A Comparative Analysis of the Effect of Pregnancy in Cohabiting Unions on Formal Marriage in Canada, The Netherlands, and Latvia: A Causal Event History Approach to Interdependent Processes

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Abstract

Recently, the western world has witnessed among young cohorts a significant rise in both cohabitation and out of wedlock births as well as an increasingly complex relationship between marriage and childbirth. This study follows previous investigations conducted by Blossfeld and colleagues (1999) on the experience of pregnancy within cohabiting unions and how it conditions the likelihood of transition to formal marriage with the same partners. A hazard model with time-varying covariates is specified explicitly as time-dependent, with entry into first marriage as the dependent process and first pregnancy/birth as the explaining process. Our conceptual framework relies on the rational actor theory, which proposes that norm-guided and rational self-centred behaviour co-exist in the case when a pregnancy occurs in a consensual union and a decision is to be made by the couple with respect to marriage or non-marriage. Our test of this interrelated process is based on the experiences of Canada, Latvia, and the Netherlands. Findings suggest that the interdependencies of cohabitation, pregnancy, and marriage fit the model and are generally uniform processes across these societies. Slight country differences are attributed to attitudes and policies regarding cohabitation versus marriage and the acceptability of out of wedlock births.

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Introduction

Over the last several decades the western world has witnessed a significant rise in both cohabitation and out of wedlock births among young cohorts (e.g., Blossfeld, 1995; Leridon, 1990; Toulemon, 1997). The relationship between marriage and childbirth is increasingly complex with marriage no longer preceding the birth of a child as a rule. There is evidence that this phenomenon is not confined solely to western societies, but that Baltic and Eastern European countries are experiencing a similar trend (Katus, 1992; Stropnik, 1995). A comparative analysis of pregnancies within cohabiting unions in Canada, Lativa and the Netherlands provides valuable insights on the dynamics of these interdependent processes across three very different demographic, social, cultural, and economic contexts.

This study examines how the experience of a pregnancy within cohabiting unions conditions the likelihood of transition to formal marriage with the same partner. It is a replication of previous studies by Blossfeld, Manting and Rohwer (1993) and Blossfeld, Klijzing, Pohl and Rowher (1999). The process is modelled explicitly as time-dependent, with entry into first marriage as the dependent and first pregnancy/first birth as the explaining process. The relation of pregnancy/childbirth to first marriage is conceptualised via the rational actor model (Blossfeld et al., 1999). This approach provides a theoretical explanation of the time-dependent process and proposes that norm-guided and rational self-centred behaviour co-exist. Under the postulates of this theoretical framework, when a common-law couple's preferences regarding marriage are vague and diffuse, the discovery of pregnancy engenders a highly time-dependent process of preference formation and persuasion.

Several reasons led us to conduct this study. First, there is great value in undertaking a comparative analysis of nations that have different levels and types of common-law union experiences in addition to government policies, economic, historical and cultural differences. Liefbroer (1999: 79) maintains that "cross-national comparisons of family formation processes

are one of the most promising lines of research. These sorts of comparisons provide scope for studying the effects of societal-level factors…and for examining the extent to which these macro factors moderate the effects of individual-level variables." Countries from North America, Western Europe and the Baltic states provide a rich comparative analysis. Second, consensual unions and non-marital births in Eastern Europe and the Baltic States have skyrocketed since the 1980s. These countries, such as Latvia, however, are rarely included in comparative analyses. A third impetus is the acknowledgement that partnership and fertility behaviour are inherently interdependent processes. Fourth, we are interested to see if previous findings in this area of study, particularly those of Blossfeld and colleagues (1999) hold in different contexts. Replication using diverse contexts provides what Blossfeld et al. (1999) aptly state is: "a harsher and more useful validation than statistical testing of many models on only one data set."

We first introduce the causal approach to the analysis of interdependent processes, followed by a review of previous studies. Second, we describe the central tenets of the rational actor model, which provides the theoretical framework to understand the dynamic process of first pregnancy/birth and entry into legal marriage. Data from the *Fertility and Family Surveys* (FFS) are used in conjunction with the technique of episode splitting and partial likelihood estimation to model and understand the process.

The Causal Approach to Interdependent Processes

A causal approach to data analysis returns us to the basic elements of scientific enquiry. As Simon (1979: 79, in Willekens, 1991: 11) asserts: "Scientific inquiry is concerned not only with discovering quantitative relations between variables, but also with interpreting these relations in terms of underlying causal mechanisms that produced them." Blossfeld et al. (1999, see also Blossfeld and Rohwer 1995: 3-32) outline three aspects of the causal approach. First,

demographic processes should be understood at the individual level. This suggests a focus on the micro-level processes of individual action and interaction, in which event history data and models are capable tools. Second, *demographic processes require a time-related specification of structural constraints* to select the mechanism that determines feasible courses of action, based on the individual's beliefs, expectations, and motivations. Finally, *indeterminacy is introduced in the theory and models*, since individuals are not only influenced by their context, but also possess free will. This micro or bottom-up approach aids in the discovery of how micro-level processes comprised of individual action and interaction shapes the emergent characteristics of groups or populations. From this, we arrive at a reasonable view of prevalent behaviours or patterns of action. The causal approach thus strives to understand the emergence of behaviour of aggregate behaviour patterns or groups, not behaviour at the individual level in itself.

