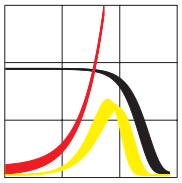

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Institutional arrangements and life course outcomes: The interrelations between cohabitation, marriage and first birth in Germany and Sweden

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Abstract

We study the link between institutional arrangements and fertility, focusing on how institutions affect the nexus between partnership formation and fertility. We apply simultaneous hazard models to Family and Fertility Survey data for Germany and Sweden. Our results show a significant presence of correlated unobserved factors that affect both partnership formation and the transition to parenthood. We argue that these factors reflect the heterogeneous composition of each population with respect to values and norms. Net of that correlation, the impact of being in a union on first birth is higher in Sweden than in Germany, in particular for cohabitation.

Keywords

Fertility, cohabitation, marriage, welfare state, Germany, Sweden.

1. Introduction

In this paper, we investigate the links between the process and type of first union (cohabitation or marriage) and first childbirth. Although practically all first births take place in a union in continental Europe, there are considerable differentials among countries in the process of union formation and the extent to which each type of union leads to childbearing. This is of particular importance given that some of the countries with the highest proportions of cohabiting couples and earlier ages at first union formation also have the highest levels of fertility in Europe (Kiernan, 1999).

The inverse correlation between fertility and age at first union formation may reflect a trend to a general postponement of events in the transition to adulthood, in which case the transition to any kind of partnership and the transition to parenthood are delayed due to common underlying factors. For instance, using U.S. data, Brien et al. (1999) show that the timing of partnership formation and of conception depend on common unobserved factors. If this is the case in general, such events have to be addressed necessarily as a whole. From a social policy point of view, policies aimed at speeding up union formation can thus not be expected to have a significant impact on the transition to parenthood and subsequently on completed fertility. Alternatively, each pathway of union formation (cohabitation and marriage) may have a causal (and potentially differential) effect on fertility. If that is the case, we would expect that policies having the effect of fostering union formation, to have a significant impact on fertility, and this effect may differ according to the type of union.

A major strength of comparative research is the opportunity to address the impact of varying key institutional arrangements on demographic processes. Two (or three)-country comparisons have provided valuable insights on how institutional arrangements affect life course outcomes in different settings (see i.e. Gustafsson, 1992; Blossfeld et

al., 1995; Hillmert, 1999; Blossfeld and Mills, 2000; Corman, 2000; Oláh, 2001; Billari et al., forthcoming; Billari and Kohler, forthcoming). To this body of literature we explicitly add the possibility that there are unobserved factors contributing to the within-country heterogeneity of the population. Those unobserved factors are mainly considered to reflect the cultural differences in the composition of the population of each country. Therefore, cross-country comparisons should control for such heterogeneity when analyzing the impact of welfare state policies and institutions in order to arrive to meaningful conclusions.

In this paper, we assess the extent to which different processes of partnership formation have an impact on entering parenthood, and the extent to which pre-union conception lead to union formation in Germany and Sweden. We motivate the choice of these two countries not only for their differences in the family formation process, but also for their contrasting institutional systems regarding welfare provision and their respective (implicit) commitment to promote different types of families. Because our data are retrospective life histories of women born between the late 1940s and the early 1970s, we exclude the parts of Germany formerly belonging to the German Democratic Republic, which before 1990 had a completely different system of welfare arrangements to those existing in West Germany. The system of support to parenthood available to individuals or couples is here of primary relevance. Equally important is the potentially differential treatment provided to each type of partnership. There is a large body of literature describing the family policies applied in each country, sometimes relating them to the larger welfare edifice that exists in a particular country. However, in order to assess their influence on family formation there is a need for more detailed analyses of the links between partnership and parenthood, not the least because of the rapid changes in partnership formation behavior in European countries.

Entry into parenthood and union formation are closely linked both in the timing of their occurrence over the life course, as well as in terms of individuals' intentions and life plans. If a union is viewed as the appropriate setting for bearing children, individuals wanting to have a child may speed up their union formation, considering this event as part of their family building strategy. Conversely, a pregnancy may precipitate marriage formation for couples that already had plans in that direction.

In disentangling such a complex web of effects empirically, one important practical difficulty has been to properly take into account the heterogeneity of a given population with respect to subjective dimensions. Such inter-individual differentials include value orientations, attitudes towards gender roles, behavioral intentions and plans, or the individual's network norms, and pressures concerning the timing of household formation. These dimensions play a prominent role in the explanations of current fertility patterns and developments. Unfortunately, existing comparative demographic and social surveys generally lack adequate (i.e. dynamic) information concerning their interplay with family behavior.

We make use of a modeling strategy that allows unmeasured common factors to influence the timing of first childbirth and first union formation simultaneously. If such common factors exist, then individuals with a high risk of childbearing will also be more likely to form a union early in their life course. As a consequence, we expect a selection effect that increases with age, and to find that individuals with lower family formation risks become more strongly represented in higher ages. Moreover, the time order of the events may not reflect a causal relationship. A reverse causality between the dependent event and the explanatory variables may be present, for instance, when the anticipated intention of having a child affects the decision to form a union. In that situation, the estimated parameters in a one-relation hazard regression will be biased and

unlikely to reflect the independent effect of union formation on conception leading to a first birth.

In order to control for the difference in composition of the German and Swedish populations with respect to time-constant unmeasured factors common to the processes, we include correlated heterogeneity components in the hazard rate equations. We model simultaneously the "risk" of first birth, first union formation, and the marriage formation of cohabitants, as dependent events. Furthermore, we model union formation in a competing-risk framework with two destinations: cohabitation and marriage. Controlling for unobserved heterogeneity allows us to interpret more confidently the impact of our main variables concerning partnership and parenthood status as reflecting the effect of different welfare state institutional arrangements present in each country.

The paper is organized as follows. Section 2 provides a short description of some elements of the family policies in (West) Germany and Sweden, that potentially have a differential impact in family formation behavior. In section 3 we present our hypotheses concerning the interrelationships between union formation and first birth. Section 4 describes the variables and the model employed. Section 5 presents and discusses the results and section 6 provides some concluding remarks.

2. Institutional arrangements in (West) Germany and in Sweden

In order to study the factors affecting transition to parenthood and partnership status, we need to consider a range of factors, some of which are located at the level of the whole population, and others are located at the level of population subgroups. State policies, though they may show some regional or local variability in a given country, essentially belong to the former group. They are embedded in a whole welfare system of institutions that include many different aspects of state action (e.g. public/private/non-

profit mix, gender ""attitude"", employment policies, organization of state). Ideally, in order to understand the cumulative effects of all parts of the system, one should analyze the system as a whole (Mayer, 2001). This would allow us to illustrate the interrelationships between, for instance, cash payments and services, direct and indirect tax burdens, the employment policies concerning part-time work, flexibility of hours worked, and jobs in the public sector. Comparative research has been particularly concerned with understanding qualitative differences in the origins and trajectories of social policy in different countries, and in consequence in developing typologies identifying the range of forms taken by welfare states -"regime types" or "worlds of welfare capitalism". In the most well known of such typologies, Sweden is taken as the prototype of the "Scandinavian Social Democratic Welfare State" and Germany is included as a distinctive member of the "Continental Conservative Welfare States" (Esping-Andersen, 1999). Here we only provide a brief review of several programs that are relevant for family formation. In particular, we focus on policies that may have a differential impact on the economic burden associated with childbearing in each country: the taxation system with respect to couples and children, child benefits, public child care, and parental leave arrangements. By restricting our analysis to Germany and Sweden we leave out two other important welfare regimes which are peculiar in terms of family formation. These are the Southern European model, which includes Spain and Italy, and the Liberal Market model, normally represented by the United Kingdom and the United States. The interaction of cohabitation and marriage, together with premarital childbearing, in the Liberal Market setting has been thoroughly studied by Manning and colleagues (Manning 1993; Manning and Smock, 1995; Smock and Manning, 1997). Welfare arrangements and its impact on family formation have been analyzed, for instance by Alm et al. (1999a and 1999b), Whittington (1992), Eissa and Hoynes,

(2000), Montanari (2000). The papers by Billari et al. (forthcoming) and Baizán et al. (2001) provide a detailed exposition of the Southern European setting. We now focus on specific parts of the institutional arrangement that we assume influence differentially family formation in the two countries.

