative effect of being a highly educated woman on the transition to motherhood is also driven by the fact that highly educated woman work more and refrain from career interruptions, tending then, to postpone the first childbirth.

Empirical findings about the effect of choosing a specific study discipline (next to educational enrolment and attainment) have mostly addressed the transition to parenthood. Van Bavel (2010), using data of 21 countries, analyzed three aspects of the education field relevant for the transition to motherhood: earning potential, family attitudes and gender composition. Results showed that female graduates in disciplines where traditional family values prevail were less likely to postpone motherhood. Moreover, in the case of male-dominated fields of study, and for disciplines characterized by a higher earning potential, women were more likely to delay motherhood. These results are consistent with economic theory which predicts higher opportunity costs of childbearing for women with higher earning potential.

Martin-Garcia (2008) showed that Spanish men enrolled in studies which concern the care of individuals or relational skills delay much more the transition to fatherhood compared to those enrolled in 'other' fields, such as sciences and engineering, all else equal. Even if the results are specific to Spain, and the study uses a quite broad categorization of fields of study, the findings reinforce economic arguments which predict a positive relation between high earning potential and fertility for men.

The family formation behaviors of men and women may also be affected by uncertain times (Blossfeld et al. 2005). Men with temporary employment and lack of human capital tend to postpone the formation of a new household, especially where the male-breadwinner model holds. Conversely, in the same kind of contexts, women with lesser career prospects tend to reduce their uncertainty by embarking

faster in partnership and motherhood. More highly educated women, expectedly, tend to postpone family formation (in a way showing a similar behavior as low educated men). However, the authors also report that this kind of gender-specific pattern did not hold in countries where the dual-earner model prevails. In Sweden or Norway, for instance, highly educated men also postponed family formation. Liefbroer (2005) argued that this result may be attributable to homogamy. Highly educated men are more often partnered with a highly educated woman who, in turn, tends to also postpone childbearing. Another plausible explanation is that highly educated men tend to develop individualistic attitudes in conflict with family formation processes (Mills et al. 2005).

We can summarize the results discussed so far as follows: (1) enrollment in education delays the formation of a new family due to role incompatibility; (2) an income effect of educational attainment may show up for women as well as for men, depending on the context; conversely, for men, a price effect may show up for similar reasons as for women, again depending on the gender role context; (3) there is evidence that low socio-economic resources are linked to a lower chance of being selected in a union for men, while the evidence is less clear-cut with regard the transition to fatherhood.

Another strand of research looks the transition to parenthood from a couple's perspective. Scholars have been looking at the relative influence of partners' intentions and characteristics on the transition to parenthood (e.g., Corijn et al. 1996; Thomson 1997; Vignoli, Drefahl, and De Santis, 2012; Jalovaara and Miettinen 2013; Begall 2013). The effect of education, in its different dimensions, may be different according to the characteristics of the partner. All these studies selected individuals who are currently in a co-residential union. This implies that those less likely to enter or to stay in a union are more likely to stay out of the picture. Additionally, most of these studies found that including men's characteristics in the analysis improved the model fit.

In Flanders (Corijn et al. 1996), Finland (Jalovaara and Miettinen 2013) and the Netherlands (Begall 2013), women's educational attainment was found to be a stronger predictor of the transition to parenthood compared to men's. The mentioned studies showed, in addition, that the timing of parenthood for the couple is strongly related to woman's age at union formation: the older the woman at the time of household formation, the shorter the expected time spent as a childless couple. Hence, what emerges is

that highly educated women form their households at a later age but move on more quickly to have their first child afterwards. The degree of educational homogamy of the couple, overall, may affect both the stability of the couple (homogamous couples tend to be more stable) and how long the couple will remain childless. Gustafsson and Worku (2006), using British and Swedish samples, found that having a higher educated partner was associated with a longer waiting time to the first birth. However, in the less prevalent cases where a highly educated woman is mated with a lower educated man, the waiting time is lower. According to the authors, the last finding implies that the education of each spouse matters for the timing of first birth. For Italy, Vignoli et al. (2012) showed that men's economic situation, in terms of income, is more crucial, compared to that of women, for the likelihood of first birth. Yet, when the authors consider the type of job-contract (temporary vs. permanent), couples whose both partners have a permanent job had higher likelihood of first birth than any other combination. This suggests that having an established position on the labor market is relevant for potential mothers as well as potential fathers, so women's economic position need not necessarily be negatively associated with the transition to parenthood, even in a context like Italy with unequal gender role expectations. In Spain, Martin-Garcia (2008) showed that couples where the man is higher educated than the woman have a higher first birth rate than educationally homogamous couples. However, couples whose man is highly educated but whose study discipline is related to health-care and relational skills have lower transition rate to first birth than couples whose men has a general upper-secondary level. Disciplines like health-care and communication sciences, for instance, are female-dominated fields of education that typically lead to jobs with a lower income than male-dominated fields of study (England 2010). The finding for Spain indicates that a prospective higher income for men is an important determinant for the transition to fatherhood.

None of the studies discussed so far account for the interrelationship between processes which make up individuals' life courses (see, section 2.1.2). To account for such interrelationship, scholars have modeled simultaneously the correlated processes (Lillard 1993; Lillard and Waite 1993; Lillard, Brien and Waite 1995; Brien, Lillard and Waite 1999). Using the approach of simultaneous equations, Billari and Philipov (2004) showed that education enrolment and attainment affect the transition to motherhood and the latter, in turns, affects the hazard of a woman to be enrolled in education and the subsequent level

of attainment (Billari and Philipov 2004). Using the same approach, Martin-Garcia (2008) showed that the reverse causation phenomenon between the participation in the education system and the transition to fatherhood processes is not significant for Spanish men. The finding corroborates the hypothesis that resources spent in education are less incompatible with family roles for men than for women (Martin-Garcia 2008).

A couple of studies have analyzed the interrelationship between first union formation and first childbirth for women (Brien et al. 1999, Baizan et al. 2003), concluding that the two processes share unobserved factors that jointly affect the experience of events. The correlation between unobserved shared factors was found to be stronger when the first union is a formal marriage rather than unmarried cohabitation. The relationship between men's first union and the transition to fatherhood has hardly been studied. Winkler-Dworak and Toulemon (2007) highlighted the endogeneity of union status when analyzing men's transition to fatherhood and considered the role of the selection into unions. To empirically demonstrate the selection mechanism, they removed union status from the hazard model for fatherhood. As expected, the effect of many covariates changed, notably the effect of education. Their results indicated that part of the positive effect of men's educational attainment on the rate of transition to fatherhood was driven by the higher rate of union formation among highly educated men. In Finland, Jalovaara and Miettinen (2013) found a strong positive and direct effect of a high level of socio-economic resources on the transition to parenthood within unions. Socio-economic resources for Finnish men and women were, then, important to be selected into unions (Jalovaara 2012) as well as to become parents. In other words, this implies that the socioeconomic gradient of couples' transition to parenthood is not strongly weakened by the selection into union in Finland (Jalovaara and Miettinen 2013, p.906). However, the authors find that the female partner's characteristics have a stronger impact on the transition to parenthood. This finding could be the consequence of a selection-into-union effect which is perhaps mainly relevant for men's socio-economic resources rather than for women's.

Begall (2013), analyzing couples' transition to first birth in the Netherlands, points out that selecting couples who lived together at the time of interview, may have biased the results in two directions: (1) underestimating the positive effect of men's earning potential and occupation position, because men with

less economic resources are less likely to live in a union and, if they do live in a union, exhibit a higher risk of separation; (2) underestimating the negative effect of women earnings, because women with higher career prospects may be less interested in family formation processes. However, additional analyzes of the author showed that including all the respondents in the model did not change the results. A finding that according to the author may be due to the group composition of the excluded respondents: they were younger and better educated (Begall 2013, pp. 926 - 927).

Overall, after reviewing theoretical arguments and empirical studies, the dynamic behind men's education and the transition to fatherhood remains ambiguous. None of the mentioned studies provided clear evidence for the fact that the poor predictive power of men's education on transition to parenthood is the result of a strong selection into unions for the highly educated men.

2.3. The selection-into-union research hypothesis

Based on the theoretical arguments and earlier empirical studies summarized above, we expect that the level of educational attainment has a consistently positive effect on men's transition to fatherhood, but that this effect is largely indirect, namely through its positive effect on the rate of union formation. Lower educated men have more difficulty finding a committed partner and therefore, all else equal, experience lower transition rates into fatherhood.

More specifically, this expectation holds for men who have completed their studies and who are no longer enrolled in education. The effect of enrolment in education is expected to be negative throughout. So, even if men who pursue a college degree will have their first child later, we are predicting consistently higher fatherhood rates for them once they have obtained their higher degree. Our hypothesis implies that the higher fatherhood rates for the college educated can be explained by the fact that they are able to match with a committed female partner more quickly than their low educated counterparts. When we model entry into a cohabiting union and entry into fatherhood jointly, we expect to find a consistent positive effect of educational attainment on union formation, whereas the effect of educational attainment on the transition to fatherhood is uncertain and may depend much more on the context.

Our selection-into-union hypothesis is based on the expectation that highly educated men tend to be very attractive on the mating market. We assume that there are at least two reasons for this. First, they have a relatively high earning potential, which, theoretically, will increase for some time after graduation. Second, highly educated men are more attractive on the mating market because on average, they hold more egalitarian gender-role attitudes, and thus may be more prone to share household chores with their partner. These two factors, however, will not be investigated here.

2.4. Contextual differences

The heterogeneity amongst the empirical findings reviewed above may be due, in part, to the different contexts within which individuals make their family-building decisions. In the analyses which follow, we will replicate our models using data for ten European countries: Austria, Belgium, Bulgaria, Estonia, France, Hungary, Lithuania, Norway, Poland and Romania.

Comparative research is fundamental in family studies because the socio-economic and cultural context may affect differently the partnership and parenting behaviour at the individual level (Yu 2015). We choose to keep a multi-country design to assess if the selection-into-union hypothesis, stated in section 2.3, is sensitive to different contexts. Specifically, the 10 European countries we selected are characterized by historical and cultural differences in demographic behavior (i.e. the so-called East-West divide, Hajnal 19965). Beyond historical and cultural continuities, it is important to underline the role of contexts with regard to the effect of education on the transition to fatherhood. In the theoretical section above, we focused on the fact that education correlates to the socio-economic resources of an individual. The extent to which education is correlated to outcomes like income and employment, however, differs across countries (Kalmijn 2013). In our specific case, differences across the selected countries may be linked to the distribution of socio-economic inequalities and welfare regimes developed after the 2nd World War.

The period after the Second World War was characterized by economic and political differences which separated European countries in two blocks: the capitalist, in the West, and the socialist, in Central and Eastern part of Europe. By the collapse of the state socialist regimes in Central and Eastern Europe

(end of the 1980s), the centralized socialist regimes were substituted by democracies and free-market economies. The societal transition posed new challenges for family behaviour of the ex-socialist countries. Beyond the previous depressed economic milieu surrounding childbearing decisions, new factors emerged, such as competition in the labor market, job and housing insecurity, and rising cost of children, which inflate the negative effect of economic problems of these countries (Frejka, 2008). The high level of job security for different strata of societies, which characterized the period before the shifting institutional setting, enhanced competition in the labor market. As a consequence, the value of higher education increased (Frejka 2008). Despite convergence policies adopted by the European Union, socio-economic inequalities have remained high, both between and within European countries. The last OECD report on the role of education in advanced societies (OECD, 2013) analyzed country-differences in returns to education. In general, the report showed that in all OECD countries highly educated people have higher chances of being employed than those without a tertiary degree and they may also improve their career prospects even in times of economic crisis. In countries like Estonia, Hungary and Poland, it seems that highly educated have higher economic returns rather than in Western European countries. Not all the fields of higher education, however, enjoy this advantage, for instance fields like history, philosophy, and religious studies experience below-average salaries and above-average unemployment rates (OECD report, p. 77, 2013).

Finally, in line with the theoretical arguments highlighted in these paragraph, our contextual expectation is that the selection-into-union hypothesis holds better in those contexts where socio-economic inequalities, derived from inequalities in education, are much stronger. This is specifically the case in Central and Eastern European countries.