'Parallel' (Willekens, 1991), 'coupled' (Courgeau and Lelièvre (1992) or 'interdependent' (Blossfeld and Rohwer, 1995) processes is a growing area of research in demography and sociology. In order to apply the causal approach to interdependent processes, three main issues arise. When examining interacting processes we are unable to apply two important prerequisites of causality - temporal ordering and contiguity (Willekens, 1991: 14) and are often unaware if other intervening processes jointly govern the interdependent processes. *Temporal ordering* refers to the notion that "present behaviour is determined by predictions of the future" (Willekens 1991: 14). The observed causal path may be an incorrect indicator of the actual temporal order of decisions. This refers to the distinction Marini and Singer (1988) outlined as the gap between mental causal priority and observed temporal sequences of behaviour. Individuals think prospectively in an attempt to plan their lives or colonise the future, based on past experience and present circumstance. Couples in a consensual union, for instance, may first decide to have a child, the woman then becomes pregnant and they marry. Others may experience an unplanned pregnancy and as a result, decide to marry.

Although the observed sequence of cohabitation-pregnancy-marriage is the same, the 'observed' temporal ordering of events does not adequately reflect the divergent mental causal priorities.

The second problem relates to *contiguity* (Willekens, 1991: 14-15), or the *temporal shapes of the unfolding effect* (Blossfeld and Rohwer, 1995: 14-15). This refers to the theoretical and methodological need to deal with time lags between cause and effect. There occurs what Willekens (1991: 15) terms an 'incubation period' and Courgeau and Lelièvre (1992) define in a slightly different manner as 'fuzzy time'. This is the duration between cause and effect (incubation period) and decisions and behaviour (fuzzy time). The contiguity requirement linking cause and effect is therefore difficult, as the effect may occur over time or become manifest only after an extended period of time. A final pitfall is that the two interdependent processes (i.e., first birth/pregnancy and first marriage) may be governed by a third *intervening process* (e.g., enrolment in education or participation in labour force) in which they are jointly dependent (Willekens, 1991).

Previous Studies

In this paper we attempt to replicate the earlier findings of Blossfeld, Manting and Rohwer (1993) who focused on the effect of fertility (first pregnancy/birth) on rate of entry into first marriage in West Germany and the Netherlands, with a series of time-dependent dummy fertility variables.[1] The first central finding of that study was that the effects these variables on marriage rate were significant for both countries and worked in same direction. Second, these authors uncovered a curvilinear relationship. When women were not pregnant, there was a comparatively low rate of entry into marriage for those living in consensual union; but when a woman became pregnant (or around time of birth in West Germany) the rate of marriage increased strongly. The rate of entry into marriage then dropped again if the couple had not married within six months after the birth of the child.

In the second study, Blossfeld, Klijzing, Pohl and Rohwer (1999) reaffirmed that entry into first marriage as a dependent process was highly interdependent with the first birth/pregnancy process. In order to model the time lags between the cause and its effect, they discovered that they required a model capable of detecting the specific and strongly time-dependent force of how fertility influenced entry into marriage. Proper temporal specification was paramount, otherwise, as Blossfeld et al. (1999: 234) state: "the aggregated average tendency to marry before the child is born could equal the aggregated average tendency to marry after the child is born, and therefore make the estimated coefficient on the time-dependent covariate 'childbirth' not significantly different from zero."

For this reason, they defined a series of time-dependent dummy variables (More than 9 months, -9, -8,…,+7 months) as lags/leads in relation to month of childbirth. Again, they detected a curvilinear relationship – a low marriage rate before pregnancy, increasing strongly up to about 4-5 months before birth, then falling steeply around time of birth to a relatively low level more than 7 months after birth. They concluded that this time-dependence must be understood from a theoretical perspective. An underlying negotiation process at the level of non-married couples led to value formation and perhaps a change in initially unstructured preferences for marriage.

The rational actor model

There are a variety of pathways and causal relationships to understand the interaction between first pregnancy/birth and first marriage in consensual unions. A common-law couple may choose to have a child, wait until the woman gets pregnant, and then marry. They may decide to marry before the woman gets pregnant, but experience the pregnancy before the actual pre-determined wedding date itself. An accidental pregnancy could lead to a marriage that may not have otherwise taken place. Pregnancy may lead to the dissolution of the consensual union for

reasons such as a disagreement of the desirability of having child. The couple or woman may decide to abort the pregnancy. Alternatively, the couple may remain in consensual union after pregnancy/birth without changing the partnership status. Consensual unions that remain the same or are dissolved in addition to termination of the pregnancy are options that are not examined in any detail in this paper. The focus remains on whether the pregnancy causes a change in the cohabiting couple's decision to enter a marital union.

In order to examine this process, Blossfeld et al. (1999) propose a hybrid model combining norms (normative, structural constraints) and self-interest (choice, preferences) – termed the *rational actor model*. The micro-level mechanisms of this model are the defining forces of how the event of pregnancy, in combination of individual desires, beliefs and opportunities, generate a marriage decision. Marriage is a pre-commitment or an assurance to bind oneself at present to increase the probability of responsible behaviour in future. Higher transaction costs of dissolution of a legal marriage as opposed to cohabitation suggest that it is not a trial relationship and thus grants a higher level of stability. Conversely, having children is an irreversible, long-term, joint project that constrains the behaviour of both partners, particularly women. Having a child decreases chances of finding a new partner if the partnership ends, which as Oppenheimer (1988) contends, is a risk much greater for women since they are often the primary caregivers of children. Finally, it constrains the future behaviour of both partners if their focus is on the quality of children.

In the rational actor model, there are two conditions at the time of discovery of a pregnancy. First, *preferences of partners to marry are vague and diffuse.* In this case, the pregnancy initiates the process of preference formation and persuasion. *Formation* suggests that partners have vague preferences that are shaped during a negotiation process of social interaction with their partner and social network. *Persuasion* denotes that the individual is led through a sequence of short-term improvements that situates marriage above non-marriage. Preference formation and persuasion are highly time-structured. The opportunity to legalise a

birth and thus avoid illegitimacy decreases with duration of pregnancy. The likelihood of medical complications also increases, signalling that the optimal marriage time is in the early pregnancy phase. After birth has taken place out of wedlock, the decision to marry takes on a different value, as the child is already 'illegitimate' with little time pressure to make a decision. Second, *the couple may have already reached a decision to marry or not in the case of a pregnancy*. This relates to the sticky notion of contiguity, cause, and effect and relates to our ability to examine only observed behaviour or outcomes and not the black box of motivations behind these actions.

