How similar are cohabitation and marriage? Second birth risks by union type in the United States and across Europe

Brienna Perelli-Harris

University of Southampton

Acknowledgments: Thank you to Wendy Sigle-Rushton, Eva Beaujouan, Mark Lyons-Amos, and colleagues at the University of Southampton who provided comments on the paper. This project was funded by a European Research Council Starting Grant and with support from the Max Planck Institute for Demographic Research. Thank you to everyone who helped collect, clean, and harmonize the data, especially Karolin Kubisch at MPIDR. The GGS data were obtained from the GGP Data Archive and refer to the publication that contains the model survey instruments: United Nations 2005. Generations & Gender Programme: Survey Instruments. New York and Geneva: UN, 2005. Please also see www.nonmarital.org for further acknowledgments.

The increase in births within cohabitation in the United States across Europe suggests that cohabitation and marriage have become more similar with respect to childbearing. Here we employ union and fertility histories from 15 countries to examine second conception risks for women who have given birth within a union. Results show that women who continue to cohabit after birth have significantly lower second conception risks than married women in all countries except in Eastern Europe, even when controlling for union duration and union dissolution. Pooled models show that the differences in second conception risks by union type between Eastern and Western Europe are significant, and that the diffusion of first births within cohabitation has an inverted U-shape effect. As the percent of first births within cohabitation increases across countries, differences in second conception risks between cohabiting and married women decrease. When more than a quarter of first births occur within cohabitation, second conception differentials start to increase again. We also find that in all countries except Estonia, women who marry after first birth have second birth risks similar to couples married at first birth, suggesting that the sequence of marriage and childbearing does not matter to fertility as much as the act of marrying itself.

The increasing percent of births within cohabitation across almost all of Europe and the United States indicates that cohabitation is becoming more common as a setting for childbearing (Kiernan 2004, Perelli-Harris et al 2010, Perelli-Harris et al forthcoming, Kennedy and Bumpass 2008). Family researchers have posited that having children within cohabitation is a sign that cohabitation has taken on many of the functions of marriage (Smock 2000, Seltzer 2000, Raley 2001), reducing the salience of the institution of marriage (Cherlin 2004). However, it is still unclear how similar these two types of unions are, even if they involve childbearing. Although the increase in first births within cohabitation suggests that cohabitation and marriage are becoming more similar, cohabitors' second birth risks may differ substantially from those of married couples indicating that fundamental differences remain between the two types of unions. On the other hand, couples may marry after a first birth, suggesting that marriage is not eschewed altogether, but simply postponed until later in the life-course (Perelli-Harris et al forthcoming). Couples who marry after first birth may be very similar to those who marry before first birth and have similar second birth risks.

In this study, we investigate how second birth risks differ between married and cohabiting couples across Europe and in the United States. We focus on second births, because previous studies show that married couples have much higher first birth risks than cohabiting couples, even when controlling for union duration (Baizan, Aassve, Billari 2003, 2004). Before entering into parenthood, cohabiting unions are more heterogeneous with respect to commitment and the intertwining of lives and finances. Once entered into parenthood, however, cohabiting couples share the responsibility of raising a child together. Therefore, we condition our analyses on already being a parent in a union. Also, because we are interested in testing whether marriage and

cohabitation are similar types of relationships, we only examine the unions in which a first birth occurs and do not follow respondents after union dissolution.

To explain any differences between cohabitation and marriage, we investigate a number of key factors. One of the primary reasons for any differences in second birth risks may be union instability; in most countries, cohabiting unions have higher dissolution risks, even if they involve childbearing (Heuveline, Timberlake, Furstenberg 2003). To account for differentials in union stability, we control for union dissolution and examine whether cohabiting couples that stay together have different second birth risks than married couples. We also specifically examine second birth risks for cohabiting couples who marry after the first birth. Given that many family-formation events are increasingly being postponed (Billari and Liefbroer 2010), some couples may postpone both childbearing and marriage until late in the woman's reproductive ages, and then have additional children quickly to account for the postponement. In general, these analyses provide insights into how the sequencing of marriage and entrance into parenthood are related to fertility risks.

Besides investigating second birth risks by union type within countries, we also explore differentials across countries to better understand how patterns of family formation mediate the relationship between cohabitation and marriage. Our study analyzes a range of countries that have very different levels of cohabitation and fertility, and these may produce or inhibit differences between cohabitation and marriage. Some of the countries in our analyses, particularly those in Eastern Europe, had very low fertility during our period of observation (Sobotka 2003), and second births were relatively rare. In these countries, married and cohabiting couples may have had similar second birth risks, because so few women had second births. In addition, childbearing within cohabitation differ substantially across countries, for

example in Norway 45% of first births occurred in cohabitation while that percent was only 5% in Italy. Higher levels of cohabitation may indicate that cohabitation is widely practiced as an alternative to marriage, resulting in few differences in fertility by union status. Alternatively, as found in a study on the influence of premarital cohabitation on divorce (Liefbroer and Dourleijn 2006), the relationship may be U-shaped, indicating that second birth differentials by union type may be different as cohabitation starts to diffuse, become more similar as childbearing within cohabitation becomes practiced by the majority behavior, and then finally become different again as cohabitation becomes the norm. By pooling our data, we exploit these differences to better understand what produces cross-national variation in second births by union type.

Taken together, our analyses show whether cohabiting unions have lower second birth risks than marital unions, even when accounting for changes in union status. Comparing second birth risks by union status in cross-national perspective leads to a better understanding of whether type of union matters for fertility in general, and how cohabiting unions differ across countries. Given that cohabitation is increasing in all countries observed, this analysis provides insights into how union behavior may be important for future trends in fertility.

Theoretical Framework

As cohabitation has increased, researchers have asked to what extent cohabitation is "indistinguishable from marriage" or an "alternative to marriage" (Heuveline and Timberlake 2004, Kiernan 2004, Perelli-Harris et al forthcoming). Childbearing within cohabitation has been one of the fundamental indicators of

whether a relationship has become more marriage-like (Manning 1993, Raley 2001, Musick 2007, Kiernan 2004). Most studies on childbearing within cohabitation focus on all births (e.g. Kiernan 2004; Heuveline and Timberlake 2004, Heuveline, Timberlake, and Furstenberg 2003), first births (e.g. Le Goff 2002, Kiernan 2004, Perelli-Harris et al 2010, Perelli-Harris et al forthcoming) conceptions (e.g. Raley 2001, Manning 2004), or even contraceptive use (Sweeney 2010). These studies find that with respect to reproductive behavior, cohabitation is taking on some of the form and function of marriage. For example, research on the U.S. and Europe has found that premarital pregnancy to single women increasingly prompts transitions into cohabitation rather than marriage, suggesting that cohabitation is becoming more similar to marriage (Raley 2001, Perelli-Harris et al forthcoming). Over time, cohabitation has become more of a persistent state throughout the childbearing process in many European countries, although the lifecourse stage around childbearing does prompt marriage for the majority of people who give birth in a union (Perelli-Harris et al forthcoming). Nonetheless, the increasing percent of births occurring within cohabitation suggests that cohabitation is becoming a suitable setting for childbearing, if not childrearing.

Little is known about childbearing behavior after a first birth within a cohabiting union, especially in Europe where cohabiting unions are expected to be more similar to marriage. The studies that examine what happens after birth tend to focus on the union and examine whether cohabiting unions are more likely to dissolve or convert to marriage (Lichter, Qian, and Mellott 2006, Wu and Musick 2008, Steele et al 2005b, Perelli-Harris et al forthcoming, Carlson, McLanahan, and England 2004, Manning 2004). Perelli-Harris et al (forthcoming) find that in most countries of Europe, few couples marry in the first three years after birth, suggesting that

cohabiting couples that remain within cohabitation throughout the childbearing process do not rush to marry when they have young children. Also, cohabiting unions in the UK that involve conception or birth are often stronger than those that do not, resulting in long-term committed unions less prone to union dissolution (Steele et al 2005b).

Thus, it could be that having a child within cohabitation cements a relationship to such a degree that the type of union no longer matters. After all, once a child is born, cohabiting and married couples are similar in many ways: two parents live together and are available to care for the child, maintain the household, and contribute to financial resources (Musick 2007). They have a shared interest in the well-being of their child and may stay together in order to raise the child in a stable household. In European countries, cohabiting fathers have the same rights to raise, care, and make decisions about their children as married fathers. Unmarried fathers are able to establish paternity and gain joint custody over their children, although they may face greater bureaucratic obstacles when doing so (Perelli-Harris and Sanchez Gassen Forthcoming). In addition, many of the social taboos of having unmarried childbearing are also disappearing; surveys from around Europe and the United States point to greater acceptance of childbearing outside of marriage (Kiernan 2004, Thornton and Young-DeMarco 2001). Thus, marriage is increasingly becoming irrelevant to parenting a child in a cohabiting union. As the institutional context of raising children within cohabiting unions becomes more equal, the behaviors of cohabitors and married couples may become more similar.

Nonetheless, most studies show that cohabitors and married people are quite different. Individuals who have ever cohabited typically have less traditional family-oriented attitudes, as argued by proponents of the Second Demographic Transition

(Lesthaeghe and Neidert 2006, Lesthaeghe 2010). The Second Demographic Transition posits that innovators in new family behaviors, such as childbearing within cohabitation, value self-actualization and expression, values that emphasize the individual and not the traditional family unit (Lesthaeghe and Neidert 2010). These values may manifest themselves in individual-oriented behavior, for example keeping economic resources separate, a behavior more prevalent among cohabitors (Lyngstad, Noack, Tufte 2011, Heimdal and Houseknecht 2004). In general, because cohabitors may be less focused on children, they may be more likely to have only one child in favor of a stable, fulfilling career.

