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Partnership dynamics and the transition to first birth in Europe and the United States: New insights from a multi-state approach

by

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ABSTRACT

FACULTY OF SOCIAL AND HUMAN SCIENCES

Social Statistics and Demography

Thesis for the degree of Doctor of Philosophy

PARTNERSHIP DYNAMICS AND THE TRANSITION TO FIRST BIRTH IN EUROPE AND THE UNITED STATES: NEW INSIGHTS FROM A MULTI-STATE APPROACH

Júlia Mikolai

This thesis examines the intersection between partnership histories and the transition to motherhood in Europe and the United States. Using a multi-state framework provides new insights into the role of changing partnership dynamics in the transition to first birth. I investigate three main questions: 1) how partnership histories are related to childless women's probabilities to become mothers in later reproductive ages, 2) the educational gradient of several partnership transitions leading to motherhood, and 3) what methods can be used to study complex family life courses. Using comparative harmonised union and fertility histories, this research emphasises the importance of partnership histories in the transition to motherhood. Among women who are still childless at age 30/35 those who married their cohabiting partner by this age have the highest first birth probabilities, followed by the directly married, those who cohabit, and those who experienced union dissolution. Never partnered women have the highest probabilities to remain childless. With respect to the second question, this thesis highlights educational differences not only in the partnership context of a first birth but also in partnership transitions leading to a first birth. The transition to first birth within cohabitation and while being never partnered has a persistent negative educational gradient in all countries. Additionally, cohabiting women with higher education have a higher risk to marry their cohabiting partner than the low educated. Once they do so, they are more likely to delay having a first child than those with lower education. Last, this thesis shows that while sequence analysis and latent class growth models attempt to describe family behaviours of different groups of women, multi-state event history models are especially useful for addressing research questions specifically related to the influence of changing covariate effects over the life course on the individual level.

Contents

List of tables

List of figures

DECLARATION OF AUTHORSHIP

I, Júlia Mikolai

declare that the thesis entitled

'Partnership Dynamics and the Transition to First Birth in Europe and the United States: New Insights from a Multi-state Approach'

and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- none of this work has been published before submission

- part of this work was under review for publication at the time of submission:
    - Mikolai, J. Later or never? Partnership histories and the transition to motherhood at later reproductive ages in Europe, submitted to *European Journal of Population*.

Signed: ……..

Date: 29/01/2015

Supervisor statement

We, Dr Ann Berrington and Dr Brienna Perelli-Harris, declare that we will be named as co-authors on the paper titled 'Pathways to first birth and the changing role of education in Europe and the United States' (Chapter 5) when it is submitted for publication. In the paper included in this thesis our role remained consistent with that of a supervisor; Júlia Mikolai wrote the paper and we provided feedback on previous drafts and offered guidance in the interpretation of the results.

Signed:

Signed:

Date: 27.1.2015

Declaration of co-authorship

I, Dr Mark Lyons-Amos, declare that Júlia Mikolai and myself have co-authored the paper titled 'Coping with complex individual histories: A comparison of sequence analysis, latent class growth models, and multi-state event history models with an application to partnership transitions in Norway' (Chapter 2). Júlia Mikolai has conceived the idea and wrote the paper except for section 2.4, the second paragraph of section 2.7, and section 2.2.8. Also, I conducted the sequence analysis and latent class growth analysis. Additionally, the concluding section was finalised jointly.

Signed:

Date: 23/01/2015

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Abbreviations

CEE – Central and Eastern Europe(an countries)

GGP – Generations and Gender Programme

GGS – Generations and Gender Survey

ISCED - International Standard Classification of Education

LCGM – Latent Class Growth Models

NSFG – National Survey of Family Growth

OECD – Organisation for Economic Co-operation and Development

POD – Pattern of Disadvantage

SA – Sequence Analysis

SDT – Second Demographic Transition

TFR – Total Fertility Rate

US – United States

UK – United Kingdom

1. Chapter 1 – Introduction

1.1 Introduction

Over the last five to six decades, profound changes have occurred in the dynamics of family life courses across Europe and the United States. Life course transitions, such as union formation, marriage or the transition to parenthood have been postponed (Liefbroer, 1999). Additionally, the traditional sequence of family formation (i.e. marriage, followed by living together and having children) became less prevalent as new steps emerged in the life course, including living alone, non-marital cohabitation, union dissolution, divorce, and re-partnering (Ermisch & Francesconi, 2000; Kiernan, 1999, 2001, 2004a, 2004b; Liefbroer, 1999). Consequently, the variation of life course patterns increased, the sequencing of life events changed, and the transition from youth to adulthood became more diverse and less predictable than in the past (Billari & Liefbroer, 2010; Elzinga & Liefbroer, 2007; Liefbroer, 1999; Liefbroer & Toulemon, 2010; Shanahan, 2000).

These changes in partnership dynamics also have implications for the partnership context of childbearing. The proportion of first births to unmarried mothers has increased across Europe and the United States (Heuveline & Timberlake, 2004; Heuveline et al., 2003; Kiernan, 1999, 2001, 2004a, 2004b; Manning, 1995; Perelli-Harris et al., 2010b; Raley, 2001) mainly as a result of the increasing proportion of first births to cohabiting women (Bumpass & Lu, 2000). As these changes take place many questions emerge. Is marriage becoming irrelevant as cohabitation spreads as an accepted context for childbearing? Will cohabitation become an alternative to marriage (i.e. context for childbearing for most couples) or is it only a step in the marriage process? Do these changes and new family behaviours have negative consequences for couples' and children's outcomes and for societies in general?

These questions have generated an increased interest among demographers. Many researchers examined the link between partnership status (usually cohabitation or marriage) and the transition to first birth (e.g. Baizán et al., 2003, 2004; Berrington, 2001, 2003; Brien et al., 1999; Manning, 1995; Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2012; Perelli-Harris et al., 2010b;

Steele et al., 2005; Upchurch et al., 2002). Most of these studies predominantly focused on one country[1] which means that it is difficult to compare findings across countries due to varying data sources, analytical approach, definitions, and control variables used. At the same time, in order to fully understand how unique or universal and widespread these behaviours are examining family life courses in a cross-national context is crucial. By comparing these processes across countries with similar and different cultural, historical, and institutional background, we can learn more about changing family formation processes and their implications for societies and individuals.

Studies that compared union and family formation behaviours across countries usually only focused on one segment of the family life course (e.g. Heuveline & Timberlake, 2004; Hoem et al., 2010; Hoem et al., 2009; Kalmijn, 2013; Kiernan, 1999, 2001, 2004a; Perelli-Harris et al., 2010b; Prskawetz et al., 2003)[2]. However, life course theory suggests that family life courses consist of several interdependent and interrelated events (Elder, 1975, 1977, 1985, 1992; Willekens, 1999). In other words, events which occur earlier in the life course influence the timing and occurrence of later events (Liefbroer & Toulemon, 2010). Consequently, in order to fully understand the implications of changing family life courses partnership transitions and the transition to motherhood needs to be examined from a life course perspective.

Therefore, this thesis focuses on the intersection between partnership transitions and the transition to motherhood from a life course perspective in several European countries and the United States. More specifically, I address the following research questions:

How are partnership transitions and the transition to motherhood interrelated (Chapter 3 and Chapter 4)? Does this interrelationship vary by socio-economic status (Chapter 5)? Are there similarities across Europe and the United States (Chapter 4 and Chapter 5)? And how can we examine interdependent partnership dynamics (Chapter 2)?

[1] Baizán et al. (2004) studied two countries: Spain and Germany.
[2] Although Perelli-Harris et al. (2012) examined several transitions, they focused on changes in unions which eventually produced a child.

Changing partnership dynamics have two main implications for the transition to motherhood. First, changes in the structure of family life courses lead to uncertainty as to whether, when and in what type of partnership women will have their first child. Women who have difficulties finding a (new) partner are likely to further postpone the transition to motherhood which might lead to remaining childless unintentionally. If this is the case, changing partnership dynamics would indirectly contribute to even lower levels of fertility which, in turn, would further accentuate the aging of societies (McDonald, 2000b). This question is further investigated in Chapter 4. Second, it is not clear from the literature how the different strata of the population are affected by these changes. If women with fewer resources are the most likely to experience new family behaviours (such as cohabitation or non-marital first birth), then the diffusion of new family behaviours among these women would imply an accumulation of disadvantage for those with the fewest resources. This, in turn, would contribute to the reproduction of social inequalities. These issues are examined in more detail in Chapter 5.

Using a life course perspective has increasingly been the focus of studies that are interested in family life transitions. As family life courses are becoming more complex, the development of new methods has been a key to understanding family behaviours from a life course perspective. Previous studies either focused on the de-standardisation of the life course using sequence analysis (for example Aassve et al., 2007; Billari, 2001a; Billari & Piccarreta, 2005; Elzinga & Liefbroer, 2007; Robette, 2010; Widmer & Ritschard, 2009) or studied the changing heterogeneity of union patterns across countries and over time using latent class growth models (Perelli-Harris & Lyons-Amos, 2013). Although these methods examine entire family life trajectories they do not reveal the interrelationships between different transitions that constitute the family life course. More complex studies applied simultaneous hazards models to jointly examine the determinants of several family life transitions (Baizán et al., 2003, 2004; Brien et al., 1999; Lillard & Waite, 1993). Although this technique accounts for the interrelated nature of family life events, it produces rather complex results which are already hard to interpret when only one country is involved in the analyses and would, therefore, not be suitable for comparing a large number of countries. Thus, although many previous studies attempted to examine family life transitions

from a life course perspective using different methodological approaches, a method which is fully able to address the complexity of family life courses has not been established.

To address this gap in the literature and to answer the research questions I investigate multiple transitions across the family life course in a cross-national context using multi-state models. Multi-state models allow me to 1) focus on several consecutive partnership and family life transitions that occur during an individual's family life, 2) to keep track of individuals' previous partnership experiences, and 3) to calculate the influence of key variables on all examined transitions. Thus, this approach provides an innovative way to study the interrelationship between partnership dynamics and the transition to motherhood from a life course perspective which is the focus of this thesis. Additionally, using this technique allows me to distinguish between direct marriage and marriage that was preceded by cohabitation as well as between never partnered single women and those who are single following union dissolution. Although it is not common in the literature to focus on these types of partnership experiences separately, doing so is important because it is possible that these partnership experiences have different implications for the transition to motherhood. Moreover, where possible, I examine the transition to union dissolution and re-partnering as well as to a first birth following these events. Taken together, by examining multiple family life transitions in a cross-national context this thesis contributes to our understanding of changing family dynamics and their implications for societies and individuals.

The remainder of this Chapter is structured as follows. Section 1.2 describes and discusses the key elements of Life Course Theory which is the main theoretical framework of this thesis. Then, Section 1.3 sets the scene for this thesis by highlighting cross-national differences in the intersection between partnership formation and the transition to motherhood. This Chapter primarily utilises official statistics and aggregate level data[3]. In line with what is commonly done in the literature, I portray the main trends in single partnership transitions and the transition to motherhood. This description is

[3] Where aggregate level data are not available (for example transitions related to non-marital cohabitation), individual level data from the Harmonized Histories are used to calculate proportions. This will be indicated and further explained in the relevant sections.

followed by a discussion of possible explanations for changing partnership and fertility behaviours (Section 1.4). Then, to understand cross-national similarities and differences in family behaviours, Section 1.5 highlights the main explanations in the literature and establishes a broad cross-national typology that will be applied in Chapter 3 and Chapter 4. Section 1.6 reiterates the overarching research question and formulates more specific research questions which are investigated in Chapter 2 to Chapter 5. Together with the research questions, the structure of the thesis is also discussed.

1.2 Life Course Theory

To study the link between partnership experiences and the transition to motherhood, this thesis primarily builds on the Life Course Theory as a theoretical framework. The 'life course' refers to sequences of events (or transitions) experienced by individuals over time as they age (Elder, 1975, 1985). Transitions are discrete life changes that are embedded in trajectories while trajectories are sequences of linked states in a life domain (such as family life or education) (Elder, 1985). Individuals' life courses are also embedded in social institutions, historical time and cohort context. The concept of time is, therefore, central to the life course perspective; it has different dimensions such as historical time, individual time (i.e. age), and generational time (i.e. cohort). These can be defined as follows.

First, historical time refers to societal or macro level-changes and their influence on the lives of individuals. Second, individual age in itself, has diverse meanings (Elder, 1975). Biological age refers to chronological age or the life span from birth to death. Social age, on the other hand, is based on social norms and expectations about the timing of events. Social norms influence the timing and sequencing of life course transitions through providing rules and guidelines about the appropriate timing of life events (Billari & Liefbroer, 2007; Heckhausen, 1999). For example, certain "age norms" or "social deadlines" (Aassve et al., 2013; Settersten, 2003; Settersten & Hagestad, 1996) prescribe when it is "on-time" or "off-time" to engage in certain life course transitions. Third, a cohort includes a group of people who were born in the same period and who, therefore, encounter the same historical events at different points in their life course (Elder, 1977).

Next to the timing of life events, other key factors also play a role in shaping individuals' life courses (Elder, 1994; Giele & Elder, 1998). First, individuals' lives are embedded in a geographical context. Second, individuals actively make decisions and organise their lives so as to achieve their goals (human agency). Additionally, life courses are also shaped through contact with other individuals and as a result of an interaction between individual life courses and cultural, social, institutional, and psychological factors (linked lives). Last, life courses are interdependent; there is interplay between trajectories and transitions over time and in relation to other individuals (Elder, 1985). Additionally, earlier events and later events in individuals' life courses are also interdependent; earlier events influence the timing and occurrence of later events.

With the increased availability of longitudinal and panel studies since the 1980s, longitudinal and life course studies have proliferated (Mayer, 2000, 2009) in the field of demography. These studies typically incorporate one or more of the above described principles which are central to the life course perspective (George, 2003). For example, in family demography, scholars addressed changes over time (Ní Bhrolcháin & Beaujouan, 2013; Perelli-Harris et al., 2012), across cohorts (Bras et al., 2010; Manting et al., 2002; Ravanera et al., 2006), and across several life domains (Aassve et al., 2007; Billari & Philipov, 2004); the role of social age and age norms (Aassve et al., 2013; Billari et al., 2011; Billari & Liefbroer, 2007; Blossfeld & Huinink, 1991; Marini, 1984), the link between macro and micro level factors (Aassve et al., 2013; Billari, 2004), the importance of linked lives (Balbo & Barban, 2014), the relevance of geographical context (e.g. Kalmijn, 2007, 2013; Perelli-Harris et al., 2012; Perelli-Harris & Lyons-Amos, 2013; Perelli-Harris et al., 2010b), and the interrelationship between partnership and family formation (e.g. Aassve, 2003; Baizán et al., 2003, 2004; Berrington, 2001; Brien et al., 1999; Perelli-Harris & Gerber, 2011; Steele et al., 2006).

One of the main criticisms of Life Course Theory is that although it is undoubtedly a useful approach and theoretical framework for studying changes in individual's lives, it lacks theoretical explanations for the possible mechanisms that are driving these changes (Huinink & Kohli, 2014; Mayer, 2000, 2009). Additionally, although a huge body of literature investigated several aspects of the life course, as summarised above, some challenges

remain. For example, most studies focused on single transitions or short lifespans (Mayer, 2000) and less attention has been paid to the interrelated nature of different trajectories (Elder, 2001) and domains (Mayer, 2000). Additionally, there is a lack of studies that link earlier and later experiences in the life course or study transitions across the life course (Elder, 2001). Also, virtually no research has been done on joint trajectories of interlinked individuals such as spouses, siblings, or parents (Mayer, 2000).

1.3 Cross-national differences in the intersection between partnership formation and the transition to motherhood

This section aims to set the scene for the rest of the thesis by reviewing trends and patterns in the intersection between partnership experiences and the transition to motherhood in a cross-national context. This intersection consists of three elements: 1) partnership experiences, 2) the transition to motherhood, and 3) the intersection of these two (i.e. a first birth within different partnerships). The following subsections describe the trends and patterns of these three elements in several European countries and the United States. The presented graphs portray one transition at a time following typical demographic representations of union formation and childbearing. To show changes in family behaviours most subsections use aggregate level data from official statistics collected in the Generations and Gender Programme (GGP) Contextual Database[4] and the OECD Family Database. However, data on cohabitation are not available from official data sources. Therefore, the graphs which depict changes related to non-marital cohabitation utilise survey data from the Harmonized Histories. The Harmonized Histories are described in more detail in Chapter 3.

The countries examined in this chapter include those that are investigated in at least one of the remaining chapters. These countries are: Austria, Belgium, Bulgaria, Estonia, France, Italy, Lithuania, the Netherlands, Norway, Romania, Russia, Spain, the United Kingdom, and the United States. The choice of

[4] The GGP Contextual Database contains macro level demographic, economic, and policy indicators from different sources such as national, international, and supranational organisations (e.g. European Union and World Bank).

countries was mainly driven by data availability and data quality. The aim was to include as many European countries in the analyses as possible in order to gain a comprehensive understanding of family formation processes in Europe and the United States. The Harmonized Histories is an excellent choice for this purpose as it includes harmonized and reliable retrospective union and fertility histories of women for many countries. Although weights are included in the Harmonized Histories (except for Russia and Bulgaria, see Appendix 1) in this thesis weights have only been applied in the descriptive analyses in Chapter 1. This is primarily because the software used in later chapters to conduct multi-state analysis does not allow for the inclusion of survey weights. More information about the Harmonized Histories is included in Chapter 3, Section 3.2.1.

To explore trends and patterns in partnership and family formation across the examined countries, in this chapter I examine women born between 1930 and 1969. This enables me to understand when partnership and family behaviours started to change and which cohorts would be interesting to investigate in later chapters. It has to be noted that not all women in the 1960-1969 birth cohort will have had completed their fertility. For example, in a country where data collection took place in 2004 women born in 1969 were only 35 years old. Data were collected between 2003 (Italy and the Netherlands) and 2010 (Belgium); see Appendix 1 for more information on the year of data collection in each country. This needs to be taken into account when interpreting results presented in this chapter for women born between 1960 and 1969. Nonetheless, these results are interesting because they might give an indication of future trends in partnership and family formation.