3. Data and Methods

3.1. Data: the Generation and Gender Surveys

We have used GGS data of ten European countries with suitable information: Austria, Belgium, Bulgaria, Estonia, France, Hungary, Lithuania, Norway, Poland and Romania.[3] The GGS are part of a wider program whose aim is to improve the knowledge of macro and micro factors which affect the relationships between generations and between genders (http://www.ggp-i.org/). The surveys, which include individuals between 18 – 79 years old, deal with different topics such as: fertility and partnership histories, the transition to adulthood, economic activity, care duties and attitudes. For this study, the sample for each country includes men born from 1950 onwards with available information about partnership and fertility histories.

The date of first partnership formation has been coded using information on the month and year of the first co-residential partnership. If the respondent answered positively to the question "Have you ever before lived together with someone as a couple or have you ever been married?", then the first partnership coincides with "partner 1" of the partnership history grid. If the answer was negative, the first co-residential partnership coincides with the co-residential partnership (if any) at the moment of interview. In both cases we could distinguish if the partnership started as an un-married cohabitation or as a marriage. The GGS surveys collected information only on partnerships which lasted for at least three months (Vikat et al. 2007).

The date of first conception is calculated using the birth of first biological child back-dated by 8 months to avoid anticipation biases following Baizan et al. (2003). To focus exactly on the relationship between first union and first birth, respondents who experienced more than one co-residential union have been censored at the end of the first partnership, so that first births occurred during higher order union are not

[3] At the time we started working on the paper, Czech Republic was not released yet, Italy had missing information about the timing of events for men living in a union, for the Netherlands was not possible to define if the first union started as unmarried or married cohabitation, and the German GGS sample has been criticized so, for the moment, we decided not to use it (see, Kreyenfeld et al. 2010).

considered[4]. In general, we cannot perfectly know if the (first)child declared by the man is the child he had with his first co-residential partner or with a woman he did not co-reside with. As a consequence, we assume that the first co-residential partner is the mother of his first child, in case the birth occurred[5].

Men were censored at age 45 for both events, because first union and first birth are rarely occurring at very older ages, even for men Indeed, men's age at fatherhood depends on theirs partners' age at union formation, which is mostly driven by biological limitations.

We used information about the month and year of events. If the month was missing, we randomly imputed it. From an initial sample of 51224 men (for all countries), we excluded from the analysis men involved in same-sex relationships (163) and those born before 1950 (14881). Then we dropped cases with missing or misreported information on the date of first union (703) as well as date of first birth (28), cases where it was not possible to define if the event of interest occurred or not and cases for whom the timing of event was experienced before the 15th birthday (overall: 125 for first union and 29 for first birth). We obtained, then, a total sample of 35295 men.

Two aspect of education are considered: enrolment status and the highest educational attainment achieved by the respondent. Both variables are constructed as time-varying covariates, using information on the date of graduation. In case the information about the year of graduation was missing, we imputed the value according to the country-specific mean time to obtain the degree for each level of education[6]. Time since graduation is included as a categorical variable with three categories defined as follows: (1)

[4] Among the selected individuals, only in Norway the proportion of first birth in higher order unions (which have been censored) reaches the 7.4%. In France and Austria is almost 5%, whereas in Belgium 4.4%, below the 4% for the other countries.

[5] We are aware of the fact that men may tend to misreport their fertility histories (e.g. Rendall et al. 1999). The study of Rendall et al. (1999), however, focused on United States and United Kingdom, and it could be that those findings are not applicable to other European countries. For instance, a study based on the Russian GGS dataset showed that underreporting was minor concern compared to the previous findings (Alich 2009).

[6] In Lithuania we had to impute almost the 38% of cases. However, we run additional analysis, dropping the imputed cases and the results remain stable, a part, of course, for standard errors which became higher because of the lower sample size. For France the amount of imputed cases was around 12%, we proceeded such as for Lithuania and in principle we can draw similar conclusions. Basically the few differences are due to the fact that the standard errors increased affecting, slightly, the significance. For the other countries the amount of imputed cases was far below the 5%.

still enrolled in education; (2) in the first two years after graduation; (3) two or more years after graduation.

Collapsing categories from the international standard classification of education (ISCED 1997), we grouped men into three levels of attainment: low, medium and high. The first group includes those who completed primary plus lower secondary school (at least 8 years of schooling, ISCED 0, 1, 2). The medium category consists of men who attained the upper-secondary and those who also got a post-secondary level (ISCED 3, 4). Finally, highly educated men are those who got a bachelor/master/PhD degree (ISCED 5, 6). In the main models, we combined the enrolment variable (and years spent since graduation) with the categories of the educational attainment. As a result, we obtained a unique variable of 10 categories (11 considering a category for missing values).

The classification for the female partner's education follows the categorization for the educational attainment of the respondent. To catch the effect of a long-term dimension of the social status, we included parents' educational attainment, coded with 4 categories ("both parents low educated", "only the father medium-high educated", "only the mother medium-high educated", "both medium-high educated"). In addition, we included the number of siblings as a time constant variable, because, especially for fertility studies, it has been showed that individuals who had more siblings are more prone to family building processes (Murphy 2013). Overall we distinguish between three birth cohorts: 1950-1959, 1960-1969, and 1970-1990[7]. All the variables mentioned so far have been included in both the model of first conception and first union.

The model of first birth includes the endogenous variable "union status". It specifies in a time-varying way whether the man is living in a co-residential union or not. If the man is in union and the educational attainment of the female partner is available, the same variable distinguishes between men partnered with a "low", "medium" or "high" educated woman. We added a category "not available" for those men who are in union but we do not have information about partner's education. Additionally, in the model of first conception we included a time varying dummy variable which indicates if the union is a

[7] The most recent year of birth varies between countries for the youngest cohort, depending on the survey year of the country sample (see Appendix 1).

marriage or not. In the model of first union a time-varying dummy variable for the conception of the first child is included.

3.2. Methods: the piecewise linear model for single and multiple processes

To falsify the selection-into-union hypothesis, we use event history techniques. The analysis has two steps. In the first step we model separately the processes of first union and first birth. In the second step, we model the two processes by means of joint modelling. The first step has been carried out using both a piecewise exponential hazard model, (see, e.g., Blossfeld, Golsch, and Rohwer 2007) using the STATA software, and a piecewise linear hazard model, implemented in the software aML (Lillard and Panis 2003). We did apply both approaches to check whether the results would be similar, which was indeed the case. For the second step we proceeded only using the piecewise linear hazard model. In all cases we apply proportional hazard models, implying that the effect of covariates on the hazard of occurrence is multiplicative, which implies that the effect of covariates does not alter the shape of the hazard but shifts the baseline upward or downward according to the sign of the effect.

A general formulation of the piecewise linear model is:

$$\ln h(t) = \gamma\,'T(t) + \beta\,'X(t)$$

$\ln h(t)$ is the log-hazard of occurrence at time t, $\gamma\,'T(t)$ captures the baseline hazard duration dependence, and $\beta\,'X\,(t)$ represent the covariates (both fixed and time-varying) which shift the baseline hazard. The piecewise linear specification $\gamma\,'T(t)$ using five year age splines parameterize the baseline log-hazard. The duration dependence (the baseline) is characterized by a pattern (nodes and slopes) and an origin, which in this case is the beginning of the hazard spell, i.e. the 15th birthday of the respondent. The piecewise linear specification of the duration dependence lets the time-effect changing gradually and continuously (Panis, 1994).

As already mentioned, the timing of first birth and first union are endogenous, and the survival in one state affects the outcome of the other process. A common approach to the endogeneity problem is to jointly model the two processes and estimate the correlation between those factors that are unobserved (unobserved heterogeneity). In other terms, we control for the time-constant shared but unmeasured

factors that simultaneously affect the processes under study. The statistical estimation follows the framework developed by Lillard (1993), in formal terms, we have:

$$\ln h(t)^{F} = \gamma' T(t) + \beta' X(t) + \varepsilon$$

$$\ln h(t)^{U} = \gamma' T(t) + \beta' X(t) + \delta$$

The superscripts *F* and *U* refer to the equation for the transition to fatherhood and first union, respectively. The random variables ε and δ represent unobserved heterogeneity terms, which are assumed to have a joint bivariate standard normal distribution:

$$\begin{pmatrix} \varepsilon \\ \delta \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_{\epsilon}^{2} & \rho_{\varepsilon\delta} \\ \rho_{\varepsilon\delta} & \sigma_{\delta}^{2} \end{pmatrix} \right)$$

Because we consider only one single event per process, namely *first* union and *first* birth, we deal with single spells hazard models. As Aassve et al. (2003) suggested in their analysis, in presence of correlation between single spells hazard models, results tend to be sensitive to the variance of the unobserved heterogeneity terms. We have run models fixing the variance to 1 (the variance of the standard normal distribution) and estimating the variance. In general, the results tend to be robust in the direction of the effects and their significance, changing slightly with regard the magnitude of the effects. For France, and Estonia, however, the parameter of the correlation between unobserved factors changes both in terms of significance and sign of the effect. The parameter estimates of main, substantive interest are more stable, however.

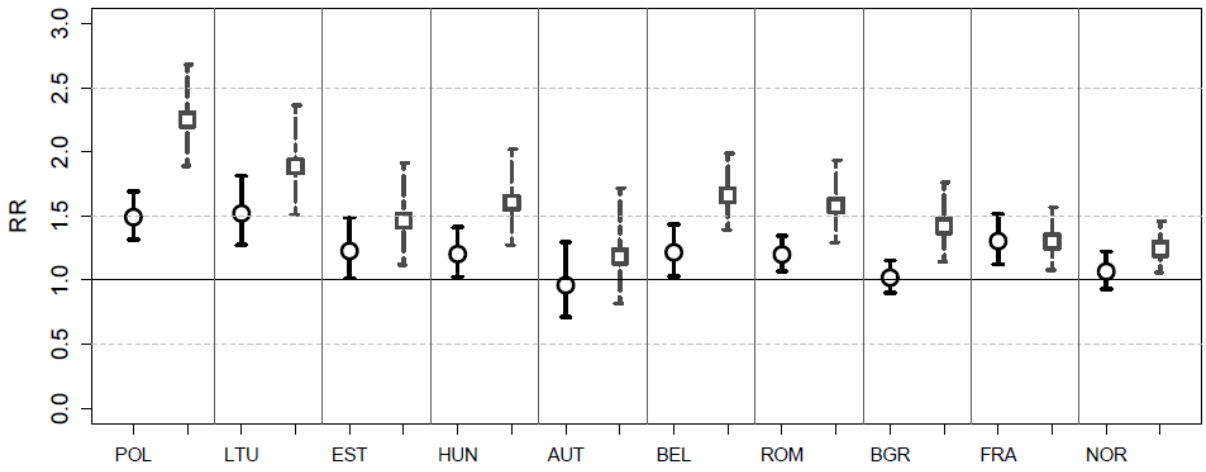
The model is estimated and replicated for each country-sample separately. We did not apply a multilevel modelling for several reasons. First of all, our aim is not to test statistically the effect of countries' characteristics but, rather, we are interested in repeatedly testing the same hypothesis in different contexts. This kind of procedure will give us insights on the sensitiveness of our hypothesis to different contexts without, however, quantifying such effect. Secondly, the number of countries considered is too small to apply multilevel modelling and test hypotheses about the role of country characteristics. Finally, if we combine our countries, we would get an averaged and (hence) stylized summary of our main finding, consistent with what we do report here; separate models, instead, leave maximum room for country differences.

4. Results

Appendix 2 presents results for all countries and for both processes, i.e. first union formation and transition to fatherhood. Figure 1 illustrates the effect of educational attainment on the transition to fatherhood for medium and highly educated men who have been out of school for two or more years (in comparison to the low educated), without controlling for partnership status. In general, we observe a positive effect of being highly educated on the transition to fatherhood. Once we control for union status, as Figure 2 shows, the effect of education is reduced in most of the countries. The first part of the analysis partly tests the selection into union hypothesis, indeed: once we control for union status, the effect of education on the transition to fatherhood changes, mostly, to a smaller and/or not statistically significant effect. This fact implies that most of the positive effect of education on the transition to fatherhood is driven by the positive effect of being in a union. We then proceed modeling jointly first birth and first union. As Figure 3 illustrates, high education improves the likelihood of experiencing the first union, whereas the effect of education on the transition to fatherhood is basically not significant.