However, it could also be that those who cohabit have less stable relationships, with less union commitment. Studies show that cross-nationally, cohabitors have higher risks of dissolution than married couples (Liefbroer and Dourleijn 2006, Kiernan 2004), leading to higher levels of single-mother families (Heuveline, Timberlake, and Furstenberg 2003). Studies in the U.S. show that cohabiting women are more likely than married women to be unhappy or dissatisfied with their current situation (Brown 2000; Brown 2003), and cohabiting women suffer higher rates of physical violence and emotional abuse (DeMaris 2001; Kenney and McLanahan 2006). In most European countries, cohabitors have lower levels of subjective well-being (Soons and Kalmijn 2009). Even in Norway and Sweden, where cohabitation is often considered indistinguishable from marriage, cohabiting couples are less serious and satisfied with their relationship than married couples, although this differs for couples with plans to marry (Wiik, Bernhardt, and Noack 2009). Thus, even though cohabiting couples may have one child together, their relationship may be too precarious for them to want to have more. On the whole previous studies lead us to

expect that cohabitors have lower second birth risks than married people, even when controlling for couples whose unions dissolve.

Delayed Marriage

Although couples may be cohabiting at the time of birth, they may not be rejecting marriage altogether, but instead postponing marriage along the lifecourse. In committed relationships, marriage and childbearing may have been jointly planned, with childbearing simply occurring first (Wu and Musick 2008). Just as previous research has found that relationship satisfaction was similar between cohabiting couples with plans to marry and married couples (Wiik, Bernhardt, and Noack 2009), the behavior of cohabiting couples who marry after birth could be very similar to those married at birth. Thus, we expect that cohabitors who marry after first birth have similar second birth risks to those married at first birth.

Variation in Childbearing within Cohabitation across Europe and the United States

Although the percent of births within cohabitation has increased in all of our selected countries, the variation across countries remains striking. The different levels of cohabitation could have very different effects on the behaviours of cohabiting and married couples. As cohabitation becomes a normative behaviour, cohabitation could become less selective of certain characteristics, and the differences between cohabitation and marriage could decline. Some studies have found that differences between cohabitation and marriage disappear as the level of cohabitation increases. For example, the higher the level of cohabitation in a country, the lower the gap between the subjective well-being of married and cohabiting couples (Soons and

Kalmijn 2009). On the other hand, the relationship between cohabitation and a given behavior may be U-shaped. When cohabitation is rare, marriage and cohabitation outcomes can be quite different, but as it becomes more common, the differences decrease. Then, as nearly everyone practices cohabitation and marriage becomes rare, the differentials widen again; marriage becomes selective of couples who have more conservative or traditional family values, perhaps because they are more religious. Liefbroer and Dourleijn (2006) found this relationship with respect to premarital cohabitation and divorce.

Such an effect could occur with respect to second birth risks as well. As the level of cohabitation increases, cohabitors could be more likely to adopt the fertility levels and patterns of those who practice normative behavior – in other words, married people. This may mean that cohabitors are more likely to achieve the ideal fertility in a given country, or if actual fertility levels are far below ideal, as in Eastern European countries, it may mean that cohabiting couples also curtail their fertility like married couples. In either case, we would expect that as the level of cohabitation in a society increases, second birth risks would be less likely to differ by union type. However, once cohabitation becomes the norm and marriage becomes rarer, we would expect second birth differentials to increase again.

Data and Methods

To compare second birth risks across countries, we employ retrospective union and fertility histories from 15 surveys that have been standardized in a dataset called the Harmonized Histories (Perelli-Harris, Kreyenfeld, and Kubisch 2009, and see *www.nonmarital.org*). Together, they cover a substantial proportion of Europe's

population and include North-South family patterns (Reher 1998), as well as East-West household formation regimes as described by Hajnal (Coale 1992). We also study the United States, which has a unique pattern of union and family formation (Cherlin 2009). The data for Austria, Belgium, Bulgaria, Estonia, France, Hungary, Italy, Norway, Romania, and Russia come from the Generations and Gender Surveys (GGS), which interviewed nationally representative samples of the resident population in each country. Because the GGS is not available for all countries (or the retrospective histories were not adequate for our purposes), we also relied on other data sources. The Dutch data come from the 2003 Fertility and Family Survey (FFS). The data for the UK are from the British Household Panel Survey (BHPS). The Spanish data come from the Survey of Fertility and Values conducted in 2006[1], and the Polish data are from the Employment, Family, and Education survey conducted in 2006. The U.S. data are from the National Survey of Family Growth, conducted between 2006 and 2008.

The Harmonized Histories data include month of children's birth, entrance into cohabiting union, marriage, and union dissolution. Despite slightly different survey designs, information on births and union formation is relatively comparable. Questions about cohabitation generally refer to co-resident relationships with an intimate partner that last more than three months. In the Italian, German and Austrian surveys, there is no minimum duration. Registered unions, or PACS, are recorded in the French GGS, but we include them with marriages.[2] Although retrospective data are subject to recall error, especially for the date of entrance or exit from cohabitation and the existence of short-term unions (Teitler et al. 2006), we expect that marriage

[1] The Centro de Investigaciones Sociológicas, but it is still undergoing processing. Therefore, the CIS holds no responsibility for any inaccuracies found in the data.
[2] Fewer than one per cent of first marriages are registered unions in France

and birth dates are more accurate, thereby helping to order the events of interest. Because not all surveys include complete male union histories, we restrict the analyses to women. We focus on women who gave birth to a first child in 1985-2000 in order to ensure the greatest comparability; some surveys (U.S., Poland, Austria) only interviewed respondents up to age 44 or 49, which limits our ability to test change over time.

In order to test our proposed hypotheses, we conduct three sets of analyses. The first set of models compares second conception risks among married and cohabiting couples in each country. The second set of models examines second conception risks by union status net of the effect of union dissolution. The third set of models pools the 15 countries to examine whether cross-national differentials in second conception risks by union status can be explained by country-specific factors such as level of childbearing within cohabitation or second conception risks.

Our dependent variable for all models is the log-odds of a conception that leads to a second live birth occurring in a given month. As is common practice in fertility studies, we backdate our analyses 9 months to the time of conception, in order to capture decision-making processes and avoid changes in union status that may come as a response to a second pregnancy. For our first set of analyses, we use discrete-time hazard models for each country separately to estimate the hazard of conceiving a second child. Respondents enter the risk set in the month following their first birth and are censored when they conceive their second child, when they turn 50, when their unions dissolve, or in the month and year of interview (which differs by survey).

To examine second conception differentials by union type net of union dissolution, we employ competing risk hazard models. We model two risks in a

discrete-time framework by estimating multinomial logistic regressions (MLR) using the sample of all person-months when respondents were at risk for having a second conception. By defining no event as the reference category, the model is able to estimate the net hazard of either second conception or dissolution. Respondents are censored at birth, union dissolution, age 50, or interview.

The final set of models pools all of the country datasets to examine whether differences in second birth risks across countries can be explained by level of fertility or cohabitation. In these models, we include interactions between country and other parameters to account for country-specific patterns. In additional models, we include variables to account for the prevalence of childbearing within cohabitation in order to account for differences in selection effects across countries.

Independent Variables

Union status. Our primary variable of interest is the type of union after the birth of the first child. Union status is a time-varying covariate with three possible states: continuously married, continuously cohabiting, and currently married having previously cohabited (after first birth). Cohabitors who marry move from "currently cohabiting" to "married, but previously cohabited."

Mother's age at first birth. It is important to control for mother's age at first birth in all models, because of the implications for the timing of fertility on subsequent fertility and union behaviour, and because the age pattern of childbearing differs substantially across the countries in our study. Mother's age at first birth may impact second birth risks, since women who delay childbearing may compress second births to have them before the end of the reproductive age (Kreyenfeld 2002). On the other hand, early age at first birth is often associated with being in a cohabiting union and

increased union dissolution. Mother's age at first birth differs across countries and over time; in Eastern Europe, for example, mean age at first birth has been much younger than in Western Europe, although recently the age at first birth has increasingly been postponed (Sobotka 2004).

Duration of union before first birth. Previous research has shown that as union duration increases, cohabiting couples become more similar to marital couples, for example in their likelihood to pool economic resources (Lyngstad et al 2011). In addition, some governments only begin to regulate cohabiting relationships after a certain length of time, for example two years (Perelli-Harris and Sanchez Gassen Forthcoming). Therefore, we control for the number of months in the union before the first birth. We expect that unions that have lasted longer would be more stable, thereby increasing the probability of having additional children. We do not record changes in union type before first birth, since it is not the focus of the study.

First birth cohort. Because fertility risks changed substantially over our period of analysis, we control for the five-year cohort in which a first birth occurred between 1985 and 2000. The reference category is 1985-89.

Duration since first birth. This variable captures the duration from first birth to second conception. We tested linear and quadratic specifications of number of months after first birth but found that splines work best. After testing different spline specifications, we included splines that are 13-24 months, 25-36 months, 37-48 months, 49-60 months, 61-72 months, and 72+ months in the individual country models, and 13-36, 37-60, and 61+ in the pooled models. 1-12 months after birth is the reference category in all models.