Some graphs in this chapter present information by calendar year and not by birth cohort. The reason for this is purely data availability. Most such graphs present data from the period 1970 to the early 2000s. Women born in the 1930s were in their prime childbearing ages roughly in the 1950s and 1960s, while those who were born in the 1940s were forming families during the 1960s and 1970s. The period of the 1970s and 1980s roughly corresponds to the childbearing ages of women born in the 1950s. Last, women born in the 1960s were forming families in the 1980s and 1990s. This should be kept in mind when interpreting figures from graphs which picture period data. In this

chapter where individual level data are used from the Harmonized Histories, women are observed between age 15 and age at the time of the survey.

1.3.1 Cross-national differences in partnership experiences

Using both aggregate and individual level data, this subsection describes the similarities and differences in the main trends of women's partnership experiences in the examined countries. In order to do so, the following paragraphs depict changes in 1) age at first marriage, 2) the proportion of first unions that start as non-marital cohabitation, 3) the proportion of first cohabiting unions that transition to marriage, 4) the proportion of first cohabiting unions that end in union dissolution, 5) the total divorce rate, 6) the proportion of women who experience several pre-marital cohabiting unions, and 7) the proportion of women who experience several marriages.

1.3.1.1 Mean age at first marriage

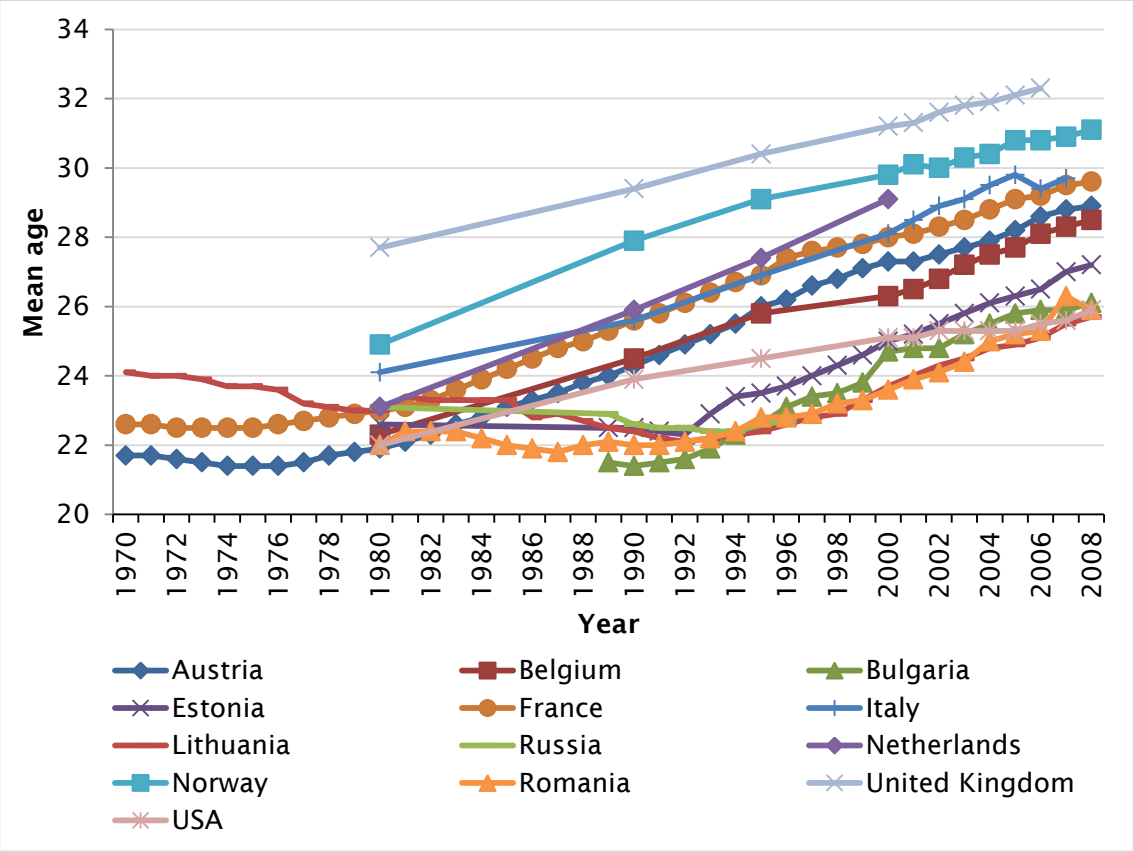
Figure 1.1 shows the mean age of women at first marriage in Europe and the United States between 1970 and 2008. Although data are not available for all countries to the same extent, the data series show an increase in the age at first marriage indicating that women delayed first marriage to increasingly later ages in all examined countries. However, the pace of this increase differed greatly across countries. In most countries (Austria, France, Belgium, Norway, the UK, the Netherlands, and Italy) the mean age at first marriage has increased by up to 7 years. From around 22 years of age it has increased to 28 to 32 years. In Norway and the UK the mean age at first birth was already higher in the 1980s (25 and 28, respectively) than in the other countries. Notably, Italy also shows similar patterns to these Northern and Western European countries; from just age 24 in 1980, the mean age at first marriage has increased to almost 30 years in 2008.

In Lithuania, Romania, Bulgaria, Estonia, Russia, and the United States the mean age at first marriage has increased only by about 5 years over the examined period. In post-socialist countries the age at first marriage was rather stable and even decreased slightly during the 1970s and 1980s. Following the societal and political transition in 1989-1990, the mean age at first marriage started to increase dramatically in these countries. It is

interesting to note that in the United States the increase has slowed down during the late 1990s and 2000s while it was steadily increasing before.

These cross-national differences in the pace of delaying first marriage imply that the heterogeneity in the age at first marriage has increased across countries. While in the 1970s it was between ages 22 and 24 in all countries for which we have data available, by 2008 it varied between ages 26 and 32.

Figure 1.1 Mean age at first marriage, selected European countries and the United States, 1970-2008[5]



Source: GGP Contextual Database

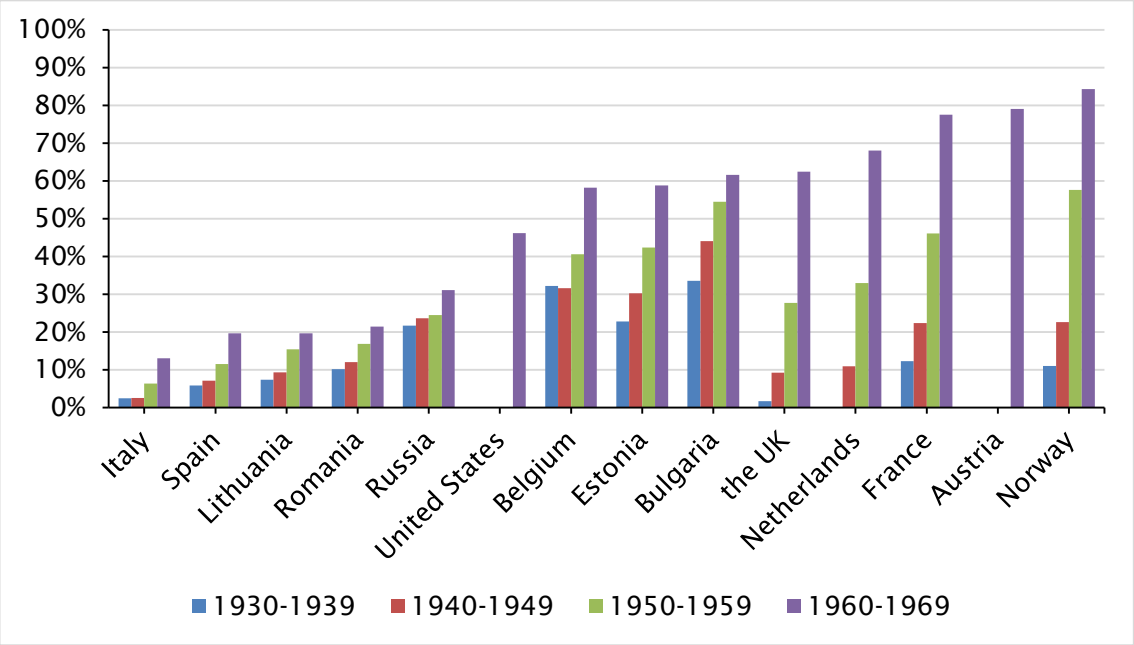
1.3.1.2 Non-marital cohabitation as first union

As the mean age at first marriage increased, so did the proportion of first unions that start as non-marital cohabitation in all countries. This increase may partially explain the delay in first marriages. Figure 1.2 shows the proportion of first unions that started as cohabitation (as opposed to direct marriage) by ten year birth cohorts in the examined European countries and the United

[5] Note that in this graph data for Spain are not available.

States. This graph is based on individual level survey data from the Harmonized Histories[6] because official statistics are not available on the proportion of first unions that start as cohabitation. Note that for Austria and the United States, information is only available for the youngest birth cohort (1960-1969)[7] while for the Netherlands, data for the oldest cohort (1930-1939) are not available.

Figure 1.2 Proportion of first unions that started as non-marital cohabitation by cohort and country



Source: Harmonized Histories, author's own calculations, weights applied.

This figure indicates that in all countries, cohabitation as a form of first union has become more prevalent while the experience of direct marriage (i.e. marriage without prior cohabitation experience) has decreased. Although the direction of these changes is similar across countries, it is also clear from this graph that there are large cross-national differences in the proportion of first unions that started as cohabitation. In post-socialist and Southern European countries the proportion of cohabiting first unions has increased to 20%-30% except for Estonia and Bulgaria. These countries are more similar to Belgium

[6] The Harmonized Histories are based on the Generations and Gender Surveys. More information on these surveys is provided in Chapter 3 and at www.nonmarital.org.
[7] More precisely, for Austria, data were collected for women born between 1963 and 1990 whereas in the United States women born between 1961 and 1993 were interviewed (see Appendix 1).

and the United Kingdom where the proportion of first cohabiting unions is about 60% among women born in the 1960s. Finally, in the Netherlands, France, Austria, and Norway this proportion has increased to 70%-85% among the youngest cohort.

Not only the proportion of first unions that start as cohabitation varies across countries but also the pace and magnitude of the changes in this proportion. In Belgium, Bulgaria, Estonia, Lithuania, Romania, and Russia, the proportion of first unions starting as cohabitation has about doubled or tripled between women born in the 1930s and those born in the 1960s. This increase was much more dynamic in the other countries; there was a 5 to 7-fold increase in the proportion of first unions that started as cohabitation. The largest increase occurred in the UK. Additionally, the greatest increase in the proportion of first cohabiting unions occurred between the cohort of women born in the 1940s and those born in the 1950s in Bulgaria, Lithuania, Romania, and Norway. In the other countries this happened mainly between the 1950-1959 and 1960-1969 birth cohorts. This implies that the variation in the proportion of first unions that start as cohabitation has increased across countries over time.

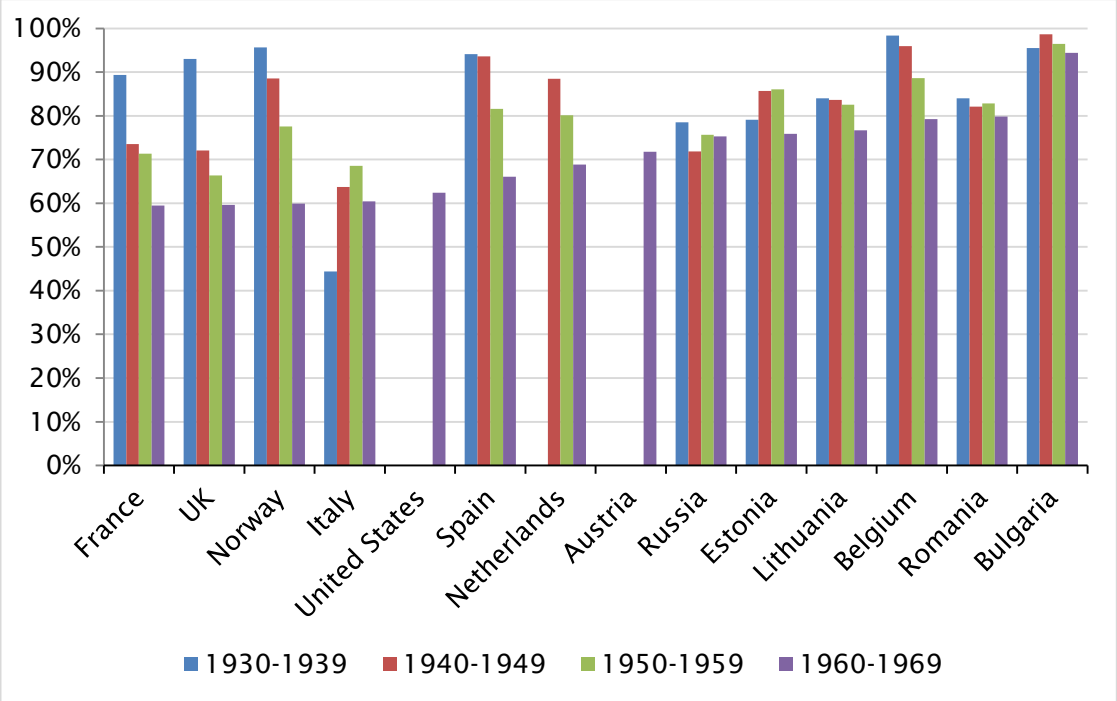
As a result of these changes, in Italy, Spain, Lithuania, Romania, Russia, and the United States direct marriage remained the main form of first union even among women born in the 1960s whereas in the other countries the majority (more than 50%) of first unions among these women started as non-marital cohabitation. This increase in the proportion of first unions that start as cohabitation probably contributes to the increase in the mean age at first marriage.

1.3.1.3 The outcome of non-marital cohabitation

Whether first unions that start as non-marital cohabitation translate to marriage or end with separation might give an indication of the nature of cohabitation. If cohabiting couples marry, cohabitation is likely seen as an additional step in the marriage process which simply delays marriage and family formation. However if cohabiting unions are likely to dissolve, it might mean that cohabitation is a more unstable form of union or that it represents an alternative living arrangement to being single rather than a step in the marriage process (Heuveline & Timberlake, 2004).

Figure 1.3 shows that overall among younger cohorts a smaller proportion of cohabiting unions transition to marriage across all examined countries (in Italy, Russia, Estonia, and Bulgaria there are some deviations from this overall pattern). But again, there are differences across countries. For example, in Bulgaria even among the youngest cohort, more than 90% of cohabiting unions transitioned to marriage. This suggests that in Bulgaria, cohabitation is likely a step in the marriage process. In the other countries between 60% and 80% of cohabiting unions end in marriage among the youngest cohort. These figures indicate that eventually the majority of women still married their cohabiting partner even among women in the youngest cohort. The decrease in the proportion of first cohabiting unions that transition to marriage was much more marked in France, the UK, Norway, Spain and the Netherlands than in the other countries leading to increased variation across countries.

Figure 1.3 Proportion of first cohabiting unions which transition to marriage, by cohort and country



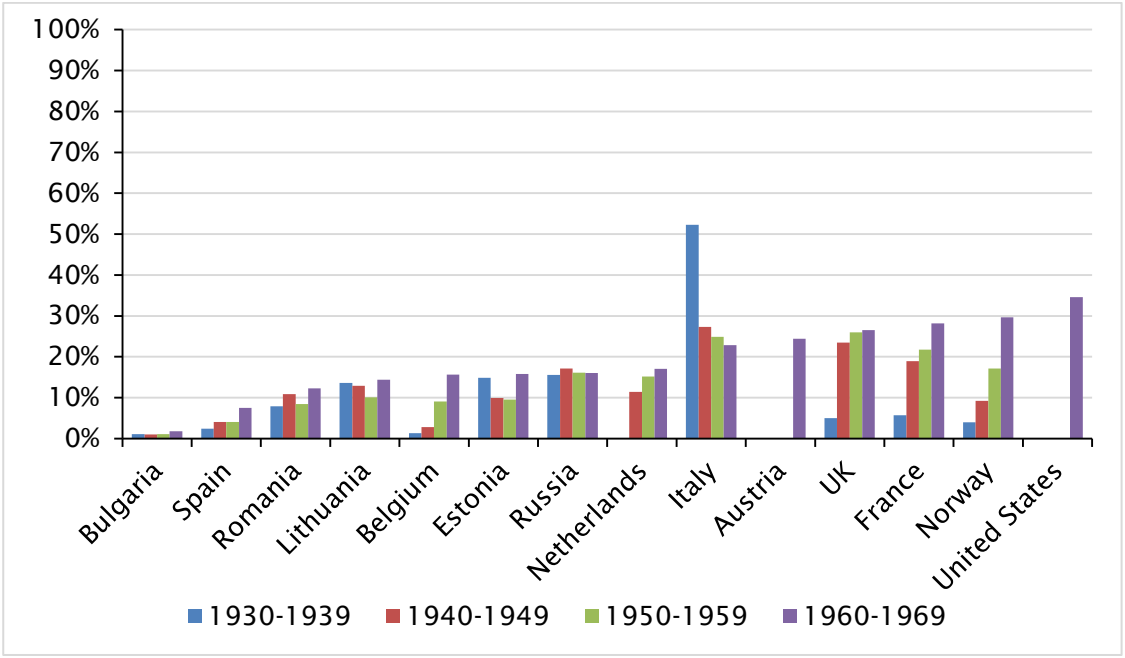
Source: Harmonized Histories, author's own calculations, weights applied.

1.3.1.4 Union dissolution and divorce

The previous section showed that in most countries over time a smaller proportion of cohabiting women marry. Figure 1.4 shows that in line with this trend, an increasing share of cohabiting unions end with union dissolution. In Bulgaria, Romania, Estonia, Spain, Lithuania, and Russia this trend is somewhat

less clear and much less pronounced than in the other countries. Even among the youngest cohort the proportion of first cohabiting unions which dissolve remains below 10% in Bulgaria and Spain and below 20% in Romania, Lithuania, Belgium, Estonia, Russia, and the Netherlands. Again, this might indicate that in these countries cohabitation is seen as a step in the marriage process. In the other countries, about 20% to 35% of cohabiting first unions end in union dissolution. This proportion is the highest in the US. These figures suggest that in these countries cohabitation is potentially a less stable living arrangement compared to the other countries.