The income tax system

The fiscal treatment of couples is highly different in the two countries. While in Sweden family status has no impact on the amount of tax that an individual pays, the tax system in Germany does play a major role in the redistribution of income among individuals and among different types of families. These resources allocated to children in that way are complemented by the existence of child benefits given to the parents in both countries.

In Germany, married couples can opt for the "split" system, which means that the income of spouses is aggregated and halved, and the tax schedule is applied to this tax base. Married couples thus profit from a more favorable taxation in the case of an asymmetric earnings situation between the spouses, as is often the case if the partners combine full-time/part-time employment, or if one of the partners is not employed whereas the other is. Moreover, high-income couples benefit most from income splitting due to the progressive nature of the tax schedule. This implies a higher percentage reduction in the marginal rate for high-income couples. Of course this does not necessarily mean a greater net income for each member of the couple, since often the women may have higher marginal taxation compared to a tax system where spouses are taxed separately (Gustafsson, 1992; O'Donoghue and Sutherland, 1998). An important feature of the German system is that joint taxation is only allowed for *married* couples. Although tax allowances exist for single parents, the German taxation system clearly

favors “traditional” family arrangements through marriage. For many couples it creates an incentive for the “specialization” of women in housework and child-care, where the implied monetary transfer is in effect a virtual homemaker salary (Sainsbury, 1997; Montanari, 2000).

Mandatory separate taxation for couples in Sweden was introduced in 1971, with an explicit aim to promote gender role equality as well as a means to increase the labor force (Gustafsson, 1992). An increased net household income for families and the welfare of children is promoted by boosting the resources of mothers, in particular their incentives to take paid work. Other measures concerning the labor market, such as flexible hours and part-time work, were also progressively implemented.

In both countries, the fiscal treatment of children is independent of the marital status of the parents. In Germany there are tax allowances directly related to the children, together with an extra tax allowance for owner-occupiers with children, as well as other family tax instruments[1]. None of these has been in existence in Sweden in recent years, although a housing-related benefit for families with children has been in place since the 1930s.

Child benefits

In both countries all children are granted a cash allowance. These benefits have been universal in Sweden since 1948, and in Germany since 1974. They are a substantial benefit, since they provided about 12 percent in Sweden and in Germany about 7 percent of net income for a family with an average industrial worker’s wage in 1985 (Wennemo, 1994). In Germany the child benefit (Kindergeld) depends of the rank order

[1] For instance, if the tax allowance for children is not all used, then up to 19 percent of the unused allowance can be paid as a cash transfer. Some tax deductions exist for children’s education and childcare (for lone parents).

of the child[2]. In Sweden, every child is granted some 750 SEK per month (that is US$ 97) in 2000, paid to the mother, and between 1982 and 1995 a special allowance of about 155 US$ was provided to the third and additional children (Hoem and Hoem, 1996). This higher benefit was reintroduced in 1998.

Childcare

In both Germany and Sweden, child-care services are mainly provided by local municipalities. Due to high market barriers of entry, heavy regulations, and a dominance of public providers, there are hardly any private providers of day care[3]. However, about half of the slots in day care centers in West Germany are provided by non-profit organizations (particularly church organizations), which are publicly subsidized by up to 90 percent of the operating costs (Kreyenfeld et al. 2001). The proportions of young children enrolled in public-funded day-care institutions in the late 1980s was very different in each country: it was only 3 percent of children aged 0-2 in West Germany and 31 percent in Sweden. The proportion of children aged 3 to 6 was much less uneven: 65-70 percent in West Germany and 79 percent in Sweden (Gauthier, 1991).

Kreyenfeld and Hank (2000) have argued that individual behavior in West Germany is less influenced by the affordability of day care than by its availability. The poorer provision and the inflexibility of family services in Germany, as compared to Sweden, explain at least partially the lower ability of women to maintain continuous work careers, and the choices of individuals and couples in the family formation domain (Kreyenfeld and Hank, 2000; Hoem and Hoem, 1996).

[2] For instance, in 2000, the 1st and 2nd child had a monthly benefit of 270 DM, the 3rd 300 DM, and the 4th+ 350 DM.

[3] There are some semi-private alternatives in Sweden, such as the parental or staff-cooperative daycare centres. In addition family daycare also exists: a licensed childminder takes care of children of several families in her home under public supervsion (Corman, 2000).

Parental leave

The parental leave period has progressively been extended in Germany, from 4 months in 1979 to 10 months in 1986, and several times since then, up to 3 years in 1992 (Kreyenfeld, 2002). At the end of the parental leave period, the parent - usually the mother- is allowed to return to her previous employer. During most of that period -currently 2 years-, parents are entitled to a tightly income-related childrearing benefit of 600 DM, provided that one of the parents is not employed. In Sweden, the right to maternal leave was introduced in 1939 and became (earnings-related) paid leave in 1955. The current policy dates from 1974 when fathers became entitled to share the parental leave, and when the pay level was raised to 90% of previous wage (up to a maximum ceiling). The benefit period has been extended repeatedly, from six months in 1962 to fifteen months in 1989. In addition, parents are entitled to unpaid leave after the paid parental leave, until the child is eighteen months old. The system is highly flexible and since 1974 benefits can be used full time or part time. They can also be postponed and used at a later date provided the child is not older than 8 years old. Non-working parents are entitled to a maternity leave of a similar duration, paid at a flat rate, which is low but certainly not negligible (about US$ 232). However, this last option has become less relevant, since most women have a job preceding first childbirth (Andersson, 2000). Although the regulations have often been subject to modifications, including some restrictions during the 1990s, they constitute a massive public support to parenthood, to which the individuals count on in their decisions (Sundström, 1996; Corman, 2000; Oláh, 1996).

3. Hypotheses

3.1 Interrelations between processes

The conceptual framework adopted here integrates aspects from economic and sociological theories of family-building behaviors and incorporates the dynamic and interrelated approach offered by the life course perspective. In that last perspective, the processes of childbearing and union formation interact dynamically with each other and are affected by different contexts in which the individual is embedded (Buchmann, 1989; Liefbroer, 1999). Important in this context is the extent to which norms affect the way events are sequenced (Marini, 1985). Norms vary according to social class, historical time, or according to the individual's network. For instance, a prevalent view or norm is that childbearing ought to take place within a stable (cohabiting or married) relationship (Roussel, 1989). Consequently, forming a union becomes part of the strategy leading to procreation, and individual desires for children will influence union formation and its timing. Norms regarding the sequence of events may also help to explain why a pregnancy generally leads to a union formation before the birth or shortly after it. Other normative sequences of events that are important for family formation include education and employment. For instance, union formation and childbirth should take place after school completion (Blossfeld and Huinink, 1991), and preferably after having achieved a consolidated position in the labor market, especially for men (Oppenheimer, 1988). At the same time, however, we also expect differences of such norms within a population, both in terms of their relative strength and in sequencing.