There is, however, some variety in the general pattern when we compare countries. For convenience, we discuss the results for each kind of model for three groups of countries: (1) countries in the North-West of Europe, adding Austria; (2) the Baltic countries, and (3) Eastern European countries.

Figure 1 The effect of educational attainment on the transition to fatherhood without controlling for union status (relative risk from model estimation), 10 countries (square with dashed bars: highly educated, circles with solid bars: medium educated).



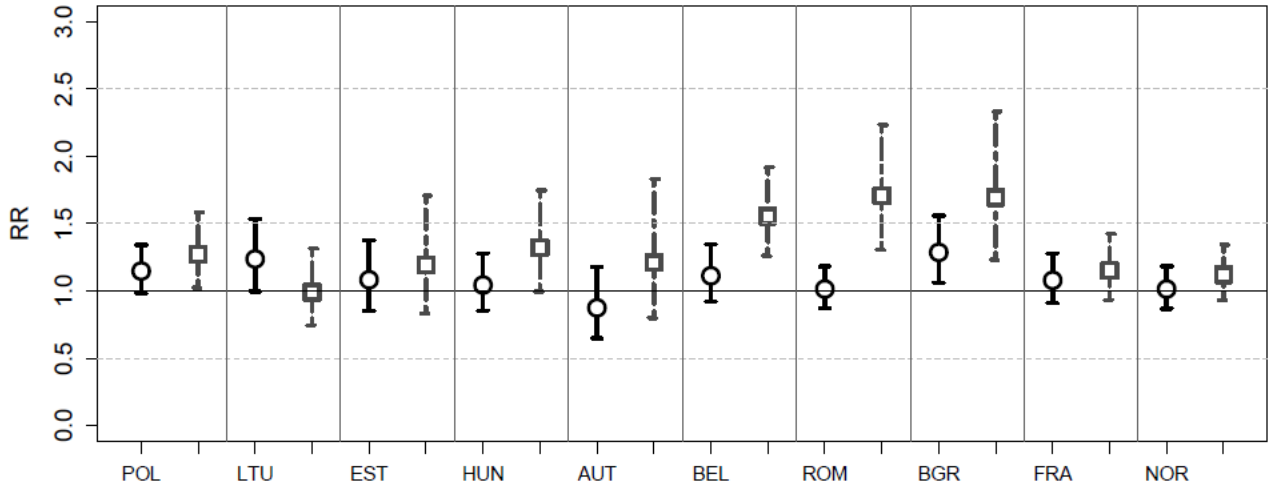
- ✓ *North-Western European countries (including Austria and Norway)*

Model 1 shows the estimates of the transition to fatherhood prior the inclusion of the variable of union status. For the first group of countries, we notice that being enrolled in education decreases fatherhood rates compared to the reference category, which in all models (and for all countries) is being a low educated men not enrolled in school since 2 years or more. In Belgium, France and, to a lesser extent, in Norway, we find a significant effect of educational attainment on the transition to fatherhood. Medium and highly educated in their first 2 years since graduation have a lower rate of transition to fatherhood compared to low educated (results showed in the Appendix 2). The same does not hold for medium and highly educated who already spent 2 or more years out of education. For instance, in Belgium, medium and highly educated show, respectively, a relative risk of 1.2 and 1.7 than low educated (see Figure 1).

Model 2 includes the process of first union formation as a covariate, but still in a single equation framework. From the results of **model 2** we can start drawing conclusions about the selection into union hypothesis. As expected, the role of partnership status is consistently and highly relevant for the transition to fatherhood in all contexts considered: being partnered (independently from female's partner education) increases the hazard of first birth. And, also unsurprisingly, being married is a booster for fatherhood.

The inclusion of union status does little to alter the covariates' profile for Austria. The same cannot be said about Belgium, France and Norway (see Figure 2). In Belgium and France, the difference in the hazard of fatherhood between medium and low educated disappears. Moreover, whereas for France and Norway, the effect of educational attainment also loses its predictive power for the highly educated; for Belgium, even if the magnitude of the effect slightly decreases, the difference between high and low educated remains strong. In addition, we may notice from the single equation model of first union formation that highly educated men, who graduated since 2 or more years, have higher transition rate to first union than low educated men in the same position. Only in Norway, differentials among educational levels are not very strong with regard to the process of first union (results shown in Appendix 2).

Figure 2 The effect of educational attainment on the transition to fatherhood once controlling for union status (relative risk from model estimation), 10 countries (square with dashed bars: highly educated, circles with solid bars: medium educated).



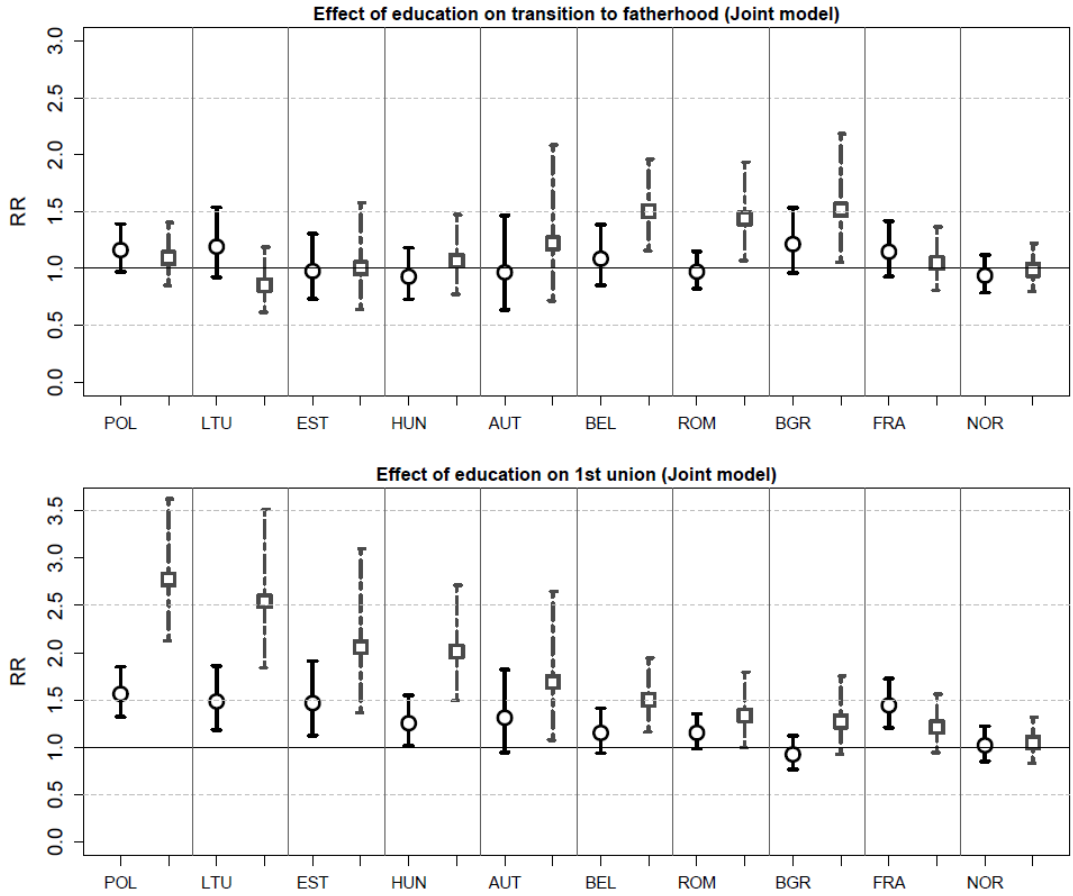
Model 3 is the joint model (JM) of the transition to fatherhood and transition to first union. The JM model accounts for the correlation between unobserved heterogeneity terms of the two processes. First, we notice that the baseline hazards of the separate model and the joint model differ, for both processes and most countries. The baseline hazard tends to change sign of the slope at an earlier age for the separate model, which does not account for unobserved heterogeneity. Without including unobserved heterogeneity, we do not account for the fact that individuals with a higher probability of experiencing the two events will leave the population at younger ages, strongly reducing the hazard at older ages for both events. When we account for this selection effect in the joint model, the baseline hazard better represents the actual effect of age rather than reflecting selection (Baizan et al. 2003). In addition, single equations modeling of the two processes separately leads, in most countries, to an underestimation both of the effect of union formation on the transition to fatherhood and of the effect of having conceived a child on the transition to partnership.

For the North-Western group of countries, the effect of education on union formation tends to remain unchanged compared to the single equation model. Similarly, once we model jointly the processes, the effect of education on the transition to fatherhood also tend to be unchanged, the effect of education remains positive and significant only for the highly educated Belgian men. In Belgium, the positive effect of education on fatherhood is not entirely due to the selection into union. It could be that in Belgium there

are strong role expectations for being a father, and that the highly educated are the most likely to meet these expectations. As alternative explanation, it could be that the effect of educational attainment represents a direct income effect on the transition to fatherhood.

Finally, results of the correlation between unobserved heterogeneity factors of the two processes vary among countries. In general, in all countries, if we exclude in the system of equations one of the two endogenous variables (union status in the equation of first birth or conception in the equation of first union) the correlation between unobservable is positive. A positive correlation term implies that there are shared unobserved factors between the processes which accelerate both the experiencing of first union and the transition to fatherhood. Once we include in the system of equations both endogenous variables, the findings with regard to the effect of education do not change substantially, but the positive correlation between un-observables disappears. Only in Belgium the correlation term between unobserved factors is positive, significant and consistent. In Austria it is not significant (probably due to the small sample size), in Norway it is positive but not significant, whereas in France the significance and sign of the correlation term are sensitive to the values of the unobserved heterogeneity factors (see tables on the correlation terms in Appendix 3).

Figure 3 The effect of education on the transition to fatherhood and first union in a simultaneous equations framework, 10 countries (square with dashed bars: highly educated, circles with solid bars: medium educated).



✓ *Baltic countries*

Estonia and Lithuania have similar stories. For both countries, being enrolled in school does not have a significant effect. It means that being enrolled is not different from being a low educated out of education since more than 2 years, in terms of the pace of the transition to fatherhood or first union formation. It is worth mentioning that the Estonian and Lithuanian populations are both characterized by a higher proportion of highly educated women than men (in the age class 25-29) since already the end of the 1970's (see, Van Bavel, 2012). Such unbalanced sex ratio makes up a difficult context for low educated men to find a partner. In principle, highly educated women tend to prefer mates with similar or higher educational attainment. As a result, in our models we observe a strong positive educational gradient for the process of first union, which even become stronger in the joint modelling framework (see Figure 3). With regard to the transition to fatherhood, we observe a strong positive educational gradient but only in

the model without partnership status (see Figure 1). Once controlling for union status, the educational attainment loses its predictive power, and the pattern does not change when we model jointly the two processes (see Figure 2 and 3). The evidence here suggests that the selection into union hypothesis is applicable to the Baltic countries.

Finally, the results of the correlation between unobserved factors of the two processes are not strongly robust for Estonia. For Lithuania the results show a negative value, meaning that there may be unobserved factors (e.g. personality traits) that enhance the experience of one event but delay the other. For instance, it could be that men, who are not inclined to become father but want to start a partnership, may decide to live with a partner, most likely preferring cohabitation over marriage, and postpone fatherhood. In any case, the observed heterogeneity (the covariate profile) already explains the positive correlation between the process of first union and transition to fatherhood.

- ✓ *South-Eastern European countries (including Poland)*

Bulgaria, Hungary, Poland and Romania form a heterogeneous group with regard the selection into union hypothesis. There are strong similarities between Hungary and Poland, and to some extent between Bulgaria and Romania.

In all these countries, men enrolled in school have a lower relative risk than low educated out of education both for the transition to union and fatherhood. More specifically, in Poland the effect of being enrolled is not significant for the transition into union, whereas in Bulgaria and Romania enrolment in education turns to be not significant once we control for partnership status in the first birth model (see detailed results in Appendix 2). It is possible that for Bulgarian and Romanian men, enrollment delays strongly the entry into first union and, as a result, once controlling for the union status in the model of first birth, enrolment in education loses its significance.

With regard to the role of educational attainment, we observe a strong positive educational gradient for the transition to first union and for the transition to first birth in Hungary and Poland (see Figure 1). However, especially when we apply a joint model framework, the effect of educational attainment tends to be reduced till losing its significance in the model of the transition to fatherhood (see Figure 3).