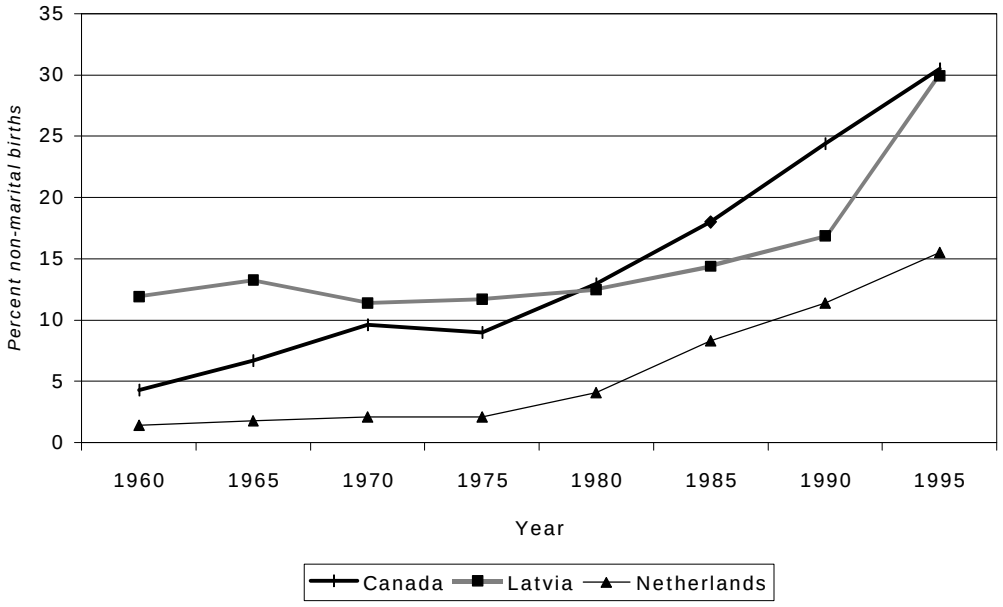
Micro-levels of forces of choice, value formation, and persuasion are not the only important determinants of the decision to marry in lieu of a pregnancy. The enabling and constraining aspects of the structural context also inform the decision. Norms indirectly shape the informal and formal rules of a society. The decision to marry or not is based on informal control structures such as the force of tradition, family, and social control, often experienced through a religious, family or community network. Norms shape the acceptability of cohabiting unions, legal marriage, or abortion. Norms are not only spatially or geographically based, but evolve through time. Thus, it is important to consider the time that the respondent was born (birth cohort) and the period they experienced the pregnancy and marriage decision (historical period).

Norms indirectly shape the formal system of legal rules and regulations that may influence decision-making. Tax system privileges or family allowance may impact whether it is advantageous for the couple to marry or have children within a legal union. The couple may also consider legal aspects such as the last name of the child or custody of children in the case of dissolution. The availability of day care or pre-primary school may also impact entry into parenthood. Although not examined here, abortion laws and social acceptability could also influence whether the couple continues the pregnancy to term. In order to regulate fertility in the first place, the availability and acceptability of contraceptives may also play a role. If

contraceptives are not an easy or desirable option for the couple, the risk of unplanned pregnancy within a cohabiting union increases.

Figure 1 shows a sharp increase in non-marital births in all study countries since the 1980s. Generally, women appear more likely to have children in marital unions in the Netherlands. This may be attributed to avoidance of visual signs of pregnancy (i.e., stigma), and marriage in the early months of pregnancy (Manting, 1994). Since 1975, there has been a steady increase in non-marital births in Canada. In 1991, 78 of 100 children lived in families that were married couples. Although not examined here, this trend continued. From 1991 to 1996 there has been a 52 percent increase in children living in common-law partnership families, with 14 percent of all children under the age of six living in these types of families (Statistics Canada, 1997).

FIGURE 1. Percentage non-marital births as a percentage of all live births, Canada, Latvia, and the Netherlands, 1960-1995



Sources: Canada, Statistics Canada (1993, Table 21: 35). Netherlands, Latten & De Graaf (1997: 52). Latvia, Central Statistical Bureau of Latvia (1995: 56) in Zvidrins et al. (1998).

The percentage of non-martial births in Latvia has been at a comparatively higher level since the 1960s. This may be attributed to low contraceptive use. In 1996, for instance, only 20

percent of the population age 15 to 44 were using some form of contraception (Government of Latvia, 1999: 125). A dramatic increase since the 1990s is most likely tied to the substantial institutional changes, such as independence from Soviet occupation in 1991. This continued to rise with the proportion of children born in common-law unions reaching 35 percent in 1997 (Government of Latvia, 1999: 124).

Increased educational and labour force opportunities for women, childcare, and the social acceptability of cohabitation and out-of-wedlock births vary per period. Female labour force participation over time is a general indicator of female economic independence and opportunities across countries. Although not available for Latvia, Table 1 shows that Canadian women have an overall higher rate of labour force participation as compared to the Netherlands, with both showing steady increases from 1950 to 1991.

TABLE 1. Female labour force participation rates, Canada and the Netherlands, 1950-1990

Year	Canada	Netherlands
1950	23.5	24.3
1960	28.7	21.9
1970	38.4	25.7
1980	51.7	32.6
1990	58.2	45.9

*Rates for Canada are 1951-1991.
Sources: Canada: Wu (1999:50); Netherlands: (Latten & De Graaf (1997: 50).