The extent to which being in a couple is considered as a requirement for having children has changed dramatically during recent decades. The modern spread of cohabitation has significantly contributed to this trend. In fact, the very meaning of cohabitation and marriage has evolved substantially through time (Manting, 1996). For

instance, at the beginning of the 1980s cohabiting couples, in contrast to married couples, had a greater urge for independence in their relationships, were more critical of the quality of their relationship, and had lower levels of commitment towards maintaining their relationship. Having children was less frequently anticipated among cohabiting couples (Wiersma, 1983).

From being a select group of the population, cohabitation has evolved to become less selective, while marriage may have followed the opposite trend. Important differences between countries are to be expected in this respect. Hoem and Hoem (1988) provide an outline of how cohabitation has evolved in Sweden. First, it spread to incorporate a small "deviant" group of the population. It later emerged as a pre-marital probationary period, a gradual way of moving into a union. In a third phase cohabitation has become a real substitute to marriage. Finally, the very distinction between cohabitation and marriage disappears. Although this is a simplified view of a more complex historical development, not necessarily connected with a unique path, this four-stage classification is still useful as a guiding framework. It is not clear where Germany at present day can be located in this schema. Our view is that Germany is somewhere between the second and the third stage. In West Germany, marriage is still the living arrangement where the transition to parenthood mainly takes place, although this is increasingly less the case for younger cohorts (Billari and Kohler, forthcoming). Countries like Sweden or Denmark may be approaching the fourth stage, where the very distinction between cohabitation and marriage is disappearing (Kiernan, 2001). However, if marriage has become an "easier" decision among those who already are cohabiting[4], then by contrast, those who have started their first union with a marriage must now be considered as a highly selected group of the population.

Another important dimension of the interrelationship between first birth and first union is the impact of values, attitudes, and intentions towards family life. Many authors have argued that differences in value orientations are important in explaining family formation (among others, see Lesthaeghe and Moors, 1995). Furthermore, family formation may be embedded in a choice process in which young adults seek strategic balancing of their family-life goals with goals in other domains (Liefbroer, 1999). Motherhood, for instance, may be considered by some women as being incompatible with a self-directed biography. It is clear that value orientations play a role in linking such behaviors more strongly for some individuals than for others. As noted before, this connection is likely to be stronger in the case of marriage than for cohabitation. Where, as in Sweden, cohabitation has become the predominant way of starting unions, the overall connection between union formation and first birth is likely to have weakened considerably. So far it has not generally been possible to properly assess the impact of such cultural factors on family formation in a comparative perspective, which is mainly due to a lack of appropriate data. Consequently, in the analyses done so far, unobserved characteristics have potentially affected and biased the estimates, because they were not accounted for; moreover, the role of cultural factors might have been understated. Our first set of hypotheses derives directly from this literature:

Hypothesis 1a: *The timing of first union and of first birth is, at least partially, determined by unobserved factors, and such factors are positively correlated.*

Hypothesis 1b: W*e expect a higher correlation between unobserved factors affecting marriage and first birth than between those affecting first union and first birth.*

Hypothesis 1c: *The correlation between unobserved factors affecting first union and first birth is higher in Germany than in Sweden.*

[4] As seems to be shown by the sharp increase in the number of marriages in 1989, motivated by a change

3.2. Impact of partnership formation on first parenthood

The literature has shown that entering a union drastically increases the rate of conception. This should not be a surprise, especially in Western Europe, where most births takes place either within marriages or consensual unions (Kiernan, 1999, 2001). There are many good reasons why institutional models concerning nuptiality and fertility (including Sweden and Germany), consider a union as the most suitable environment for rearing children. A union, especially marriage, normally implies a certain level of commitment, which creates stability and security. Having a child outside a union is often associated with adverse outcomes in terms of work and education. Consequently, it acts as an insurance against such unfavorable outcomes[5]. As a consequence of these circumstances and normative expectations, individuals in a union may develop more favorable attitudes and intentions to childbearing than single people. Social pressure and expectations (from parents or others) related to procreation may also increase once individuals are in a union (Barber and Axinn, 1998). Additional impacts may be generated by a higher sexual activity of cohabiting and married people, which raises the risks of conception (Rao and DeMaris, 1995).

The arguments we put forward conduce to differential effects on the transition to parenthood for marriage and cohabitation. In sum, marriage tends to be viewed by many as a more permanent living arrangement than cohabitation. It is laden with a higher degree of normative pressure and, in case of union dissolution, it may offer several legal

in the legislation concerning widow's pension according to marital status (Andersson, 1998).

[5] Economic theory also predicts an increase in the risks of first birth after union formation. A union can be considered as an institution where the production of children, i.e. child bearing and rearing, is more efficient due to division of labor (Becker 1981). Children constitute union-specific capital, and they can be viewed as a rational investment based on the long-term perspectives of the union, which allows a certain degree of role specialization for the couple. Consequently, bearing children outside a union is generally considered to be less beneficial. In addition to having a higher direct cost, it may also hamper the individual's attractiveness in the marriage market, lowering any future marriage prospects.

compensations for the economically weakest partner. However, as cohabiting couples are no longer considered as a marginal group with a low level of social acceptance there may be less pressure to marry in order to have children, while being in a partnership is viewed as necessary (Mulder and Manting, 1993).

Fertility decisions also involve an economic aspect. Having children is limited by the cost of children. This includes not only the direct expenditure on the child, but also forgone earnings and lost human capital accumulation due to child rearing. Overall fertility costs vary across individuals according to market wages and the amount of human capital accumulated. Moreover, the impact of these costs are mediated by public policies, and the difference between Sweden and Germany in this respect is significant, as discussed in section 2. Sweden has progressively shaped its institutions in such a way that the simultaneous fulfillment of the roles of parenthood and labor force participation has become possible for most couples. German institutions, while providing considerable direct monetary support to families, create disincentives to a "combination strategy", and have promoted more traditional gender roles and welfare arrangements. Though, a priori, it is not possible to elucidate in absolute terms which of these institutional arrangements should provide more support to parenthood, some elements can be advanced which points towards a lower ability of German couples to bear children, as compared to their Swedish counterparts. First, the strong commitment of the German welfare institutions towards marriage, may fail to provide equivalent support to cohabiting couples (or singles) with children. Second, the monetary contribution of women to family welfare (including long-term welfare) may be crucial in childbearing decisions (irrespective of possible compensation by state subsidies). Hoem (2000), for

instance, has shown that the transition to first births in Sweden is faster for women with own higher income levels[6].

Based on these arguments we propose the following set of hypotheses.

Hypothesis 2a: *Union formation has a strong effect on the transition to parenthood, and this effect is not cancelled by the presence of correlated unobserved factors. This impact is higher in the case of marriage than in the case of cohabitation.*

Hypothesis 2b: *The impact of being in a union on entering parenthood is higher in Sweden than in Germany.*

Hypothesis 2c: *The contrast between the effects of marriage and cohabitation on childbearing is wider in Germany than in Sweden.*

3.3. Impact of first birth on partnership formation

Our third set of hypotheses concerns the effect of pregnancy and of first birth on the transition to first unions. Single women who become pregnant may form a union because of a desire to offer their child the social and economic protection that normally accompanies a union, and in some countries a marriage. Furthermore, normative pressures are likely to increase the incentives to "legitimize" the birth through an acceleration of union formation. In terms of theories of marriage market search (see for instance Keeley, 1977) the cost of searching for a partner increases after an out-of-union birth. Children absorb resources and impose time constraints, making partnership formation more difficult. At the same time, the required quality a single mother puts on a prospective partner may be lowered, accelerating the settlement for a partnership[7]. In terms of empirical research, relatively little is done to establish the effect of pre-union childbearing on forming a union. An exception is Goldscheider and Waite (1986), who

[6] The increase in dissolution risks of couples may have acted in the same sense.

find that premarital births have a strong accelerating effect on marriage. More recently, Brien et al. (1999) consider the effect of a pre-union pregnancy on cohabitation and marriage separately. They find that a premarital birth generally accelerates marriage, but that this effect fades quickly for those who do not marry just after the birth. In terms of cohabitation, on the other hand, the overall effect is considerably weaker.