Education. Some studies have shown that women with higher education have higher second birth risks, although part of this is attributable to the time-squeeze effect

(Kreyenfeld 2002). Therefore, we include a control variable for highest level of education achieved in the individual country models. In the surveys we use, education is measured at the time of the interview rather than at time of birth. Although this may introduce some biases, because some women may gain higher educational attainment after giving birth, we expect these cases would be relatively few. We use three simple categories of education (high, medium, and low), which were collapsed based on ISCED classifications included in each survey.

Proportion of cohabitors. As discussed above, we are interested in how the prevalence of cohabitation may change or explain the relationship between union type and second birth risks. To test this, we include a measure of the percent of first births to cohabiting women in a given country in the pooled models. Respondents were also grouped into five-year cohorts based on the year of the woman's first birth. We then follow the strategy of Liefbroer and Dourleijn (2006) by specifying 1) an interaction between percent of first births in cohabitation and currently cohabiting and 2) an interaction between the squared percent of first births in cohabitation and currently cohabiting. We also tested the same interactions for those who changed from cohabiting to married.

Some limitations of this study must be noted. First, each survey suffers from specific limitations, such as biased response risks or missing data. Nonetheless, validation studies of the basic fertility measures show that the GGS surveys generally reflect official statistics, especially for the most recent periods (Vergauwen, Wood, and Neels 2012). Some of the surveys in Eastern Europe (especially Russia and Bulgaria) are skewed towards rural inhabitants, where second conception risks are higher and cohabitation may be more prevalent. We tested for differences by

urban/rural location, but due to lack of effects and not all countries including the variable, we did not present these results.

Results

Table 1 shows the percent of first and second births that occurred in cohabitation for first births between 1985 and 2000 in our sample countries. Where available, weights were applied. First note that the variation in the percent of first and second births in cohabitation across countries is quite substantial, with the fewest percent of births in cohabitation in Italy and the Eastern European countries, and the highest in Norway. What is most striking, however, is that the percent of first births is higher than or the same as the percent of second births in cohabitation in all study countries. The largest difference between first and second births is in Norway, with 12% more first births in cohabitation than second births. The smallest gaps are in Poland, Bulgaria, Romania, Hungary, and the US, which have only 0-1% difference between first and second births in cohabitation. This table, however, does not account for the fertility patterns or composition of the population. We now turn to hazard models to control for compositional effects.

[Table 1 about here]

Conception Risks by Union Status, Modelled Separately by Country

Table 2 shows the discrete-time hazard models of second conception risks by country. In most countries, continuously cohabiting women have second conception risks that are lower than those of women who were married at the time of the first birth (significant at the .05 level or less). In these countries, the odds ratios range from

29% lower in Spain to 55% lower in Italy. The results suggest that with respect to childbearing, cohabiting women are different from married women. Although we are unable to tell from the results whether cohabiting women have lower fertility preferences or if they are constrained by other factors, such as poor relationship quality, the consistent difference between married and cohabiting women across countries is striking.

However, these results do not obtain for all countries. In most of the Eastern European countries – Hungary, Bulgaria, Romania, Russia, and Estonia - cohabiting and married women have no significant difference in second conception risks. In Bulgaria, Hungary, and Russia, conception risks for cohabitors are slightly lower than those for married people, while in Estonia and Romania, conception risks are slightly higher for cohabiting couples, but the lack of significance in these countries suggests that the childbearing patterns for married and cohabiting mothers of one child are relatively similar. The lack of difference, however, may be because both groups have very low fertility risks in general; second conception risks may be so low in these countries that neither type of couple could be having children, thus rendering the difference between the two union types negligible. The lack of difference could also be due to small sample size.

[Table 2 about here]

In all countries except Estonia, women who were in a cohabiting relationship at first birth and then married afterwards have second conception risks that were not significantly different from women who were continuously married. In Estonia, cohabiting women who married have second birth risks 73% higher than their continuously married counterparts. The lack of significance for the other countries may be due to small sample size. Note, however, that in Austria, the Netherlands,

Poland, and Spain, the odds ratios are above 1.2, implying that if the results were significant, women who marry after first birth speed up the timing of their second conceptions, relative to their continuously married counterparts. Only in Belgium, Italy, and the U.S. are the odds ratios below one, suggesting that those who marry after birth may have lower second conception risks than those who were married at first birth. In any case, the results do not show strong differences between those who marry before first birth and those who marry afterwards. In general, the similar second conception risks suggest that cohabiting couples who have a first birth and then marry have similar levels of commitment and ideas about family size as those married at first birth. The finding may also indicate that couples who marry after a first birth planned both events jointly and just happened to have a first birth before marriage (Wu and Musick 2008).

Note that these results obtain even when controlling for the length of the union in which the first birth occurs, which has been found to be an important distinguishing characteristic of unions in other studies (Lyngstad, Noack, and Tufte 2011). Duration of union is a significant variable in 10 out of 15 countries, but it is slightly below one in all countries. Duration of union acts in conjunction with the other measures of time in the models: mother's age of first birth and duration since first birth. All of these controls are relatively consistent across countries, although the interval between first birth and second conception does differ across countries, for example Norway seems to have a steep peak of second conceptions between 25-36 months after first birth, while Russia has a flat risk of conceptions during the 72 months after first birth. The period controls also differ considerably, reflecting the fluctuations in second conception risks during the period of observation. For example, we can see how

second birth risks in Bulgaria, Hungary, Poland, Romania, and Russia were much lower throughout the 1990s than in the late 1980s.

We can also see substantial variation in second conception risks by level of education across our study countries, and again, there appears to be a rough East-West Europe divide. In Belgium, France, Hungary, Italy, the Netherlands, Norway, and Spain, women with higher education have significantly higher second conception risks than people with medium education. This is consistent with studies in Western Europe that suggest that the effect of postponement among more highly educated women leads to a time-squeeze effect on second birth risks (Kravdal 2001, Kreyenfeld 2002, Köppen 2006). On the other hand, in Bulgaria, Poland, Russia, and Romania, where first births occur much earlier, women with lower education have significantly higher second conception risks than people with medium education, while women with higher education have lower second conception risks, suggesting a negative educational gradient of second births. These results corroborate findings in other studies on Eastern Europe, which suggest the negative gradient is due to more highly educated women curtailing childbearing because of opportunity costs (Galezewska forthcoming, Mureşan and Hoem 2010). The U.S., on the other hand, has a U-shaped pattern of education, with both higher and lower educated women having higher second birth risks than medium educated women. Given that highly educated women are more likely to postpone childbearing while less educated women are not (Brand and Davis 2009), both the time-squeeze effect and the higher fertility for less educated women may be operating simultaneously.

These educational differences in second conception rates, however, do not differ by union status. The interaction term between education and union type was not significant in any country, indicating that education does not explain the differences

found between cohabitation and marriage. For example, women with higher education who continuously cohabited after first birth are not more or less likely to conceive again than women with lower education; both were still less likely to have a second conception than married women. Thus, unlike in other studies, which found a significant educational gradient for first births within cohabitation (Perelli-Harris et al 2010), education does not play a role in the difference between second conception risks for cohabiting and married couples.

Differentials Net of Union Dissolution

We now turn to competing risk hazard models of second conception risks and union dissolution, to see whether the differentials between cohabitation and marriage obtain for those couples whose unions do not dissolve. As discussed above, one of the main reasons for differences in second birth risks may be the higher dissolution risks of cohabiting couples, which would provide less exposure time for being at risk of second conceptions. Table 3 shows that estimates of second conception risks are not very different from those in table 2. Most countries had significantly lower second conception risks for cohabiting women compared to married women, and the same five former socialist bloc countries had no significant difference between second conception risks for cohabiting and married couples. The similar results may be because union dissolution directly after first birth is relatively rare: Perelli-Harris et al (forthcoming) found that less than 10% of unions dissolved within three years of a first birth in most countries, although some countries had a much higher percent of unions dissolve than others. The present analysis extends the possible period of observation after birth up to 15 years, but this period may still be insufficient to

capture the majority of union dissolution, especially because the presence of young children may strengthen unions (for example, in Great Britain Steele et al 2005b).

[Table 3 about here]

Nonetheless, as expected, most countries had higher dissolution risks among cohabitors than married couples, with the exception of Spain and the Netherlands. Romanian cohabiting women had dissolution risks that were more than eight times higher than those for married women, and Italian cohabiting women had dissolution risks that were five times as high, perhaps because giving birth within cohabitation is so rare in these countries, and the couples would have married had their unions been stable. The results for Spain are a bit strange in that women who cohabited continuously had similar dissolution risks to married couples, but those who married after first birth had dissolution risks that were nearly six times higher than married couples. Spanish couples may face social pressure to marry directly after birth, but these relationships may turn out to be less stable and quickly dissolve.

Pooled Models

The difference in second birth risks by union type between the Eastern and Western European countries plus the U.S. raises many questions, particularly about the former socialist countries. As discussed above, these countries went through major upheaval after the collapse of the Soviet Union, and their fertility risks plunged to extreme lows, primarily due to the postponement or elimination of second births (Perelli-Harris 2006, Sobotka 2003). These countries also experienced a major increase in cohabitation and childbearing within cohabitation (Hoem et al 2009, Perelli-Harris and Gerber 2011). In order to investigate whether the differences between Eastern and Western countries seen on Table 2 are significant, we pool the

Harmonized Histories surveys and run a single event history model with second conception as the outcome of interest. We include interactions between covariates and country to allow the hazards to vary across countries on all aspects. France is the reference category.