Results from Bulgaria show that, as expected, there is a positive educational gradient for the transition to fatherhood and first union. The joint model reveals that highly educated men have a relative risk to become fathers of about 1.5 times the low educated, graduated since 2 or more years. However, against to what predicted by the selection into union hypothesis, the effect of high education turns to be not significance for the process of first union. Overall, it seems that in Bulgaria the negative effects of education for first union, namely being enrolled in education, or being just graduated with a medium level degree, mediate the negative effect on the transition to fatherhood. In other words, we do observe a selection into union, but it refers to the fact that those enrolled in education or with a medium degree, recently obtained, experience later the first union. This pattern resembles in part the results for Romania, with the only exception that in Romania the positive educational gradient for first union remains partly significant. In addition, for Bulgaria and Romania the separate model for the transition to fatherhood underestimates the positive role of marriage, which, on the other hand, shows up only when we model the process of first union and first birth jointly.

Finally, for all these countries, the correlation term between unobserved factors is positive and significant when we do not include in the equation for first union the variable of conception, but it turns negative and significant once we control for that variable. Again, a plausible interpretation of the negative correlation between unobserved factors lays on the role of different types of unions: we observe a selection effect for men who want to get the benefits of being in a union without, however, implying any form of stability and committed behaviour which is required to become a father.

5. Discussion

The increasing interests in studying fertility from a couple's perspective motivated us to assess the role of selection into unions for the transition to fatherhood. The role of men, their intentions and behaviour, is expected to become increasingly important for the processes of family formation (Van Bavel 2012; Huinik and Kohli 2014; Goldscheider et al. 2014). With this paper we have laid down theoretical and empirical basis for future research which aims to consider the role of male partner for the process of parenthood.

In this paper we wanted to test the selection into union hypothesis, according to which the level of educational attainment has a consistent positive effect on men's transition to fatherhood, but that this effect is largely indirect, namely through its positive effect on the rate of union formation. Our results showed that the *selection into union hypothesis* is applicable mostly to Central and Eastern European countries, with exception of Bulgaria and Romania. For the latter countries we do observe a selection-into-union effect of education on the transition to fatherhood, but this effect is mostly due to the negative effect of being enrolled in school, which delays the transition to first union.

Some limitations of this study need to be mentioned. First, the transition to first union is not modelled as a competing risk process (i.e. marriage vs. cohabitation). The selection effect which would lead highly committed men to marry and having children, rather than cohabit, it is not modelled. The fact that the process of first union does not distinguish between marriage and cohabitation could affect the correlation terms between unobserved factors. Men who are more inclined to commitment, and then marriage, would probably have a first child earlier than those who do cohabit. As a result, the correlation term between unobserved factors could tend to be more positive for the relation between marriage and first child, rather than unmarried cohabitation and first child. Additionally, in contexts where cohabitation is not yet considered the ideal partnership setting to raise a child, it is reasonable to expect a weaker (or even negative) correlation between unobserved factors of first birth and first union. The aim of the paper, however, was not to analyze the role of different kind of living arrangement histories, but rather the effect of being in a union vs. not being in a union. We are aware of the different meaning of marriage and cohabitation and, for this purpose, we also control for type of union in the equation of the transition to fatherhood.

A second limitation regards the adequacy of the proportionality assumption within our multiprocess framework. According to the proportionality assumption, the effect of each covariate on the hazard of an event is multiplicative over time. This implies that the effect of education is the same over age splines. However, previous studies have shown that this may not be the case when we model life events, such as the transition to first union or first birth (see e.g. Corijn and Klijzing 2001). Usually, to account for the possibility that the effect of education may not be proportional over time, the tendency is to include an

interaction effect between education and individual's age. The aML software, however, does not allow an interaction between age splines and a time-varying covariate, such as education. As a consequence, to partially account for a timing effect, we included time since graduation in the definition of the educational categories. In such way, we were able to compare men with different level of education who spent the same amount of time out of education.

Next, our paper focused only on two dimensions of education: enrolment and attainment. Still it would be interesting to test if the selection-into-union hypothesis holds with regard to the effect of educational field of study. On a contextual level, future research could also address the role of mating market composition in terms of educational distribution on the selection effect at the time of union, including, then, both individual and country level indicators. As Van Bavel (2012) argued, a consequence of the educational mating-market composition at the micro-level would be that low educated men, to avoid remaining single, may compete for a highly educated woman, adapting their behaviour to the role of male-household carer.

All in all, we argue that the selection into union hypothesis should be taken into account especially when we compare the role of women and men in the process of parenthood. It may be also the case that for higher order unions and births the dynamic changes. For instance, it is plausible to expect a stronger direct income effect of men's socio-economic background on second and higher order births. Yet, the role of men's characteristics, intentions and behaviour may even become more and more important for the future of fertility; but we may risk not seeing such a dynamic if the focus remains only on one family process and one partner at a time.

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7. Appendices

Appendix 1: Descriptive statistics by country

	BGR	FRA	HUN	ROM	NOR	AUT	EST	BEL	LTU	POL
Cohort %										
1950-1959	20.10	28.09	29.40	31.30	25.65	0.00	28.52	27.55	25.16	29.20
1960-1969	29.59	30.71	22.76	29.65	28.00	29.84	27.22	28.07	24.84	20.07
1970-1987[1]	50.31	41.20	47.84	39.05	46.35	70.16	44.26	44.38	50.00	50.72
Education %										
low	23.79	21.54	12.97	21.44	19.70	10.54	17.80	26.25	14.47	12.20
medium	62.20	50.26	73.38	66.62	48.41	72.35	62.39	38.19	64.78	67.98
high	13.96	28.20	13.65	11.94	30.80	17.11	19.81	35.00	20.75	19.35
unknown	0.05	0.00	0.00	0.00	1.09	0.00	0.00	0.56	0.00	0.47
Parents'education %										
both low	42.07	49.56	34.72	60.62	21.25	24.13	32.14	44.85	35.71	31.89
only father medium-high	9.51	17.25	21.99	16.59	22.42	25.36	12.12	18.43	7.39	14.41
only mother medium-high	12.21	11.55	7.20	4.03	18.86	9.72	20.02	11.85	21.19	10.92
both medium-high	32.94	12.50	35.38	17.07	32.78	36.00	35.40	19.51	27.03	38.91
both unknown	3.27	9.14	0.71	1.69	4.69	4.79	0.32	5.36	8.68	3.87
Partner's education %										
low	15.16	11.16	8.44	20.46	7.13	12.12	8.60	11.63	4.09	6.59
medium	33.89	20.76	30.72	38.51	17.26	48.22	55.41	13.02	38.28	47.05
high	14.18	14.67	8.39	7.34	17.49	9.06	16.02	18.17	16.13	18.46
unknown	0.59	31.42	22.60	10.35	34.71	0.15	0.00	39.49	14.20	0.42
not rstpartner	36.18	22.00	29.85	23.34	23.41	30.45	19.97	17.69	27.29	27.48
Siblings %										
no sib	13.66	6.59	11.67	15.12	4.90	10.13	14.50	9.90	16.89	8.07
1	55.54	25.86	48.58	31.91	29.15	33.30	46.32	29.37	41.06	29.38
2	14.57	25.54	21.33	22.05	32.05	24.34	21.32	21.84	21.74	24.92
3+	16.22	42.01	18.42	30.91	33.90	32.23	17.86	38.88	20.31	37.63
N events 1st birth										
No 1st child	1796	1464	2104	1438	2346	1155	678	1126	1549	2314
1st child	2273	1359	1675	2457	2690	809	1170	1186	1873	3833
N events 1st union										
No union	1472	621	1128	909	1179	598	369	409	934	1689
1st union	2597	2202	2651	2986	3857	1366	1479	1903	2488	4458
N	4069	2823	3779	3895	5036	1964	1848	2312	3422	6147

[1] The higher limit for this cohort di eres among countries: 1983 (Estonia, Hungary); 1988 (Norway); 1989 (Lithuania); 1990 (Austria, Belgium); 1993 (Poland).

Appendix 2: Models

Model1 refers to the analysis of first birth without controlling for the union status. Model2 is the full model either of first birth or first union. Model3 includes the results of the joint model.

Austria - First birth										
	Model1			Model2				Model3		
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE
15-19	0.702	2.018	0.08***	0.543	1.721	0.08	***	0.535	1.707	0.081***
20-24	0.192	1.212	0.031***	0.036	1.037	0.032		0.061	1.063	0.037*
25-29	0.01	1.01	0.028	-0.066	0.936	0.029	**	-0.035	0.966	0.035
30-34	0.001	1.001	0.039	-0.037	0.964	0.041		0.012	1.012	0.045
35-39	-0.298	0.742	0.092***	-0.29	0.748	0.092	***	-0.255	0.775	0.093***
40+	-0.028	0.972	0.29	-0.028	0.972	0.301		-0.055	0.946	0.289
Constant	-7.508	0.001	0.434***	-7.139	0.001	0.423	***	-7.913	0	0.471***
ref. cat. 1970-1987										
1950-59	0	1	0	0	1	0		0	1	0
1960-69	0.402	1.495	0.075***	0.322	1.38	0.081	***	0.477	1.611	0.103***
ref. cat. low2+										
inedu	-0.517	0.596	0.177***	-0.571	0.565	0.176	***	-0.53	0.589	0.238**
low0-2	1.304	3.684	0.381***	0.964	2.622	0.402	**	1.128	3.089	0.423***
medium0-2	-0.259	0.772	0.213	-0.332	0.717	0.209		-0.219	0.803	0.256
medium2+	-0.04	0.961	0.153	-0.134	0.875	0.153		-0.035	0.966	0.213
high0-2	-0.288	0.75	0.272	-0.218	0.804	0.261		-0.284	0.753	0.318
high2+	0.169	1.184	0.19	0.191	1.21	0.211		0.2	1.221	0.273
eduNA	0	1	0	0	1	0		0	1	0
ref.cat. BOTHlow										
DADmedium-high	-0.168	0.845	0.095*	-0.186	0.83	0.111	*	-0.245	0.783	0.14*
MOMmedium-high	-0.137	0.872	0.14	-0.295	0.745	0.166	*	-0.43	0.651	0.192**
BOTHmedium-high	-0.225	0.799	0.101**	-0.234	0.791	0.114	**	-0.253	0.776	0.143*
bothNA	0.039	1.04	0.174	-0.005	0.995	0.16		-0.073	0.93	0.212
ref.cat.No siblings										
sib1	0.497	1.644	0.145***	0.45	1.568	0.151	***	0.56	1.751	0.199***
sib2	0.449	1.567	0.149***	0.43	1.537	0.156	***	0.527	1.694	0.205**
sib3	0.545	1.725	0.146***	0.525	1.69	0.152	***	0.688	1.99	0.203***
ref.cat.Not in union										
inunionLOW				1.872	6.501	0.167	***	2.422	11.268	0.229***
inunionMEDIUM				1.825	6.203	0.111	***	2.186	8.9	0.182***
inunionHIGH				1.66	5.259	0.159	***	1.888	6.606	0.216***
inunionNA				0	1	0		0	1	0
marrie(ref.cat. Not married)				1.174	3.235	0.097	***	1.596	4.933	0.107***

Austria - First union										
				Model2				Model3		
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE
15-19				0.51	1.665	0.038***		0.55	1.733	0.04 ***
20-24				0.08	1.083	0.022***		0.166	1.181	0.024 ***
25-29				-0.025	0.975	0.026		0.07	1.073	0.029 **
30-34				-0.155	0.856	0.048***		-0.103	0.902	0.05 **
35-39				-0.099	0.906	0.102		-0.078	0.925	0.104
40+				0.158	1.171	0.212		0.227	1.255	0.21
Constant				-5.323	0.005	0.227***		-5.932	0.003	0.278 ***
1950-59				0	1	0		0	1	0
1960-69				0.023	1.023	0.06		0.038	1.039	0.086
inedu				0.139	1.149	0.131		0.11	1.116	0.172
low0-2				0.924	2.519	0.313***		0.936	2.55	0.336 ***
medium0-2				0.229	1.257	0.148		0.242	1.274	0.182
medium2+				0.203	1.225	0.127		0.273	1.314	0.167
high0-2				0.255	1.29	0.222		0.31	1.363	0.263
high2+				0.483	1.621	0.173***		0.525	1.69	0.229 **
eduNA				0	1	0		0	1	0
DADmedium-high				0.093	1.097	0.082		0.13	1.139	0.111
MOMmedium-high				0.232	1.261	0.115**		0.406	1.501	0.155 ***
BOTHmedium-high				-0.004	0.996	0.08		0.012	1.012	0.116
bothNA				0.233	1.262	0.139*		0.363	1.438	0.207 *
sib1				0.129	1.138	0.101		0.192	1.212	0.139
sib2				0.129	1.138	0.102		0.164	1.178	0.145
sib3				0.015	1.015	0.102		0.048	1.049	0.145
child1(ref.cat.No conception)				1.281	3.6	0.127***		2.04	7.691	0.196 ***
SigEps								1		
SigDelta								1		
Rho								-0.219		0.173
ln-L				-11079.25				-11015.8		