Several authors have studied the effects of pregnancy/birth on marriage formation of cohabiting couples and have found a consistent positive effect (Blossfeld and Mills, 2000; Manning and Smock, 1995; Berrington, 2001). There are two important factors to consider. First, social and economic protection is likely to be reinforced, especially since a pregnancy may trigger the couple's commitment to a longer-term perspective usually inherent to marriage. Furthermore, dissolution is made more difficult through a marriage contract. Second, by adding the legal dimension to their union, the couple may better comply with social expectations and norms concerning the legitimization of a child.

In addition, we expect the effect of a pregnancy or a birth to be highly duration-dependent. There are several reasons for this. First, there is a time lag from conception to the moment when the woman realizes that she is pregnant. Consequently, pregnancy is only going to influence the decision to enter a union starting one or two months after actual conception. Second, women may want to avoid an out-of-wedlock birth or an out-of-union birth, in order to comply with social norms and expectations. If this is the case, entry into a union is more likely to take place around the middle of the pregnancy possibly before the pregnancy has become too visible. Otherwise, the women may decide to have an abortion[8]. Once the child is born, the hazard of entering a union (or legalizing an existing one) is likely to tail off, possibly as a result of increasing

[7] Economic search models generally provide ambiguous results in this respect.

difficulties in finding a suitable partner, if the woman is a single mother. In such circumstances, prospective male partners might perceive the emotional and social costs associated with partnering a single mother to be high, mainly as a result of the increased burden of sharing the mother's time and attention with her child and the obligations associated with the newly acquired parental role (Lichter and Roempe Graefe, 2001). Overall, the positive effect of pregnancy on the hazard of first union formation should, therefore, be concentrated during pregnancy or shortly after delivery, under the conditions of the birth-cohorts studied.

The differences between Germany and Sweden with respect to welfare protection accompanying cohabitation and marriage are likely to result in different attitudes to and preferences for each type of union in the event of a pregnancy. In addition, the different meanings attributed to cohabitation and marriage by the population in each country, as discussed above, may also imply a differential impact of pregnancy/birth for entering each type of union. The control we make for the heterogeneous composition of the population may not suffice to account for these differences, since they affect, to a certain extent, the whole population of each country at a given moment in time. Consequently, there may be a higher pressure to legitimize a child through a marriage in Germany than in Sweden, especially for the birth cohorts studied here, while a union status is still desired in Sweden.

We thus formulate the third set of hypotheses.

Hypothesis 3a: *Pregnancy and first birth have a strong positive effect on union formation, independent of common factors. This impact decreases shortly after the birth of the child.*

[8] The fact of not observing abortions, as is often the case in demographic surveys, may lead to an overestimation of the pregnancy/birth effect, because pregnant women that would not have wanted to enter a union are systematically under-represented.

Hypothesis 3b: *The effect of pregnancy/first birth on marriage formation of cohabiting couples should be less important than in the case of union formation.*

Hypothesis 3c: *The effect of pregnancy/first birth on starting cohabitation is higher in Sweden than in Germany, while the effect on marriage formation is stronger in Germany.*

4. Methods and data

4.1 Statistical models

We make use of structural-equation event history models with correlated unobserved heterogeneity of the type introduced by Lillard (1993). We thus study simultaneously the processes of first union formation (where marriage is distinguished from cohabitation through a competing risks framework), the marriage of cohabitants, and the transition to parenthood (specified as the time to the conception leading to the first birth). The specification consists of four simultaneous hazard rate equations, three of them capturing time since age 15 to first birth or to first union formation (by destination), and a fourth equation that captures time since the start of cohabitation (first union) to marriage.

$$
\begin{aligned}
\ln h^{B}(t) &= y^{B}(t) + \sum_{k} z_{k}^{B}(u_{k}+t) + \sum_{j} a_{j}x_{j} + \sum_{i} \alpha_{i}\, w_{i}(t) + \varepsilon \\
\ln h^{C}(t) &= y^{C}(t) + \sum_{k} z_{k}^{C}(u_{k}+t) + \sum_{j} \phi_{j}x_{j} + \sum_{i} \pi_{i} w_{i}(t) + \delta \\
\ln h^{MS}(t) &= y^{MS}(t) + \sum_{k} z_{k}^{MS}(u_{k}+t) + \sum_{j} b_{j}x_{j} + \sum_{i} \beta_{i} w_{i}(t) + \eta + \delta \\
\ln h^{MC}(t) &= y^{MC}(t) + \sum_{k} z_{k}^{MC}(u_{k}+t) + \sum_{j} g_{j}x_{j} + \sum_{i} \gamma_{i} w_{i}(t) + \eta
\end{aligned}
$$

(1)

The subscript for an individual is suppressed for simplicity. The superscripts *B*, *C*, *MS* and *MC* denote, respectively, first birth, entering cohabitation for individuals never previously in a union, marriage formation for individuals never previously in a union,

and marriage formation of cohabitants in their first union. Union formation is modeled as a competing risk process. Each *y(t)* denotes a piecewise linear spline[9] that captures the effect of the duration on the intensity. The $\{z_k\}$ are splines that capture the effects of certain covariates that are continuous functions of t, z_k starting from an origin u_k relevant to each individual. In the equation for the process of first birth, these splines consist of the effects of duration since marriage formation (first union), the duration since the start of cohabitation (first union), and the duration since first marriage (for individuals having started their first union as cohabitants). In the equations for the processes of union formation or the marriage of cohabitants, the splines represent the time since the conception of the first child.

The vector $\{x_j\}$ denotes fixed time-invariant covariates; and $\{w_l(\cdot)\}$ is a set of time-varying covariates whose values change at discrete times in the spell, and is constant over the time span between those changes. The random variables ε, δ, and η capture unobserved heterogeneity. In particular, ε reflects unobserved factors influencing the timing of first births, δ reflects unobserved factors influencing the timing of first union (independently on the type of first union) i.e. the *living arrangement dimension*, while η reflects unobserved factors influencing the timing of first marriage, i.e. the *legal arrangement dimension*. ε, δ, and η and are assumed to follow a joint tri-variate normal distribution:

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

[9] Piecewise linear splines are used to approximate continuous functions (such as a baseline hazard or a non-proportional relative risk), by using function that are linear within each (possibly open-ended) interval. Those linear functions are connected at knots given *a priori*: piecewise linear splines are then also continuous functions.

In (2), $\rho_{\varepsilon\delta}$ and $\rho_{\varepsilon\eta}$ represent the correlation between the unobserved heterogeneity terms of the processes of union formation and first birth, and the correlation between the heterogeneity terms of marriage formation and first birth[10] respectively. The variances of the heterogeneity components where set to be 1.5 for both countries analyzed [11]. We estimate the model separately for German and Swedish women, using exactly the same specification for both. Model estimation was performed using full-information maximum likelihood, as implemented in the software package aML (Lillard and Panis, 2000).

4.2 Data and construction of variables

The data we use comes from the Fertility and Family Surveys (FFS), conducted in 1992 in West Germany (Pohl, 1995) and in 1992-93 in Sweden (Granström, 1997). These surveys offer highly comparable data in terms of the cohorts studied and the variables provided. The data provides full retrospective histories of partnership formation and dissolution, childbearing, educational and occupational activities. Foreign population was excluded from the samples analyzed for both countries. The German survey was undertaken in 1992 with 10,012 interviews of men and women born between 1952 and 1972. We selected the West German sample, which resulted in usable records for 4,922 individuals (of which 2,952 are women). The Swedish survey contains usable life histories on 4,903 respondents, selected by simple random sampling from each of five

[10] We do not include a separate analysis of union dissolution, which may be correlated with the processes we study here. Individuals who disrupt a union are censored at the moment of their disruption. This last event is then considered to be independent, given the array of covariates we include in the analysis, and the fact that we include a different specification of the heterogeneity components for married and for cohabitant couples (whose dissolution risks are known to be considerably higher than those of married couples).