[Figure 1 about here]

Figure 1 presents the predicted probabilities from these models for union status at second conception calculated using the mean age at first birth for all countries (age 25), mean union duration before first birth (31 months), union duration after birth 13-36 months, and period 1990-95. Figure 1 shows the range of predicted probabilities of second conception across countries; as expected, the highest probabilities of second conception occur in Norway and the Netherlands, and the lowest occur in very low fertility countries: Bulgaria, Estonia, Italy, Poland, Romania, and Russia.

Figure 1 also shows that cohabiting women have much lower predicted probabilities of a second conception than married women in most countries, as seen above. However, in Bulgaria, Estonia, Romania, and Russia, the probability of second conception within cohabitation appears to be very similar to that within marriage. An interaction term between country and cohabitation for these countries is significant in the pooled models, indicating that the relationship between cohabitation and marriage is significantly different than that in France (see Appendix, which shows significant odds ratios). This significance is not just due to very low conception risks in cohabitation, for example Italy has cohabiting conception risks similar to those in Russia, but the non-significant interaction term for Italy and cohabitation indicates that the association between union status and fertility is no different than in France. Thus, the results indicate that the association between fertility and union status in

these countries of Eastern Europe is significantly different than that in Western Europe, even after controlling for differences in second conception risks.

Prevalence of Cohabitation

Finally, in order to see how the prevalence of cohabitation may explain the results, we ran additional models with the pooled data (Table 4). The first model simply included the proportion of first births within cohabitation for each country, which had no significant results; neither did its square. We then followed Liefbroer and Dourleijn (2006) and included 1) the proportion of those cohabiting at first birth interacted with those who were continuously cohabiting/married but previously cohabited after first birth and 2) the squared proportion of those cohabiting at first birth interacted with those who were continuously cohabiting/married but previously cohabited. The interaction terms for those continuously cohabiting were significant, but not for those who married after cohabiting. The results for those continuously cohabiting indicate a U-shaped effect; however, figure 2 shows that the direction of the effect was the reverse of that in the Liefbroer and Dourleijn paper: the U is upside down. Note that figure 2 only shows the relative risks for up to 55% of first births within cohabitation, because that is the maximum percent of first births within cohabitation in our data. For this range of effects, second conception risks for those who continuously cohabited start out about two-thirds lower than second conception risks for those married at first birth. As the percent of first births within cohabitation rises to about 25%, cohabitors have second birth risks that are 55% of those married at first birth. Then the risk of second conception for cohabitors declines to only about one-fifth of the risk for married women when 55% of first births are within cohabitation. Overall, the results indicate that while the difference between cohabiting

and married women may narrow as childbearing within cohabitation starts to increase, it widens dramatically as childbearing within cohabitation starts to become more prevalent. Thus, even though cohabitation and first births within cohabitation may be increasing in all countries observed, the differences in second births between married and cohabiting couples may become more pronounced over time.

[Table 4 and Figure 2 about here]

Discussion

In this study, we find that in the U.S. and most Western countries of Europe cohabiting mothers with one child have significantly lower second conception risks than married mothers with one child. For these countries, the results are remarkably consistent, with cohabitors having between 40% and 50% lower second conception risks than married women, even when controlling for duration of union before first birth. The results are also robust when controlling for union disruption; a competing risk analysis that separates women whose unions dissolved from those who remained within a union, shows that even cohabitors who stay in a union have lower conception risks than married women who stay in a union. In general, the results suggest that cohabiting mothers are different from married mothers, perhaps due to different fertility preferences formed by Second Demographic Transition values (Lesthaeghe 2010) or other constraints, such as poor relationship quality (Brown 2003, Wiik, Bernhardt, and Noack 2009) or lower subjective well-being (Soons and Kalmijn 2009).

However, we also find that in the former-socialist countries of Estonia, Hungary, Romania, Bulgaria and Russia, cohabiting and married mothers had no significant differences in second conception risks. Controlling for union dissolution does not change these results; marriage and cohabitation were still not significantly

different in the Eastern European countries. Our pooled models showed that the Eastern European pattern of fertility was distinct from that of Western Europe and second conception risks were very low in the 1990s. They also showed that the association between union status and fertility in France is significantly different than in Estonia, Bulgaria, Romania, and Russia. The findings suggest that cohabitation and marriage may have different meanings in Western and Eastern Europe, especially regarding childbearing and rearing.

Previous research helps to shed light on these results. Perelli-Harris et al 2010 found a significant negative educational gradient for the risk of a first birth in cohabitation relative to the risk of a first birth in marriage in Russia, the Netherlands, Norway, and the UK, and a negative educational gradient that was not significant in Austria, France, and to some degree West Germany. The relationship in Italy was significantly U-shaped, with both higher and lower educated women having higher risks of first births in cohabitation relative to marriage. These results suggest that having a first birth within cohabitation is associated lower education, or a "Pattern of Disadvantage" (Perelli-Harris and Gerber 2011, Perelli-Harris et al 2010). Yet the current findings indicate that childbearing after a first birth differs in Eastern and Western Europe. In Western Europe childbearing in cohabitation that occurs among the least educated seems to result in lower fertility, perhaps due to relationship instability and lack of commitment that prohibits additional births. In Eastern Europe, however, lower education at first birth may result in higher subsequent fertility among cohabitors, especially relative to the low levels of marital fertility in Eastern Europe (Perelli-Harris and Gerber 2011, Sobotka 2003). Hence, the lack of difference between cohabiting and marital fertility in Eastern Europe may be due to the increase

in cohabitation among disadvantaged women coupled with the decline in marital fertility for the majority population.

The findings that examine the prevalence of cohabitation at first birth shed further light on the situation. As in Liefbroer and Dourleijn (2006), we found a significant U-shaped relationship between the prevalence of cohabitation and cohabitors' behavior; however our U is inverted and we only show estimates for up to 55% of first births within cohabitation, the maximum percent found in our dataset. The findings imply that initially, when childbearing within cohabitation is still a marginal behaviour as in Italy, cohabiting women have significantly lower second conception risks. As first births within cohabitation increase, the difference in second conception risks for cohabiting and married women narrows. Then, as more than a quarter of first births occur within cohabitation, the differences between cohabitation and marriage increase again. When the percent of first births in cohabitation reaches its maximum (55%), second conception rates for cohabitation and marriage are most dissimilar. Thus, unlike in the Liefbroer and Dourleijn study, the differences in married and cohabiting behaviour do not narrow as childbearing within cohabitation becomes normative. This may be because bearing and raising children within cohabitation is still selective even though more first births are occurring within cohabitation, perhaps for low educated women as seen in Perelli-Harris et al 2010. Those women who remain within cohabitation after first birth become more distinct, because women with stable, committed relationships marry

The findings for women who marry after having a birth within cohabitation support these conclusions. We found no significant differences in second conception risks between continuously married women and women who marry after first birth, with the exception of Estonia, where women who marry after first birth have much

higher risks. Although the lack of significance may be due to small sample size, in most countries the risks for those who marry after first birth are higher, suggesting that women who marry speed up the timing of second births. In general, this finding suggests that the most committed couples marry and then conceive at similar or higher risks than those who are married at first birth. The results are consistent with studies that find that couples with plans to marry have similar relationship satisfaction as already married couples (Wiik, Bernhardt, Noack 2009). For stable cohabiting couples, the sequence of first birth and marriage does not matter as much as the act of marrying itself.

Nonetheless, the differences between cohabitation and marriage may disappear if a greater majority of women have a first birth within cohabitation. Right now, marriage still seems to be the predominant union for bearing and raising more children, but if the percent of first births substantially increases, the differences in second conception risks for cohabiting women may disappear. In order to truly test the U-shaped relationship that Liefbroer and Dourleijn find, we must wait until first births within marriage become uncommon.

To sum up, this study shows that in many countries of Western Europe and the United States, cohabiting and married couples have different fertility behaviors, even after having had one child together. The results hold across a wide variety of countries, from those where childbearing within cohabitation is just beginning to emerge to those which have had a much longer history of childbearing within cohabitation. Even though attitudes, norms, and policies towards cohabitation may differ substantially across countries (Perelli-Harris and Sanchez Gassen Forthcoming), second conception risks within cohabitation are much lower, indicating that cohabitation should not be considered “an alternative to marriage” or “indistinguishable from marriage”

(Heuveline and Timberlake 2004). We urge researchers, particularly in Western Europe, to recognize this distinction in their models and note that the two types of unions appear to be substantially different, regardless of length of union. Nonetheless, cohabitation, childbearing, and marriage are clearly connected, with decisions about each occurring jointly (Wu and Musick 2008, Steele et al 2005a). Therefore, it is important to study the transition from cohabitation to marriage, and to understand how decisions about unions differ across countries.

References:

Baizán, P., A. Aassve, and F.C. Billari. 2003. "Cohabitation, Marriage, and First Birth: The Interrelationship of Family Formation Events in Spain." *European Journal of Population* 19(2):147-169.

—. 2004. "The Interrelations between Cohabitation, Marriage and First Birth in Germany and Sweden." *Population & Environment* 25(6):531-561.

Billari, F.C.and A.C. Liefbroer. 2010. "Towards a new pattern of transition to adulthood?" *Advances in Life Course Research* 15(2-3):59-75.

Brand, J.and D. Davis. 2011. "The Impact of College Education on Fertility: Evidence for Heterogeneous Effects." *Demography* 48(3):863-887.

Brown, S.L. 2000. "The effect of union type on psychological well-being: depression among cohabitors versus marrieds." *Journal of Health and Social Behavior* 41(3):241-255.

—. 2003. "Relationship Quality Dynamics of Cohabiting Unions." *Journal of Family Issues* 24:583-601.