Figure 1.4 Proportion of first cohabiting unions that end in union dissolution by cohort and country



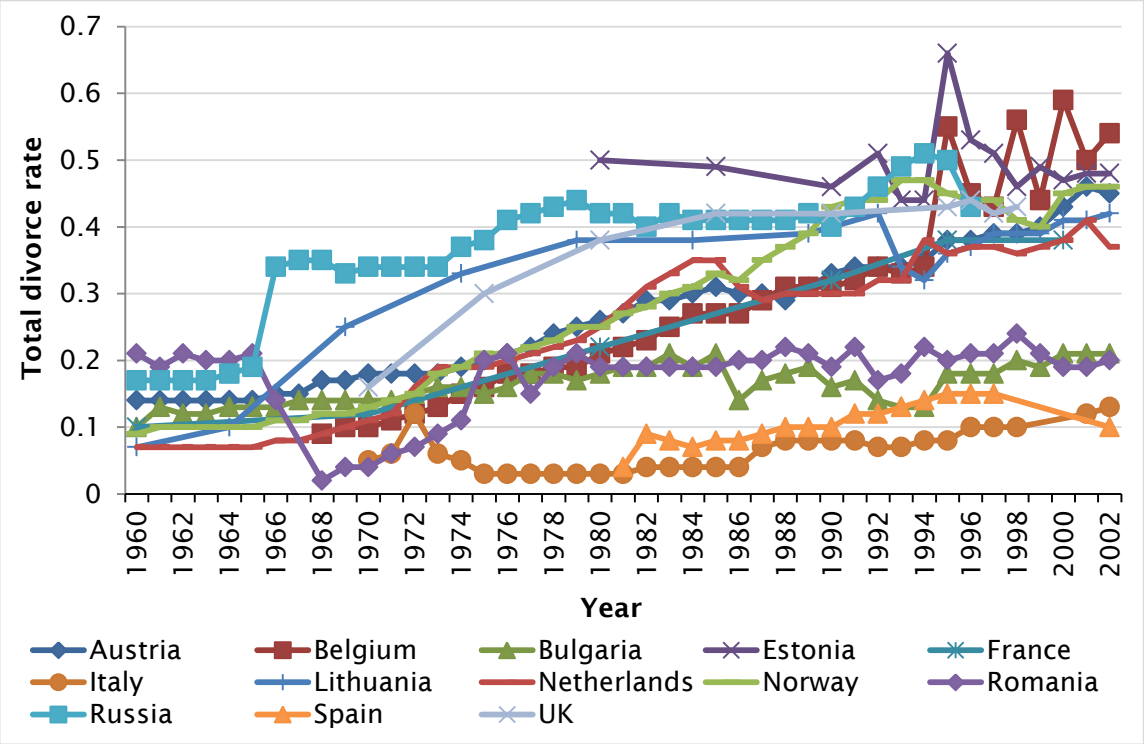
Source: Harmonized Histories, author's own calculations, weights applied.

Next to the increase in the proportion of first cohabiting unions that end in union dissolution, aggregate data show that the proportion of marriages that end in divorce has also risen (Figure 1.5). Between 1960 and 2008 the total divorce rate[8] has increased in all examined countries. While in 1960 it varied between 0.1 and 0.2, 40 years later these rates were between 0.1 and 0.6. In Italy, Spain, Bulgaria, and Romania the rate of the increase was much slower

[8] The total divorce rate shows the mean number of divorces per marriage in a given year. It is computed by adding up the divorce rates by duration of marriage for the year in question. This measure refers to a hypothetical generation of marriages subjected to the current marriage conditions at each age (Source: GGP Contextual Database).

than in the other countries. The total divorce rate in Russia was high compared to the other countries throughout the 1960s and early 1970s. This rate was also reasonably high in Lithuania, the UK, and Estonia throughout the 1970s and 1980s. These changes are also tied to legislation; for example, in Italy divorce was not legalised until 1970 (Vignoli & Ferro, 2009). Additionally, the steep increase in the Russian divorce rate in 1965 is associated with a simplification of the divorce process (Avdeev & Monnier, 2000).

Figure 1.5 Total divorce rate, selected European countries, 1960-2008[9]



Source: GGP Contextual Database. For France, data come from Council of Europe, 2006

1.3.1.5 Complexity of partnerships

Altogether the increase in the prevalence of cohabitation, union dissolution and divorce, and a delay in the age at first marriage imply that family life courses became less standardised, more varied, and more complex (Shanahan, 2000). Indeed, research has shown that the similarity of family life courses has decreased and the variation in family life trajectories has increased across cohorts born between 1945 and 1964 across several European countries and

[9] Note that in this figure data for the US are not available.

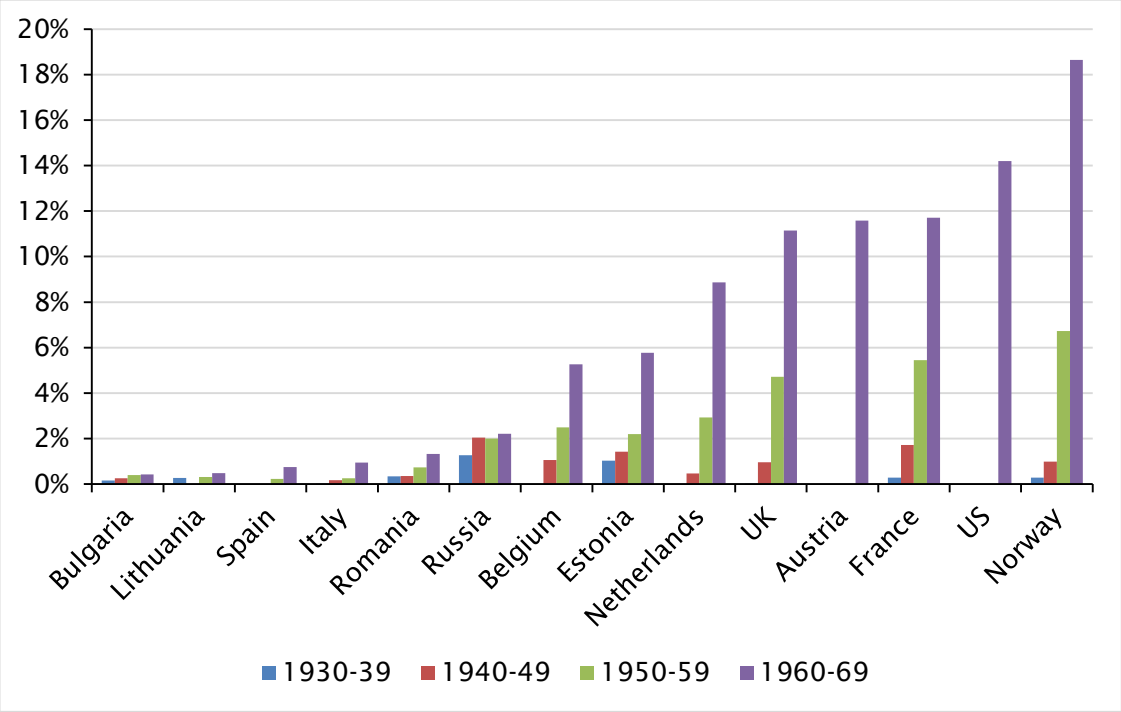
the US (Elzinga & Liefbroer, 2007)[10]. However, as we have seen in the previous sections, changes in partnership experiences were much more rapid in countries such as Norway, France, the UK, and the Netherlands than in the other countries. This also implies that over time, variation in partnership experiences between countries has increased. This general finding is in line with previous studies that found a lack of convergence or perhaps even divergence of certain family formation behaviours across Europe (Billari, 2005b; Billari & Kohler, 2002; Elzinga & Liefbroer, 2007; Kuijsten, 1996).

The rise in the total divorce rate and the increased likelihood of separation of cohabiting unions imply that more people form higher order (i.e. second, third, etc.) cohabiting and marital unions. In the US, Lichter et al. (2010) found that the proportion of women who experienced serial cohabitation (i.e. two or more consecutive pre-marital cohabiting relationships) increased by 40% between 1990 and 2000. In 2002, 25% of women reported that they have experienced serial cohabitation. For the UK, Bukodi (2012b) found that this proportion was about 10% among 16-34 year-old men in the 1958 birth cohort. To date, no other studies are available on the prevalence of serial cohabitation.

My calculations based on data from the Harmonized Histories show that overall the proportion of women who experienced at least two pre-marital cohabiting unions has increased in all countries across birth cohorts (Figure 1.6). In Bulgaria, Italy, Lithuania, Romania, Russia, and Spain this proportion remained fairly low (below 2%). However, in Austria, France, the Netherlands, the UK, and the US the share of women experiencing two or more pre-marital cohabitation has increased from less than 1% (among the 1930-1939 cohorts) to about 9% to 14% (among the 1960-1969 cohorts). In Norway, it has risen to more than 18% among women from the youngest cohort. These figures indicate that in the latter countries the complexity of partnership experiences increased more than in the former countries.

[10] This study included the following countries which are also investigated in this thesis: Austria, Estonia, France, Italy, the Netherlands, Norway, Spain, and the US.

Figure 1.6 Proportion of women who experienced two or more pre-marital cohabiting unions by cohort and country

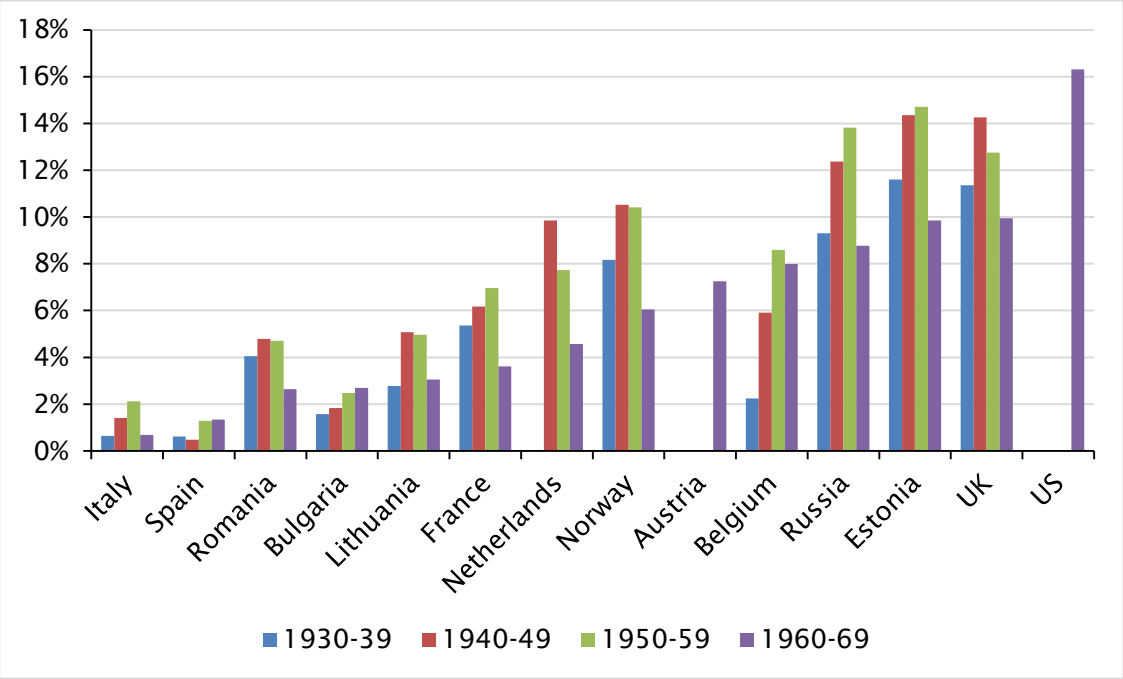


Source: Harmonized Histories, author's own calculations, weights applied.

A similar conclusion can be drawn when examining the proportion of women who experienced at least two marriages. This proportion has also increased across cohorts in all countries except the Netherlands where it decreased (Figure 1.7). It is possible that in the Netherlands divorced women increasingly choose to cohabit with a new partner rather than remarry. Among women born between 1960 and 1969, the proportion of those who married at least twice is smaller across countries than among women born between 1950 and 1959. However, as women in the youngest cohort were only 35-44 years old at the time of the survey in most countries, it is possible that some of these women might still experience divorce and re-marriage at later ages. In Italy, Spain, Bulgaria, Romania, Lithuania, France, the Netherlands, and Belgium the proportion of women who experienced at least two marriages remained below 10% across all cohorts. In Russia and Estonia, where divorce rates were also the highest, the proportion of women who experienced at least two marriages has increased to about 14% among women born in the 1950s. In the UK more than

12% of these women experienced at least two marriages.[11] These figures indicate that in Russia, Estonia, the UK, and the US, divorced women might be more likely to choose marriage as a form of new partnership while in the other countries they might be more likely to choose to form a cohabiting union (if at all they form a new union) following divorce.

Figure 1.7 Proportion of women who experienced two or more marriages by cohort and country



Source: Harmonized Histories, author's own calculations, weights applied.

1.3.2 Cross-national differences in the transition to motherhood

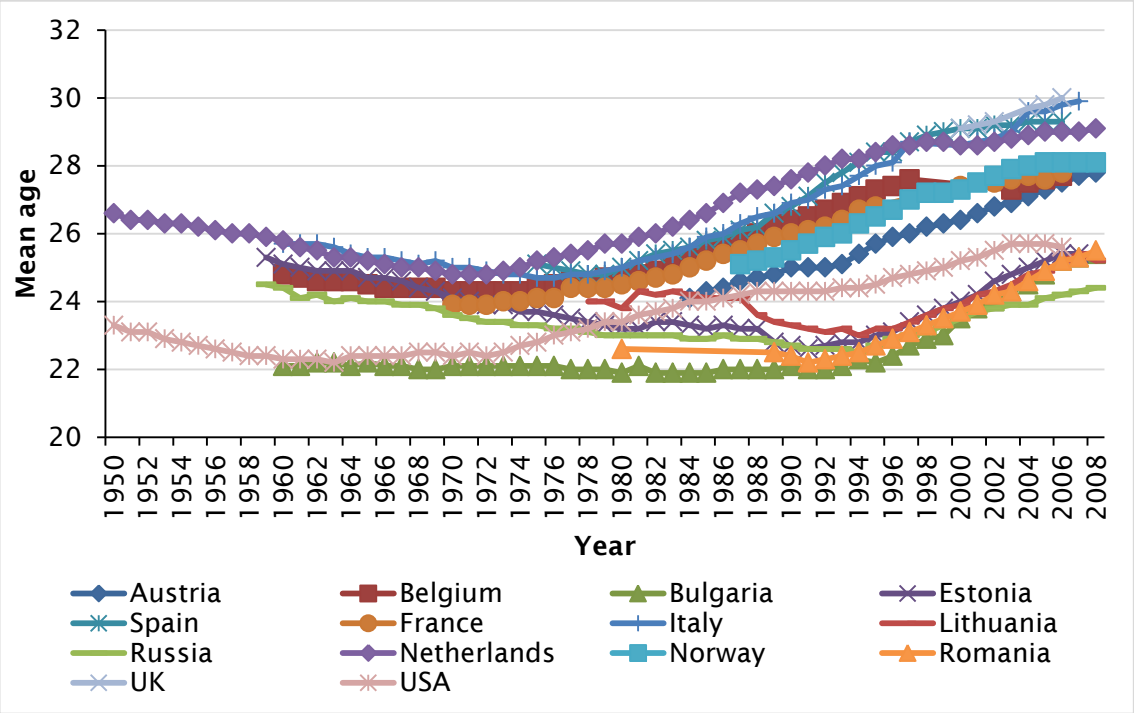
This subsection examines cross-national differences in the second element of the intersection between partnership experiences and the transition to motherhood, namely the transition to motherhood. I explore two main aspects of this component: 1) mean age at first birth and 2) the proportion of childless women.

[11] For Austria and the US, data are only available for the 1960-1969 birth cohort. As explained in the text, we see from data in the other countries that these proportions probably understate the share of women who will have experienced at least two marriages by later ages.

1.3.2.1 Mean age at first birth

Figure 1.8 shows the mean age of women at the birth of their first child in several European countries and the United States between 1950 and 2008. As the transition to motherhood is closely related to the transition to marriage, it is not surprising that as first marriages are being delayed, so are first births. Overall, similarly to the mean age at first marriage, the mean age at first birth has increased in all examined countries indicating that women have their first child at increasingly later ages.