[11] Changing the variance did not have a large impact on the parameter estimates. In all cases the sign and the significance were unchanged.

cohorts of women born in 1949, 1954, 1959, 1964 and 1969, containing 3,270 female respondents, and three cohorts of men born in 1949, 1959 and 1964. For the purposes of the analyses performed here we only include data for women.

The event variables are based on retrospective histories provided by the respondents. Both the dates of first union and first marriage are given to the nearest month. The event of first conception is given by the date of the first birth, also given to the nearest month, minus nine months. This means that we are unable to capture pregnancies that are interrupted by abortions. Censoring dates are generally given as the date of interview. However, in terms of the processes of first birth and of marriage of cohabitants, censoring date is given by the dissolution date, if this occurs. Respondents also provide their full education and employment histories. Both current enrolment and employment are implemented as time varying dummy variables. In terms of work we distinguish between full and part-time work. The respondents are recorded as working full-time if the average working hours per week exceeds 34 hours. Both the German and the Swedish FFS samples provide information on respondents' educational attainment, but the degree system in the two countries is different and not generally comparable. Consequently, we construct the educational levels based on the amount of time enrolled at school. We define three educational groups, which we label as Low, Middle, and High. Respondents fall into the first category if they have less than 11 years of schooling, into the second category if they have between 11 and 13 years (inclusive), and into the third category if they have more than 13 years of schooling. The educational attainment variables are also implemented as being time varying. The construction of the remaining background variables is more straightforward. Individuals are classified as having "Many siblings" if the number is more than 3 or, and live in an urban area if the population is more than 10,000 (at age 15).

5. Results

The results we obtained are displayed in tables 1 to 5 and figures 1 to 5. Table 1 shows the estimated correlation coefficients between the three unobserved components. Table 2 presents the results of the estimation of the process of conception leading to a first birth. Table 3 and 4 show, respectively, the results for consensual union formation and for marital union formation. Table 5 shows the results for the process of marriage of cohabitants. In what follows, let us keep in mind that all these results are parts of the same simultaneously estimated system of equations for each country, according to specification (1) shown above. We also estimated an alternative specification, not including any heterogeneity components (thus, assuming zero correlation between the processes). This latter specification is not presented here, but can be obtained from the authors on request.

5.1. Interrelationship between unobserved factors

The heterogeneity components of the processes of first union and first conception (table 1) have a significant positive correlation: 0.50 for Germany and 0.22 for Sweden. This indicates the existence of common unobserved factors affecting the two processes, as stated in our first hypothesis (H1a). Young women who are more likely to have a first birth are also more likely to form a union.

We now turn to the heterogeneity component capturing the *legal* dimension of marriage (direct marriage as well as marriage of cohabitants). Here the correlation with first birth is as high as 0.80 for Germany and 0.79 for Sweden. As expected in our hypothesis 1b, there is a higher correlation between unobserved factors affecting marriage and first birth than between those affecting first union and first birth. This is particularly the case

for Sweden, where the distinction married versus cohabitation captures very different groups within the population.

Finally, the connection between first birth and union formation is considerably weaker for Sweden, as expected in hypothesis 1c, while in Germany there is a more important presence of factors jointly affecting the timing of these two events. In sum, taking into account that union formation and first birth are part of the same process and that they are affected by a similar set of unobserved factors seems from our results to be a crucial component of the analysis. As such it provides support for the expectations stated in section 3.1.

[TABLE 1 ABOUT HERE]

5.2 The effects of union status on first birth

As shown in table 2, entering a first union sharply accelerates the conception leading to a first birth, for both Germany and Sweden. However, there are considerable differences between the two countries, not only in the impact produced by each type of partnership, but also in the time-shape of these effects (figures 1 and 2). The immediate effect of entering a first union implies a higher increase in the hazard among Swedes compared to Germans. In Sweden the risk is increased 11.2 times for the directly married, and 5.4 times for cohabitants, in both cases with respect to singles. In Germany the relative risk for direct marriage is 5.2 and for cohabitation 3.3. The subsequent effects are highly divergent. In Sweden, there is an increase in the hazard during the 6 years following both, marriage formation and especially, after entering cohabitation. In Germany, after the immediate increase in the first birth hazard caused by entering a union, there is a decline in the risks of first birth during the first few years of the union for married individuals. For cohabitants the risk is more or less stable during the 6 years after

entering the union. The relative risk thus becomes lower for married women than for cohabiting women after the third year in a union. This surprising divergence in patterns between cohabitation and marriage could be due to some other selection effects which we are not able to control for. For instance, infecundity could be more prevalent among married people who have not had a child in the early stages of their union than among cohabitants (who more often postpone childbearing in their union). One should also keep in mind the increasingly small number of cases of individuals not having a child at increasingly longer duration of a union. Overall, the increase in the hazard of conception in both types of union (with respect to singles) is thus higher in Sweden, and in particular among cohabiting couples. Concerning the event of marriage of cohabitants (figure 2), we notice that the additional effect (with respect to cohabitants) on first birth risks is somewhat higher in Germany (the relative risk of entering marriage equals 2.1) than in Sweden (where the relative risk is 1.7). This higher additional effect of marriage of cohabitants can be related to the sharper distinction, with respect to the welfare arrangements, between these union statuses in Germany, as explained in section 2 (H2c).

These results provide strong support to our second hypothesis, in which we stated that union formation has an impact on the risks of first birth net of common factors (H2a). They suggest that a union is indeed viewed by individuals as the most appropriate setting for having a child, and that individuals tend to avoid having out-of-union births. In addition, the results indicate a preference for having the first child in a marital union rather than in a cohabiting union, especially in Germany (H2c). The first few years of the union lead the highest levels of childbearing.

The observed differences between the two countries, with generally higher hazards of childbearing in Sweden, can be interpreted with a view to the relative support of

childbearing provided by the institutional arrangements in each country. Our results suggest that cohabiting couples in Germany seem to face greater difficulties relating to childbearing than their Swedish counterparts, as stated in our hypothesis 2b.

[TABLE 2 ABOUT HERE]

[FIGURE 1-2 ABOUT HERE]

5.3 The effects of pregnancy and first birth on union formation

The parameter estimates in tables 3, 4 and 5 refer to the processes of entering cohabitation, entering first union as a marriage ("direct marriage"), and marriage of cohabitants, respectively. We focus our attention on the effects of pregnancy and age of first child on the hazard of each type of union, since they reflect the extent to which women want to have their first birth inside each type of union.

Our findings show that during the period of pregnancy there is a remarkable increase in the propensity to enter a union (H3a). In figures 3 and 4 it can be seen that the peak attained during pregnancy sharply declines in the first year of life of the child, to reach even lower hazards than those of individuals who have not entered motherhood (in particular in the case of the hazard of marriage). These results are consistent with the expectations outlined in section 3.3. The hazards for entering cohabitation and for direct marriage, show similar increases in Sweden (with respect to individuals who are not pregnant or having a child), suggesting that individuals see both types of union as equivalent. However, it is important to take into account that in Sweden the proportion of individuals marrying directly is small (as are the number of cases involved in the computations), and that the proportion of individuals following this path has declined through birth-cohorts. In Germany, by contrast, a pregnancy leads much more often to a

marriage than to a cohabitation (H3c), suggesting a much stronger incentive to legitimize the child and a differential social status for each type of union. In addition, it is interesting to observe that in Sweden the shape of the risk of entering cohabitation is less concentrated in the central months of pregnancy, compared to Germany. The hazard of entering cohabitation is still higher (with respect to individuals who are not pregnant/parents) during the few years after the birth of the child and may be due to a lesser urge to necessarily enter the union before the birth of the child.