Carlson, M., S. McLanahan, and P. England. 2004. "Union Formation in Fragile Families." *Demography* 41(2):237-261.

Cherlin, A. 2009. *The marriage-go-round: The state of marriage and the family in America today*. New York: Knopf.

Cherlin, A.J. 2004. "The Deinstitutionalization of American Marriage." *Journal of Marriage and Family* 66 848–861.

Coale, A.J. 1992. "Age of Entry into Marriage and the Date of the Initiation of Voluntary Birth Control." *Demography* 29(3):333-341.

DeMaris, A. 2001. "The influence of intimate violence on transitions out of cohabitation." *Journal of Marriage and the Family* 63(1):235-246.

Galezewska, P. forthcoming. "Einfluss der Bildung der Frau auf das Zweitgeburtsverhalten in Polen während der sozioökonomischen Transformation." *Zeitschrift für Familienforschung*.

Heimdal, K.R.and S.K. Houseknecht. 2003. "Cohabiting and Married Couples' Income Organization: Approaches in Sweden and the United States." *Journal of Marriage and Family* 65(3):525-538.

Heuveline, P.and J.M. Timberlake. 2004. "The role of cohabitation in family formation: the United States in comparative perspective." *Journal of Marriage and the Family* 66(5):1214-1230.

Heuveline, P., J.M. Timberlake, and F.F. Furstenberg. 2003. "Shifting childrearing to single mothers: results from 17 Western countries." *Population and Development Review* 29(1):47-71.

Hoem, J.M., A. Jasilioniene, D. Kostova, and C. Muresan. 2009. "Traces of the Second Demographic Transition in selected countries in Central and Eastern Europe: union formation as a demographic manifestation." *European Journal of Population* 25(2):123-156.

Jorik, V., J. Wood, and K. Neels. 2012. "Quality of Demographic Data in GGS Wave 1." in *European Population Conference*. Stockholm, Sweden.

Kennedy, S.and L. Bumpass. 2008. "Cohabitation and children's living arrangements: New estimates from the United States." *Demographic Research* 19:1663-1692.

Kenney, C.T.and S.S. McLanahan. 2006. "Why are cohabiting relationships more violent than marriages?" *Demography* 43(1):127-140.

Kiernan, K. 2004. "Unmarried Cohabitation and Parenthood: Here to Stay? European Perspectives." in *The Future of the Family*, edited by D.P. Moynihan, Timothy M. Smeeding, and Lee Rainwater. New York: Russell Sage Foundation.

Köppen, K. 2006. "Second births in Western Germany and France." *Demographic Research* 14(14):295-330.

Kravdal, Ø. 2001. "The high fertility of college educated women in Norway: An artefact of separate modelling of each parity transition." *Demographic Research* 5(6):185-215.

Kreyenfeld, M. 2002. "Time-squeeze, partner effect or self-selection? An investigation into the positive effect of women's education on second birth risks in West Germany." *Demographic Research* 7(2):15-48.

Le Goff, J.-M. 2002. "Cohabiting unions in France and West Germany: Transitions to first birth and first marriage." *Demographic Research* 7(18):593-624.

Lesthaeghe, R. 2010. "The Unfolding Story of the Second Demographic Transition." *Population and Development Review* 36(2):211-251.

Lesthaeghe, R.J.and L. Neidert. 2006. "The Second Demographic Transition in the United States: Exception or Textbook Example?" *Population and Development Review* 32(4):669-698.

Lichter, D.T., Z. Qian, and L.M. Mellott. 2006. "Marriage or dissolution? Union transitions among poor cohabiting women." *Demography* 43(2):223-240.

Liefbroer, A.C.and E. Dourleijn. 2006. "Unmarried Cohabitation and Union Stability: Testing the Role of Diffusion Using Data from 16 European Countries " *Demography* 43(2):203-221.

Lyngstad, T.H., T. Noack, and P.A. Tufte. 2010. "Pooling of Economic Resources: A Comparison of Norwegian Married and Cohabiting Couples." *European Sociological Review*.

Manning, W.D. 1993. "Marriage and cohabitation following premarital conception." *Journal of Marriage and the Family* 55:839-850.

—. 2004. "Children and the Stability of Cohabiting Couples." *Journal of Marriage and Family* 66(3):674-689.

Mureşan, C.and J.M. Hoem. 2010. "The negative educational gradients in Romanian fertility." *Demographic Research* 22(4):95-114.

Musick, K. 2007. "Cohabitation, nonmarital childbearing and the marriage process." *Demographic Research* 16(9):249-286.

Perelli-Harris, B. 2006. "The influence of informal work and subjective well-being on childbearing in post-Soviet Russia." *Population and Development Review* 32(4):729-753.

Perelli-Harris, B.and N.S. Gassen. Forthcoming. "The relationship between the state, cohabitation, and childbearing across Europe: policy dimensions and theoretical considerations." *Population and Development Review.*

Perelli-Harris, B.and T.P. Gerber. 2010. "Nonmarital childbearing in Russia: Second Demographic Transition or Pattern of Disadvantage?" *Demography* 48(1):317-342.

Perelli-Harris, B., M. Kreyenfeld, and K. Kubisch. 2009. "The Harmonized Histories." *Max Planck Institute for Demographic Research Working Paper*. Rostock.

Perelli-Harris, B., M. Kreyenfeld, W. Sigle-Rushton, R. Keizer, T. Lappegård, A. Jasilioniene, C. Berghammer, and P.D. Giulio. Forthcoming. "Changes in union status during the transition to parenthood: An examination of 11 European countries." *Population Studies*.

Perelli-Harris, B., W. Sigle-Rushton, T. Lappegård, R. Keizer, C. Berghammer, and M. Kreyenfeld. 2010. "The educational gradient of nonmarital childbearing in Europe." *Population and Development Review* 36(4):775-801.

Raley, R.K. 2001. "Increasing Fertility in Cohabiting Unions: Evidence for the Second Demographic Transition in the United States." *Demography* 38(1):59-66.

Reher, D.S. 1998. "Family ties in Western Europe: Persistent contrasts." *Population and Development Review* 24(2):203-234.

Seltzer, J.A. 2000. "Families formed outside of marriage." *Journal of Marriage and Family* 62(Nov.):1247-1268.

Smock, P.J. 2000. "Cohabitation in the United States: an appraisal of research themes, findings, and implications." *Annual Review of Sociology* 26:1-20.

Sobotka, T. 2003. "Re-emerging diversity: Rapid fertility changes in central and eastern Europe after the collapse of the communist regimes." *Population* 58:451-486.

—. 2004. "Is Lowest-Low Fertility in Europe Explained by the Postponement of Childbearing?" *Population and Development Review* 30(2):195-220.

Soons, J.P.M.and M. Kalmijn. 2009. "Is Marriage More Than Cohabitation? Well-Being Differences in 30 European Countries." *Journal of Marriage and Family* 71(5):1141-1157.

Steele, F., H. Joshi, C. Kallis, and H. Goldstein. 2005a. "Changing compatibility of cohabitation and childbearing between young British women born in 1958 and 1970." *Population Studies* 60(2):137-152.

Steele, F., C. Kallis, H. Goldstein, and H. Joshi. 2005b. "The relationship between childbearing and transitions from marriage and cohabitation in Britain." *Demography* 42(4):647-673.

Sweeney, M.M. 2010. "The Reproductive Context of Cohabitation in the United States: Recent Change and Variation in Contraceptive Use." *Journal of Marriage and Family* 72(5):1155-1170.

Teitler, J.O., N.E. Reichman, and H. Koball. 2006. "Contemporaneous Versus Retrospective Reports of Cohabitation in the Fragile Families Survey." *Journal of Marriage and Family* 68(2):469-477.

Thornton, A.and L. Young-DeMarco. 2001. "Four Decades of Trends in Attitudes toward Fertility Issues in the United States: The 1960s through the 1990s." *Journal of Marriage and the Family* 63:1009-1037.

Wiik, K.A., E. Bernhardt, and T. Noack. 2009. "A Study of Commitment and Relationship Quality in Sweden and Norway." *Journal of Marriage and Family* 71(3):465-477.

Wu, L.and K. Musick. 2008. "Stability of marital and cohabiting unions following a first birth." *Population Research and Policy Review* 27(6):713-727.

Figure 1. Predicted probabilities of second conception for each union status for women aged 15-49 who had a first birth in a union (estimated 25 years old at first birth, union duration of 31 months before first birth, 13-36 months after first birth, 1990-95), based on pooled model of 15 countries (see Appendix)

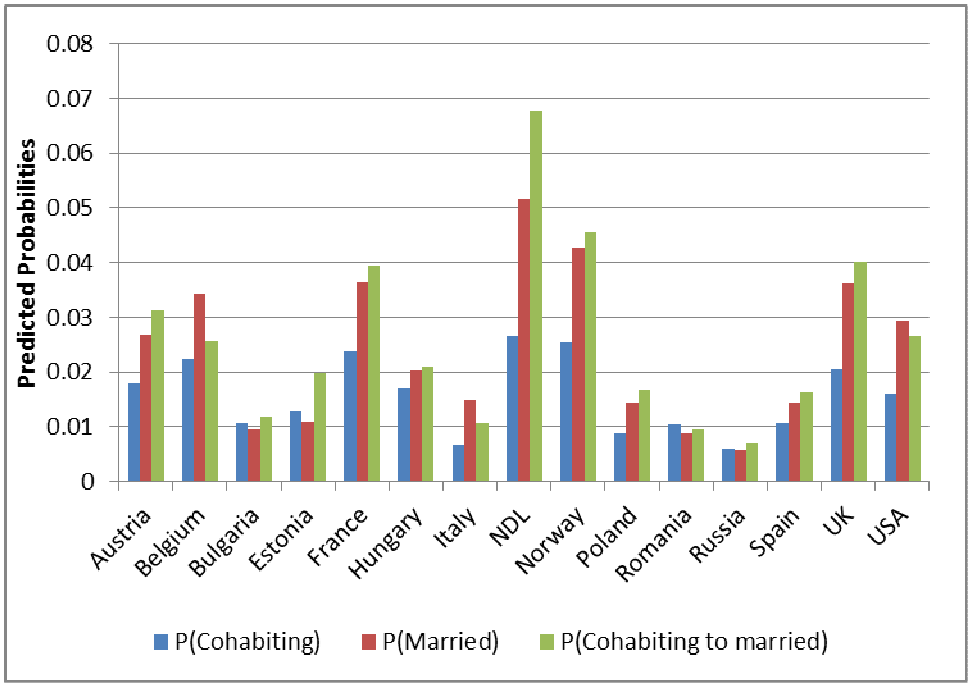

Figure 2. Relative risk of second conceptions for those continuously cohabiting by the percent of first births in cohabitation, based on estimates shown in Table 4.