Figure 1.8 Mean age at first birth, selected European countries and the US, 1950-2008



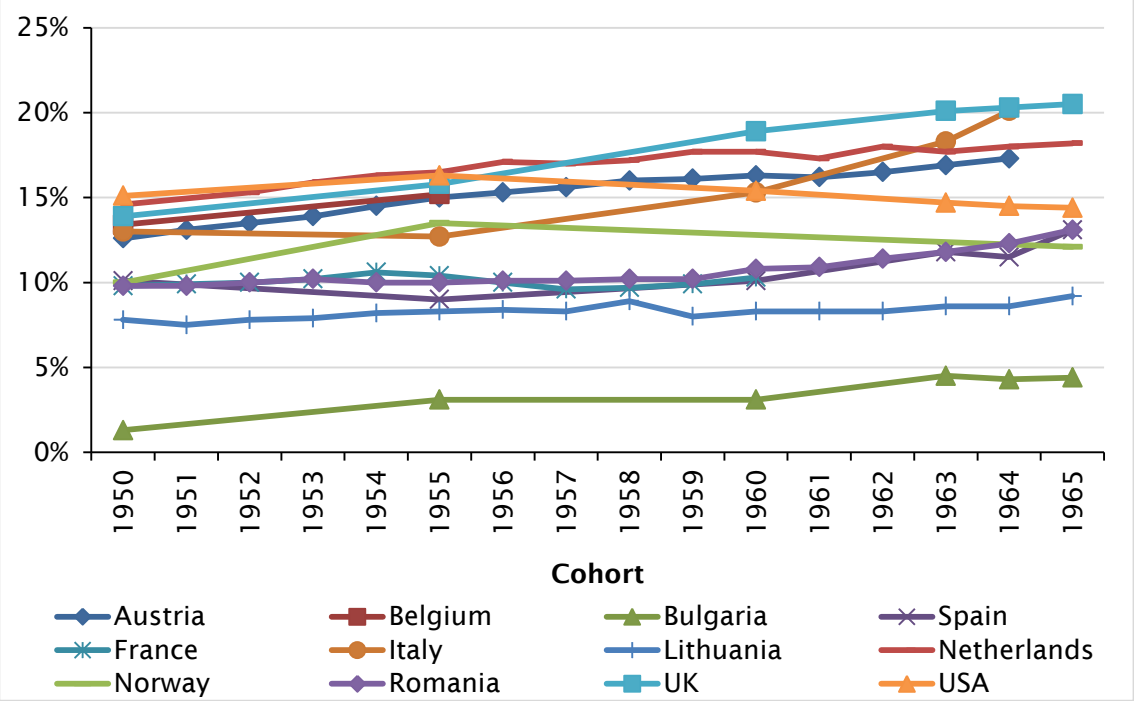
Source: GGP Contextual Database

This process started in the 1970s in the Netherlands, Belgium, France, Italy, Spain, and, the United States while it only began during the 1990s in the post-socialist countries of Estonia, Lithuania, Romania, Bulgaria, and Russia. As the data series are incomplete for the UK, Norway, and Austria it is not clear from this figure when the postponement started in these countries. Around 1970, the mean age at first birth varied between 22 years in Bulgaria and 25 years in the Netherlands and Italy. By 2008, the variation in the mean age at first birth has increased across countries and it was between 24 years in Russia and 30 years in Italy and the UK.

1.3.2.2 Proportion of childless women

As discussed in more detail in Chapter 4, while first marriages and first births are being delayed, the biological age limit to female fecundity does not change (Billari et al., 2007; McKinlay, 1996) and only a very limited group of women are able to make use of medically assisted reproductive technologies (Schmidt et al., 2012). These trends might lead to a higher proportion of women who remain childless unwillingly because they postponed having a first child until it was too late (Berrington, 2004; Billari et al., 2007; te Velde et al., 2012). Alternatively, women might have a preference for remaining childless (Testa, 2007) or might experience fertility problems.

Figure 1.9 Proportion of childless women born between 1950 and 1965, selected European countries and the United States



Source: OECD Family Database

Figure 1.9 depicts the proportion of childless women in Europe and the United States for women born between 1950 and 1965. Overall, the proportion of childless women has increased in all countries. In most countries, this process started with the 1945 birth cohort, except in Bulgaria, Romania, and Norway where it started among women born in 1950. Additionally, in France this increase started among women born in 1955.

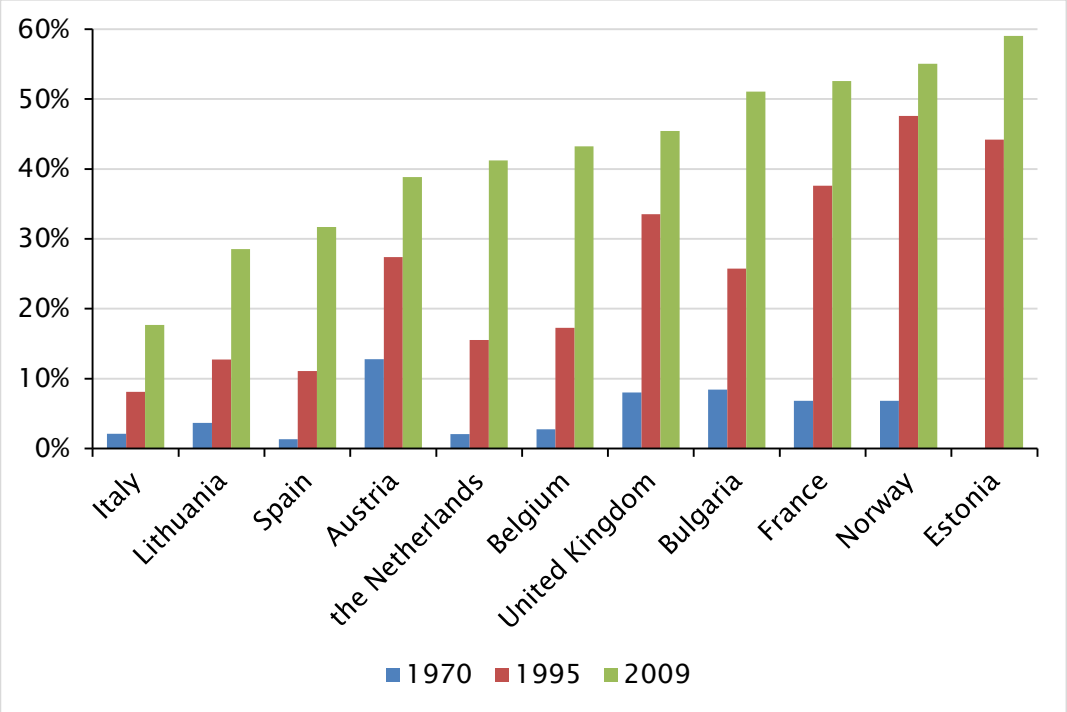
1.3.3 Cross-national differences in the intersection between partnerships and the transition to motherhood

This subsection explores cross-national differences in the intersection between partnership experiences and fertility. As this is the main interest of this research, several aspects of it will be discussed in Chapter 3 to Chapter 5. Therefore, the aim of this subsection is not to fully describe cross-national patterns in family behaviours but to give a first glimpse into these differences by showing 1) the proportion of out of wedlock births and 2) the proportion of first births that occur within second or higher order unions across Europe and the United States. These figures will shed light on the interplay between changing partnership experiences and fertility behaviour across countries.

1.3.3.1 Non-marital childbearing

Figure 1.10 shows the proportion of non-marital births in Europe and the United States between 1970 and 2009 using aggregate level data. Note that this graph includes all births and not just first births and shows births that happened to single and cohabiting women. Overall, the proportion of births outside marriage has increased dramatically across all examined countries. Whereas in most countries it was below 10% in 1970 (except for Austria and the US), by 1995 it has increased to 10-20% in Italy, Spain, Lithuania, and the Netherlands, it was above 30% in the UK, the US, and France, while it was greater than 40% in Norway and Estonia. By 2009 more than 50% of births occurred outside a marital union in Estonia, Norway, France, and Bulgaria. This proportion was also high (around 40% to 45%) in the UK, the US, Belgium, the Netherlands, and Austria. Finally, it was around 30% in Spain and Lithuania, and about 18% in Italy. These figures also indicate that non-marital childbearing has spread earlier and quicker in Norway, France, the US, and the UK and it was the slowest and latest in Italy, Lithuania, and Spain. Additionally, in Lithuania, Spain, the Netherlands, and Bulgaria the increase in the proportion of non-marital births was greater between 1995 and 2009 than between 1970 and 1995. Similarly to what we have seen when examining partnership experiences, such cross-national differences in the level and pace of changes in the proportion of non-marital births imply an increasing heterogeneity between countries over time.

Figure 1.10 Proportion of births out of wedlock in selected European countries and the United States, 1970-2009



Source: OECD Family Database
Source: For the United States data come from the National Vital Statistics System provided by the Centers for Disease Control and Prevention

Using data from official data sources does not allow for distinguishing between first and higher order births or between non-marital first births to cohabiting and to single women. Furthermore, single women might be never partnered or they might be single following union dissolution. Using individual level survey data, Chapter 3 will further investigate first births by women's partnership experiences differentiating between first births to never partnered women, cohabiting women, and to women who are single following union dissolution. This distinction is important because family structure during childhood potentially has an impact on children's well-being both during childhood and in later life. More specifically, children who grow up with both biological parents have better outcomes than those who live with just one parent (Cherlin, 1999; Kiernan & Cherlin, 1999). This is largely because single mothers are in an economically disadvantaged position (Smock et al., 1999).

1.3.3.2 Complex partnerships and their implications for first births

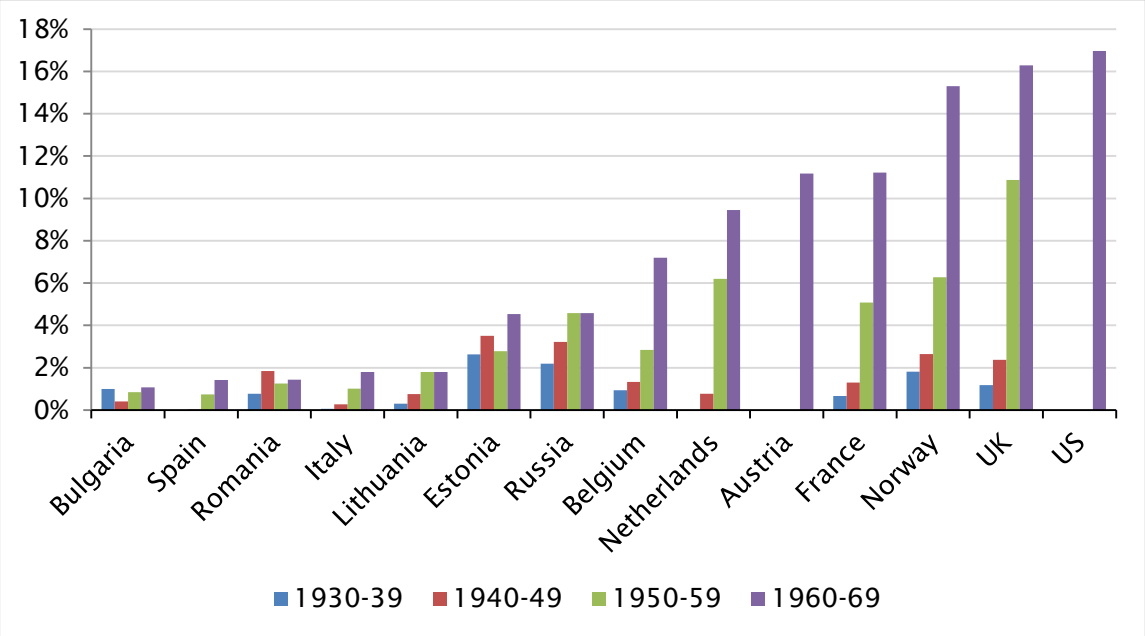
Trends in partnership behaviours interact with trends in the transition to motherhood. The previous sections have shown that first marriages and first

births are being delayed; more first unions start as cohabitation and fewer cohabiting unions transition to marriage. For a marital first birth where marriage was preceded by cohabitation these processes probably mean a delay in first birth as pre-marital cohabitation takes additional time. If the cohabiting union dissolves, the situation becomes more complicated as women will have to find a new partner before they decide to have a child. This might imply experiencing several consecutive partnerships before settling down with one partner. Indeed, the previous subsections showed that the proportion of cohabiting unions that end with separation and the share of women who experience higher order cohabiting and marital unions have increased. But how do these changes influence the partnership context of first births?

If higher order partnership transitions result in a marital first birth, probably these additional steps in the family life course would only imply a delay in the transition to motherhood. Complex partnership pathways might lead to unwanted childlessness if they result in postponing having a first child until it might be too late (as further discussed in Chapter 4). However, it might be that cohabiting unions that do not transition to marriage produce a first birth. If this is the case, the occurrence of a cohabiting union might not necessarily imply a postponed first birth. This is especially relevant in countries where the proportion of first births within cohabitation is higher, such as the UK and the US. Alternatively, women might have a child following union dissolution with or without a new partner. The contextual factors which may influence these interrelationships across countries are discussed in the next section (Section 1.3).

Figure 1.11 shows the proportion of first births that occur in higher order unions. Overall, women increasingly have their first child with a partner who was not their first co-residential partner. This trend is less pronounced in Bulgaria, Romania, Lithuania, Italy, and Spain where the proportion of first births that occurred in higher order unions was below 2% among women born in the 1960s. This proportion was around 4% in Estonia and Russia, 10% in the Netherlands, Austria, and France; and between 14% and 17% in the UK, US, and Norway. These figures indicate that the increasing complexity of partnerships is likely to be linked to changes in the partnership context of first births.

Figure 1.11 Proportion of first births that occur in higher order unions by cohort and country



Source: Harmonized Histories, author's own calculations, weights applied.

To sum up, the previous sections presented descriptive statistics on several dimensions of family change examining single transitions. These results give rise to questions about how more sophisticated analysis of multiple transitions will enhance our understanding of family change. Additionally, these results were largely based on aggregate level data. However, as shown before, aggregate level data do not allow for investigating transitions relating to cohabitation. The remainder of this thesis uses individual level survey data which allow for a more detailed examination of partnership and family formation processes.

1.4 Explanations for changes in partnership formation and the transition to motherhood

The previous subsections showed the dramatic changes that occurred in partnership formation and the transition to first birth during the last decades across Europe and the United States. These changes were brought about by a set of interrelated and complex factors (Furstenberg, 2014; Liefbroer, 1999) including changes in economic and social structure, technology, culture, and in the meaning of partnerships and parenthood. These factors are highly interrelated (Sobotka, 2004) and it is not clear to date how exactly these

processes relate to each other and to changing partnership and family formation. Despite the complex relationships between these factors and family change, the following subsections will discuss them and their implications on fertility and family change relatively separately.

It has to be noted here that in Central and Eastern European countries (CEE) fertility and family formation remained relatively stable during the 1970s and 1980s (Frejka, 2008a), when other European countries and the US experienced the largest changes. In CEE countries the most remarkable and most rapid changes occurred following the societal and political transition in 1989-1990. Therefore, although in this section the focus is not on explanations for cross-national differences in family and fertility behaviours (for such explanations see Section 1.4), where necessary some of the explanations will be discussed separately for CEE countries and other European countries and the US in the following subsections.

1.4.1 Changes in the economic and social structure

In the last five decades many changes occurred in the economic and social structure across Europe and the United States which influenced women's partnership and family life transitions. The first major change was the expansion of higher education starting from the 1950s (Liefbroer, 1999). The proportion of young adults enrolled in higher education has increased tremendously in all European countries and the United States (Meyer et al., 1992). This educational expansion accelerated from the 1960s and was especially large among women (Liefbroer, 1999). The rate of the expansion was somewhat smaller in Eastern Europe during the 1970s and 1980s but following the transition in 1989-1990 it accelerated and by 2000 Eastern and other European countries had similar enrolment rates in tertiary education (Schofer & Meyer, 2005).

The educational expansion has directly contributed to delayed union formation and childbearing (Blossfeld, 1995; Blossfeld & Huinink, 1991; Thornton et al., 1995). The period spent in education is seen as incompatible with family formation (Sobotka, 2004). This is first because normative expectations in the society prescribe women, who are at school, not to take on the responsibilities of forming a family before finishing education. Second, due to the conflict

between women's roles as students and mothers or spouses (Blossfeld & Huinink, 1991; Rindfuss et al., 1988; Thornton et al., 1995) women who are enrolled in education are less likely to become mothers and to form a first marital or co-residential union than those who already left school (Blossfeld & Huinink, 1991; Kravdal, 1994; Rindfuss et al., 1988).

The second major change was the increase in women's labour force participation. Across Europe (except for Central and Eastern Europe) and the US this process was triggered by factors such as increasing standards of household consumption (Furstenberg, 2014), changing norms and values (see Section 1.3.3 below), and a deteriorating economic climate during the 1980s which was preceded by economic prosperity during the 1960s and 1970s (Liefbroer, 1999). Additionally, during the 1970s most countries cut back on welfare state benefits which particularly affected young adults (Liefbroer, 1999).

There are two main competing explanations on how women's increased labour force participation influenced changing partnership and family formation processes. According to neoclassic microeconomic theory, these processes have led to decreasing marriage and fertility rates. It is argued that women's increasing education, labour force participation, and economic independence reduced their gains from and interest in traditional marriage where they would be expected to care for family and children (Becker, 1981; Liefbroer, 1999). Additionally, the opportunity costs of having children are higher for women with better career prospects and higher income because for them the potential forgone earnings due to an interrupted labour market career are higher than for women with lower earnings (Becker, 1981; Mills et al., 2011).

However, competing explanations emphasise that women's increased education and labour force participation provides access to more attractive partners, enhances women's desirability as potential partners, and enables them to make a more informed decision on the marriage market (Oppenheimer, 1997, 2000; Thornton et al., 1995). Thus, it is argued that these processes have contributed to the postponement of marriage and first births. In turn, delayed marriages together with changes in norms and values (see Section 1.3.3) and changes in premarital sexual behaviour (see Section

1.3.2) have led to an increased prevalence of cohabiting unions (Oppenheimer, 1994).

In Central and Eastern Europe a dual-earner model was enforced by the socialist regime before the transition in 1989-1990; women's labour force participation was promoted as part of the regime's ideology on gender equality (Frejka, 2008a). Following the societal and political transition, these countries experienced decline and postponement of both marriage and fertility. There are opposing explanations in the literature as to whether these changes were primarily the result of the spread of the Second Demographic Transition (see also Section 1.3.3 and Section 1.4.1.1) to CEE countries or they occurred due to economic circumstances, i.e. increased economic uncertainty, unemployment, and job insecurity (Frejka, 2008a; Lesthaeghe, 2010; Lesthaeghe & Moors, 2000; Lesthaeghe & Surkyn, 2002; Perelli-Harris & Gerber, 2011; Philipov et al., 2006; Sobotka, 2008; Surkyn & Lesthaeghe, 2004).

1.4.2 Technological changes

The introduction of effective contraceptives during the early 1960s across all examined countries enabled women to engage in extra-marital sexual activities without having to bear the consequences of an unwanted pregnancy (Liefbroer, 1999). Thus, on the one hand the introduction and distribution of contraceptives have led to a weakened link between sex and marriage (Furstenberg, 2014). On the other hand, it has increased women's opportunities to plan a family and to delay having a first child until the circumstances were appropriate (Goldin & Katz, 2002) without having to abstain from sexual activities.