Unlike the results for entering first union, the effects of pregnancy and birth on the marriage of cohabitants show higher relative increases for Germany than for Sweden. Again, this may reflect a stronger importance for German women of institutionalizing the status of the union. In fact, this effect may have declined sharply in recent cohorts in Sweden. The effect of pregnancy/birth on marriage formation of cohabiting couples is much less important than the corresponding effect on entering a union (H3b).

Our results suggest that women (and probably also men) want to avoid an "out-of-union" birth in both countries and, in particular for Germany, many of them also want to avoid an out-of-wedlock birth.

[TABLE 3-4-5 ABOUT HERE]

[FIGURE 3-4-5 ABOUT HERE]

6. Conclusions

Our findings suggest that institutional arrangements, such as the differential incentives for marriage versus cohabitation, and other policies directed to lower the burden of childbearing, as depicted in the German and the Swedish case, affect the mutual interrelations between union formation and the transition to parenthood. Simultaneous hazard models have allowed us to show that the timing of first union and of first birth

are, at least partially, determined by unobserved factors, and such factors are positively correlated. Furthermore, there is a higher correlation between unobserved factors affecting marriage and first birth than between those affecting first union and first births. The correlation between unobserved factors affecting first union and first birth was higher in Germany than in Sweden. The strong correlation found suggest that failing to account for them would have lead to a serious distortion in the estimates. We provided a theoretical discussion on which elements (values, norms on the sequence of transitions) can explain the interrelationship between the process of first birth and first union formation.

We believe that cross-country comparisons on life course outcomes of institutional arrangements and on the interaction between demographic processes, would benefit by permitting the presence in the analyses of correlated unobserved heterogneity. The methods we used allow for a control of country-specific composition of the population with respect to unobserved heterogeneity. Thus, the connections between welfare state institutions and family formation behavior can be better appraised. However, future comparative studies should also aim at measuring what is presently unmeasured, and include a direct modeling of these factors.

Furthermore, we have showed that union formation has a strong effect on the transition to parenthood, net of the presence of correlated unobserved factors. This impact is higher in the case of marriage than in the case of cohabitation. Moreover, we found that transition rates to parenthood within a union are higher in Sweden than in Germany. This is especially the case for cohabiting couples.

Finally, we showed that pregnancy and first birth for singles have a strong effect on union formation, independent of common factors. This impact decreases shortly after the birth of the child. The effect of pregnancy on starting cohabitation is higher for

Sweden than for Germany, while the effect on marriage formation is stronger for Germany.

Our results suggest that the welfare arrangements existing in Sweden during the last few decades have been more successful than those present in West Germany in providing support for family formation. This conclusion is mainly based on two distinguishing features: 1) the treatment of cohabitation, and 2) policies supporting a "strategy" of combining parenthood and work, versus a "strategy" favoring the retreat from the labor market to have a child. This different support given to different types of families may also have consequences for the welfare of households, and especially the welfare of women and children in each country.

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Tables

Table 1. Correlation between heterogeneity components.

	(west) GERMANY			SWEDEN		
	Parameter	S.E.		Parameter	S.E.	
Correlation between first union and first birth	0.50	0.10	***	0.22	0.08	***
Correlation between first marriage and first birth	0.80	0.09	***	0.79	0.07	***

Note: *** = p<0.01, ** = p<0.05, * = p<0.10

Table 2. Estimation results. ***Process: conception leading to first birth***

	(west) GERMANY				SWEDEN			
	Coeff.	S.E.	Sig.	R.Risk	Coeff.	S.E.	Sig.	R.Risk
Direct marriage								
(reference = never been in union)				1.00				1.00
Enter marriage shift	1.66	0.19	***	5.24	2.41	0.25	***	11.18
0 -1 years (slope)	-0.40	0.23	*	#4.30	0.08	0.30		#11.65
1 -3 years (slope)	-0.16	0.11		#3.01	-0.07	0.17		#11.30
3 - 6 years (slope)	-0.33	0.10	***	#1.57	0.15	0.15		#13.16
6 years or more (slope)	-0.20	0.07	***		-0.22	0.23		
Cohabitation								
(reference = never been in union)				1.00				1.00
Enter cohabitation shift	1.20	0.25	***	3.33	1.69	0.15	***	5.40
0 -1 years (slope)	-0.18	0.28		#3.04	0.62	0.16	***	#7.36
1 -3 years (slope)	-0.06	0.11		#2.63	0.13	0.06	**	#11.48
3 - 6 years (slope)	0.09	0.08		#2.84	0.16	0.05	***	#16.77
6 years or more (slope)	-0.03	0.08			0.07	0.05		
Marriage of cohabitant								
(reference = in cohabiting union)				1.00				1.00
Enter marriage shift	0.72	0.25	***	2.06	0.51	0.16	***	1.66
0 -1 years (slope)	-0.32	0.32		#1.76	-0.07	0.22		#1.60
1 -3 years (slope)	0.06	0.13		#1.60	-0.20	0.11	*	#1.26
3 years or more (slope)	-0.25	0.08	***		-0.27	0.07	***	
Educational level								
Low	-0.06	0.11		0.94	0.35	0.16	**	1.42
(reference = middle)				1.00				1.00
High	-0.26	0.11	***	0.77	-0.82	0.10	***	0.44
Enrolled in education	-0.90	0.12	***	0.41	-0.29	0.11	***	0.75
Employment status								
(reference = not employed)				1.00				1.00
Full time	-0.23	0.09	***	0.79	0.13	0.09		1.14
Part time	-0.09	0.15		0.91	0.16	0.13		1.17
Parents divorced/separated	0.09	0.14		1.09	0.20	0.12		1.22
Lives in rural location	0.27	0.09	***	1.31	0.07	0.08		1.07
3 or more siblings	0.77	0.10	***	2.17	0.51	0.08	***	1.66
Birth cohorts								
1949 - 1951	-	-		-	0.59	0.11	***	1.81
(reference = 1952 - 56)				1.00				1.00
1957 - 61	-0.40	0.13	***	0.67	-0.33	0.12	***	0.72
1962 - 66	-0.68	0.13	***	0.51	-0.56	0.13	***	0.57
1967 - 71	-1.24	0.15	***	0.29	-0.79	0.15	***	0.45
Intercept	-5.19	0.29	***		-6.47	0.35	***	

Note: *** = p<0.01, ** = p<0.05, * = p<0.10

The relative risks for each age group are calculated by exponentiating the value of the average hazard for the ages concerned.