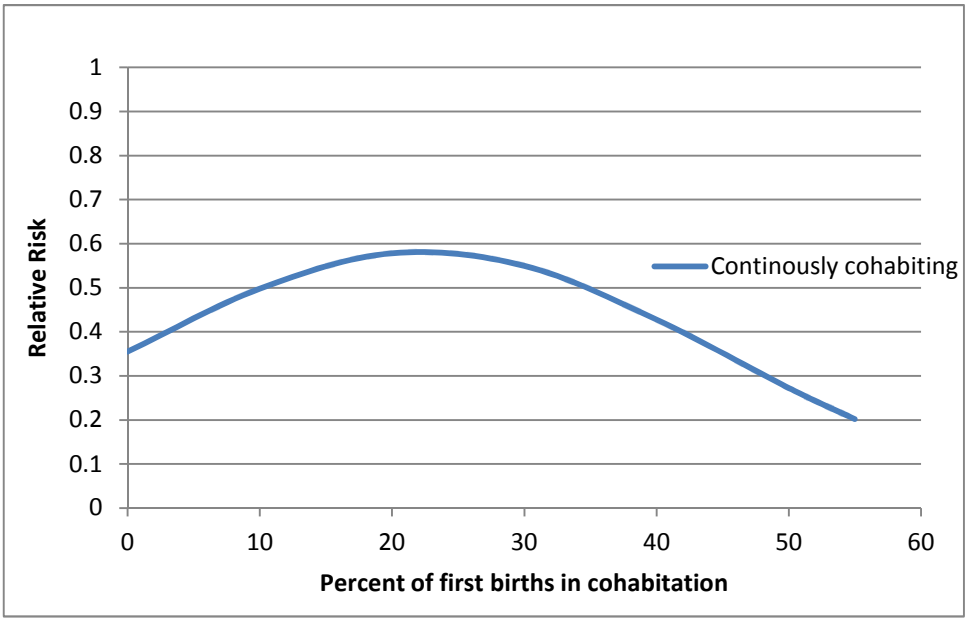

Table 1. Percent of first and second births by union status, and difference between first and second births in cohabitation, to women aged 15-49, for first births occurring 1985-2000.

	Birth 1			Birth 2			
	Cohabiting	Married	N	Cohabiting	Married	N	Difference between first and second births in cohabitation
Austria	31	54	998	22	72	797	9
Belgium	22	68	651	19	72	488	3
Bulgaria	12	80	2,130	12	82	1,291	0
Estonia	30	60	956	28	66	726	2
France	37	55	1,120	28	66	947	9
Hungary	8	85	1,085	7	89	843	1
Italy	5	90	3,539	2	96	2,369	3
NDL	14	77	1,183	10	85	973	4
Norway	46	43	1,796	33	62	1,528	12
Poland	6	80	1,541	5	91	1,137	0
Romania	9	87	1,339	8	90	767	1
Russia	14	74	1,653	11	83	758	3
Spain	12	79	1,548	10	87	1,124	2
UK	18	64	1,243	16	77	955	2
USA	18	56	2,064	16	69	1,732	1

Note: Births to single women not shown.

Table 2. Odds ratios of second conceptions based on discrete-time hazard models, women aged 15-49 who had a first birth in a union between 1985 and 2000, by Country

	AUS	BEL	BUL	EST	FRA	HUN	ITA	NDL	NOR	POL	ROM	RUS	SPA	UK	USA
Cohabit.	0.590***	0.573***	0.819	1.153	0.601***	0.830	0.448***	0.532***	0.614***	0.626*	1.086	0.921	0.708*	0.554***	0.537***
	(-5.01)	(-3.33)	(-1.75)	(1.35)	(-6.10)	(-1.22)	(-4.20)	(-5.27)	(-7.30)	(-2.36)	(0.47)	(-0.50)	(-2.48)	(-4.96)	(-6.44)
Married, prev. cohabit.	1.236	0.740	1.089	1.725**	1.100	1.138	0.721	1.409	1.110	1.283	1.043	1.153	1.243	1.076	0.886
	(1.65)	(-1.14)	(0.48)	(3.09)	(0.68)	(0.42)	(-1.85)	(1.88)	(1.18)	(0.94)	(0.20)	(0.70)	(0.91)	(0.36)	(-0.99)
Higher educ.	1.134	1.497***	0.779***	0.988	1.399***	1.390***	1.230*	1.313**	1.250***	0.745**	0.698*	0.816	1.535***	1.087	1.231**
	(1.07)	(3.43)	(-3.30)	(-0.12)	(4.06)	(3.55)	(2.55)	(2.91)	(3.56)	(-2.79)	(-2.30)	(-1.92)	(4.23)	(1.02)	(2.60)
Lower educ.	1.086	0.909	2.131***	1.181	1.135	1.055	0.916	0.729***	0.847	1.336***	1.371***	1.644*	1.044	0.988	1.338**
	(0.73)	(-0.73)	(8.75)	(1.07)	(1.26)	(0.46)	(-1.87)	(-4.02)	(-1.84)	(3.95)	(3.64)	(2.42)	(0.60)	(-0.07)	(2.94)
1990-94	0.936	1.065	0.776***	0.834	1.103	0.871	1.088	1.019	1.116	0.962	0.807*	0.680***	1.160	0.877	1.167
	(-0.61)	(0.53)	(-3.61)	(-1.77)	(1.13)	(-1.61)	(1.66)	(0.23)	(1.55)	(-0.39)	(-2.45)	(-4.18)	(1.89)	(-1.35)	(1.48)
1995-99	1.107	1.300*	0.659***	0.825	1.287**	0.765**	1.203**	1.081	1.277***	0.722**	0.740**	0.440***	1.207*	0.945	1.149
	(0.90)	(2.05)	(-5.14)	(-1.66)	(2.80)	(-2.86)	(3.20)	(0.90)	(3.40)	(-3.09)	(-2.95)	(-6.39)	(2.17)	(-0.56)	(1.35)
Union Duration	0.997	0.993***	0.994**	0.990***	0.994***	0.995*	0.992***	0.998*	0.998	0.995*	0.993**	0.997	0.995***	0.998	0.993***
	(-1.49)	(-3.63)	(-2.93)	(-3.30)	(-4.47)	(-2.32)	(-7.35)	(-2.23)	(-1.61)	(-2.02)	(-2.74)	(-1.21)	(-3.50)	(-1.76)	(-4.56)
Age at first birth	0.965*	0.943***	0.950***	0.983	0.957***	0.940***	0.954***	0.958***	0.950***	0.962*	0.941***	0.943***	0.964***	0.958***	0.992
	(-2.33)	(-3.61)	(-4.57)	(-1.11)	(-3.96)	(-4.60)	(-7.77)	(-3.93)	(-6.18)	(-2.55)	(-4.61)	(-4.69)	(-4.19)	(-4.62)	(-0.79)
Duration 13-24	2.431***	2.097***	2.090***	1.250	2.986***	2.221***	2.510***	3.496***	3.730***	1.201	1.085	1.288	2.006***	2.225***	1.766***
	(7.69)	(5.36)	(7.62)	(1.82)	(9.40)	(6.43)	(10.97)	(13.35)	(14.13)	(1.86)	(0.72)	(1.95)	(5.61)	(7.67)	(6.35)
Duration 25-36	1.916***	2.302***	1.881***	0.974	4.128***	3.606***	2.873***	3.624***	4.631***	1.169	1.081	0.920	2.303***	2.190***	1.794***
	(4.96)	(5.57)	(6.09)	(-0.18)	(11.79)	(10.44)	(12.45)	(12.16)	(15.62)	(1.48)	(0.65)	(-0.56)	(6.65)	(6.64)	(5.89)