1.4.3 Cultural changes

Changes in the economic and social structure and in technology have coincided with cultural changes which have influenced norms and values of young adults relating to family formation (Liefbroer, 1999). The theory of the Second Demographic Transition (SDT) argues that changes in partnership and family formation were not solely demographic in their nature but ideational and value changes contributed to these changing behaviours (Lesthaeghe & van de Kaa, 1986; Van de Kaa, 2002). Thus, changes in family behaviours are

argued to be related to new lifestyle choices (Surkyn & Lesthaeghe, 2004). With increasing living standards and gender equity, and weakened normative regulations, people developed a need for self-development and self-fulfilment ("higher order needs" (Maslow, 1954)). In other words, more liberal, more individualistic and more secularised people are argued to be the forerunners of new family behaviours such as non-marital cohabitation and non-marital childbearing (Lesthaeghe & van de Kaa, 1986; Van de Kaa, 2002).

Next to individuals' values and norms, social norms also influence the timing and sequencing of life course transitions through providing rules and guidelines about the appropriate timing of life events (Billari & Liefbroer, 2007; Heckhausen, 1999). For example, research suggests that certain "age norms" or "social deadlines" (Aassve et al., 2013; Settersten, 2003; Settersten & Hagestad, 1996) prescribe when it is "too early", "normal", or "too late" to engage in certain life course transitions. In line with this, Thornton and Young-DeMarco (2001) found that respondents' ideas about the ideal timing of marriage have moved to later ages in the US. Additionally, Billari et al. (2011) showed that across Europe the mean perceived age after which women should not have a(n additional) child was 41.7 while for men this was 47.3 based on data from the European Social Survey from 2006-2007. Some researchers showed that the role of age in these transitions is relative to peer experiences, idealised life cycles and the expectations of friends and other important persons (Balbo & Barban, 2014; Rindfuss & Bumpass, 1976).

Cherlin (2004) argues that social norms that define people's behaviour have weakened over the past decades as a result of changing societal context. Sanctions became less central than in the past which led to the internalisation of social norms (Heckhausen, 1999). This implies that in modern societies there is no need for external sanctions. Hence, although the nature and content of social norms might have changed, they are still important for understanding demographic behaviour (Liefbroer & Billari, 2010). Altogether, these processes have contributed to the postponement of union and family formation and to the increase in the prevalence of non-marital cohabitation and non-marital childbearing.

1.4.4 Changes in the meaning of partnerships and parenthood

As a result of ideational change, the meaning of partnerships and parenthood has also changed during the last decades. The shift to more liberal and individualistic norms, ideas, and values resulted in greater 'individual autonomy in decision-making' (Beck & Beck-Gernsheim, 2002); in other words we have experienced a shift from a 'standard biography' to a 'choice biography' (Beck & Beck-Gernsheim, 2002). These changes influence how individuals perceive partnerships and parenthood.

Giddens (1992) argues that these changes resulted in a shift to 'pure relationships' which are based on the intimacy and satisfaction derived from a relationship. Individuals constantly assess whether they still get satisfaction from their relationship which they only continue until both partners are satisfied (Giddens, 1992; Sobotka, 2004). These increased expectations about relationships are likely to contribute to the delay in partnership formation (Billari & Liefbroer, 2010).

Similarly, the decision to make the transition to parenthood became increasingly individualised. Parenthood is now a matter of personal choice and preference for women rather than an obligation or duty (Ryder, 1979; Tanturri & Mencarini, 2008). Women make the transition to motherhood in order to satisfy their own personal needs (such as personal development), and motherhood is seen as an expression and extension of one's self (Lesthaeghe & Meekers, 1986; Mills et al., 2011).

1.5 Explanations for cross-national differences

The descriptive statistics presented in Section 1.2 highlighted the large cross-national variation in family behaviours. The graphs have also shown that it is not always straightforward to conclude which countries are similar to each other with respect to changes in family behaviour. Nonetheless, comparative studies on partnership and family behaviours tend to classify countries based on similarities and differences in cultural and historical context, and institutional settings. The following subsections review and discuss the possible explanations for cross-national similarities and differences in

partnership transitions and the transition to motherhood along these dimensions.[12]

1.5.1 Cultural and historical differences

This subsection elaborates on cultural and historical differences across countries using notions from theories on ideational change, religiosity, North/South – East/West differences in family traditions, and the variation in the meaning of cohabitation across countries.

1.5.1.1 Ideational change

As explained in Section 1.3.3, changes in individuals' norms and values played a role in the emergence of new family behaviours. The SDT theory (Lesthaeghe & van de Kaa, 1986; Van de Kaa, 2002) and Inglehart's (1977, 1990) theory on postmaterialism argue that changes in family behaviours occurred as a result of emerging self-actualisation and individualisation. The SDT theory also postulates that the United States and Scandinavian countries were leading these changes which already started in the 1960s. New values and behaviours then spread to Western Europe in the 1970s, to the Iberian countries in the mid-1980s, and to Central and Eastern Europe in the 1990s (Lesthaeghe, 2010; Surkyn & Lesthaeghe, 2004). Thus, one possible source of cross-national differences in family and fertility behaviours is the fact that different countries are at different stages of the Second Demographic Transition. However, the examined countries experienced these changes not only at different times but also to varying degrees depending on the context (e.g. different diffusion patterns of new behaviours across social strata, different policies, different reactions to economic hardship, and cultural differences across countries and regions)[13] (Lesthaeghe & Moors, 2000).

[12] Cultural and historical, and institutional changes are highly interdependent. Therefore, the aim of this thesis is not to separate these or to separately attribute changes in partnership or fertility behaviours to one of these factors. However, in order to structure this subsection, I decided to attempt to group the existing explanations in the literature under these headings.

[13] This implies that there is an interrelationship between ideational change and the other possible reasons for cross-national differences that will be discussed later on in this section.

1.5.1.2 Religiosity

Related to the arguments of the SDT, Inglehart's (1977, 1990) theory on postmaterialism argues that modernisation (i.e. economic and technological advancements) has contributed to changes in values (i.e. moving away from traditional, religious values to more secular values related to self-expression). However, modernisation does not follow a linear path; instead, cultural change is path dependent (Inglehart & Baker, 2000). The cultural heritage of a society (whether it has Protestant, Roman Catholic, Orthodox, or Communist roots) has a long lasting impact on societies' values despite modernisation (Inglehart & Baker, 2000). Although the authors grouped European countries and the United States under the headings 'advanced industrial democracies' (including Northern, Western, and Southern European countries and the United States) and 'ex-communist societies'[14], based on their arguments one would expect historically Protestant, Roman Catholic, Orthodox, and Communist countries to display distinctively different partnership and family formation behaviours. Thus, according to this explanation Italy, Spain, Austria, and France (Roman Catholic countries) would be expected to show very similar patterns of partnership and family formation. Additionally, the historically Protestant countries of Belgium, the Netherlands, Norway, the UK, and the US should exhibit similar trends. Last, family behaviours in the post-socialist countries of Bulgaria, Estonia, Lithuania, Romania, and Russia would be expected to be similar. However, it needs to be mentioned that even if historically these groups of countries had similar religious traditions, these traditions might have changed to a larger extent in some countries than in some other countries. For example, in Italy the influence of Church on everyday life remained stronger (De Rose et al., 2008) than in the other historically Catholic countries.

1.5.1.3 East/West and North/South differences in family systems

Different parts of Europe belong to different family systems (Reher, 1998). West from the St Petersburg – Trieste line the "western European" pattern of marriage dominated historically which means late entry into marriage and high proportions of women remaining single. On the other hand, east of this line

[14] They also distinguished a third group, namely developing and low-income societies.

this pattern can be described as early marriage with only a small fraction of the population remaining single[15] (Coale, 1992; Hajnal, 1965). This east-west distinction of countries does not include countries of Southern Europe or the United States.

Differences in family systems do not only prevail between the East and West of Europe but also between the North and the South. Reher (1998) grouped countries based on the strength of intergenerational family ties. He argued that southern Europe (i.e. Mediterranean countries) is characterised by strong family ties where traditionally the family has priority over the individual, young people leave the parental home at relatively old ages usually to establish their own family. However, in the northwest (i.e. United States, Scandinavia, the UK, the Netherlands, Belgium, Austria, and Germany), where family ties are weak, individuals and individual values have priority over everything else and youngsters usually live independently for a period before they form their own families. The nature of the family systems also has implications for the society and for the way it functions. For example, in societies with strong family ties there is greater social cohesion (indicated by the low divorce rates and low proportions of extramarital births), more social control of behaviour, and these societies are more conservative compared to those with weak family ties. This categorisation does not include post-socialist countries and some Western societies (e.g. France) cannot be clearly placed into one or the other category.

1.5.1.4 Cross-national differences in the meaning of cohabitation

The prevalence of cohabitation and childbearing within cohabitation is likely to be influenced by factors discussed in Section 1.3 and Section 1.4. However, it needs to be noted that the prevalence of cohabitation itself, attitudes towards cohabitation and the various meanings of cohabitation in family formation across countries might also be a possible explanation for cross-national differences in the link between partnership experiences and the transition to motherhood. Whether cohabitation is viewed as a substitute for marriage or simply as a step in the marriage process that delays marriage may well influence the link between partnership experiences and the partnership

[15] A third pattern is the Asian-African pattern where marriage is late and universal but this pattern is not considered as here the focus is only on European countries and the United States.

context of childbearing. Additionally, in countries where cohabitation is more widespread and more accepted, women who cohabit will be a less selective group than in countries where cohabitation is less prevalent and less tolerated (Heuveline & Timberlake, 2004; Hiekel, 2014). This might also influence the relationship between partnership transitions and the transition to motherhood.

Several typologies of the various meanings of cohabitation exist in the literature. Building on earlier debates on whether cohabitation is an alternative to marriage or a step in the marriage process (Casper & Bianchi, 2002; Kiernan, 2001; Rindfuss & VandenHeuvel, 1990), Heuveline and Timberlake (2004) identified the following ideal types of cohabitation. First, cohabitation is *marginal* in countries (e.g. Italy, and Spain[16]) where only a minority of couples cohabits because cohabitation is institutionally penalised and culturally not accepted. Second, cohabitation is a *prelude to marriage* where it is seen as a "testing ground" for a relationship; it is of short duration, it most likely transforms into marriage especially before childbearing (e.g. Belgium). Third, cohabitation is a *stage in the marriage process* if couples formalise their cohabiting relationship relatively quickly following the birth of a child (e.g. Austria). Next, cohabitation is an *alternative to being single* if the couple prefers to live together to living separately but they enter cohabitation without an immediate intention to marry (e.g. US). Additionally, cohabitation is an *alternative to marriage* if the couple chooses to cohabit rather than marry and their family formation behaviour is the same as that of married couples (e.g. France). Finally, cohabitation is *indistinguishable from marriage* in countries where couples are indifferent to marrying because cohabitation is so widely accepted.

More recently, Hiekel et al. (2014) developed a typology based on individuals' marriage intentions, their opinion about the institution of marriage, and whether they feel that they are in economic hardship. The authors distinguished cohabitation as *a prelude to marriage* (e.g. Austria, France, Romania, Russia), where the couple cohabits with the intention to marry, from cohabitation as *a trial marriage,* where such intentions are not present. Couples who think that marriage is an outdated institution yet they still plan to

[16] Heuveline and Timberlake (2004) compared 17 countries, many of which are different from the countries studied in this thesis. Therefore, where examples are given in brackets, I only focus on countries which are examined in this thesis.

marry their cohabiting partner are labelled as *conformists* (e.g. Lithuania). This typology also accounts for couples who might decide to live together due to *economic reasons*; either because they cannot afford to get married or because of the economies of scale that a co-residential union provides. Last, people who think that marriage is an outdated institution are categorised as *refusing marriage* (e.g. Bulgaria), while those who neither agree nor disagree with this statement consider *marriage irrelevant* (e.g. Norway).

These studies showed that the meaning of cohabitation varies greatly across countries; this variation is likely to influence cross-national differences in the link between partnership experiences and the transition to first birth. For example, in Italy and Spain, where cohabitation is less widespread, women would be more likely to bear children within marriage than within cohabitation. On the other hand, in countries where cohabitation is indistinguishable from marriage (Norway), where it is as an alternative to marriage (France) and where women refuse the institution of marriage (Bulgaria), we would expect women to be more likely to have children outside marriage than in the other countries. For women in the remaining ideal types cohabitation represents a stage in the life course that will be followed by marriage before children are born. In other words, in these countries, cohabitation might be widespread but its primary role in family formation is a step in the marriage process and it is less likely to be context for childbearing.

Cross-national variation in the meaning of cohabitation also implies that in countries where cohabitation is marginal cohabiting women constitute a much more selective group than in the other countries. On the other hand, where cohabitation is indistinguishable from marriage, cohabiting women would be a heterogeneous group. To what extent women in the remaining cohabitation typologies constitute a selective group is not clear from these typologies but this would likely depend on the prevalence of cohabitation in these countries as well as on the prevalence of decisions to have children within cohabitation and to remain within this cohabiting union for a longer time period (Heuveline & Timberlake, 2004).

1.5.2 Institutional setting

The institutional setting of a country is important to consider because it provides opportunities or constraints for adopting new family behaviours. In other words, two countries with similar cultural and historical background but different institutional settings might develop completely different family behaviours. This subsection considers the following dimensions of cross-national differences in institutional settings: welfare state regimes, legislation, and the level of gender equity in a society.

1.5.2.1 Welfare state regimes

The examined countries differ in terms of their welfare context. Following Esping-Andersen's (1990) typology of welfare states, and building on Gauthier's (2002) and others' (Deacon, 2000; Kääriäinen & Lehtonen, 2006; Lesnard et al., 2010; Neyer, 2003; Vogel, 2002) work extending this typology, the examined countries can be categorised into five distinct welfare regime types. Norway belongs to the social democratic welfare regime where welfare support is individual-based and next to a high commitment to gender equality, working parents receive high support. In liberal welfare regimes (such as the US and the UK) family support is typically at a relatively low level and is mainly targeted at reducing poverty; childcare is largely provided by the private sector. However it has to be mentioned that in the UK since the 1980s lone parents and low income families receive substantial support, such as housing subsidies, income support, and exception from local taxes (Rendall et al., 2009). Austria, Belgium, and France belong to the conservative welfare regime. In these countries, the level of support for families depends on parents' employment status. These policies usually support the traditional division of labour in the family. Italy and Spain are part of the Southern European welfare regime which is characterised by modest family policies and the incompatibility between work/education and motherhood. Finally, the rest of the countries (Bulgaria, Estonia, Lithuania, Romania, and Russia) belong to the post-socialist welfare regime which combines reforms inspired by Western countries with certain remaining features of the former socialist system's welfare policy (e.g. broad welfare coverage but with low benefits). While this typology is widely applied in comparative studies, it has not been developed for studying family behaviours. Instead, this typology was primarily based on pension, sickness

and unemployment benefits (Gauthier, 2002). Cross-national differences in family policies, policies relating to the reconciliation of work and family life, and the availability and affordability of childcare are also important factors that might explain cross-national differences in the timing and sequencing of family formation events (Neyer, 2003; Neyer & Andersson, 2008; Rendall et al., 2009; Thomas et al., 2003).

1.5.2.2 Legislation

Country-specific policies and legislation regulating the rights and responsibilities of cohabiting and married couples and parents differ across countries and has changed considerably over time. This is an important dimension to consider when studying cross-national similarities and differences in partnership formation and the transition to first birth as legislation might constrain or encourage new family behaviours. Until the late twentieth century, unmarried couples were outside the jurisdiction and in some countries it was even forbidden for unmarried man and women to live together. In the 1960s when changes in values and family behaviours took place, states started to provide more support for families. The diverging welfare contexts also mean that countries had a fundamentally different approach to the legislation of marriage, cohabitation, and unmarried parenthood (Perelli-Harris & Sánchez-Gassen, 2012). Countries differed by when they started to legislate for example the rights of children born to unmarried parents or to single mothers, and laws related to unmarried fathers' right to custody of the child and inheritance issues within cohabiting relationships continue to evolve today (Perelli-Harris & Sánchez-Gassen, 2012).

It is not clear whether changes in family behaviours would respond to policies or legislation would respond to changing family behaviours (McDonald, 2000b). This might also vary across countries and over time, increasing the complexity of possible explanations for cross-national differences in the intersection between partnership experiences and the transition to motherhood.

1.5.2.3 Gender equity

The level of gender equity in a society influences fertility. McDonald (2000b, 2000a) argues that in societies where societal institutions see women as

individuals (i.e. individualistic societies) the economic model is closer to a dual earner model and gender equity is usually higher than in societies where social institutions see women as mothers or as part of a family (i.e. familistic societies). McDonald also argues that in societies where low gender equity is coupled with familistic values, fertility will be much lower than in gender egalitarian societies. Although McDonald does not specifically state which countries would belong to the gender egalitarian and to the familistic societies, according to these arguments it would be expected that the Nordic and Western European countries together with the United States would be characterised as gender egalitarian societies whereas Southern European and post-socialist countries are more familistic and less gender egalitarian.

1.5.3 Discussion and the applied classification

To reiterate, the available theoretical expectations on cross-national differences predict that the examined countries belong to several different groups. Different arguments draw the boundaries of these groups so that they do not always overlap. For example, according to the SDT, the Nordic countries are the forerunners of new behaviours, followed by Western, Southern and Central and Eastern European countries. It is debated in the literature whether the United States has experienced the SDT (Lesthaeghe & Neidert, 2006; Raley, 2001). Inglehart's (1977, 1990) theory, on the other hand, expects all advanced industrial democracies (i.e. Nordic countries, the United States, Western, and Southern European countries) to be similar. Hajnal's (1965) theory differentiates between the east and west of Europe, while Reher (1998) divided the west of Europe into North and South. Moreover, according to the welfare state typology, the United States and the United Kingdom are argued to be similar (liberal welfare regimes) but different from Austria, Belgium, and France (conservative welfare regime) and Norway is expected to be different from all of these European countries and the United States. Finally, based on religiosity, post-socialist, historically Protestant, and historically Roman Catholic countries are expected to display similarities in family behaviours.