Table 3. Estimation results. ***Process: First union formation (cohabitation)***

	(west) GERMANY				SWEDEN			
	Coef.	S.E.	Sig.	R.Risk	Coef.	S.E.	Sig.	R.Risk
First birth (conception)								
(reference = no children)				1.00				1.00
Start of pregnc. to 4.5 mths (slope)	3.51	0.87	***	#1.93	6.41	0.53	***	#3.32
4.5 months to birth (slope)	-0.21	1.18		#3.59	0.40	0.68		#11.91
from birth to 1 year (slope)	-1.59	0.41	***	#1.56	-1.68	0.28	***	#5.54
more than one year (slope)	-0.07	0.07			-0.09	0.06		2.09
Educational level								
Low	-0.43	0.12	***	0.65	0.24	0.12	**	1.27
(reference = middle)				1.00				1.00
High	-0.21	0.11	*	0.81	-0.20	0.10	**	0.82
Enrolled in education	-0.25	0.10	***	0.79	-0.31	0.07	***	0.73
Employment status								
(reference = not employed)				1.00				1.00
Full time	0.34	0.09	***	1.40	0.20	0.06	***	1.23
Part time	-0.13	0.18		0.88	0.19	0.10	*	1.21
Parents divorced/separated	0.76	0.13	***	2.13	0.58	0.10	***	1.79
Line in rural location	0.02	0.10		1.02	0.15	0.07	**	1.16
3 or more siblings	0.56	0.11	***	1.76	0.18	0.08	***	1.20
Birth cohorts								
1949 - 1951	-	-		-	-0.37	0.12	***	0.69
(reference = 1952 - 56)				1.00				1.00
1957 - 61	-0.04	0.15		0.96	0.27	0.11	***	1.31
1962 - 66	-0.03	0.14		0.97	0.03	0.11		1.03
1967 - 71	-0.62	0.15	***	0.54	0.03	0.12		1.03
Intercept	-6.39	0.32	***		-5.73	0.23	***	

Note: *** = p<0.01, ** = p<0.05, * = p<0.10

The relative risks for each age group are calculated by exponentiating the value of the average hazard for the ages concerned.

Table 4. Estimation results. ***Process: First union formation (direct marriage)***

	(west) GERMANY				SWEDEN			
	Coef.	S.E.	Sig.	R.Risk	Coef.	S.E.	Sig.	R.Risk
First birth (conception)								
(reference = no children)				1.00				1.00
Start of pregnc. to 4.5 mths (slope)	5.60	0.62	***	#2.86	6.80	0.92	***	#3.58
4.5 months to birth (slope)	-0.45	0.77		#7.49	-2.15	1.28	*	#8.54
from birth to 1 year (slope)	-2.20	0.33	***	#2.29	-1.89	0.67	***	#2.21
more than one year (slope)	-0.32	0.07	***		-0.17	0.15		
Educational level								
Low	-0.12	0.15		0.89	-0.04	0.42		0.96
(reference = middle)				1.00				1.00
High	-0.46	0.15	***	0.63	-0.63	0.24	***	0.53
Enrolled in education	-0.88	0.15	***	0.41	-1.25	0.22	***	0.29
Employment status								
(reference = not employed)				1.00				1.00
Full time	0.22	0.12	*	1.25	-1.47	0.17	***	0.23
Part time	0.38	0.22	*	1.47	-0.69	0.33	**	0.50
Parents divorced/separated	0.01	0.22		1.01	-0.67	0.34	**	0.51
Live in rural location	0.41	0.13	***	1.51	-0.26	0.17		0.77
3 or more siblings	0.83	0.14	***	2.29	1.06	0.18	***	2.90
Birth cohorts								
1949 - 1951	-	-		-	0.86	0.24	***	2.36
(reference = 1952 - 56)				1.00				1.00
1957 - 61	-0.93	0.17	***	0.39	-0.24	0.28		0.78
1962 - 66	-1.81	0.18	***	0.16	-0.33	0.29		0.72
1967 - 71	-2.98	0.20	***	0.05	-0.56	0.32	*	0.57
Intercept	-8.07	0.41	***		-8.21	0.73	***	

Note: *** = p<0.01, ** = p<0.05, * = p<0.10

The relative risks for each age group are calculated by exponentiating the value of the average hazard for the ages concerned.

Table 5. Estimation results. ***Process: Marriage formation of cohabitants***

	(west) GERMANY				SWEDEN			
	Coef.	S.E.	Sig.	R.Risk	Coef.	S.E.	Sig.	R.Risk
First birth (conception)								
(reference = no children)				1.00				1.00
Start of pregnc. to 4.5 mths (slope)	3.37	0.74	***	#1.88	1.54	0.49	***	#.331
4.5 months to birth (slope)	-0.34	0.83		#3.32	-0.90	0.53	*	#1.50
from birth to 1 year (slope)	-1.45	0.32	***	#1.51	-0.55	0.16	***	#0.97
more than one year (slope)	-0.21	0.05	***		-0.23	0.03	***	
Age								
15 - 19 (slope)	0.39	0.19	**	#1.00	0.44	0.19	**	#1.00
19 - 24 (slope)	0.04	0.05		#8.39	0.16	0.03	***	#11.75
24 - 30 (slope)	0.00	0.04		#9.37	0.06	0.03	***	#23.25
30 + (slope)	-0.17	0.12			0.02	0.03		
Educational level								
Low	-0.18	0.17		0.84	0.31	0.24		1.36
(reference = middle)				1.00				1.00
High	-0.35	0.15	**	0.71	0.11	0.12		1.11
Enrolled in education	-0.89	0.20	***	0.41	-0.57	0.14	***	0.57
Employment status								
(reference = not employed)				1.00				1.00
Full time	-0.26	0.14	*	0.77	-0.09	0.09		0.92
Part time	0.51	0.24	**	1.67	-0.21	0.11	**	0.81
Left home before starting union	-0.60	0.15	***	0.55	-0.09	0.10		0.92
Parents divorced/separated	-0.47	0.20	***	0.62	-0.04	0.14		0.96
Live in rural location	0.32	0.14	***	1.38	-0.17	0.09	*	0.84
3 or more siblings	0.10	0.15		1.11	0.36	0.10	***	1.44
Birth cohorts								
1949 - 1951	-	-		-	1.05	0.12	***	2.85
(reference = 1952 - 56)				1.00				1.00
1957 - 61	-0.57	0.19	***	0.56	-0.48	0.14	***	0.62
1962 - 66	-1.01	0.19	***	0.36	-0.48	0.15	***	0.62
1967 - 71	-1.41	0.23	***	0.24	-1.02	0.20	***	0.36
Intercept	-1.96	0.73	***		-0.44	0.75	***	

Note: *** = p<0.01, ** = p<0.05, * = p<0.10

The relative risks for each age group are calculated by exponentiating the value of the average hazard for the ages concerned.

Figures:

Figure 1. First birth process: effects of duration since start of first union

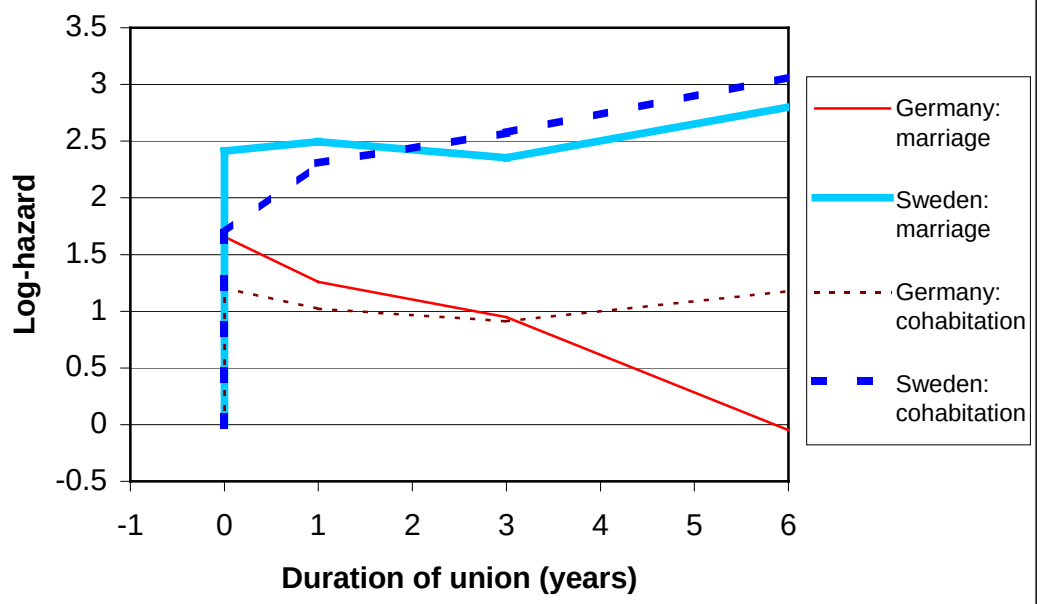

Figure 2. First birth process: effects of duration since start of cohabitation and of marriage of cohabitant