Duration 37-48	1.627** (3.27)	1.580* (2.50)	1.495*** (3.48)	1.108 (0.70)	3.336*** (8.78)	2.656*** (7.04)	3.345*** (14.08)	2.737*** (7.73)	3.718*** (11.55)	1.126 (1.03)	0.844 (-1.24)	1.042 (0.28)	2.850*** (8.35)	1.549** (2.99)	1.636*** (4.25)
Duration 49-60	0.992 (-0.04)	1.223 (0.93)	1.468** (3.15)	0.834 (-1.06)	2.758*** (6.44)	1.886*** (3.92)	3.178*** (12.67)	1.400 (1.79)	2.840*** (7.71)	0.952 (-0.38)	0.734* (-2.07)	0.868 (-0.85)	2.867*** (8.03)	1.508* (2.36)	1.634*** (3.69)
Duration 61-72	0.910 (-0.45)	0.771 (-0.90)	1.268 (1.75)	1.013 (0.08)	1.832** (3.02)	1.466* (2.04)	2.116*** (6.97)	0.886 (-0.47)	1.901*** (3.82)	0.832 (-1.28)	0.707* (-2.17)	0.855 (-0.89)	2.304*** (5.70)	0.684 (-1.46)	0.983 (-0.09)
Duration 73+	0.339*** (-6.04)	0.129*** (-7.67)	0.442*** (-6.82)	0.282*** (-7.52)	0.527** (-3.21)	0.481*** (-4.05)	1.101 (1.01)	0.145*** (-6.24)	0.614** (-3.04)	0.403*** (-7.50)	0.180*** (-11.85)	0.403*** (-6.43)	0.826 (-1.40)	0.138*** (-6.76)	0.474*** (-4.48)
N(mo.)	44501	37532	145974	51690	50776	58827	218580	43737	70292	78627	106617	109474	100647	37937	53363
chi2	218.6	252.1	551.6	130.3	388.7	293.8	631.2	403.3	551.6	205.7	339.8	182.7	269.5	211.6	198.4

Exponentiated coefficients; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3. Relative risk ratios of second conception or union dissolution from discrete-time competing risk hazard models, for women who had a first birth in a union between 1985 and 2000, by Country (Reference category: no event)

	AUS	BEL	BUL	EST	FRA	HUN	ITA	NDL	NOR	POL	ROM	RUS	SPA	UK	USA
Second conception															
Cohabit.	0.593***	0.574**	0.820	1.144	0.602***	0.831	0.435***	0.532***	0.616***	0.629*	1.093	0.924	0.710*	0.550***	0.532***
	(-4.80)	(-3.23)	(-1.72)	(1.23)	(-5.98)	(-1.11)	(-4.50)	(-5.19)	(-6.99)	(-2.52)	(0.50)	(-0.48)	(-2.47)	(-4.94)	(-6.60)
Married, prev. cohabit.	1.238	0.740	1.089	1.718***	1.100	1.138	0.724	1.408	1.111	1.288	1.045	1.155	1.247	1.078	0.868
	(1.72)	(-1.00)	(0.46)	(3.58)	(0.73)	(0.42)	(-1.79)	(1.70)	(1.26)	(0.99)	(0.21)	(0.73)	(0.94)	(0.38)	(-1.16)
Higher educ.	1.121	1.498***	0.779**	0.981	1.399***	1.391***	1.229**	1.314**	1.250***	0.747**	0.702*	0.817	1.535***	1.086	1.218*
	(0.94)	(3.50)	(-3.26)	(-0.20)	(4.12)	(3.57)	(2.69)	(3.00)	(3.62)	(-2.73)	(-2.23)	(-1.92)	(4.56)	(1.01)	(2.50)
Lower educ.	1.085	0.908	2.132***	1.183	1.136	1.056	0.914	0.729***	0.850	1.337***	1.361***	1.646**	1.041	0.991	1.320**
	(0.73)	(-0.70)	(9.13)	(1.15)	(1.30)	(0.49)	(-1.93)	(-3.96)	(-1.74)	(4.00)	(3.63)	(2.60)	(0.56)	(-0.05)	(2.90)
1990-94	0.938	1.065	0.775***	0.839	1.102	0.870	1.089	1.019	1.115	0.959	0.809*	0.681***	1.160	0.877	1.162
	(-0.61)	(0.53)	(-3.73)	(-1.76)	(1.11)	(-1.62)	(1.68)	(0.23)	(1.55)	(-0.44)	(-2.43)	(-4.18)	(1.90)	(-1.36)	(1.49)
1995-99	1.103	1.303*	0.659***	0.829	1.287**	0.764**	1.205***	1.081	1.274***	0.719**	0.743**	0.440***	1.203*	0.949	1.135
	(0.84)	(2.09)	(-5.09)	(-1.61)	(2.76)	(-2.83)	(3.30)	(0.91)	(3.35)	(-3.28)	(-2.93)	(-6.43)	(2.23)	(-0.51)	(1.27)
Union Duration	0.997	0.993***	0.994**	0.990***	0.994***	0.995*	0.992***	0.998*	0.998	0.995*	0.993**	0.997	0.995***	0.998	0.992***
	(-1.58)	(-3.80)	(-3.24)	(-3.35)	(-4.73)	(-2.47)	(-7.54)	(-2.37)	(-1.67)	(-2.05)	(-2.92)	(-1.26)	(-3.70)	(-1.72)	(-4.65)
Age at first birth	0.965*	0.943***	0.950***	0.984	0.957***	0.940***	0.954***	0.957***	0.950***	0.962*	0.939***	0.943***	0.964***	0.957***	0.993
	(-2.34)	(-3.72)	(-4.78)	(-1.16)	(-4.51)	(-4.76)	(-7.95)	(-4.24)	(-6.51)	(-2.56)	(-4.87)	(-4.78)	(-4.42)	(-4.59)	(-0.75)
Duration 13-24	2.421***	2.095***	2.089***	1.249	2.986***	2.222***	2.509***	3.495***	3.717***	1.202	1.085	1.288	2.026***	2.217***	1.790***
	(7.51)	(5.23)	(7.52)	(1.79)	(9.15)	(6.36)	(10.87)	(13.01)	(13.75)	(1.84)	(0.71)	(1.94)	(5.62)	(7.47)	(6.38)

Duration 25-36	1.917*** (4.89)	2.302*** (5.50)	1.881*** (6.02)	0.975 (-0.18)	4.131*** (11.63)	3.605*** (10.43)	2.872*** (12.36)	3.628*** (12.13)	4.638*** (15.41)	1.161 (1.39)	1.081 (0.64)	0.921 (-0.55)	2.327*** (6.67)	2.194*** (6.61)	1.813*** (5.93)
Duration 37-48	1.627** (3.24)	1.580* (2.48)	1.496*** (3.46)	1.092 (0.60)	3.345*** (8.73)	2.657*** (7.05)	3.346*** (13.98)	2.743*** (7.79)	3.725*** (11.56)	1.126 (1.02)	0.844 (-1.23)	1.042 (0.28)	2.881*** (8.36)	1.534** (2.89)	1.664*** (4.38)
Duration 49-60	0.993 (-0.04)	1.221 (0.91)	1.468** (3.13)	0.833 (-1.06)	2.758*** (6.37)	1.887*** (3.93)	3.156*** (12.50)	1.402 (1.79)	2.845*** (7.73)	0.952 (-0.38)	0.723* (-2.15)	0.870 (-0.84)	2.898*** (8.05)	1.512* (2.42)	1.620*** (3.60)
Duration 61-72	0.911 (-0.44)	0.770 (-0.92)	1.268 (1.75)	1.013 (0.07)	1.832** (3.04)	1.466* (2.03)	2.117*** (6.94)	0.887 (-0.47)	1.903*** (3.79)	0.832 (-1.27)	0.707* (-2.16)	0.854 (-0.89)	2.327*** (5.76)	0.685 (-1.46)	1.004 (0.02)
Duration 73+	0.339*** (-6.51)	0.129*** (-8.16)	0.442*** (-7.08)	0.281*** (-7.91)	0.527*** (-3.44)	0.482*** (-4.28)	1.098 (1.01)	0.145*** (-6.40)	0.615** (-3.25)	0.400*** (-7.92)	0.180*** (-12.36)	0.403*** (-6.67)	0.835 (-1.38)	0.138*** (-7.03)	0.480*** (-4.83)
Dissolution															
Cohabit	2.154*** (3.61)	2.310** (2.74)	1.938* (2.47)	2.090*** (3.81)	2.096** (2.91)	3.085** (2.70)	5.425*** (7.72)	1.439 (0.99)	2.201*** (4.60)	2.989*** (3.34)	8.711*** (7.61)	1.924*** (4.43)	0.975 (-0.06)	1.659* (2.47)	2.149*** (5.90)
Married, prev. cohab.	0.999 (-0.00)	1.223 (0.27)	1.113 (0.21)	0.220* (-2.11)	1.134 (0.25)	6.44e-14[a] (-0.00)	1.377 (0.63)	0.746 (-0.28)	0.714 (-1.12)	1.590 (0.64)	1.297 (0.44)	1.533 (1.88)	2.651* (2.04)	1.110 (0.25)	1.330 (1.37)
Higher educ.	1.069 (0.22)	1.457 (1.28)	0.984 (-0.09)	0.842 (-0.89)	1.033 (0.11)	1.557 (1.10)	1.180 (0.69)	2.072 (1.72)	0.959 (-0.26)	0.404* (-2.31)	1.094 (0.28)	1.295* (2.28)	1.041 (0.11)	0.766 (-1.53)	1.006 (0.04)
Lower educ.	0.638 (-1.49)	0.785 (-0.72)	1.645* (2.02)	1.229 (0.79)	1.285 (0.91)	1.115 (0.29)	0.846 (-1.05)	1.369 (0.95)	1.278 (1.31)	1.037 (0.15)	0.781 (-1.01)	1.335 (1.10)	0.624 (-1.94)	0.609 (-1.33)	0.594** (-3.26)
1990-94	1.512 (1.63)	1.196 (0.56)	0.755 (-1.58)	0.875 (-0.73)	0.762 (-0.98)	0.474* (-2.06)	1.228 (1.17)	0.926 (-0.22)	1.469* (2.24)	0.961 (-0.12)	1.296 (1.18)	1.110 (0.89)	0.929 (-0.27)	0.796 (-1.16)	0.952 (-0.31)