However, the descriptive findings in Section 1.2 revealed sometimes substantial deviations from these possible cross-national typologies. For example, comparing trends and patterns in partnership experiences across European countries and the United States showed substantial heterogeneity

within post-socialist countries. Estonia and Bulgaria were more similar to Belgium and the UK than to the other post-socialist countries when examining the proportion of first unions that started as cohabitation. Additionally, Italy and Spain seemed very similar in this respect to the post-socialist countries of Lithuania, and Romania. At the same time, the highest proportions of cohabiting first unions were found in the Netherlands, France, Austria, and Norway. Post-socialist countries were, however, rather homogeneous in that they were characterised by a relatively low mean age at first marriage and high proportions of first cohabiting unions that transitioned to marriage. The United States had a similarly low mean age at first marriage as post-socialist countries while in Northern and Southern Europe women married at later ages. Additionally, Belgium was similar to post-socialist countries in that a relatively high proportion of first cohabiting unions ended in marriage while these proportions were much lower in the other Southern, Northern, and Western European countries. With respect to union dissolution, in Italy and Spain the total divorce rate remained low throughout the examined period, followed by Bulgaria and Romania. However, in the other post-socialist countries, divorce rates were much higher during the 1970s than in most Western European countries. In Russia, Estonia, and Lithuania, the total divorce rate exceeded that in the UK. On the other hand, the proportion of first cohabiting unions that end in dissolution was the highest in the US and Western Europe (except for the Netherlands and Belgium). Additionally, Italy showed very similar dissolution rates. At the same time, Spain and the post-socialist countries together with the Netherlands and Belgium showed much lower dissolution rates. While serial cohabitation was most common in the Netherlands, Austria, the UK, France, Norway, and the US, the proportion of women who experienced at least two marriages was the largest in Russia, Estonia, the UK, and the US.

Examining cross-national trends and patterns in the transition to motherhood revealed a generally lower mean age at first birth in post-socialist countries and a higher mean age at first birth in the countries of Southern, Northern, and Western Europe. The United States was in-between these two groups of countries with respect to mean age at first birth. Although data availability on the proportion of childless women by birth cohort was somewhat limited, there was more cross-national variation in patterns of childlessness. In post-socialist

countries and in France, the proportion of childless women was generally lower compared to other European countries and the United States.

When investigating the proportion of extra-marital births, the cross-national variation was even larger than when simply examining patterns of partnership experiences or the transition to motherhood. These greater cross-national differences are probably the result of the interplay between cross-national similarities and differences in partnership formation and the transition to motherhood. Italy and Lithuania had the lowest proportions first births out of wedlock, followed by Spain, Austria, the US, the Netherlands, Belgium, and the UK. The highest proportions were found in Estonia, Norway, France, and Bulgaria. Finally, in Western and Northern Europe and the US the proportion of first births that occur following union dissolution was much higher than in Southern Europe and the post-socialist countries.

From this summary it is apparent that the above reviewed typologies do not seem to be applicable for comparing changes in family behaviours across countries; the examined countries cannot be easily grouped according to any of the above classifications. Perhaps this is not surprising given the large cultural, historical, and institutional differences across countries and the possible interplay between these factors. I do not aim to specifically test the above mentioned explanations for cross-national differences in this thesis. This is primarily because of data limitations as well as due to the complexity of the interrelationship between these processes. However, to facilitate cross-national comparison and the interpretation and discussion of the results, in Chapter 3 and Chapter 4 I will rely on a more general and broad classification of European countries: post-socialist (Bulgaria, Estonia, Lithuania, Romania, Russia), Southern European (Italy and Spain), Western European (Austria, Belgium, France, the Netherlands, the UK), and Northern European (Norway) countries. Because American families are often argued to have substantially different characteristics[17] compared to European families (Cherlin, 2010), the United States will be considered as a separate category in this broad typology. This classification is based on similarities in fertility levels and timing, and trends in the main characteristics of family behaviours (Pinnelli, 2001; Pinnelli

[17] For example, compared to Western Europeans, Americans form first unions at a younger age, their unions are more fragile as indicated by the high proportion of unions that break up, and a larger share of Americans re-partner after union dissolution (Cherlin, 2010).

et al., 2002) such as timing and type of partnership formation, and the partnership context of childbearing. It is acknowledged that countries within one group can exhibit fairly different patterns of family and fertility behaviours. For example, in the UK and France fertility is higher than in other Western European countries and more comparable to fertility in Norway and the US (GGP Contextual Database). Additionally, the high prevalence of teenage pregnancy distinguishes the UK from the rest of the Western European countries (Lawlor, 2004). Nonetheless, this grouping of European countries facilitates the discussion of the results and enables me to draw attention to those instances where there are deviations from this broad and general grouping.

Fertility and family behaviours in these four groups of European countries and the United States have been characterised in the literature as follows. In post-socialist countries, the prevalence of non-marital cohabitation has been much lower than in other European countries and the US. Additionally, compared to the other examined countries, fertility was higher among single mothers (Muresan et al., 2008) who usually married shortly after conception (Lesthaeghe & Moors, 2000; Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2012). Before the societal and political transition, these countries were characterised by early and universal marriage and early childbearing with the proportion of childless women remaining below 10% in most countries (Katus & Kingkade, 2004; Koytcheva & Philipov, 2008; Muresan et al., 2008; Stankuniene & Jasilioniene, 2008; Zakharov, 2008). Marriage, pregnancy, and first birth were strongly related events. After the transition, fertility and marriage rates have decreased dramatically, marriage and family formation was delayed, the proportion of extra-marital births increased while the prevalence of cohabiting relationships remained relatively low (Katus & Kingkade, 2004; Koytcheva & Philipov, 2008; Muresan et al., 2008; Sobotka, 2004; Stankuniene & Jasilioniene, 2008; Zakharov, 2008). There is more heterogeneity in the prevalence of divorce across post-socialist countries. For example, in Romania and Bulgaria, the divorce rate remained relatively low while in Lithuania, Estonia, and Russia it has increased to or even exceeded Western European levels (Sobotka & Toulemon, 2008).

In Southern Europe, fertility decline and the delay of marriage and childbearing started earlier than in post-socialist countries (De Rose et al., 2008; Delgado et

al., 2008). However, changes in partnerships have not followed the changes in fertility behaviour; fertility decline occurred without any radical changes in family formation (De Rose et al., 2008). Consequently, non-marital cohabitation and non-marital childbearing remained rare (Kiernan, 2004b) and the transition to parenthood remained very closely linked to union formation and marriage (Heuveline & Timberlake, 2004; Kohler et al., 2002). Additionally, the proportion of marriages ending in divorce is relatively low (Sobotka & Toulemon, 2008). Among more recent birth cohorts, the prevalence of cohabiting unions has increased in Spain (Dominguez-Folgueras & Castro-Martin, 2013) and so did the proportion of marriages that end in divorce among younger marriage cohorts (Bernardi & Martínez-Pastor, 2011; Gabrielli & Vignoli, 2013).

In Western and Northern Europe, marriage and fertility have been delayed since the 1960s (Frejka & Sobotka, 2008) and these two events are not as closely related as in other countries (Sigle-Rushton, 2008). The prevalence of cohabitation is high but its role in the family formation process differs greatly across countries (Sobotka & Toulemon, 2008). For example, in Norway and France, where cohabitation is more stable than in the other countries (Kravdal & Rindfuss, 2008; Toulemon et al., 2008), around 50% of all conceptions took place within cohabitation between 1995 and 2004. In Austria and the Netherlands, this proportion was around 25% (Heuveline & Timberlake, 2004; Perelli-Harris et al., 2012). Additionally, the UK is not only characterised by high proportions of cohabiting conceptions but also by high levels of conceptions to single mothers (Perelli-Harris et al., 2012; Seltzer, 2004) and, as mentioned before, to teenage mothers (Lawlor, 2004).

In the United States fertility postponement started in the early 1970s (Sobotka, 2004) but the mean age at first birth remained quite low when compared to European countries. In 2006, the mean age of mothers at the birth of their first child was 25 in the US as compared to 29 in the Netherlands (Mathews et al., 2009). At the same time, fertility levels remained relatively high in the United States; in 2006 the total fertility rate (TFR) was 2.11 while for example in the UK it was 1.84, in the Netherlands it was 1.72, and in Norway it was 1.9 (GGP Contextual Database). The proportion of extra-marital first births has increased tremendously in the US. While in 1978 about 1 in 6 births occurred outside marriage, by 2004 this ratio was 1 in 3 (Cherlin, 2004). This is partially due to

the high levels of teenage pregnancy (Lawlor, 2004) and to the high prevalence of non-marital cohabitation. Many scholars in the US literature argue that new family behaviours are the cause and consequence of economic and social disadvantage (Furstenberg, 2014; McLanahan, 2004; Perelli-Harris & Gerber, 2011) and that marriage is becoming affordable only for the higher educated minority (Cherlin, 2004; Lichter et al., 2006). Divorce rates increased during the 1960s and 1970s (Amato & Irving, 2005) and were high compared to European rates. Additionally, cohabiting unions in the US are more likely to be unstable (Bumpass & Lu, 2000; Kennedy & Bumpass, 2008). These trends in relationship instability have led to an increased prevalence of multi-partner fertility and stepfamilies (Cherlin, 2004). Last, the US is characterised by a greater racial and ethnic diversity which implies that different fertility and family behaviours are present in society (Seltzer, 2004).

1.6 Research questions and structure of this thesis

To summarise, the previous sections highlighted the dramatic changes that occurred in fertility and family behaviours in the past five to six decades across the examined countries. However, the intensity, pace, and level of these changes varied greatly across countries. This heterogeneity reflects the complex interrelationships between the mechanisms that influence changing partnerships and fertility. To fully understand the implications of changing partnership dynamics on the transition to motherhood, the most commonly applied approach of examining only one segment of the family life course is not sufficient. Therefore, this thesis examines the interrelationship between multiple partnership transitions and the transition to motherhood in Europe and the United States using an innovative methodological approach. To reiterate, the overarching research questions are: How are partnership transitions and the transition to motherhood interrelated? Does this interrelationship vary by socio-economic status? Are there similarities across Europe and the United States? And how can we examine interdependent partnership dynamics? More specifically, the remaining chapters aim to answer the research questions highlighted below.

Before further investigating the interrelationship between partnership transitions and the transition to first birth across Europe and the US, Chapter 2 takes a methodological approach to examining partnership transitions. The

increasing complexity of family life courses presents a methodological challenge. Despite the availability of other promising techniques the methodological discussion in the literature has been limited to comparing the so called event based approach (e.g. event history analysis) with the holistic approach (e.g. sequence analysis). Chapter 2 contributes to the literature by comparing and contrasting sequence analysis, latent class growth models, and multi-state event history models for studying the family life course with an application to Norwegian women born between 1955 and 1964. This application focuses on the role of education in changes in partnership status. The chapter asks the following research questions:

1) How can sequence analysis, latent class growth models and multi-state event history models be used for studying the influence of education on partnership transitions over the early family life course? What types of research questions can be answered using these methods? And are these methods applicable to the same problems to the same extent or is one of them better than the other and if so in which situation?

Building on the previous sections which portrayed large cross-national differences in the trends and patterns of partnership and family formation using aggregate level data, Chapter 3 further explores cross-national differences in the intersection between partnership histories and the transition to motherhood across several birth cohorts at the individual level. Using survey data enables me to examine changes in individual family life courses and to distinguish between single and cohabiting non-marital first births. Moreover, this chapter goes a step further and investigates more complex transitions than Chapter 1. Using descriptive statistics and multi-state life tables, I describe basic individual level patterns in several partnership transitions and the transition to motherhood by cohort, age, and educational level across the examined countries. This allows me to tease out some of the individual level factors behind changing family processes. This chapter specifically focuses on changes in family behaviours among women born between 1930 and 1969 by answering the following research question:

2) How has the intersection between partnership histories and fertility behaviours changed over time and by age and educational level across Europe and the United States?

Chapter 4 explores partnerships and fertility postponement. Many studies addressed the relationship between partnership status and the transition to motherhood. However, life course theory suggests that current partnership status is a result of several successive previous partnership transitions. Therefore, focusing only on current partnership status might mask the importance of previous transitions for the transition to motherhood. In order to explore this issue, I focus on the role of partnership *histories* (i.e. the sequences of several partnership transitions) in remaining childless. This enables me to explore the link between multiple partnership pathways and the transition to motherhood. To do so, Chapter 4 utilises an extended multi-state model where the states are defined as sequences of previous states. This extension allows for examining the influence of entire partnership histories at age 30 and 35 on women's probability of experiencing a first birth by the end of their reproductive years to understand how different partnership histories at these ages shape childless women's probabilities of achieving motherhood by age 40. This chapter specifically focuses on women born between 1953 and 1962 and asks the following research questions:

3) What are the partnership histories of women who remain childless? How do these partnership histories relate to the transition to motherhood in later reproductive ages? How do these associations differ across European countries?

Chapter 5 takes a step further by examining the intersection between partnership experiences and the transition to first birth by education. Previous studies have shown that socio-economic status (measured by educational attainment) is an important predictor of partnership and family behaviours. However, as previous research primarily focused on one transition and/or one country it is not clear where in the childbearing process the role of education is crucial and whether its role is similar across countries. Examining at what point(s) of partnership pathways leading to a first birth education plays a crucial role in a cross-national context will contribute to our understanding of what cohabitation, marriage, and union dissolution means for the transition to motherhood for women with different socio-economic status. Therefore, Chapter 5 examines the association between educational attainment and several partnership transitions and the transition to motherhood among women born between 1950 and 1969 in 13 European countries and the United

States. In Chapter 5 I employ multi-state event history models; these models are fitted as a series of stratified Cox proportional hazards regressions. This approach allows for examining the changing influence of education on the pathways to a first birth in a cross-national context to understand where in the family life course the role of education is important. The research questions addressed in this chapter are:

4) What is the role of education on the entry into and exit from cohabitation, marriage, and union dissolution? And how does education influence the transition to parenthood once women have entered these partnerships? Are these patterns similar across Europe and the United States?

Taken together, this thesis investigates the interrelationship between multiple partnership experiences and the transition to motherhood in a cross-national context by four main dimensions: cohort, age, education, and partnership histories. The applied multi-state framework provides new insights into changing family formation and fertility behaviours across Europe and the United States.

2. Chapter 2 – Coping with complex individual histories: A comparison of sequence analysis, latent class growth models, and multi-state event history models with an application to partnership transitions in Norway

2.1 Introduction

In the last half century, patterns of family life courses have changed considerably. For example, the transition to parenthood has been delayed; non-marital cohabitation and non-marital childbearing have become more common, as have union dissolution and re-partnering. These changes have generated an increased interest in the applicability of different methods for modelling life courses with their complexities. Although a number of methods are available to study the family life course, discussion has mainly been limited to comparing simple event history models and sequence analysis (Billari, 2001b, 2005a; Billari & Piccarreta, 2001, 2005; Piccarreta & Billari, 2007).

Simple event history analysis is commonly used to examine single or competing events (Heuveline & Timberlake, 2004; Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2010b). Applications of event history analyses vary in focus and complexity. For example, recent studies (Baizán et al., 2003, 2004) applied simultaneous equations models to study the determinants of several concurrent life course transitions. Others used multilevel multi-process models to account for correlated event histories (Steele et al., 2005). These "event based" approaches primarily focus on the (causal) influence of certain covariates on particular events. Simultaneous models improve upon simple event history models by accommodating possible interdependencies between several events via modelling joint processes and unobserved heterogeneity. Even so, they limit attention to a specific segment of the life course and to one-way transitions.

Others have promoted the use of sequence analysis arguing that unlike event history analysis, this approach can examine the life course trajectory as a whole meaningful unit ("holistic approach") by looking for "ideal-types" of trajectories that categorise and describe different life course patterns (Billari, 2001b, 2001a, 2005a; Billari & Piccarreta, 2005; Piccarreta & Billari, 2007). It is also possible to assess how different covariates influence the probability of an individual to belong to one of these "ideal-types".

Despite the availability of other techniques only a few studies investigated their applicability to life course research. For example, Barban and Billari (2012) have compared and tested the consistency of sequence analysis and latent class analysis. Additionally, Bonetti et al. (2013) proposed an extension of multi-state models to studying the family life course. This chapter aims to contribute to this line of research by comparing the strengths and weaknesses of sequence analysis and two other promising techniques, namely, latent class growth models, and multi-state event history models. Multi-state event history models and latent class growth models have only recently been used (Bonetti et al., 2013; Mikolai et al., 2013; Perelli-Harris & Lyons-Amos, 2013) for studying the family life course. Earlier, Mills (2004) applied Markov and semi-Markov multi-state life tables to study partnership histories in Canada, the Netherlands, and the Russian Federation. These methods are ideal to examine family events from a life course perspective because they combine the properties of the event based and the holistic approaches by being capable of focusing on several consecutive events.

The aim of this chapter is to illustrate the different types of methods that are available to a researcher interested to study life courses. Therefore, sequence analysis, latent class growth models, and multi-state event history models are described. Additionally, by applying these methods to a real life example (Norwegian women born between 1955 and 1964), the differences and similarities as well as the strengths and weaknesses of these approaches are emphasised. This example focuses on the role of education on changes in partnership status (i.e. being never partnered, transition to first cohabitation and first marriage, the dissolution of a first cohabitation or a first marriage, and forming a new partnership after union dissolution). This chapter aims to tackle the following questions, pertinent to life course research: How can sequence analysis, latent class growth models and multi-state event history

models be used for studying the influence of education on partnership transitions over the early family life course? What types of research questions can be answered using these methods? And are these methods applicable to the same problems to the same extent or is one of them better than the other and if so in which situation?

The following sections briefly describe the applied methods and explain how they operate. This is followed by a description of the specific models that this chapter studies. Results for each modelling technique with the interpretation of the result are presented, and then synthesised in the concluding section of the chapter.