Data

Data is taken from the *Fertility and Family Surveys* (FFS) for Canada (1995), Latvia (1995), and The Netherlands (1993).[2] We selected only women born between 1950 and 1969, or roughly 25-45 years of age at the date of the survey. The 1995 FFS data for Canada is derived from Statistics Canada's 1995 General Social Survey (GSS). The FFS female sample contains women (n=4,166) between the ages of 15 to 54 collected from January to December 1995 to represent seasonal variation (Statistics Canada, 1997: 8). The overall household response rate was 90.4 percent, with 80.7 percent at the individual level (Statistics Canada, 1997: 15). There are several important technical aspects concerning the use of the Canadian data, which are described in detail in the technical appendix. In particular, only the timing of events up to the tenth of the

year is publicly released (age of events up to one decimal point). In order to shift the data to months, or from the tenth to twelfth of the year, we generated a random (uniform) distribution to obtain the timing of events up to three decimal points.

The female sample of 4,516 women in the 1993 Netherlands FFS includes women aged 18 to 42 years, collected from February to June 1993 (Latten and de Graaf, 1997). Characteristic of many Dutch surveys, this study had a non-response rate of 51.5 percent at the address level and 90.3 percent at the household level. This does not diverge from typical non-response rates in the Netherlands for surveys conducted by the Netherlands Central Bureau of Statistics (Bethlehen and Kersten, 1986, in Liefbroer, 1991). The female sample of the 1995 Latvian FFS Survey contains 2,699 women aged 18-49 (Zvidrins et al., 1998). Fieldwork was conducted in September 1995 covering one half of the administrative area of the country, with representative sampling to reflect the gender, rural/urban, age and ethnic composition. During the survey approximately 23 percent of females originally selected for interview were replaced due mainly to non-availability (Zvidrins et al., 1998: 59) with one-fifth of non-response was attributed to refusal.

Method

We use a Cox (1972) hazard model with time-dependent covariates for this analysis. The model produces partial likelihood estimates of the transition rate to first marriage after the discovery of a pregnancy for women in consensual unions, controlling for selected covariates.

When using the causal approach, one of the interdependent processes is designated as the dependent one.[3] Following Blossfeld and Rohwer (1995) and Blossfeld et al. (1999), Y_t is a system of joint processes - first pregnancy/birth and first marriage at time *t* - dependent on the history and present state of the entire dynamic system. Y_t consists of the two processes Y_t^A

((non)occurrence of first pregnancy/birth) and Y_t^B (transition to first marriage or not). The assumption is that a change in Y_t^A could be a cause or impetus for change in Y_t^B. Thus, a change is the cause of the process, *not* the process itself (i.e., process of Y_t^A is not the cause of the process Y_t^B). The causal relation of how an antecedent change in pregnancy/birth affects the future probability of a change in marriage is specified as:

$$\triangle Y_t^A \rightarrow \triangle \Pr(Y_{t'}^B) \qquad t < t' \qquad \text{[EQ01]}$$

In other words, any change in the time-dependent covariate of pregnancy/birth, Y_t^A, will influence the future probability of entrance into first marriage, Y_t^B. This causal effect is thus conceived using a probabilistic statement.

The second assumption is that each event may not produce an instantaneous reaction, which may result in a time lag. With causality in mind, we consider not only the temporal order of events, but also the way in which effects unfold over time due to the formation of beliefs or evolving motivations due to interaction and persuasion. The principle of conditional independence is the third assumption. This suggests that a change in Y_t^B (and vice-versa) at any point in time depends on the history of both processes up to, but not including time *t*. The first marital process (Y_t^B) at any point in time is conditionally independent on what happens with the first pregnancy/birth (Y_t^A) process at *t*, conditional on the history of the joint process Y_t, up to, but not including *t*.

The causal reasoning underlying this approach is formally specified as (Blossfeld and Rohwer, 1995; Blossfeld et al, 1999):

$$\triangle Y_t^A \rightarrow \triangle r\ (t') \qquad \text{[EQ02]}$$

A change in covariate, Y_t^A in the past may lead to changes in the transition rate r(*t'*) of the dependent variable (first marriage) in the future. Further model specifications, such as the likelihood, are described in detail in Blossfeld and Rohwer (1995: 157-161) and Rohwer and Pötter (1999). We estimated this model in the statistical package TDA, using the technique of episode splitting. [4]

Research hypotheses

Our general expectation is that, similar to previous results, the rate of the transition to a married state given a pregnancy within each country, will vary on the time-dependent pregnancy-birth process, birth cohort, historical period, educational level, school enrolment.[5]

As described in the previous section, when a common-law couple's preferences regarding marriage are vague and diffuse, the discovery of pregnancy engenders a highly time-dependent process of preference formation and persuasion. *We will test if a curvilinear relationship between first pregnancy/birth and transition rate to first marriage holds in the countries being observed*. This is estimated using a series of 14-value **time-dependent first pregnancy/birth** binary variables (more than 9 months before birth, 9 months before birth,…etc, more than 7 months after birth, coded as centred effects). [6]

Based on previous evidence, we also expect that younger **birth cohorts** are more likely to enter cohabiting unions and have out-of-wedlock births. Birth cohorts were divided into four groups ranging from 1950-54, 1955-59, 1960-64, to 1965-69. Generally, we expect that *women in younger cohorts will have a lower rate of entry into marriage after the discovery of a pregnancy*.

Another important temporal indicator is the **historical period** at the time of the interdependent processes. Informal and formal rules, regulations and policies regarding the social and legal acceptability of cohabiting unions and non-marital births are highly tied to the

historical period in each country. The three periods of before 1974, 1974-83 and after 1983 control for this historical influence. We hypothesise that *women who experienced a pregnancy in later periods will have a lower transition rate to marriage*. This is based on the rationale that women facing this decision in earlier periods were more bound by social (e.g., religious) norms than women who had to make this decision in later periods. The latter group is less likely to consider traditional mores as important in their decisions.