Belgium - First birth

	Model1			Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19	0.758	2.134	0.134***	0.604	1.829	0.132	***	0.543	1.721	0.131	***
20-24	0.284	1.328	0.031***	0.067	1.069	0.032	**	0.131	1.14	0.037	***
25-29	0.012	1.012	0.021	-0.004	0.996	0.021		0.096	1.101	0.025	***
30-34	-0.162	0.85	0.031***	-0.162	0.85	0.03	***	-0.132	0.876	0.032	***
35-39	-0.131	0.877	0.054**	-0.138	0.871	0.052	***	-0.115	0.891	0.052	**
40+	-0.406	0.666	0.148***	-0.41	0.664	0.147	***	-0.406	0.666	0.146	***
Constant	-7.978	0	0.654***	-8.041	0	0.644	***	-8.392	0	0.644	***
ref. cat. 1970-1987											
1950-59	0.109	1.115	0.079	-0.139	0.87	0.091		-0.033	0.968	0.117	
1960-69	0.15	1.162	0.072**	0.113	1.12	0.075		0.159	1.172	0.096	*
ref. cat. low2+											
inedu	-0.691	0.501	0.139***	-0.421	0.656	0.145	***	-0.595	0.552	0.167	***
low0-2	-0.009	0.991	0.377	0.277	1.319	0.383		0.237	1.267	0.417	
medium0-2	-0.725	0.484	0.287**	-0.427	0.652	0.295		-0.425	0.654	0.311	
medium2+	0.196	1.217	0.085**	0.107	1.113	0.097		0.082	1.085	0.124	
high0-2	-0.577	0.562	0.184***	-0.393	0.675	0.184	**	-0.59	0.554	0.205	***
high2+	0.509	1.664	0.091***	0.442	1.556	0.107	***	0.409	1.505	0.135	***
eduNA	0.295	1.343	0.292	0.667	1.948	0.455		0.627	1.872	0.785	
ref.cat. BOTHlow											
DADmedium-high	-0.052	0.949	0.083	-0.022	0.978	0.092		-0.037	0.964	0.119	
MOMmedium-high	0.016	1.016	0.104	0.095	1.1	0.114		0.117	1.124	0.148	
BOTHmedium-high	-0.149	0.862	0.091	-0.127	0.881	0.098		-0.219	0.803	0.125	*
bothNA	0.027	1.027	0.133	0.075	1.078	0.15		0.146	1.157	0.193	
ref.cat.No siblings											
sib1	0.088	1.092	0.117	0.061	1.063	0.12		0.146	1.157	0.15	
sib2	0.254	1.289	0.12**	0.2	1.221	0.123		0.32	1.377	0.153	**
sib3	0.251	1.285	0.112**	0.235	1.265	0.115	**	0.333	1.395	0.143	**
ref.cat.Not in union											
inunionLOW				2.55	12.807	0.15	***	2.519	12.416	0.209	***
inunionMEDIUM				2.645	14.083	0.143	***	2.622	13.763	0.189	***
inunionHIGH				2.635	13.943	0.132	***	2.561	12.949	0.171	***
inunionNA				1.708	5.518	0.115	***	1.441	4.225	0.207	***
marrie(ref.cat. Not married)				0.567	1.763	0.079	***	0.868	2.382	0.098	***

Belgium - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.205	1.228	0.024***		0.265	1.303	0.025	***
20-24				0.088	1.092	0.019***		0.197	1.218	0.02	***
25-29				-0.136	0.873	0.025***		-0.045	0.956	0.028	
30-34				-0.124	0.883	0.041***		-0.101	0.904	0.042	**
35-39				-0.089	0.915	0.065		-0.073	0.93	0.067	
40+				-0.275	0.76	0.144*		-0.265	0.767	0.146	*
Constant				-3.229	0.04	0.146***		-3.637	0.026	0.183	***
1950-59				-0.032	0.969	0.06		-0.113	0.893	0.086	
1960-69				-0.077	0.926	0.058		-0.14	0.869	0.087	
inedu				-0.362	0.696	0.08***		-0.435	0.647	0.102	***
low0-2				-0.316	0.729	0.158**		-0.375	0.687	0.164	**
medium0-2				-0.306	0.736	0.12**		-0.365	0.694	0.136	***
medium2+				0.153	1.165	0.076**		0.143	1.154	0.104	
high0-2				0.143	1.154	0.111		0.072	1.075	0.135	
high2+				0.356	1.428	0.097***		0.408	1.504	0.131	***
eduNA				-0.082	0.921	0.211		-0.376	0.687	0.34	
DADmedium-high				0.088	1.092	0.066		0.102	1.107	0.096	
MOMmedium-high				0.076	1.079	0.085		0.125	1.133	0.122	
BOTHmedium-high				0.023	1.023	0.073		0.028	1.028	0.106	
bothNA				0.07	1.073	0.099		0.068	1.07	0.14	
sib1				0.025	1.025	0.092		0.041	1.042	0.131	
sib2				0.092	1.096	0.095		0.119	1.126	0.136	
sib3				-0.026	0.974	0.087		-0.076	0.927	0.126	
child1(ref.cat.No conception)				0.864	2.373	0.175***		1.434	4.195	0.373	***
SigEps								1			
SigDelta								1			
Rho								0.35		0.151	**
ln-L				-15476.11				-15421.65			

France - First birth

	Model1			Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19	0.759	2.136	0.1***	0.564	1.758	0.097	***	0.514	1.672	0.1	***
20-24	0.221	1.247	0.025***	-0.049	0.952	0.027	*	0.001	1.001	0.034	
25-29	0.021	1.021	0.02	0.035	1.036	0.02	*	0.118	1.125	0.024	***
30-34	-0.166	0.847	0.03***	-0.154	0.857	0.03	***	-0.132	0.876	0.033	***
35-39	-0.171	0.843	0.056***	-0.167	0.846	0.056	***	-0.147	0.863	0.056	***
40+	-0.246	0.782	0.143*	-0.248	0.78	0.139	*	-0.228	0.796	0.138	*
Constant	-7.677	0	0.489***	-7.332	0.001	0.467	***	-7.749	0	0.492	***
ref. cat. 1970-1987											
1950-59	0.184	1.202	0.077**	0.008	1.008	0.085		0.101	1.106	0.107	
1960-69	0.152	1.164	0.07**	0.146	1.157	0.069	**	0.179	1.196	0.087	**
ref. cat. low2+											
inedu	-0.673	0.51	0.122***	-0.406	0.666	0.13	***	-0.492	0.611	0.156	***
low0-2	0.309	1.362	0.604	0.606	1.833	0.63		0.587	1.799	0.659	
medium0-2	-0.507	0.602	0.212**	-0.395	0.674	0.215	*	-0.415	0.66	0.235	*
medium2+	0.266	1.305	0.076***	0.076	1.079	0.087		0.137	1.147	0.108	
high0-2	-0.187	0.829	0.162	-0.052	0.949	0.165		-0.201	0.818	0.188	
high2+	0.264	1.302	0.095***	0.142	1.153	0.108		0.047	1.048	0.134	
eduNA	0	1	0	0	1	0		0	1	0	
ref.cat. BOTHlow											
DADmedium-high	-0.089	0.915	0.085	-0.014	0.986	0.086		-0.014	0.986	0.109	
MOMmedium-high	-0.155	0.856	0.097	-0.193	0.824	0.101	*	-0.281	0.755	0.121	**
BOTHmedium-high	-0.194	0.824	0.101*	-0.131	0.877	0.11		-0.145	0.865	0.128	
bothNA	-0.222	0.801	0.105**	0.122	1.13	0.104		0.123	1.131	0.146	
ref.cat.No siblings											
sib1	0.06	1.062	0.125	-0.163	0.85	0.127		-0.183	0.833	0.161	
sib2	0.063	1.065	0.126	-0.061	0.941	0.127		-0.053	0.948	0.163	
sib3	0.084	1.088	0.122	-0.067	0.935	0.122		-0.038	0.963	0.158	
ref.cat.Not in union											
inunionLOW				2.962	19.337	0.135	***	3.244	25.636	0.185	***
inunionMEDIUM				2.895	18.084	0.112	***	3.023	20.553	0.163	***
inunionHIGH				2.722	15.211	0.117	***	2.728	15.302	0.165	***
inunionNA				1.135	3.111	0.132	***	1.005	2.732	0.212	***
marrie(ref.cat. Not married)				0.978	2.659	0.071	***	1.345	3.838	0.079	***

France - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.794	2.212	0.048	***	0.8	2.226	0.1	***
20-24				0.104	1.11	0.016	***	0.237	1.267	0.034	***
25-29				-0.14	0.869	0.021	***	-0.043	0.958	0.024	*
30-34				-0.092	0.912	0.035	***	-0.058	0.944	0.033	
35-39				-0.174	0.84	0.065	***	-0.165	0.848	0.056	**
40+				0.008	1.008	0.122		0.014	1.014	0.138	
Constant				-6.357	0.002	0.255	***	-6.779	0.001	0.287	***
1950-59				0.058	1.06	0.058		0.091	1.095	0.083	
1960-69				0.039	1.04	0.054		0.052	1.053	0.078	
inedu				-0.382	0.682	0.077	***	-0.555	0.574	0.103	***
low0-2				-0.175	0.839	0.427		-0.26	0.771	0.435	
medium0-2				0.056	1.058	0.101		0.007	1.007	0.12	
medium2+				0.278	1.32	0.065	***	0.368	1.445	0.091	***
high0-2				0.104	1.11	0.107		-0.046	0.955	0.129	
high2+				0.239	1.27	0.093	**	0.195	1.215	0.129	
eduNA				0	1	0		0	1	0	
DADmedium-high				0.113	1.12	0.067	*	0.18	1.197	0.088	**
MOMmedium-high				0.125	1.133	0.079		0.214	1.239	0.11	*
BOTHmedium-high				-0.016	0.984	0.078		-0.044	0.957	0.106	
bothNA				-0.041	0.96	0.085		0.049	1.05	0.126	
sib1				0.068	1.07	0.101		0.063	1.065	0.151	
sib2				0.053	1.054	0.101		0.026	1.026	0.153	
sib3				-0.014	0.986	0.099		-0.025	0.975	0.149	
child1(ref.cat.No conception)				1.262	3.532	0.151	***	2.094	8.117	0.206	***
SigEps								1			
SigDelta								1			
Rho								0.101		0.139	
ln-L				-17340.9				-17285.24			