2.2 Data

To illustrate the similarities and differences between sequence analysis, latent class growth models, and multi-state event history models, a real-life application is presented. Using data from the first wave of the Norwegian Generations and Gender Survey[18] (GGS) from 2007/2008 (N = 14,881), we examine the influence of educational attainment on changes in partnership status of women born between 1955 and 1964. For this application Norway is used as an example because in Norway variation in partnership experiences is one of the largest when compared to other European countries (Elzinga & Liefbroer, 2007).

The dataset includes extensive retrospective information on the start and end date (year and month) of up to five cohabitating and marital unions as well as union dissolutions. In the Norwegian GGS, cohabitation is defined as a co-residential relationship which lasted for at least three months. Partnership histories are reconstructed using this information. LCGMs and SA are fitted using yearly partnership information, while multi-state event history models utilise monthly information. For LCGMs, in particular, the use of smaller time intervals can be computationally intense.

Although the Norwegian GGS provides cross-sectional weights, no longitudinal weights are available. As cross-sectional weights are only representative of the

[18] This chapter used the version that is available in the Harmonized Histories (Perelli-Harris et al., 2010a).

population structure in the year of the survey, the analyses presented in this chapter do not incorporate weights. This implies that the results presented in this chapter might not be representative of the overall distribution of the examined partnership formation behaviours in Norway. However, this is not a major limitation of this chapter because the aim is not to provide population estimates but to explore how the different methods can be applied to the same problem.

2.3 Sequence analysis

Sequence analysis (SA) represents each individual life course by a sequence (i.e. a character string, which indicates the order and duration of states that the individual occupied in each year). For example, in this application, the sequence SSSCCMMMM means that the respondent was never partnered (S) for three years, then cohabited (C) for two years, and afterwards was married (M) for four years. Due to the large possible number of combinations of states, usually very few individuals experience the exact same sequence. To reduce the number of sequences, Optimal Matching Analysis (OMA) is used. This approach was introduced to the social sciences by Abbott (1995).

OMA is a technique that measures the dissimilarity between sequences by identifying how similar pairs of sequences are. Similarity is defined in terms of the number, order, and duration of states within the sequences. The algorithm calculates the similarity or dissimilarity between two sequences by taking into account three possible operations: replacement (one state is replaced by another one), insertion (an additional state is added to the sequence), and deletion (a state is deleted from the sequence). The fewer operation of any kind is needed to turn one sequence into the other, the more similar two sequences are while the more operation is needed, the more dissimilar they are. Furthermore, to each operation, a certain cost can be attached. Therefore, identifying the relative cost of all operations is critical to determining (dis)similarity between sequences. Unfortunately these require *a priori* definition by the researcher with little objective measure of the correct specification, and results can be highly sensitive to their specification (Brzinsky-Fay & Kohler, 2010). In particular, the specification of higher insertion and deletion costs tends to reduce the number of substitutions and hence the estimated distance between differing sequences. The distance

between two sequences is defined by the minimum costs of the operations that are necessary to transform one sequence into the other (Abbott & Tsay, 2000). The distances are recorded in a dissimilarity matrix.

Then, in order to find existing patterns in the data, cluster analysis is performed on this dissimilarity matrix. The aim of the cluster analysis applied here (k means cluster analysis) is to minimise the chosen within cluster distance and maximise the between cluster distance. The researcher needs to specify the number of clusters to be extracted from the data either *a priori* (e.g. k-means clustering) or by using fit statistics. Once the clusters are formed, they can be described with respect to the grouping variables (in this example partnership experiences). Comparison of sequences can also be based on the number of episode changes within once sequence, the length of the sequences, or the number of different events in a sequence (Brzinsky-Fay & Kohler, 2010). Furthermore, the clusters can be used both as independent and dependent variables in further analyses (although the former approach has not been widely applied).

2.4 Latent class growth models

Latent Class Growth Models (LCGMs) are a form of growth curve models with the key assumption that individuals are drawn from different subpopulations (classes), and hence an overall population growth curve cannot adequately describe individual deviations, even with the addition of continuous random effects. Similarly to SA, these models have an individual centred perspective meaning that they seek to identify relationships between individual response patterns and form groups based on these patterns (Jung & Wickrama, 2008). Growth curves are typically formed by identifying a response variable for an individual across a number of time intervals (these need not be equally spaced). Changing expected values of this response are defined by a model including parameters for an intercept and slope. The intercept and slope parameters are typically allowed to vary based not only on observed covariates (e.g. education) but also on groupings extracted from response patterns (latent classes).

The latent classes are presented in Equation 2.1. We define 1…*J* classes, which are denoted by C_j. The response (in this application partnership state) is

defined as the random variable *y*, with the growth curve for this variable defined by intercept (α) and slope parameters (β) for time *t*. Since in this example *y* is nominal, it is transformed by a link function (e.g. logit). Note that all of these parameters can vary between classes. The shape of the growth curves can be altered by the inclusion of covariate information, in this case educational attainment. In this example the parameter $\beta_{3,j}$ can alter the intercept according to the vector of dummy variables *educ* corresponding to educational level, and the slope similarly altered by $\beta_{4,j}$. We note that although this model can be extended to include individual level deviations from the overall population line (via a random effect) to form the more general Growth Mixture Model, we were unable to include this in our current approach for computational reasons.

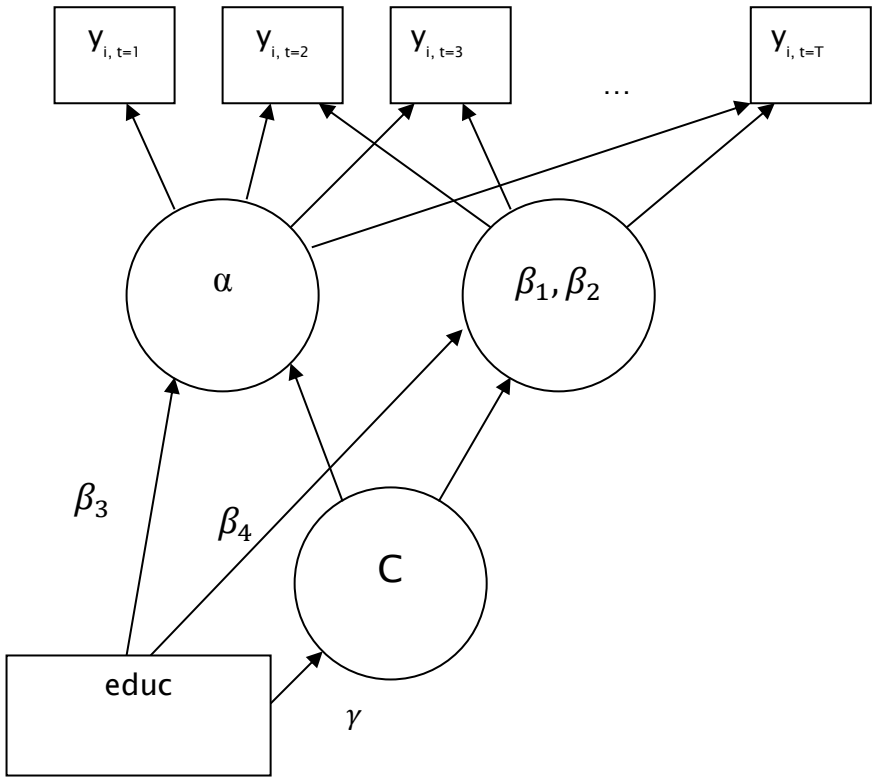
$$f(y_{tj}) = \alpha + \beta_{1,j}t + \beta_{2,j}t^2 + \boldsymbol{\beta_{3,j}educ} + \boldsymbol{\beta_{4,j}educ\ t} \quad (2.1)$$

As with other latent class analysis, membership of a particular class can be determined by covariate information. This is represented as the probability π^jwhich is defined as $\Pr(C_j = j)$ and can depend on covariate information (in this case a vector of dummy variables representing educational attainment). This is presented in Equation 2.2 where $\boldsymbol{\gamma}$ is a vector of coefficients and $f(\pi^j)$ is a link function.

$$f(\pi^j) = \boldsymbol{\gamma\ educ} \quad (2.2)$$

To further facilitate interpretation, Figure 2.1 shows the conceptual model of LCGMs. Manifest variables are presented by squares and latent variables are depicted by circles.

Figure 2.1 Conceptual representation of LCGM with covariates altering the growth trajectories

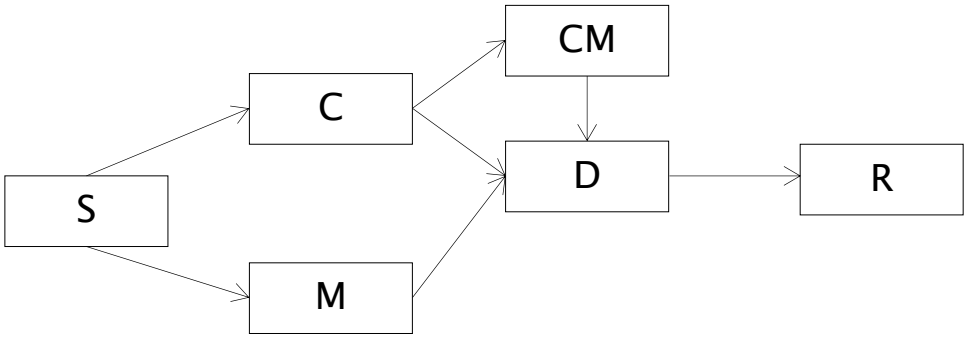


LCGMs can incorporate covariate information in two ways. First, covariates can be used to predict membership of a certain class, accounting for the probability of class membership (Wang et al., 2005). This is estimated by the γ coefficient in Equation 2.2 and Figure 2.1. This approach is comparable to sequence analysis. Where LCGMs have an advantage over SA is that they allow for covariates to alter the shape of the trajectories (through coefficients β_3 and β_4). More specifically, the growth curve specified within each class is a function of covariate information and hence the trajectories will not only depend on class membership but also vary by education. An additional advantage of LCGMs is that a variety of fit statistics are available for deciding the optimal number of classes and can be validated via simulation since the estimates are model based. However, the different criteria and test statistics (such as AIC, BIC or Lo-Mendell-Rubin Likelihood Ratio Test) can lead to different and sometimes contradictory conclusions (Nylund et al., 2007).

2.5 Multi-state event history models

Multi-state event history models differ from SA and LCGMs in that they do not aim to classify or group individuals. It is a variable-centred approach where the main purpose is to establish statistical relationships between the independent variable(s) and several transitions. Multi-state event history models are an extension of simple event history models; rather than examining one transition, this approach allows individuals to move among different states over time. These movements are assumed to be stochastic and are modelled by means of transition probabilities. Thus, multi-state event history models allow for examining covariate effects on several transitions within the same model.

Figure 2.2 Multi-state event history model



Note: S – never partnered, C – cohabitation, M – direct marriage, CM – marriage preceded by cohabitation with the same partner, D – union dissolution, R – re-partnering

Another distinct advantage of this method is the possibility to include time-varying covariates and thereby examine how the influence of a variable of interest changes over the family life course. For example, it is possible to examine the influence of educational attainment, which may change over the life course, on several family life transitions. This cannot be done using simple event history models, SA or LCGMs. The original multi-state model assumes the Markov property; that is that the present behaviour of an individual is enough to predict its future behaviour (Andersen & Keiding, 2002; Hougaard, 1999). For example, it would assume that the transition probability from marriage to union dissolution is the same for all individuals irrespective of whether they have cohabited before marriage. As life course theory emphasises that earlier transitions play an important role in later transitions, this assumption is not realistic when taking a life course perspective. In order to be able to examine

the partnership transitions in a dynamic way, the original Markov model can be extended.

By defining the state 'CM', the model allows for differentiating between direct marriage and marriage that was preceded by cohabitation. Without defining such a state, the model would assume that the influence of education is the same on the transition to direct marriage and to marriage that was preceded by cohabitation. One disadvantage of multi-state event history models is that as the number of states gets bigger and as individuals move along the life course, one might end up with small cell sizes and thus, with unreliable estimates of the transition hazards.

Figure 2.2 shows the multi-state model estimated in this chapter, where the following states are defined: never partnered (S), cohabitation (C), direct marriage (M), marriage that was preceded by cohabitation with the same partner (CM), union dissolution (D) and re-partnering (R). In this application I do not distinguish between cohabitation and marriage as a form of re-partnering due to the relatively small cell sizes and in order to keep the models comparable. The multi-state event history model is estimated as a stratified continuous-time Cox model where each transition is represented by a different stratum (de Wreede et al., 2011; Putter et al., 2007; Putter et al., 2006). This means that we allow for each transition to have a separate baseline hazard. Covariates are incorporated as transition-specific covariates to allow for the effect of the covariates to differ across transitions. The transition hazard of individual *k* is given by Equation 2.3

$$\lambda_{ij}(t|\boldsymbol{Z}) = \lambda_{ij,0}(t)\exp\left(\boldsymbol{\beta_{ij}}^{T}\boldsymbol{Z}_{ij}\right) \tag{2.3}$$

where ij indicates a transition from state i to state j, $\lambda_{ij,0}(t)$ is the baseline hazard of this transition, $\boldsymbol{Z}$ is the vector of covariates at baseline and $\boldsymbol{Z}_{ij}$ is the vector of transition-specific covariates.

2.6 Variables

Level of education. In all three models, the highest level of education at the time of the survey is measured by a categorical variable with the following categories: low (ISCED 0, ISCED 1, and ISCED 2), medium (ISCED 3 and ISCED 4), and high education (ISCED 5 and ISECD 6). High education is used as the

reference category in all three models. In the multi-state event history models, education is measured as a time-varying variable which is created using information on the year and month of reaching the highest level of education. We assume continuous education from age 15 and that secondary education takes 4 years while high education takes 3 years on average. Missing information (7.9%) on the year and/or month of reaching the highest level of education was imputed using information on the median age of finishing education by educational level. In LCGMs and SA, education is time-constant and indicates the highest level of education at the time of the survey. Where censoring occurs in these models it is assumed to follow a MCAR process.

Educational enrolment is measured by a time-varying categorical variable and indicates whether the respondent was enrolled or not (reference) in full-time education in the given month. This variable is used as a control variable only in the multi-state event history model.

2.7 Modelling strategy

This chapter presents three sets of analyses. First, using sequence analysis, several groups are created based on women's yearly[19] partnership trajectories between age 15 and 40. Women who have had similar family life experiences are expected to belong to the same cluster. After performing OMA with equal costs assigned to insertion and deletion (in this instance 1), individuals are allocated to clusters based on Ward's distance. Insertion and deletion costs are typically set by the researcher according to existing literature. The levels at which these costs are set can influence the number of clusters extracted as well as cluster allocations (Brzinsky-Fay et al., 2006). Exploration of the sensitivity of the clusters extracted is, however, beyond the scope of the current analysis. We assess the number of clusters based on two measures of average cluster linkage; the Calinski–Harabasz pseudo-F index (Calinski & Harabasz, 1974) and the Duda–Hart index (Duda & Hart, 1973). These statistics help to determine the optimal number of clusters by comparing the ratio of the within cluster distances to the between cluster distances. The Duda-Hart index

[19] Yearly intervals are used to reduce dataset size and to increase the speed of estimation.

also produces a pseudo T-statistic[20], which can be used for assessing the number of clusters. We note that while the Duda-Hart index requires hierarchical clustering for valid inference, this assumption is not a requisite for the Calinski-Harabasz index. Once the optimal number of clusters is established, cluster allocation is used as a response variable in a multinomial logistic regression. The models are estimated using the SQ-Ados ado for Stata 12 (Brzinsky-Fay et al., 2006).

Then, the analysis is repeated using LCGM. Latent class growth models extract a number of classes of partnership behaviour. The number of classes is decided using a variety of fit statistics, including AIC, BIC and Sample-Size adjusted BIC. A set of 2, 3, 4, and 5 class models are explored and, for all classes, the Lo-Mendell-Rubin-Likelihood Ratio Test (LMR-LRT) is performed. This test examines the improvement in model fit for a J class model compared to a J-1 class model. In case of a 2 class model, this test is equivalent to examining whether the Latent Class Growth Model performs better than a simple Latent Growth Model, which assumes that one growth curve is enough to describe women's partnership behaviours. We do not include the analogous Bootstrap Likelihood Ratio test due to excessive computational demands. The models are estimated in Mplus 6.2 for Linux, via the iridis-3 cluster computer provided by the University of Southampton. Note that we do not explore models with more than 5 classes[21]. Due to the specification of partnership state as a nominal variable, the implementation of this model is not part of the main Mplus language. As a result, model estimation is computationally intense due to both the difficulty of the calculations required and the volume of data to be read (the data file needs to be expanded to person-period format). Classes are formed based on yearly partnership histories[22] and include education as a predictor of class membership as well as a covariate that can alter the partnership trajectories. This is important as a significant effect of education on the growth trajectory can be regarded as evidence of the importance of

[20] $\frac{1}{(\frac{Je(2)}{Je(1)})} = 1 + \frac{T^2}{N_1+N_2-2}$, where N_c denotes the number of observations in cluster *c*.

[21] Initial posterior exploration revealed that higher order results tended to produce sparsely populated classes, which limits interpretability.

[22] Yearly intervals are used to reduce dataset size and to increase the speed of estimation. Robustness checks for similar analyses have shown the reduction in information from monthly to yearly intervals do not substantially influence the results (Perelli-Harris and Lyons-Amos 2013).

education in the model and that ignoring this association can distort the relationship between the observed variables and class (Jung & Wickrama, 2008). To ensure convergence, the individual level variance is specified at zero around each growth curve (some classes have zero probabilities across the life course for some partnership states).

Last, we study the influence of education on all examined partnership transitions using multi-state event history analysis. Using monthly information on partnership experiences, the model is estimated as a continuous-time stratified Cox regression where each transition represents a stratum. To estimate this model, an augmented dataset needs to be used with one row per transition that the individual is at risk for. Women are observed from age 15, when they are never partnered until age 40, the time of the survey or the time when they experience re-partnering, whichever happens earlier (N = 7,704). As educational attainment is defined as a time-varying categorical variable, additional episode splitting is performed where an educational transition happened within an at-risk period. The models are estimated using the *mstate* package in R (de Wreede et al., 2011). These models allow us to estimate the influence of education on each transition within the same model.