Educational level is measured by the highest education level attained, which is divided into three categories ranging from low (less than high school), middle (high school or technical degree) to high (post-high school education) (see technical appendix). Highly educated adults attach greater value to autonomy and independence and therefore often opt for consensual unions and may postpone marriage (Liefbroer, 1991). Blossfeld and Huinink (1991) found that the higher one's education level, the higher the attachment to an occupational career and for women, economic autonomy. Thus, we expect that *highly educated women will have postponed rate of entry into marriage after the discovery of a pregnancy than women with lower education.*

Education, however, is not static and participation may shift over time. Following Blossfeld et al. (1999), we therefore introduce the binary **time-dependent variable of school enrolment** at the time of pregnancy-birth process (enrolled or not enrolled). Education is another competing process with the fertility and union careers. As Oppenheimer (1988) has discussed, increased educational enrolment of women results in the delay in life course events such as marriage. Longer enrolment and later marriage may be the result of lack of money, less time for the relationship and less commitment to a long-term union (Hoem, 1986). Blossfeld and Huinick (1991) argue that there is a norm that students are often economically dependent on their parents and at a lower risk of entering marriage and parenthood. The majority of women delay entry into marriage and parenthood until the completion of school. We therefore expect that *women enrolled in school will have a decreased rate of entry into marriage*. Selectivity is, of course, also an issue here. Women who are currently enrolled in education may have a lower

chance of being in a union, take precautions against pregnancy, and thus do not appear in our sample in the first place.

Canada, Latvia, and The Netherlands have each followed a unique historical, social, economic and religious path. Attitudes and policies regarding cohabitation versus traditional marriage and acceptability/feasibility of out of wedlock births reflect this path dependence. Since the **country** of residence is a decisive contextual variable, models were run separately for each country. Based on previous findings, we expect that *all countries will show a strong time-dependent and early entrance into first union after the discovery of a pregnancy*. We expect, however, that *significance and temporal variation of the process may vary due to disparate contexts of each nation.*

The full model (without interaction effects) is specified as:

$$r(t) = [h_0(t)] \exp [X_1(t)\beta_1 + X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + X_5(t)\beta_5] \qquad [EQ03]$$

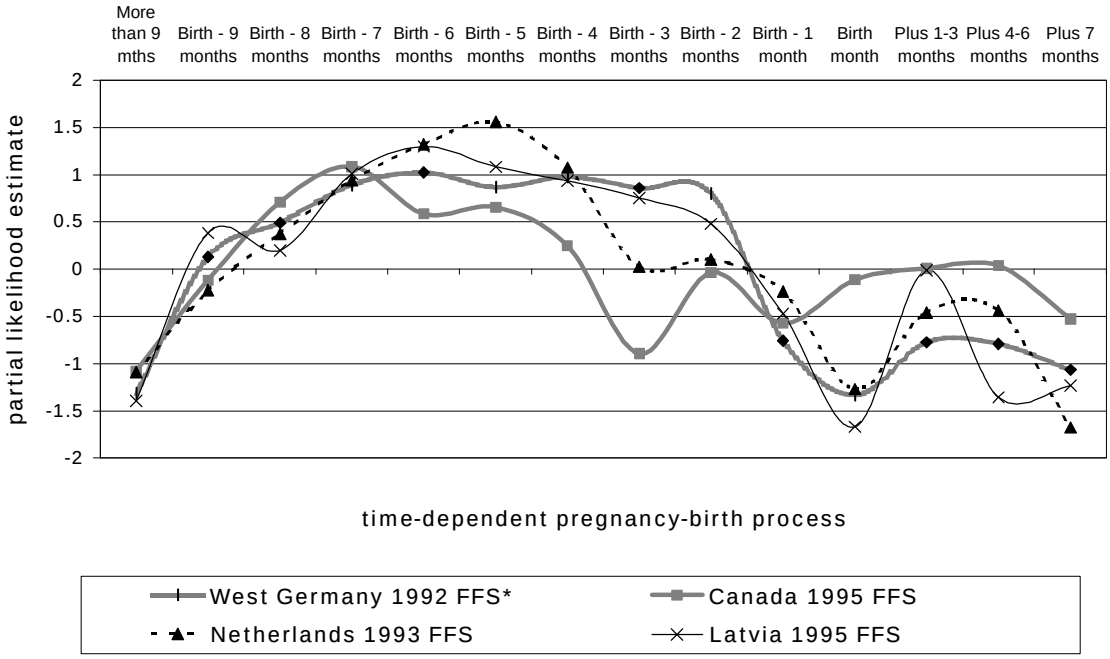
Where $h_0(t)$ is the baseline hazard function and $r(t)$ is the rate of entry into marriage as a function of the time-varying covariates $X_1(t)$ and time-constant X_2 covariates. Where, $X_1(t)\beta_1$ is the pregnancy-birth process, $X_2\beta_2$ is birth cohort, $X_3\beta_3$ represents historical period, education level is $X_4\beta_4$, and the time-varying covariate of school enrolment is $X_5(t)\beta_5$.

Results

Tables 2 to 4 show the results of the partial likelihood estimates of the transition rate from consensual union to marriage for each country. Within each table, models 1 to 5 show the results when controlling for the different covariates. Figure 2 plots the final partial likelihood estimates from each model against the results by Blossfeld et al. (1999) for West Germany to graphically illustrate the generality of results. Overall, the findings suggest a high degree of uniformity in

the interdependent process of pregnancy/birth and marriage probabilities, though the levels of effects tend to vary across countries. That is, the transition rate from cohabitation to marriage tends to once again, increase in a curvilinear fashion up until approximately the fifth month before a birth and then tends to remain more or less constant until the third month before a birth, at which point it drops and remains low until well after a birth occurs. The partial likelihood estimates for the Latvian sample are generally similar to the previous West German analysis.