Norway - First birth

	Model1			Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19	0.846	2.33	0.061***	0.699	2.012	0.057	***	0.681	1.976	0.058	***
20-24	0.249	1.283	0.017***	0.002	1.002	0.019		0.05	1.051	0.022	**
25-29	0.037	1.038	0.015**	-0.006	0.994	0.015		0.086	1.09	0.019	***
30-34	-0.076	0.927	0.022***	-0.064	0.938	0.021	***	-0.009	0.991	0.024	
35-39	-0.264	0.768	0.045***	-0.271	0.763	0.045	***	-0.242	0.785	0.046	***
40+	-0.194	0.824	0.108*	-0.211	0.81	0.106	**	-0.208	0.812	0.108	*
Constant	-8.265	0	0.305***	-7.628	0	0.289	***	-8.157	0	0.309	***
ref. cat. 1970-1987											
1950-59	0.557	1.745	0.054***	0.418	1.519	0.059	***	0.655	1.925	0.075	***
1960-69	0.395	1.484	0.05***	0.317	1.373	0.05	***	0.4	1.492	0.063	***
ref. cat. low2+											
inedu	-0.285	0.752	0.07***	-0.32	0.726	0.078	***	-0.442	0.643	0.09	***
low0-2	0.549	1.732	0.282*	0.265	1.303	0.274		0.147	1.158	0.298	
medium0-2	0.04	1.041	0.101	-0.022	0.978	0.104		-0.086	0.918	0.115	
medium2+	0.065	1.067	0.07	0.014	1.014	0.079		-0.065	0.937	0.09	
high0-2	-0.087	0.917	0.105	-0.174	0.84	0.11		-0.324	0.723	0.124	***
high2+	0.218	1.244	0.082***	0.113	1.12	0.093		-0.013	0.987	0.108	
eduNA	-0.21	0.811	0.259	0.05	1.051	0.266		-0.234	0.791	0.336	
ref.cat. BOTHlow											
DADmedium-high	0.058	1.06	0.062	-0.033	0.968	0.072		-0.079	0.924	0.084	
MOMmedium-high	0.028	1.028	0.065	-0.036	0.965	0.074		-0.056	0.946	0.092	
BOTHmedium-high	-0.071	0.931	0.06	-0.099	0.906	0.069		-0.21	0.811	0.083	**
bothNA	-0.173	0.841	0.093*	-0.239	0.787	0.127	*	-0.396	0.673	0.144	***
ref.cat.No siblings											
sib1	0.048	1.049	0.099	-0.073	0.93	0.102		-0.018	0.982	0.136	
sib2	0.143	1.154	0.098	-0.059	0.943	0.102		0.047	1.048	0.136	
sib3	0.234	1.264	0.097**	0.076	1.079	0.101		0.192	1.212	0.136	
ref.cat.Not in union											
inunionLOW				2.401	11.034	0.11	***	2.657	14.253	0.141	***
inunionMEDIUM				2.488	12.037	0.077	***	2.699	14.865	0.112	***
inunionHIGH				2.421	11.257	0.071	***	2.446	11.542	0.111	***
inunionNA				1.758	5.801	0.07	***	1.732	5.652	0.115	***
marrie(ref.cat. Not married)				0.695	2.004	0.053	***	1.132	3.102	0.059	***

Norway - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.822	2.275	0.034***		0.83	2.293	0.034	***
20-24				0.173	1.189	0.012***		0.292	1.339	0.014	***
25-29				-0.13	0.878	0.015***		-0.015	0.985	0.017	
30-34				-0.061	0.941	0.026**		-0.021	0.979	0.028	
35-39				-0.231	0.794	0.051***		-0.203	0.816	0.052	***
40+				0.001	1.001	0.091		-0.006	0.994	0.093	
Constant				-6.89	0.001	0.189***		-7.3	0.001	0.213	***
1950-59				0.065	1.067	0.045		0.101	1.106	0.063	
1960-69				0.107	1.113	0.042**		0.147	1.158	0.06	**
inedu				-0.065	0.937	0.062		-0.247	0.781	0.082	***
low0-2				0.697	2.008	0.175***		0.512	1.669	0.189	***
medium0-2				0.063	1.065	0.083		-0.082	0.921	0.099	
medium2+				0.064	1.066	0.07		0.022	1.022	0.092	
high0-2				0.208	1.231	0.094**		0.099	1.104	0.115	
high2+				0.148	1.16	0.091		0.048	1.049	0.117	
eduNA				0.33	1.391	0.217		0.126	1.134	0.242	
DADmedium-high				0.084	1.088	0.055		0.095	1.1	0.077	
MOMmedium-high				0.032	1.033	0.06		0.047	1.048	0.082	
BOTHmedium-high				-0.045	0.956	0.053		-0.084	0.919	0.076	
bothNA				-0.207	0.813	0.094**		-0.286	0.751	0.14	**
sib1				0.119	1.126	0.089		0.164	1.178	0.119	
sib2				0.2	1.221	0.089**		0.279	1.322	0.117	**
sib3				0.173	1.189	0.088*		0.238	1.269	0.118	**
child1(ref.cat.No conception)				1.246	3.476	0.082***		1.966	7.142	0.141	***
SigEps								1			
SigDelta								1			
Rho								0.173		0.108	
ln-L				-31911.09				-31692.67			

Estonia - First birth

	Model1			Model2			Model3		
	beta	exp(beta)	SE	beta	exp(beta)	SE	beta	exp(beta)	SE
15-19	0.771	2.162	0.063 ***	0.537	1.711	0.062 ***	0.51	1.665	0.064***
20-24	0.165	1.179	0.022 ***	-0.101	0.904	0.025 ***	-0.084	0.919	0.049*
25-29	-0.141	0.868	0.027 ***	-0.147	0.863	0.029 ***	-0.127	0.881	0.042***
30-34	-0.118	0.889	0.051 **	-0.161	0.851	0.052 ***	-0.151	0.86	0.063**
35-39	-0.335	0.715	0.117 ***	-0.339	0.712	0.114 ***	-0.346	0.708	0.122***
40+	-0.208	0.812	0.231	-0.268	0.765	0.251	-0.241	0.786	0.244
Constant	-7.136	0.001	0.334 ***	-6.607	0.001	0.324 ***	-7.018	0.001	0.341***
ref. cat. 1970-1987									
1950-59	0.689	1.992	0.084 ***	0.512	1.669	0.102 ***	0.558	1.747	0.14***
1960-69	0.614	1.848	0.08 ***	0.624	1.866	0.092 ***	0.661	1.937	0.121***
ref. cat. low2+									
inedu	-0.228	0.796	0.122 *	-0.257	0.773	0.143 *	-0.438	0.645	0.177**
low0-2	0.204	1.226	0.32	0.117	1.124	0.323	0.022	1.022	0.341
medium0-2	-0.57	0.566	0.171 ***	-0.544	0.58	0.177 ***	-0.651	0.522	0.196***
medium2+	0.205	1.228	0.098 **	0.08	1.083	0.122	-0.024	0.976	0.148
high0-2	0.041	1.042	0.178	-0.16	0.852	0.199	-0.358	0.699	0.25
high2+	0.382	1.465	0.137 ***	0.176	1.192	0.183	0.003	1.003	0.231
eduNA	0	1	0	0	1	0	0	1	0
ref.cat. BOTHlow									
DADmedium-high	0.258	1.294	0.097 ***	-0.028	0.972	0.125	-0.035	0.966	0.176
MOMmedium-high	-0.076	0.927	0.09	-0.083	0.92	0.106	-0.077	0.926	0.126
BOTHmedium-high	-0.025	0.975	0.083	-0.214	0.807	0.099 **	-0.308	0.735	0.126**
bothNA	-0.861	0.423	0.518 *	-1.038	0.354	0.806	-0.891	0.41	0.936
ref.cat.No siblings									
sib1	0.1	1.105	0.09	0.139	1.149	0.104	0.194	1.214	0.132
sib2	0.195	1.215	0.1 *	0.121	1.129	0.121	0.198	1.219	0.162
sib3	0.056	1.058	0.109	0.1	1.105	0.131	0.149	1.161	0.163
ref.cat.Not in union									
inunionLOW				2.997	20.025	0.16 ***	3.814	45.331	0.294***
inunionMEDIUM				2.953	19.163	0.107 ***	3.755	42.734	0.253***
inunionHIGH				2.91	18.357	0.133 ***	3.681	39.686	0.27***
inunionNA				0	1	0	0	1	0
marrie(ref.cat. Not married)				0.383	1.467	0.09 ***	0.67	1.954	0.102***

Estonia - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.71	2.033	0.047	***	0.712	2.038	0.048	***
20-24				0.099	1.104	0.021	***	0.244	1.276	0.024	***
25-29				-0.211	0.81	0.033	***	-0.114	0.892	0.032	***
30-34				-0.063	0.939	0.059		-0.039	0.962	0.064	
35-39				-0.219	0.804	0.126*		-0.198	0.82	0.136	
40+				-0.184	0.832	0.301		-0.16	0.852	0.309	
Constant				-6.297	0.002	0.259	***	-6.845	0.001	0.286	***
1950-59				0.39	1.477	0.086	***	0.356	1.428	0.109	***
1960-69				0.315	1.371	0.082	***	0.268	1.307	0.1	***
inedu				0.048	1.049	0.118		0.01	1.01	0.145	
low0-2				0.695	2.004	0.218	***	0.743	2.102	0.235	***
medium0-2				-0.21	0.811	0.142		-0.211	0.81	0.162	
medium2+				0.345	1.412	0.107	***	0.384	1.468	0.135	***
high0-2				0.442	1.556	0.168	***	0.367	1.443	0.207	*
high2+				0.653	1.92	0.181	***	0.722	2.059	0.209	***
eduNA				0	1	0		0	1	0	
DADmedium-high				0.139	1.149	0.122		0.307	1.359	0.158	*
MOMmedium-high				0.03	1.031	0.086		-0.017	0.983	0.112	
BOTHmedium-high				0.141	1.152	0.092		0.285	1.33	0.115	**
bothNA				-0.081	0.922	0.296		-0.159	0.853	0.416	
sib1				0.035	1.036	0.09		0.079	1.082	0.114	
sib2				0.237	1.267	0.101**		0.337	1.401	0.129	***
sib3				0.068	1.07	0.108		0.14	1.15	0.14	
child1(ref. no conception)				2.13	8.418	0.146	***	3.493	32.884	0.265	***
SigEps								1			
SigDelta								1			
Rho								-0.533		0.279	*
ln-L				-11946.05				-11765.65			

Lithuania - First birth

	Model1			Model2			Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE	beta	exp(beta)	SE	
15-19	0.825	2.282	0.063***	0.713	2.041	0.06***	0.708	2.03	0.061	***
20-24	0.256	1.292	0.021***	0.027	1.027	0.023	-0.001	0.999	0.025	
25-29	-0.112	0.894	0.02***	-0.12	0.887	0.02***	-0.136	0.873	0.023	***
30-34	-0.245	0.783	0.038***	-0.224	0.8	0.037***	-0.218	0.804	0.038	***
35-39	-0.08	0.923	0.07	-0.089	0.915	0.068	-0.068	0.934	0.069	
40+	-0.592	0.553	0.239**	-0.59	0.554	0.232**	-0.594	0.552	0.216	***
Constant	-8.222	0	0.324***	-7.737	0	0.323***	-8.201	0	0.348	***
ref. cat. 1970-1987										
1950-59	0.203	1.225	0.064***	0.097	1.102	0.081	0.173	1.188	0.091	*
1960-69	0.379	1.461	0.062***	0.302	1.353	0.074***	0.339	1.404	0.089	***
ref. cat. low2+										
inedu	0.192	1.212	0.112*	0.14	1.151	0.126	0.028	1.028	0.146	
low0-2	0.264	1.302	0.227	0.06	1.062	0.23	-0.039	0.962	0.233	
medium0-2	0.368	1.445	0.121***	0.202	1.223	0.133	0.079	1.083	0.153	
medium2+	0.419	1.52	0.09***	0.213	1.238	0.11*	0.175	1.191	0.13	
high0-2	0.339	1.404	0.146**	0.079	1.082	0.164	0.012	1.012	0.188	
high2+	0.636	1.889	0.114***	-0.01	0.99	0.145	-0.159	0.853	0.168	
eduNA	0	1	0	0	1	0	0	1	0	
ref.cat. BOTHlow										
DADmedium-high	-0.221	0.802	0.099**	-0.19	0.827	0.133	-0.211	0.81	0.128	*
MOMmedium-high	-0.009	0.991	0.074	0.02	1.02	0.09	-0.029	0.971	0.108	
BOTHmedium-high	-0.012	0.988	0.068	-0.039	0.961	0.086	-0.088	0.916	0.102	
bothNA	-0.105	0.9	0.091	0.023	1.024	0.116	0.046	1.047	0.113	
ref.cat.No siblings										
sib1	0.374	1.454	0.08***	0.257	1.293	0.093***	0.336	1.399	0.108	***
sib2	0.546	1.726	0.084***	0.331	1.392	0.099***	0.34	1.405	0.116	***
sib3	0.488	1.629	0.086***	0.331	1.392	0.102***	0.375	1.455	0.121	***
ref.cat.Not in union										
inunionLOW				2.344	10.427	0.195***	3.399	29.945	0.207	***
inunionMEDIUM				2.156	8.634	0.123***	3.158	23.53	0.126	***
inunionHIGH				2.124	8.368	0.137***	3.073	21.609	0.145	***
inunionNA				0.233	1.263	0.16	1.065	2.901	0.174	***
marrie(ref.cat. Not married)				0.903	2.466	0.113***	1.174	3.234	0.115	***