1995-99	1.264	2.644**	0.594*	0.438**	0.956	0.771	1.315	1.092	1.132	0.682	0.770	1.224	1.329	0.711	0.999
	(0.80)	(3.07)	(-2.22)	(-3.21)	(-0.15)	(-0.71)	(1.35)	(0.23)	(0.64)	(-1.11)	(-0.91)	(1.48)	(1.02)	(-1.57)	(-0.01)
Union	0.987**	1.016***	0.994	1.001	1.000	1.015*	1.000	1.000	1.000	0.997	1.002	1.002	1.012***	0.996	1.002
Duration	(-2.96)	(4.17)	(-1.39)	(0.21)	(-0.01)	(2.06)	(-0.04)	(0.07)	(-0.08)	(-0.31)	(0.49)	(0.86)	(3.59)	(-1.24)	(0.76)
Age at	0.972	0.852***	0.991	0.878***	0.854***	0.770***	0.987	0.903*	0.929***	0.986	0.983	0.974*	0.883***	0.915***	0.892***
first birth	(-0.86)	(-3.71)	(-0.37)	(-3.81)	(-4.06)	(-4.02)	(-0.70)	(-2.31)	(-3.69)	(-0.28)	(-0.61)	(-1.98)	(-3.88)	(-4.09)	(-5.66)
Duration	1.338	0.457	0.774	0.943	1.036	1.560	0.611	0.801	1.709*	1.417	1.043	1.060	1.286	1.383	0.850
13-24	(0.93)	(-1.51)	(-0.83)	(-0.21)	(0.09)	(0.94)	(-1.38)	(-0.40)	(2.38)	(0.87)	(0.11)	(0.31)	(0.49)	(1.21)	(-0.94)
Duration	1.338	0.920	0.727	1.580	1.558	0.657	1.228	2.526	2.086**	1.354	0.968	1.243	1.862	1.619	1.180
25-36	(0.84)	(-0.18)	(-0.94)	(1.71)	(1.10)	(-0.62)	(0.67)	(1.96)	(3.04)	(0.71)	(-0.08)	(1.17)	(1.26)	(1.65)	(0.93)
Duration	1.074	1.224	1.393	1.489	3.125**	1.473	2.236**	4.098**	2.392**	1.013	1.033	1.014	2.278	3.017***	1.453
37-48	(0.17)	(0.44)	(1.13)	(1.35)	(3.05)	(0.68)	(2.90)	(2.97)	(3.25)	(0.02)	(0.08)	(0.07)	(1.67)	(3.96)	(1.94)
Duration	1.597	0.443	0.844	1.086	0.849	1.534	2.197**	2.745	2.486**	1.411	1.572	1.666**	2.547	2.393*	1.426
49-60	(1.17)	(-1.08)	(-0.47)	(0.23)	(-0.26)	(0.70)	(2.66)	(1.67)	(2.94)	(0.72)	(1.17)	(2.75)	(1.85)	(2.51)	(1.60)
Duration	1.734	0.548	1.077	1.475	0.745	1.486	2.225*	1.779	2.080	0.962	1.323	0.836	1.048	1.837	2.042**
61-72	(1.31)	(-0.79)	(0.21)	(1.13)	(-0.39)	(0.58)	(2.53)	(0.73)	(1.95)	(-0.07)	(0.66)	(-0.74)	(0.07)	(1.43)	(3.25)
Duration	1.565	1.216	1.087	0.843	1.893	2.374	2.181**	2.658*	2.465***	1.791	0.973	0.858	2.780*	1.946*	0.880
73+	(1.54)	(0.59)	(0.35)	(-0.64)	(1.72)	(1.94)	(3.10)	(2.11)	(3.84)	(1.69)	(-0.09)	(-0.94)	(2.45)	(2.51)	(-0.64)
N(mo)	44501	37532	145974	51690	50776	58827	218580	43737	70292	78627	106617	109474	100647	37937	53363
chi2	332.5	474.1	633.2	251.2	556.4	444.5	835.1	680.9	838.3	281.2	514.2	253.5	370.3	455.0	382.0

Exponentiated coefficients; *t* statistics in parentheses

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Note a: Hungarian results for dissolution unreliable due to lack of people who married after cohabitation and then divorced.

Table 4. Odds ratios from discrete-time hazard models of second conceptions including proportion of respondents cohabiting at first birth, women aged 15-49 who had a first birth in a union between 1985 and 2000, pooled model of 15 countries.

	Baseline model	Proportion cohabiting at first birth	Proportion cohabiting at first birth
Cohabiting	0.640***	0.640***	0.351***
	(-5.60)	(-5.60)	(-3.30)
Married, previously cohabiting	1.085	1.085	1.809
	(0.58)	(0.58)	(1.11)
Proportion cohabiting at first birth		1.031	0.992
		(0.79)	(-0.52)
Proportion cohabiting at first birth squared		0.999	……
		(-1.44)	
Proportion cohabiting at first birth * continuously cohabiting			1.046**
			(2.77)
Proportion cohabiting at first birth squared * continuously cohabiting			0.999**
			(-3.27)
Proportion cohabiting at first birth * married, previously cohabited			0.98
			(-0.76)
Proportion cohabiting at first birth squared * married, prev. cohabited			1.000
			(0.47)
N (person months)	1181560	1181560	1181560
chi2	6311.9	6311.9	6324.7

Note: Controls include all interactions included in previous model.

Appendix. Odds ratios of second conceptions based on discrete-time hazard models, women aged 15-49 who had a first birth in a union between 1985 and 2000, pooled model of 15 countries

Continuously cohabiting	0.640***
	(-5.60)
Cohabiting then married	1.085
	(0.58)
Union duration	0.994***
	(-4.50)
First birth 1990-94	1.123
	(1.32)
First birth 1995-99	1.355***
	(3.42)
Age at first birth	0.965***
	(-3.36)
13-36 months after first birth	3.437***
	(11.45)
37-60 months after first birth	3.139***
	(9.19)
More than 61 months after first birth	0.803
	(-1.31)
Bulgaria	2.370*
	(2.33)
Poland	2.704*
	(2.41)
Romania	3.233**
	(3.04)
Spain	0.466*
	(-2.15)
Norway * union duration	1.004*
	(2.20)
UK * union duration	1.004*
	(2.01)
Estonia * married, previously cohab.	1.666*
	(2.25)
Bulgaria * cohabiting	1.742***
	(4.31)
Estonia * cohabiting	1.829***
	(4.56)
Romania * cohabiting	1.874***
	(3.59)
Russia * cohabiting	1.622**
	(2.92)
Bulgaria * mother's age at first birth	0.945***
	(-3.57)
Romania * mother's age at first birth	0.954**
	(-2.84)

Russia * mother's age at first birth	0.966*
	(-2.08)
Austria * 13-36 months	0.651**
	(-2.82)
Belgium * 13-36 months	0.632**
	(-2.77)
Bulgaria * 13-36 months	0.555***
	(-4.23)
Estonia * 13-36 months	0.332***
	(-7.12)
Poland * 13-36 months	0.339***
	(-7.83)
Romania * 13-36 months	0.312***
	(-7.97)
Russia * 13-36 months	0.324***
	(-7.07)
Spain * 13-36 months	0.628**
	(-2.99)
UK * 13-36 months	0.646**
	(-3.02)
US * 13-36 months	0.518***
	(-4.87)
Austria * 37-60 months	0.437***
	(-4.51)
Belgium * 37-60 months	0.445***
	(-4.00)
Bulgaria * 37-60 months	0.434***
	(-5.24)
Estonia * 37-60 months	0.319***
	(-6.39)
Poland * 37-60 months	0.325***
	(-7.10)
Romania * 37-60 months	0.250***
	(-8.19)
Russia * 37-60 months	0.306***
	(-6.61)
UK * 37-60 months	0.497***
	(-3.94)
US * 37-60 months	0.529***
	(-4.00)
Austria * 61+ months	0.550*
	(-2.57)
Belgium * 61+ months	0.257***
	(-4.88)
Bulgaria * 61+ months	0.655*
	(-2.13)
Estonia * 61+ months	0.588*
	(-2.39)

Italy * 61+ months	1.632**
	(2.58)
NDL * 61+ months	0.364***
	(-3.69)
Poland * 61+ months	0.584**
	(-2.70)
Romania * 61+ months	0.316***
	(-5.48)
Russia * 61+ months	0.605*
	(-2.37)
UK * 61+ months	0.318***
	(-4.21)
Bulgaria * 1990-94	0.697**
	(-3.21)
Estonia * 1990-94	0.665**
	(-2.98)
Romania * 1990-94	0.736*
	(-2.46)
Russia * 1990-94	0.632***
	(-3.61)
Bulgaria * 1995-99	0.513***
	(-5.54)
Estonia * 1995-99	0.569***
	(-3.84)
Hungary * 1995-99	0.580***
	(-4.25)
Poland * 1995-99	0.553***
	(-4.26)
Romania * 1995-99	0.586***
	(-3.95)
Russia * 1995-99	0.343***
	(-6.85)
UK * 1995-99	0.698**
	(-2.68)
N	1181560
chi2	6311.9

Exponentiated coefficients; t statistics in parentheses
* p<0.05 ** p<0.01 *** p<0.001

Note: Only significant estimates shown on table.