FIGURE 2. Comparison of partial likelihood estimates of the transition rate from consensual union to marriage FFS data, Canada (1995) , Latvia (1995), The Netherlands (1993) and West Germany (1992)



*Estimates for West Germany are taken from Blossfeld et al. (1999: 240).

Notwithstanding these similarities, we must also acknowledge that the Canadian case shows a few unexpected effects on the transition rate. The likelihood of the rate of entry into marriage appears to drop earlier at approximately 3 months before birth, with fluctuations after that point. We expect that since we had to estimate some temporal data (see technical appendix, e.g., interview date), the fluctuations between 'birth –3 months' to the 'birth month' should be judged with caution. We wish to verify these results with further analyses. Another slight

variation is the ‘minus 5 months before birth’ coefficient for the Netherlands, which is somewhat larger than that of the other countries. In general, however, we believe that a similar and general process is occurring.

In general, the effect of lower education holds for all countries, with higher levels of education decreasing the marriage rate. As expected, in all countries, the younger the cohort is, the lower the chance that they may enter a marriage after the discovery of pregnancy. A similar finding shows that women who experienced this process between 1974-83 and after 1983 also had a decreased rate of entry into marriage. Educational enrolment also tends to decrease entrance into marriage. Since the number of women enrolled in education at the time of birth was often small (especially in Latvia), we do not attribute the positive value of educational enrolment in Latvia to a substantive finding. In general, the significance of entrance into marriage 7 months before birth (Canada), but especially, 7 to 3 months (Latvia) and 7 to 4 months (Netherlands), and for all, the significant negative likelihood estimate of marriage more than 7 months after birth, reflects the findings of Blossfeld and colleagues (1999).

Policy relevance of findings

In democratic societies, governments have limited power in affecting private behaviour such as procreation and marriage. Thus, it may be very difficult to come up with viable policies directed at cohabiting unions. Nevertheless, we offer some thoughts on this issue. The principle finding of this study is that in advanced societies, now in the mature stage of demographic and epidemiological transitions, an emerging reality is the growing numbers of young couples who opt for cohabitation. Many of these couples are increasingly having births prior to marriage; and as shown in the analysis, some of these couples will proceed to enter legal marriage once a pregnancy has taken place.

Another important result in this analysis was that the more recent the birth cohort of cohabitors, the less likely they are to marry, all other things being equal. This suggests there are social psychological dimensions involved in the decision to marry. Younger cohorts may not view marriage as a central institution in their lives. It would seem unlikely that democratic governments could or would desire to implement explicit policy toward changing what appears to be a pervasive attitudinal orientation among young generations.

When more individuals opt for non-marital relations and childbirth within these unions, many ethical, legal, and policy questions come to the fore. Specifically, the legal position of children in consensual unions and the rights of the cohabiting father. Kiernan (1999) argues that "the legal position of children born outside marriage has historically tended to reflect social attitudes to non-marital childbearing." Scandinavian countries, such as Norway and Sweden have been quicker to ban the use of the moral term 'illegitimacy' and provide legislation regarding children's rights of inheritance from their father. Whereas the parental and child rights and responsibilities are often assumed in a marital union, there is no clear identification of this in consensual unions, especially for cohabiting fathers (Kiernan, 1999). As Kiernan describes, although unmarried fathers have a duty to financially maintain their children after paternity has been established, they have 'no automatic rights over their children'. Issues of guardianship, custody and decisions about everyday life for children born within consensual unions has not been formalised in all historical periods and across the three countries in this analysis. In any case, the parental and child rights and responsibilities for families of consensual unions has not been equivalent with married couples. In recent years, however these issues have generally been discussed and codified. The discussion has; however, taken an interesting shift from what Kiernan (1999) describes as "a focus on the obligations and responsibilities arising from marriage to the obligations and responsibilities of parenthood."

Conclusion

This study reaffirms that there is an interdependent process between pregnancy/birth and marriage across different temporal and national contexts. A few problems, however, remain. An unresolved issue in this study and others is neglected heterogeneity, which results from the unobserved marriage decision process. Unobserved marriage decisions may have occurred within couples who previously reached decision to marry or not in the case of pregnancy. An idea for further research would also be to determine the role that abortion plays in this process, particularly in the Baltic and Eastern European context. In Latvia, abortion is an accepted and widespread method with 111, 119 and 114 terminated pregnancies per 100 live and stillbirths from 1991, 1995 to 1997 respectively (Government of Latvia, 1999: 125). Instead of the pregnancy resulting in a transition to marriage, it may be aborted. This relates to the need to examine alternative outcomes, of not only abortion, but dissolution of the cohabiting union. We would also suggest that it would be interesting to replicate this research on the United States, which has a high incidence of out-of-wedlock births, and other countries which may follow different patterns such as Eastern European and Mediterranean nations. We expect that in the latter countries, however, that the numbers of those in consensual unions may be too low to conduct such an analysis. In sum, our study has highlighted that there appears to be a general time-related process of entrance into marriage after the discovery of pregnancy for women in a consensual union.

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Endnotes

[1] Although they also examined dissolution, it is not discussed here, as it will not be replicated in this analysis.

[2] The Dutch data is available in FFS format; however, these authors used the original Dutch version of the survey, the 'Onderzoek Gezinsvorming', obtained through the Faculty of Spatial Sciences, University of Groningen.

[3] This differs from Courgeau and Lelièvre's (1992) systems approach to coupled processes where they use a multivariate dependent variable as opposed to a system of joint processes. See Frątczak (1999) for detailed comparison of the 'French' and 'German' schools in the study of parallel careers.