Lithuania - First union

				Model2			Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE	beta	exp(beta)	SE	
15-19				0.767	2.154	0.046 ***	0.769	2.157	0.046***	
20-24				0.188	1.207	0.02 ***	0.295	1.344	0.02***	
25-29				-0.16	0.852	0.022 ***	-0.075	0.928	0.023***	
30-34				-0.149	0.861	0.042 ***	-0.107	0.899	0.041***	
35-39				-0.005	0.995	0.065	-0.021	0.979	0.064	
40+				-0.65	0.522	0.202 ***	-0.612	0.542	0.202***	
Constant				-6.983	0.001	0.256 ***	-7.516	0.001	0.268***	
1950-59				-0.061	0.941	0.069	-0.16	0.852	0.082	*
1960-69				0.029	1.03	0.064	-0.028	0.973	0.078	
inedu				0.133	1.142	0.113	0.169	1.185	0.129	
low0-2				0.338	1.403	0.182 *	0.441	1.554	0.194**	
medium0-2				0.473	1.605	0.111 ***	0.549	1.732	0.129***	
medium2+				0.301	1.351	0.096 ***	0.396	1.485	0.115***	
high0-2				0.689	1.992	0.126 ***	0.678	1.97	0.148***	
high2+				0.693	1.999	0.151 ***	0.934	2.544	0.165***	
eduNA				0	1	0	0	1	0	
DADmedium-high				-0.173	0.841	0.106	-0.144	0.866	0.129	
MOMmedium-high				0.079	1.082	0.084	0.111	1.117	0.096	
BOTHmedium-high				0.064	1.066	0.074	0.09	1.094	0.089	
bothNA				-0.108	0.898	0.094	-0.12	0.887	0.114	
sib1				0.219	1.245	0.083 ***	0.187	1.206	0.098	*
sib2				0.307	1.359	0.096 ***	0.353	1.423	0.107***	
sib3				0.224	1.25	0.099 **	0.213	1.237	0.112	*
child1(ref. no conception)				2.216	9.168	0.096 ***	3.826	45.869	0.086***	
SigEps							1			
SigDelta							1			
Rho							-0.893		0.029***	
ln-L				-20081.6			-19686.95			

Bulgaria - First birth

	Model1			Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19	0.514	1.672	0.042***	0.307	1.359	0.043	***	0.298	1.347	0.043	***
20-24	0.208	1.231	0.015***	-0.012	0.988	0.017		0.039	1.04	0.021	*
25-29	-0.178	0.837	0.019***	-0.204	0.815	0.02	***	-0.178	0.837	0.024	***
30-34	-0.13	0.878	0.034***	-0.156	0.856	0.033	***	-0.141	0.868	0.038	***
35-39	-0.129	0.879	0.065**	-0.142	0.868	0.065	**	-0.12	0.887	0.066	*
40+	-0.295	0.745	0.179*	-0.314	0.731	0.177	*	-0.3	0.741	0.177	*
Constant	-5.909	0.003	0.218***	-5.882	0.003	0.22	***	-6.477	0.002	0.232	***
ref. cat. 1970-1987											
1950-59	0.535	1.707	0.062***	0.178	1.195	0.085	**	0.22	1.246	0.097	**
1960-69	0.559	1.749	0.055***	0.345	1.412	0.071	***	0.335	1.398	0.081	***
ref. cat. low2+											
inedu	-0.609	0.544	0.092***	-0.178	0.837	0.124		-0.186	0.83	0.139	
low0-2	0.512	1.669	0.216**	0.476	1.61	0.214	**	0.387	1.473	0.224	*
medium0-2	-0.575	0.563	0.121***	-0.047	0.954	0.134		-0.031	0.969	0.148	
medium2+	0.019	1.019	0.063	0.252	1.287	0.098	**	0.194	1.214	0.119	
high0-2	0.285	1.33	0.131**	0.576	1.779	0.162	***	0.547	1.728	0.189	***
high2+	0.351	1.42	0.11***	0.527	1.694	0.163	***	0.417	1.517	0.186	**
eduNA	0	1	0	0	1	0		0	1	0	
ref.cat. BOTHlow											
DADmedium-high	-0.137	0.872	0.075*	-0.13	0.878	0.106		-0.099	0.906	0.128	
MOMmedium-high	-0.247	0.781	0.076***	-0.036	0.965	0.101		-0.024	0.976	0.119	
BOTHmedium-high	-0.256	0.774	0.06***	-0.2	0.819	0.085	**	-0.202	0.817	0.097	**
bothNA	-0.216	0.806	0.133	-0.083	0.92	0.184		-0.069	0.933	0.202	
ref.cat.No siblings											
sib1	0.096	1.101	0.068	0.034	1.035	0.091		-0.009	0.991	0.104	
sib2	0.35	1.419	0.083***	0.163	1.177	0.117		0.181	1.198	0.135	
sib3	0.459	1.582	0.082***	0.329	1.39	0.114	***	0.317	1.373	0.136	**
ref.cat.Not in union											
inunionLOW				3.29	26.843	0.111	***	4.289	72.894	0.123	***
inunionMEDIUM				3.501	33.149	0.09	***	4.321	75.264	0.099	***
inunionHIGH				3.583	35.981	0.109	***	4.241	69.477	0.124	***
inunionNA				2.474	11.87	0.28	***	3.277	26.496	0.369	***
marrie(ref.cat. Not married)				-0.01	0.99	0.076		0.473	1.605	0.078	***

Bulgaria - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.515	1.674	0.034***		0.535	1.707	0.036	***
20-24				0.1	1.105	0.015***		0.217	1.242	0.016	***
25-29				-0.219	0.803	0.021***		-0.143	0.867	0.022	***
30-34				-0.15	0.861	0.038***		-0.127	0.881	0.04	***
35-39				-0.195	0.823	0.076**		-0.192	0.825	0.075	**
40+				-0.109	0.897	0.157		-0.087	0.917	0.14	
Constant				-5.36	0.005	0.186***		-5.816	0.003	0.201	***
1950-59				0.407	1.502	0.067***		0.477	1.611	0.083	***
1960-69				0.296	1.344	0.06***		0.38	1.462	0.072	***
inedu				-0.495	0.61	0.096***		-0.772	0.462	0.11	***
low0-2				0.706	2.026	0.174***		0.547	1.728	0.184	***
medium0-2				-0.592	0.553	0.113***		-0.761	0.467	0.122	***
medium2+				0.088	1.092	0.084		-0.076	0.927	0.097	
high0-2				0.316	1.372	0.144**		-0.067	0.935	0.161	
high2+				0.5	1.649	0.14***		0.242	1.274	0.163	
eduNA				0	1	0		0	1	0	
DADmedium-high				-0.23	0.795	0.1**		-0.282	0.754	0.115	**
MOMmedium-high				-0.277	0.758	0.081***		-0.477	0.621	0.101	***
BOTHmedium-high				-0.229	0.795	0.066***		-0.362	0.696	0.079	***
bothNA				-0.084	0.919	0.147		-0.139	0.87	0.176	
sib1				0.183	1.201	0.076**		0.198	1.219	0.092	**
sib2				0.347	1.415	0.102***		0.483	1.621	0.119	***
sib3				0.324	1.383	0.099***		0.444	1.559	0.119	***
child1(ref.cat.No conception)				1.836	6.271	0.122***		3.653	38.59	0.116	***
SigEps								1			
SigDelta								1			
Rho								-0.565		0.031	***
ln-L				-22792.72				-22053.67			

Hungary - First birth

	Model1			Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19	0.669	1.952	0.065***	0.5	1.649	0.061	***	0.464	1.59	0.06	***
20-24	0.24	1.271	0.021***	0.017	1.017	0.022		0	1	0.02	
25-29	-0.048	0.953	0.019**	-0.071	0.931	0.019	***	-0.038	0.963	0.022	*
30-34	-0.161	0.851	0.031***	-0.137	0.872	0.03	***	-0.098	0.907	0.033	***
35-39	-0.234	0.791	0.061***	-0.24	0.787	0.06	***	-0.241	0.786	0.061	***
40+	0.053	1.054	0.098	0.034	1.035	0.098		0.049	1.05	0.097	
Constant	-7.605	0	0.346***	-6.81	0.001	0.326	***	-7.125	0.001	0.337	***
ref. cat. 1970-1987											
1950-59	0.343	1.409	0.071***	-0.339	0.712	0.084	***	-0.414	0.661	0.099	***
1960-69	0.597	1.817	0.072***	0.399	1.49	0.075	***	0.38	1.462	0.088	***
ref. cat. low2+											
inedu	-0.248	0.78	0.117**	-0.298	0.742	0.133	**	-0.458	0.633	0.156	***
low0-2	1.304	3.684	0.302***	0.907	2.477	0.301	***	0.613	1.846	0.343	*
medium0-2	0.064	1.066	0.149	0.014	1.014	0.156		-0.133	0.875	0.176	
medium2+	0.185	1.203	0.082**	0.043	1.044	0.103		-0.075	0.928	0.123	
high0-2	0.23	1.259	0.176	0.145	1.156	0.187		0.023	1.023	0.207	
high2+	0.473	1.605	0.118***	0.278	1.32	0.143	*	0.065	1.067	0.164	
eduNA	0	1	0	0	1	0		0	1	0	
ref.cat. BOTHlow											
DADmedium-high	-0.043	0.958	0.067	-0.057	0.945	0.078		-0.073	0.93	0.094	
MOMmedium-high	-0.242	0.785	0.112**	0.002	1.002	0.129		-0.048	0.953	0.145	
BOTHmedium-high	-0.168	0.845	0.071**	-0.181	0.834	0.081	**	-0.22	0.803	0.094	**
bothNA	-0.181	0.834	0.276	-0.075	0.928	0.397		-0.057	0.945	0.531	
ref.cat.No siblings											
sib1	0.119	1.126	0.084	-0.008	0.992	0.09		0.066	1.068	0.108	
sib2	0.251	1.285	0.092***	0.041	1.042	0.102		0.125	1.133	0.125	
sib3	0.274	1.315	0.095***	0.09	1.094	0.106		0.158	1.171	0.127	
ref.cat.Not in union											
inunionLOW				2.399	11.012	0.148	***	3.235	25.406	0.174	***
inunionMEDIUM				2.538	12.654	0.106	***	3.29	26.843	0.139	***
inunionHIGH				2.466	11.775	0.127	***	3.129	22.851	0.156	***
inunionNA				0.767	2.153	0.123	***	1.222	3.394	0.173	***
marrie(ref.cat. Not married)				0.615	1.85	0.092	***	0.921	2.512	0.104	***

Hungary - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.671	1.957	0.036***		0.682	1.978	0.037	***
20-24				0.142	1.153	0.015***		0.256	1.292	0.016	***
25-29				-0.15	0.86	0.021***		-0.071	0.931	0.022	***
30-34				-0.147	0.863	0.042***		-0.118	0.889	0.041	***
35-39				-0.203	0.817	0.087**		-0.178	0.837	0.085	**
40+				-0.131	0.877	0.2		-0.112	0.894	0.197	
Constant				-6.494	0.002	0.207***		-7.06	0.001	0.229	***
1950-59				0.472	1.603	0.056***		0.682	1.978	0.072	***
1960-69				0.328	1.388	0.062***		0.466	1.594	0.075	***
inedu				-0.051	0.95	0.103		-0.246	0.782	0.121	**
low0-2				1.32	3.743	0.222***		1.166	3.209	0.24	***
medium0-2				0.12	1.128	0.117		-0.034	0.967	0.128	
medium2+				0.316	1.372	0.096***		0.228	1.256	0.107	**
high0-2				0.456	1.578	0.156***		0.316	1.372	0.175	*
high2+				0.764	2.147	0.121***		0.7	2.014	0.152	***
eduNA				0	1	0		0	1	0	
DADmedium-high				0.034	1.034	0.067		0.089	1.093	0.077	
MOMmedium-high				-0.176	0.838	0.096*		-0.226	0.798	0.124	*
BOTHmedium-high				0.043	1.044	0.065		0.096	1.101	0.077	
bothNA				-0.49	0.612	0.396		-0.354	0.702	0.489	
sib1				-0.011	0.989	0.069		0.039	1.04	0.089	
sib2				0.224	1.251	0.075***		0.263	1.301	0.099	***
sib3				0.216	1.241	0.082***		0.324	1.383	0.104	***
child1(ref.cat.No conception)				2.541	12.69	0.126***		4.019	55.645	0.118	***
SigEps								1			
SigDelta								1			
Rho								-0.663		0.086	***
ln-L				-21348.35				-21088.58			