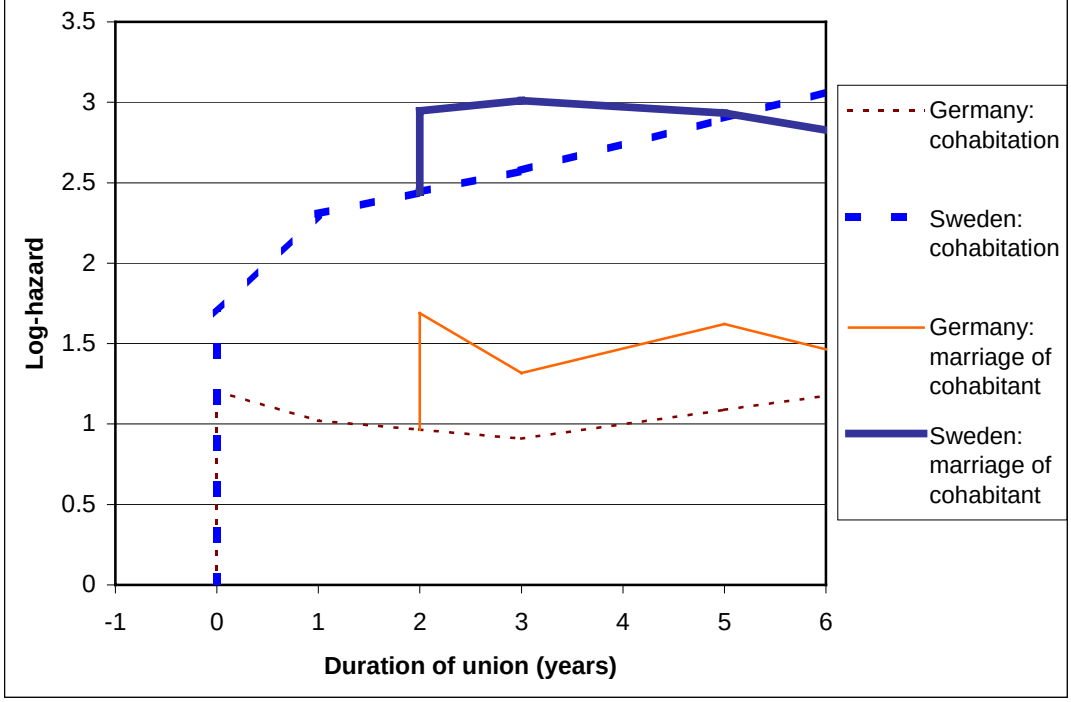

Figure 3. Union formation process (cohabitation): the effects of pregnancy and age of first child

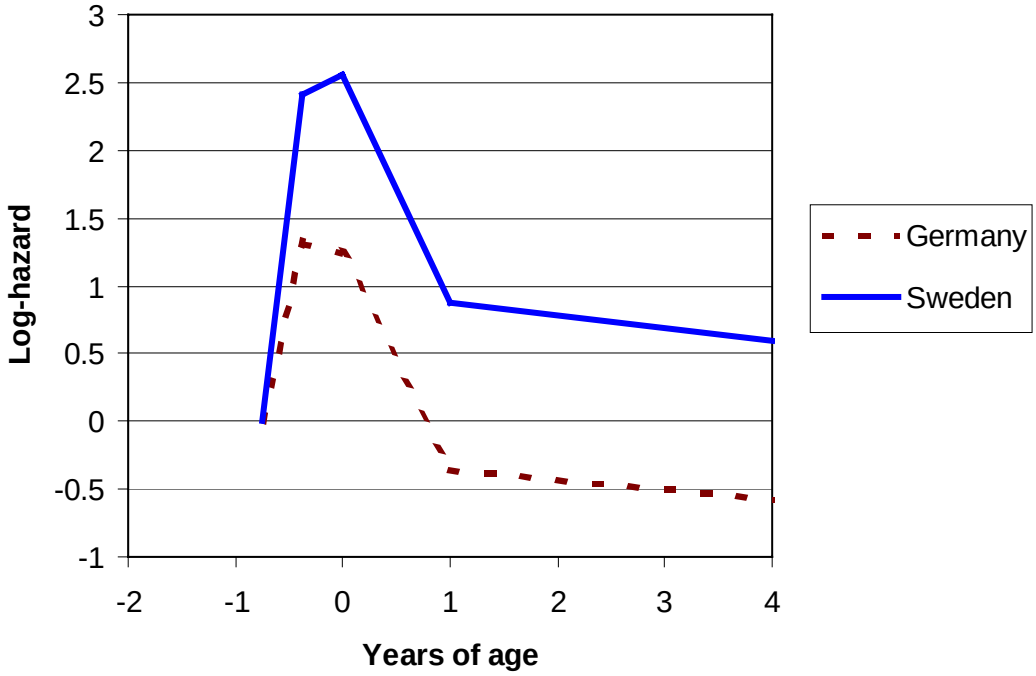

Figure 4. Union formation process (marriage): the effects of pregnancy and age of first child

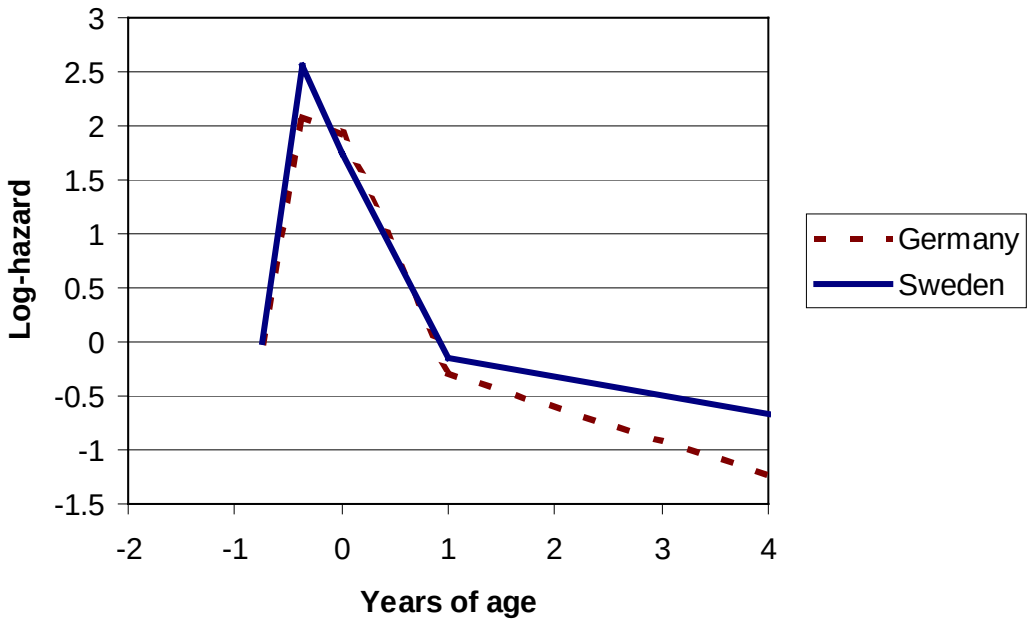

Figure 5. Process of marriage of cohabitants: effects of pregnancy and age of first child