[4] Following Blossfeld and Rohwer (1995: 128-9) and Rohwer and Pötter (1999: 6.17.7.3), when at least one of the time-varying covariates changes its value, the original episode is 'split' into sub-episodes. These sub-episodes contain information about the origin state of the original episode, starting values of covariates at the beginning of the episode, starting and ending times of the sub-episode and whether it ends with the specified destination state (i.e., marriage). For a detailed description of data reconstruction for the estimation of log-linear models using survey data in SPSS, see Mills (1999).

[5] We also tested for the impact of religious affiliation, and for Canada, variation by province. Although Catholics had a higher rate of entry into marriage (and in the Netherlands Reformed and Dutch Reformed Protestants) results were not significant. In Canada, we found that using Quebec as a control group, all provinces showed positive coefficients, except for the slightly lower negative values of Newfoundland and New Brunswick. These results, however, were not significant.

[6] Centred effect coding means that the difference between the levels of the dummy variables are expressed in terms of their deviation from the 'virtual mean.' The effects have a sum of zero over the categories. The effect of the reference category, (married more than 9 months before birth), is the negative sum of the effects of the dummy variables in the model (Blossfeld and Rohwer, 1995: 159). Another option is to estimate the model twice. First with the first category as redundant and second, with the last category as redundant. This avoids having to calculate the redundant category and ensures that we obtain the standard errors for all effects.

TABLE 2. Partial Likelihood Estimates of the Transition Rate from Consensual Union to Marriage, Canada, 1995 FFS Survey

Covariates	Model				
	1	**2**	**3**	**4**	**5**
Pregnancy/Birth Process					
Time-dependent (1)					
[More than 9 months before birth]	-1.1048	-1.0770	-1.0896	-1.0562	-1.0768
9 months before birth	-0.0732	-0.1029	-0.1080	-0.1064	-0.1157
8 months before birth	0.7255	0.7102	0.7074	0.7161	0.7107
7 months before birth	1.1325*	1.1102*	1.1105*	1.0925*	1.0851*
6 months before birth	0.6118	0.5906	0.5925	0.5881	0.5849
5 months before birth	0.6420	0.6507	0.6540	0.6617	0.6563
4 months before birth	0.2558	0.2583	0.2603	0.2613	0.2480
3 months before birth	-0.9259	-0.9106	-0.9070	-0.8974	-0.8948
2 months before birth	-0.0510	-0.0606	-0.0588	-0.0461	-0.0365
1 month before birth	-0.5991	-0.5654	-0.5631	-0.5764	-0.5693
Month of birth	-0.1179	-0.1133	-0.1155	-0.1199	-0.1115
1-3 months after birth	0.0006	0.0043	0.0046	0.0006	0.0096
4-6 months after birth	0.0541	0.0461	0.0467	0.0306	0.0363
More than 7 months after birth	-0.5504*	-0.5406*	-0.5340*	-0.5485*	-0.5263*
Birth cohort					
1965-69		-0.4304*	-0.4700*	-0.4488*	-0.4341*
1960-64		-0.3588*	-0.3645*	-0.3517*	-0.3589*
1955-59		-0.4268*	-0.4295*	-0.4320*	-0.4324*
[1950-54]		0.0	0.0	0.0	0.0
Historical period					
[Before 1974]			0.0	0.0	0.0
1974-83			-0.3235	-0.3059	-0.3027
After 1983			-0.2983	-0.2992	-0.2905
Highest education level					
Low				0.1715	0.1563
[Medium]				0.0	0.0
High				-0.1114	-0.1092
Educational enrollment					
Time-dependent					
In school					-0.3187
[Out of school]					0.0
Log-likelihood ***Without covariates:***					
-1538.60	*-1499.17*	*-1496.03*	*-1495.51*	*-1493.95*	*-1493.45*

* = significant at the 0.05 level.

(1) First covariate coded as centered effects, all others as cornered effects. Reference groups denoted by brackets.

TABLE 3. Partial Likelihood Estimates of the Transition Rate from Consensual Union to Marriage, Latvia, 1995 FFS Survey

Covariates	Model				
	1	**2**	**3**	**4**	**5**
Pregnancy/Birth Process					
Time-dependent (1)					
[More than 9 months before birth]	-1.4951	-1.4700	-1.4053	-1.3935	-1.3918
9 months before birth	0.3903	0.3726	0.3825	0.3845	0.3822
8 months before birth	0.1900	0.1842	0.1999	0.1999	0.2009
7 months before birth	1.0131*	0.9997*	1.0078*	1.0082*	1.0109*
6 months before birth	1.2995*	1.2914*	1.2922*	1.2952*	1.2959*
5 months before birth	1.0651*	1.0770*	1.0783*	1.0780*	1.0817*
4 months before birth	0.9345*	0.9360*	0.9321*	0.9327*	0.9328*
3 months before birth	0.7390*	0.7517*	0.7547*	0.7548*	0.7525*
2 months before birth	0.4603	0.4850	0.4818	0.4797	0.4793
1 month before birth	-0.4633	-0.4661	-0.4678	-0.4678	-0.4727
Month of birth	-1.6718	-1.6643	-1.6660	-1.6682	-1.6669
1-3 months after birth	-0.0152	-0.0105	-0.0093	-0.0122	-0.0136
4-6 months after birth	-1.3466*	-1.3513*	-1.3564*	-1.3563*	-1.3576*
More than 7 months after birth	-1.0998*	-1.1354*	-1.2245*	-1.2350*	-1.2336*
Birth cohort					
1965-69		-1.0031*	-1.3077*	-1.3023*	-1.3096*
1960-64		-0.5991*	-0.8623*	-0.8562*	-0.8563*
1955-59		-0.4701*	-0.6052*	-0.6067*	-0.6154*
[1950-54]		0.0	0.0	0.0	0.0
Historical period					
[Before 1974]			0.0	0.0	0.0
1974-83			-0.0029	-0.0009	0.0010
After 1983			-0.3191	-0.3115	-0.3164
Highest education level					
Low				-0.0108	-0.0164
[Medium]				0.0	0.0
High				-0.0696	-0.0763
Educational enrollment					
Time-dependent					
In school					0.2700
[Out of school]					0.0
Log-likelihood	***Without covariates:***				
	-2300.44	*-2135.94*	*-2112.76*	*-2110.60*	*-2110.44*	*-2110.06*

* = significant at the 0.05 level.