Poland - First birth

	Model1			Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19	0.801	2.228	0.047***	0.784	2.19	0.048	***	0.753	2.123	0.048	***
20-24	0.248	1.281	0.013***	0.034	1.035	0.015	**	0.065	1.067	0.016	***
25-29	-0.098	0.907	0.013***	-0.158	0.854	0.014	***	-0.133	0.875	0.016	***
30-34	-0.151	0.86	0.023***	-0.15	0.861	0.022	***	-0.132	0.876	0.024	***
35-39	-0.206	0.814	0.047***	-0.198	0.82	0.046	***	-0.181	0.834	0.046	***
40+	-0.416	0.66	0.149***	-0.424	0.654	0.147	***	-0.422	0.656	0.144	***
Constant	-7.902	0	0.248***	-7.654	0	0.258	***	-8.084	0	0.267	***
ref. cat. 1970-1987											
1950-59	0.355	1.426	0.044***	0.177	1.194	0.056	***	0.248	1.281	0.065	***
1960-69	0.296	1.344	0.045***	0.347	1.415	0.055	***	0.441	1.554	0.064	***
ref. cat. low2+											
inedu	-0.056	0.946	0.079	-0.233	0.792	0.09	***	-0.303	0.739	0.104	***
low0-2	-0.571	0.565	0.587	-0.64	0.527	0.593		-0.852	0.427	0.636	
medium0-2	0.257	1.293	0.095***	0.051	1.052	0.1		0.033	1.034	0.114	
medium2+	0.4	1.492	0.064***	0.138	1.148	0.079	*	0.15	1.162	0.092	
high0-2	0.143	1.154	0.113	-0.288	0.75	0.125	**	-0.481	0.618	0.142	***
high2+	0.812	2.252	0.089***	0.241	1.273	0.111	**	0.088	1.092	0.128	
eduNA	-0.005	0.995	0.311	-0.242	0.785	0.301		-0.434	0.648	0.358	
ref.cat. BOTHlow											
DADmedium-high	0.061	1.063	0.052	-0.09	0.914	0.069		-0.065	0.937	0.079	
MOMmedium-high	-0.029	0.971	0.065	-0.096	0.908	0.081		-0.103	0.902	0.09	
BOTHmedium-high	0.017	1.017	0.046	-0.137	0.872	0.058	**	-0.211	0.81	0.067	***
bothNA	0.007	1.007	0.088	-0.062	0.94	0.106		-0.152	0.859	0.149	
ref.cat.No siblings											
sib1	0.13	1.139	0.07*	0.159	1.172	0.087	*	0.152	1.164	0.103	
sib2	0.253	1.288	0.071***	0.293	1.34	0.089	***	0.291	1.338	0.103	***
sib3	0.295	1.343	0.07***	0.363	1.438	0.088	***	0.431	1.539	0.101	***
ref.cat.Not in union											
inunionLOW				1.88	6.554	0.136	***	2.77	15.959	0.164	***
inunionMEDIUM				1.922	6.835	0.081	***	2.724	15.241	0.102	***
inunionHIGH				1.939	6.952	0.09	***	2.529	12.541	0.112	***
inunionNA				1.396	4.039	0.582	**	2.203	9.052	0.83	***
marrie(ref.cat. Not married)				0.774	2.168	0.075	***	1.114	3.047	0.083	***

Poland - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.885	2.423	0.046***		0.83	2.293	0.045	***
20-24				0.229	1.257	0.012***		0.328	1.388	0.013	***
25-29				-0.168	0.845	0.015***		-0.065	0.937	0.015	***
30-34				-0.207	0.813	0.027***		-0.166	0.847	0.027	***
35-39				-0.164	0.849	0.049***		-0.156	0.856	0.05	***
40+				-0.174	0.84	0.105		-0.153	0.858	0.103	
Constant				-8.001	0	0.253***		-8.452	0	0.252	***
1950-59				0.108	1.114	0.055*		0.173	1.189	0.058	***
1960-69				-0.052	0.949	0.061		-0.064	0.938	0.06	
inedu				0.111	1.117	0.093		0.137	1.147	0.098	
low0-2				0.593	1.809	0.326*		0.678	1.97	0.346	*
medium0-2				0.357	1.429	0.098***		0.382	1.465	0.104	***
medium2+				0.367	1.443	0.083***		0.448	1.565	0.086	***
high0-2				0.663	1.941	0.119***		0.801	2.228	0.123	***
high2+				0.65	1.916	0.155***		1.021	2.776	0.136	***
eduNA				0.189	1.208	0.315		0.261	1.298	0.392	
DADmedium-high				0.109	1.115	0.073		0.132	1.141	0.07	*
MOMmedium-high				-0.05	0.951	0.095		0.056	1.058	0.089	
BOTHmedium-high				0.165	1.179	0.059***		0.244	1.276	0.063	***
bothNA				0.182	1.2	0.1*		0.224	1.251	0.115	*
sib1				0.064	1.066	0.088		0.047	1.048	0.097	
sib2				0.183	1.201	0.09**		0.156	1.169	0.098	
sib3				0.121	1.129	0.089		0.087	1.091	0.097	
child1(ref.cat.No conception)				2.408	11.112	0.063***		3.803	44.835	0.07	***
SigEps								1			
SigDelta								1			
Rho								-0.593		0.053	***
ln-L				-38407.81				-37501.32			

Romania - First birth

	Model1			Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19	0.661	1.937	0.059***	0.52	1.682	0.059	***	0.514	1.672	0.061***	
20-24	0.326	1.385	0.017***	0.027	1.027	0.019		0.03	1.03	0.022	
25-29	-0.137	0.872	0.016***	-0.187	0.829	0.016	***	-0.192	0.825	0.02***	
30-34	-0.108	0.898	0.028***	-0.154	0.857	0.028	***	-0.142	0.868	0.03***	
35-39	-0.466	0.628	0.076***	-0.456	0.634	0.075	***	-0.453	0.636	0.076***	
40+	0.002	1.002	0.159	-0.019	0.981	0.159		-0.023	0.977	0.161	
Constant	-7.203	0.001	0.302***	-7.186	0.001	0.297	***	-7.74	0	0.31***	
ref. cat. 1970-1987											
1950-59	0.242	1.274	0.058***	0.123	1.131	0.072	*	0.138	1.148	0.081*	
1960-69	0.36	1.433	0.057***	0.303	1.354	0.068	***	0.352	1.422	0.075***	
ref. cat. low2+											
inedu	-0.424	0.654	0.094***	-0.123	0.884	0.113		-0.192	0.825	0.121	
low0-2	-0.292	0.747	0.462	-0.222	0.801	0.478		-0.241	0.786	0.486	
medium0-2	-0.04	0.961	0.119	0.071	1.074	0.124		0.015	1.015	0.134	
medium2+	0.182	1.2	0.059***	0.014	1.014	0.078		-0.029	0.971	0.086	
high0-2	0.077	1.08	0.14	0.119	1.126	0.162		-0.039	0.962	0.179	
high2+	0.458	1.581	0.103***	0.535	1.707	0.137	***	0.364	1.439	0.151**	
eduNA	0	1	0	0	1	0		0	1	0	
ref.cat. BOTHlow											
DADmedium-high	-0.088	0.916	0.06	-0.007	0.993	0.075		-0.037	0.964	0.083	
MOMmedium-high	-0.289	0.749	0.134**	-0.275	0.76	0.181		-0.309	0.734	0.18*	
BOTHmedium-high	-0.201	0.818	0.071***	-0.286	0.751	0.087	***	-0.353	0.703	0.102***	
bothNA	0.096	1.101	0.189	0.1	1.105	0.223		0.156	1.169	0.282	
ref.cat.No siblings											
sib1	0.074	1.077	0.069	0.123	1.131	0.087		0.159	1.172	0.099	
sib2	0.213	1.237	0.073***	0.127	1.135	0.091		0.092	1.096	0.105	
sib3	0.319	1.376	0.071***	0.277	1.319	0.088	***	0.279	1.322	0.101***	
ref.cat.Not in union											
inunionLOW				3.587	36.126	0.114	***	4.549	94.538	0.123***	
inunionMEDIUM				3.575	35.695	0.11	***	4.473	87.619	0.122***	
inunionHIGH				3.144	23.196	0.148	***	4.002	54.707	0.163***	
inunionNA				2.346	10.444	0.133	***	3.151	23.359	0.15***	
marrie(ref.cat. Not married)				0.109	1.115	0.088		0.327	1.387	0.091***	

Romania - First union

				Model2				Model3			
	beta	exp(beta)	SE	beta	exp(beta)	SE		beta	exp(beta)	SE	
15-19				0.705	2.023	0.045***		0.656	1.929	0.045	***
20-24				0.251	1.285	0.014***		0.374	1.454	0.015	***
25-29				-0.158	0.854	0.018***		-0.046	0.954	0.019	**
30-34				-0.114	0.892	0.033***		-0.07	0.932	0.034	**
35-39				-0.237	0.789	0.069***		-0.215	0.807	0.07	***
40+				-0.193	0.825	0.153		-0.187	0.829	0.151	
Constant				-6.694	0.001	0.235***		-6.999	0.001	0.247	***
1950-59				0.18	1.197	0.056***		0.23	1.245	0.073	***
1960-69				0.252	1.287	0.054***		0.336	1.388	0.07	***
inedu				-0.348	0.706	0.085***		-0.531	0.593	0.104	***
low0-2				0.484	1.623	0.264*		0.349	1.422	0.287	
medium0-2				-0.078	0.925	0.099		-0.149	0.864	0.114	
medium2+				0.137	1.147	0.061**		0.144	1.157	0.081	*
high0-2				0.468	1.597	0.12***		0.384	1.493	0.146	***
high2+				0.329	1.389	0.115***		0.291	1.355	0.15	*
eduNA				0	1	0		0	1	0	
DADmedium-high				0.0003	1	0.061		-0.046	0.794	0.077	
MOMmedium-high				-0.07	0.932	0.108		-0.157	0.964	0.154	
BOTHmedium-high				0.04	1.041	0.076		0.048	1.208	0.089	
bothNA				0.153	1.165	0.153		0.161	1.191	0.221	
sib1				0.012	1.012	0.074		-0.013	0.984	0.091	
sib2				0.171	1.186	0.082**		0.213	1.228	0.097	**
sib3				0.244	1.277	0.077***		0.281	1.313	0.094	***
child1(ref.cat.No conception)				2.159	8.664	0.118***		3.725	41.554	0.114	***
SigEps								1			
SigDelta								1			
Rho								-0.691		0.048	***
ln-L				-24698.6				-24242.41			

Appendix 3

Correlation terms

	AT		BE		BG		EE		FR	
	Fixed	Free	Fixed	Free	Fixed	Free	Fixed	Free	Fixed	Free
Variance 1st birth	1	1.25***	1	1.02***	1	1.26***	1	1.12***	1	0.56***
Variance 1st union	1	1.34***	1	1.65***	1	2.23***	1	1.87***	1	1.86***
Correlation	-0.22	0.06	0.35**	0.33***	-0.56***	-0.42***	-0.53*	0.025	0.1	-0.27**

	HU		LT		NO		PL		RO	
	Fixed	Free	Fixed	Free	Fixed	Free	Fixed	Free	Fixed	Free
Variance 1st birth	1	1.11***	1	1.03***	1	1.01***	1	1.11***	1	1.04***
Variance 1st union	1	1.09***	1	1.48***	1	1.97***	1	1.30***	1	1.91***
Correlation	-0.66***	-0.56***	-0.89***	-0.87***	0.17	0.32***	-0.59***	-0.48***	-0.70***	-0.58***