(1) First covariate coded as centered effects, all others as cornered effects. Reference groups denoted by brackets.

TABLE 4. Partial Likelihood Estimates of the Transition Rate from Consensual Union to Marriage, The Netherlands, 1993 FFS Survey

Covariates	Model				
	1	**2**	**3**	**4**	**5**
Pregnancy/Birth Process					
Time-dependent (1)					
[More than 9 months before birth]	-1.6368	-1.5048	-1.1335	-1.0915	-1.0909
9 months before birth	-0.2355	-0.2738	-0.2195	-0.2206	-0.2217
8 months before birth	0.3318	0.2971	0.3701	0.3793	0.3769
7 months before birth	0.9214*	0.8943*	0.9266*	0.9374*	0.9374*
6 months before birth	1.2827*	1.2482*	1.3260*	1.3239*	1.3229*
5 months before birth	1.5395*	1.5049*	1.5667*	1.5604*	1.5587*
4 months before birth	1.1326*	1.1070*	1.0640*	1.0730*	1.0743*
3 months before birth	0.0613	0.0454	0.0309	0.0226	0.0227
2 months before birth	0.1666	0.1357	0.0713	0.0933	0.1028
1 month before birth	-0.2460	-0.2642	-0.2328	-0.2305	-0.2350
Month of birth	-1.3153	-1.2758	-1.2344	-1.2641	-1.2711
1-3 months after birth	-0.4021	-0.4078	-0.4596	-0.4614	-0.4595
4-6 months after birth	-0.3590	-0.3549	-0.4329	-0.4431	-0.4404
More than 7 months after birth	-1.2412*	-1.1513*	-1.6429*	-1.6787*	-1.6771*
Birth cohort					
1965-69		-0.9798*	-2.3075*	-2.2785*	-2.2829*
1960-64		-0.8224*	-1.4327*	-1.4210*	-1.4258*
1955-59		-0.5631*	-0.8186*	-0.8221*	-0.8228*
[1950-54]		0.0	0.0	0.0	0.0
Historical period					
[Before 1974]			0.0	0.0	0.0
1974-83			-0.2859	-0.1900	-0.2488
After 1983			-1.8222*	-1.6875*	-1.7642*
Highest education level					
Low				0.2578*	0.2490*
[Medium]				0.0	0.0
High				-0.1973*	-0.1962*
Educational enrollment					
Time-dependent					
In school					-0.1856
[Out of school]					0.0
Log-likelihood	***Without covariates:***				
	-5104.74	*-4857.58*	*-4830.20*	*-4747.95*	*-4739.05*	*-4738.64*

* = significant at the 0.05 level.

(1) First covariate coded as centered effects, all others as cornered effects. Reference groups denoted by brackets.

Technical Appendix

The Canadian data requires several technical notes. First, the situation where partners first lived common-law and then married was represented as one 'record' or 'episode' in the union file (Statistics Canada, 1997: 24). However, it was possible to identify and separate the actual first union by using the timing of events. In the case where cohabitation preceded marriage, cohabitation was considered as the first union. For more information on this procedure, see Turcotte and Bélanger (1997).

Second, since Statistics Canada does not release the month of events we were able to only obtain the timing (age) of events to each tenth of the year, or the age plus one decimal point. Since the timing of events was on a ten point, and not the more typical twelve month scale, we knew the neighboring month of the event, but not the exact month of the event. To translate these values to months, a necessity for this more detailed analysis, a random (uniform distribution) variable was created for each temporal date. This resulted in a shift from timing to within one decimal point to timing up to three decimal points. This was then converted to a twelve-month scale using the conversion table shown below.

Appendix Table 1. Conversion from 3 decimal places in the year to months

Month		Range of year (X) up to 3 digits		
1	*January*	x.000	to	x.079
2	*February*	x.080	to	x.169
3	*March*	x.170	to	x.249
4	*April*	x.250	to	x.329
5	*May*	x.330	to	x.419
6	*June*	x.420	to	x.499
7	*July*	x.500	to	x.579
8	*August*	x.580	to	x.669
9	*September*	x.670	to	x.749
10	*October*	x.750	to	x.829
11	*November*	x.830	to	x.919
12	*December*	x.920	to	x.999

In addition, only the interview year and not the month was released. We tested two assumptions, 1) that all interviews occurred in the middle of the year (July 01, 1995); and, 2) that interviews were randomly distributed over the one-year period (interviews were conducted from January to December 1995). These conversions were then checked for inconsistencies. One minor problem was the violation of timing of other life events that occurred in the interview year of 1995. In the few cases (aprox. 4 cases per event in this sample) when negative values occurred, the interview date was adjusted to one month earlier. The timing of events were then converted to century month codes. We ran the models using both interview date assumptions, finding that although the mean duration of episodes was virtually identical, results fluctuated slightly, especially between the months of 'birth – 4 months' to 'birth month'.

Education level *Canada*: low=less than a high school diploma or none, middle=high school diploma, some trade/technical/vocational/business school, some community college, some university, high=diploma from trade/technical/vocational/business school, Diploma/certificate from community college, or doctorate/masters/bachelors from University. *Latvia*: low=only primary education or less, middle=graduate from either general or technical secondary school, high= secondary education (attended a university, institute or academy). *Netherlands*: low=only primary school, middle=lower or technical stream schooling, high=semi-high technical school and university.