2.8 Results

2.8.1 Sequence analysis

Table 2.1 presents the Calinski–Harabasz and the Duda–Hart indices for 2 to 6 cluster models.

On the Calinski–Harabasz and Duda–Hart indices, higher values indicate more distinct clustering, whereas for the related Duda–Hart Pseudo T-square measure, lower values are indicative of more distinct grouping. There is disagreement between these indices as to the optimal number of clusters; the Calinski–Harabasz index indicates a 3 cluster solution to be optimal, while the Duda-Hart indices indicate that both a 3 and a 4 cluster solution would be plausible (shown by the high value of the Je(2)/Je(1) index and the corresponding low value of the derived Pseudo T-square statistic for both a 3 and 4 cluster solution). As both sets of indices show that a 3 cluster solution is plausible, we proceed with a 3 cluster model.

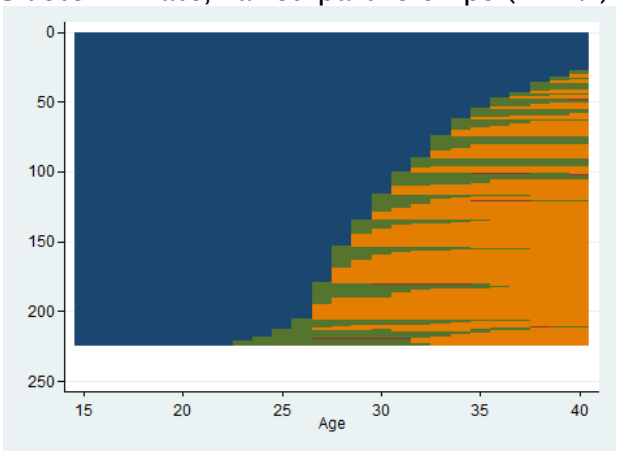
Table 2.1 Calinski–Harabasz and Duda–Hart indices for k cluster specifications

Number of clusters (k)	Calinski–Harabasz Pseudo-F	Duda–Hart indices	
		Je(2)/Je(1)	Pseudo T-square
2	97.80	0.493	311.78
3	**210.60**	*0.9719*	*5.81*
4	144.42	**0.9921**	**1.07**
5	108.67	0.742	80.86
6	116.24	0.504	98.56

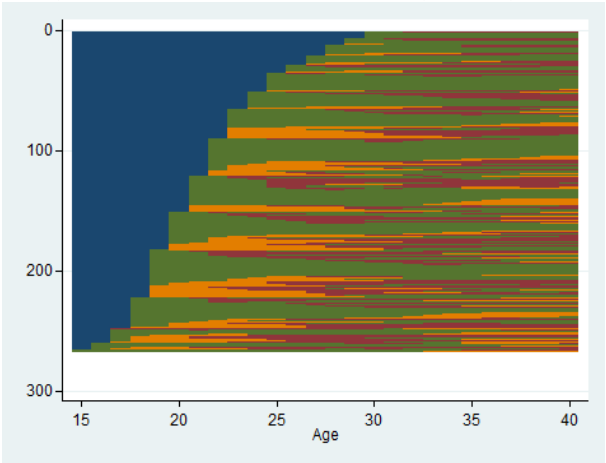
Note: Numbers in boldface indicate the best fit for the given index. Numbers in italics indicate additional plausible values.

Figure 2.3 Results of sequence analysis

a) Cluster 1: Late, varied partnerships (17.4%)



b) Cluster 2: Cohabitation (20.7%)



c) Cluster 3: (Direct) marriage (61.9%)

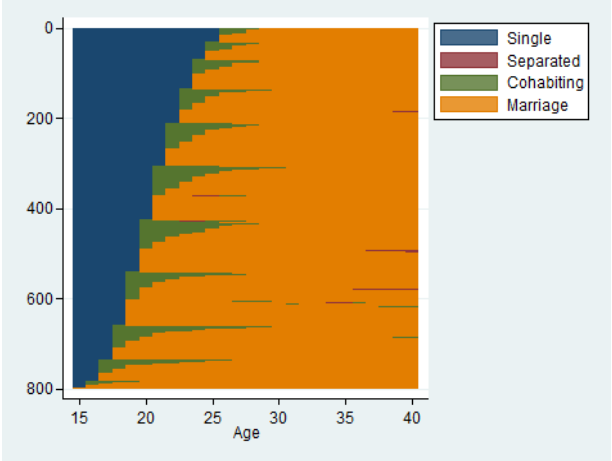


Figure 2.3 depicts the results of cluster analysis. The first cluster (Figure 2.3, panel a) is characterised by relatively late partnership formation, where the

first partnership is typically cohabitation most of which translates into marriage and only some ends with union dissolution. Additionally, some women enter marriage directly. Therefore, this cluster is titled '*late, varied partnerships*'. Women who belong to the second cluster form first partnerships at a relatively young age (Figure 2.3, panel b). Most of these partnerships are long term cohabitation with relatively high union instability. Therefore, this group is referred to as the '*cohabitation'* cluster. The third cluster (Figure 2.3, panel c) consists of women who experience early and direct marriage. Unions which start as cohabiting partnerships later translate into marriage, and most of these partnerships are stable. This cluster is, thus, named the '*(direct) marriage*' cluster.

After having identified these three clusters, we apply multinomial logistic regression to assess how educational attainment influences the odds of women to belong to one of the three clusters (Table 2.2). To facilitate the interpretation of the relative risk ratios, predicted probabilities are calculated (Table 2.3). The results show that more educated women have a higher probability to belong to the first cluster (late and varied partnerships) than lower educated women. Moreover, low educated women are more likely to belong to the cohabitation cluster (cluster 2) than medium or high educated women. Finally, there are no significant educational differences in the probability of belonging to the direct marriage cluster (cluster 3).

Table 2.2 Results of the multinomial logistic regression, regression coefficients

	Membership of cluster 1 vs cluster 3	Membership of cluster 2 vs cluster 3
Education		
High (ref)		
Medium	-0.264***	0.149**
Low	-0.212***	0.085***
Intercept	-1.133***	-1.165***

*Note: *p < .05. **p < .01. ***p < .001 . p<0.1*

Table 2.3 Predicted probabilities of cluster membership by educational level

Cluster	Low education	Medium education	High education
1 Late, varied partnerships	0.15	0.16	0.19
2 Cohabitation	0.22	0.21	0.19
3 Direct marriage	0.62	0.62	0.61

2.8.2 Latent class growth models

Table 2.4 presents fit statistics for 2, 3, 4 and 5 class models. The LMR-LRT p-value indicates that the 2 class model is an improvement over a 1 class model, justifying the LCGM approach. All fit statistics indicate improving model fit with the addition of higher order classes. From the examined models, the 5 class model demonstrated the best model fit based on AIC, BIC and Sample Size BIC (SSBIC) statistics. We note that the LMR-LRT indicates that a 4 class model is adequate, but we select a 5 class model since this is the optimal number of classes for a greater number of fit statistics.

Table 2.4 Fit statistics for 2, 3, 4 and 5 class models

Number of classes (J)	AIC	BIC	SSBIC	LMR-LRT (p-value)
2	138352.929	138731.851	138588.841	0.000
3	132500.352	133081.366	132862.085	0.016
4	129273.584	130056.690	129761.137	**0.021**
5	**126725.499**	**127710.697**	**127338.871**	0.174

Note: Numbers in boldface indicate the best fit based on the given statistic.

The five extracted classes are presented by educational attainment in Figure 2.4. Panels A to E present partnership profiles for each class extracted for women with a) high educational attainment, b) medium educational attainment, and c) low educational attainment.

Class 1 captures early and varied partnership forms, with an initial increase in the probability of both cohabitation and marriage for all educational levels. The probability of marriage peaks around the age of 24 for high and medium educated and at 22 for low educated, and declines thereafter. The probability of cohabitation rises, plateauing at age 22 for high and medium educated and at age 19 for low educated, before increasing again from around age 31 onwards. These relationships, formed at relatively early ages, are unstable; the probability of separation is high across all partnership forms and educational levels peaking around 0.6. There is some variation in how the probability of

separation changes over age by educational attainment. For women with high or medium education, the probability of separation increases and remains persistently high until age 40. In contrast, for low educated women it reaches its maximum at age 35 and falls thereafter, corresponding to an increase in the probability of post-separation cohabitation.

Class 2 broadly represents a long-term cohabitation pattern. Most women at all educational levels form cohabiting relationships from their early 20s, with a peak in the probability of cohabitation around the age of 28 for high and medium educated women and at age 25 for low educated women. Thereafter, the probability of being in a cohabiting relationship decreases among women with high and medium education, coinciding with an increasing probability of marriage from around age 31, which reaches 0.45 for highly educated women and 0.39 for women with medium education. In contrast, women with low education continue to exhibit a high probability of cohabitation (nearly 0.7 at age 40). Consequently, the corresponding increase in the probability of marriage is limited, reaching only 0.2 by age 40 indicating a lower degree of union formalisation among women with low education. Additionally, the probability of separation is more than twice as large among low educated women as among their more educated counterparts.

Class 3 describes a generally early transition to marriage with some pre-marital cohabitation. Women with high and medium education have very similar partnership experiences: partnership formation begins with a small bump in the probability of cohabitation, followed by a transition to marriage with a 50% chance of being married around age 22. The probability of marriage is close to 1 among these women in their late 20s and it remains high with little evidence of separation. The patterns are slightly different for women with low education. Entry into partnership occurs earlier, with a decline in the probability of being single already from age 15. The probability of pre-marital cohabitation is higher among low educated women than among their more educated counterparts (peaking around 0.3 compared to under 0.2 for both medium and high educated women). Marriage tends to occur later.

Class 4 represents the most ‘modern’ partnership form with a considerably high incidence of cohabitation before marriage, with a peak at age 25, when the probability of cohabitation is roughly 0.4. Thereafter, many unions are

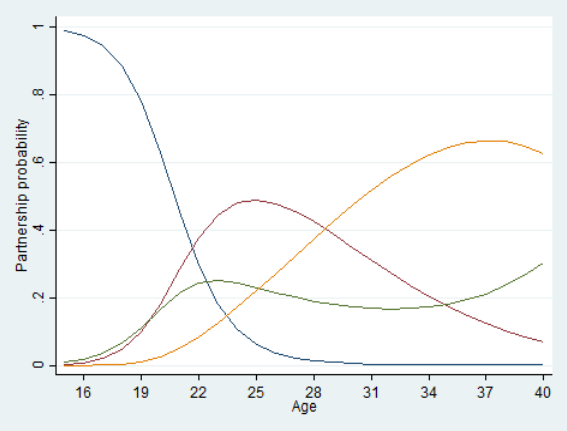
translated into marriage, the probability of which peaks around age 31. We observe roughly similar patterns of partnership formation for women of all educational levels but there are considerable differences in the timing of different partnership transitions. Women with low education tend to enter partnerships later than the more educated. Among low educated women, the probability of remaining never partnered stays close to 1 until age 21 while among medium and high educated women, this happens around age 18. Additionally, women with low education are less likely to experience cohabitation before marriage: the peak of the probability of being in a cohabiting relationship is roughly 0.35, compared to 0.40 and 0.47 for women with high and medium education, respectively.

Finally, Class 5 captures a more complex pattern of late partnership formation. Irrespective of educational level, the probability of being never partnered does not decline until after age 25 and it never falls below 0.2. After age 25, union forms are varied; the most and the least educated are more likely to form cohabiting unions than marriages at all ages while women with medium education are more likely to be married after age 37. Finally, there is some incidence of union instability in this class at later ages.

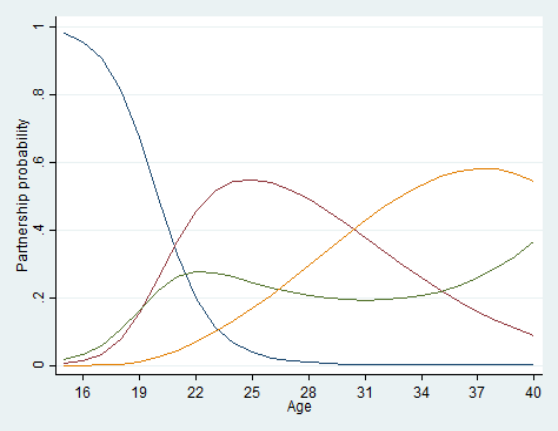
Figure 2.4 Results of the 5 class latent class growth models by education (predicted proportion of women in each class)

Panel A. Class 1: Early, varied partnerships (30.7%)

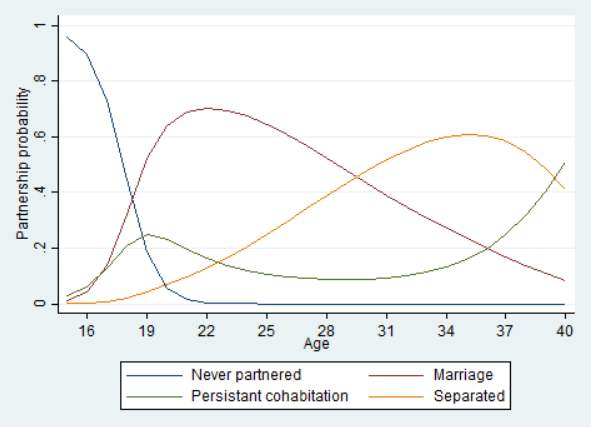
a) Highly educated



b) Medium educated

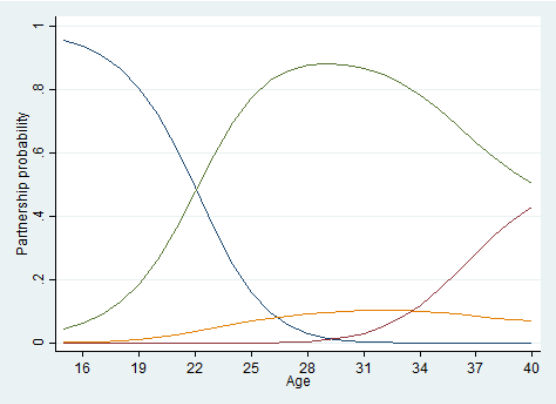


c) Low educated

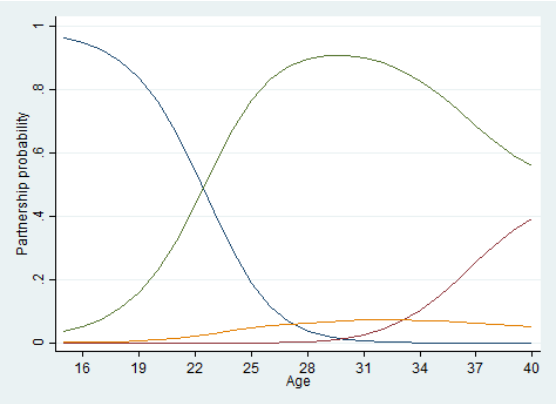


Panel B. Class 2: Early cohabitation with late translation to marriage (12.6%)

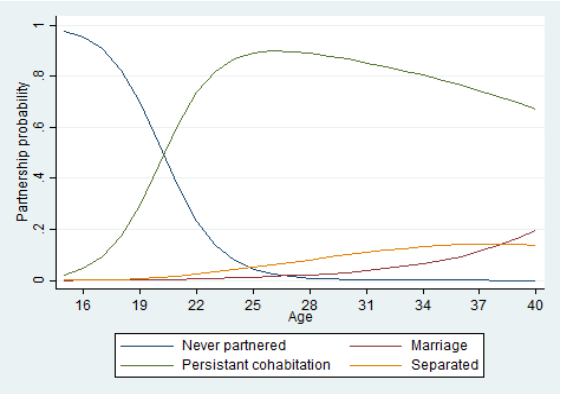
a) Highly educated



b) Medium educated

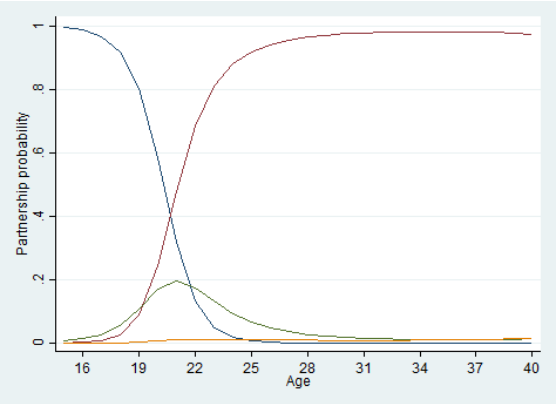


c) Low educated

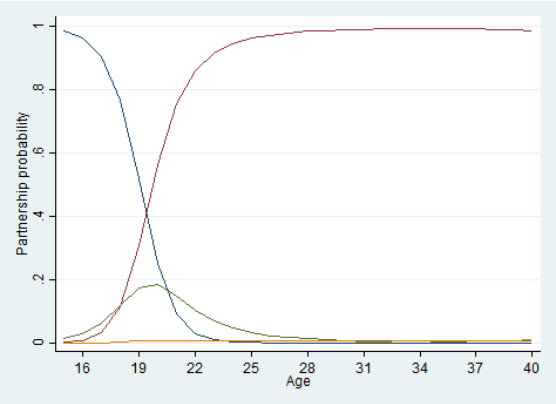


Panel C. Class 3: Early marriage with some cohabitation (21.5%)

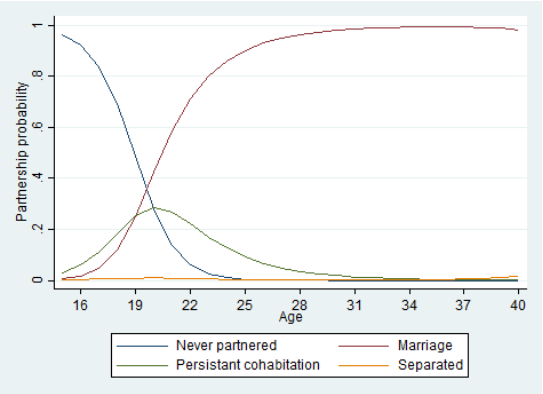
a) Highly educated



b) Medium educated

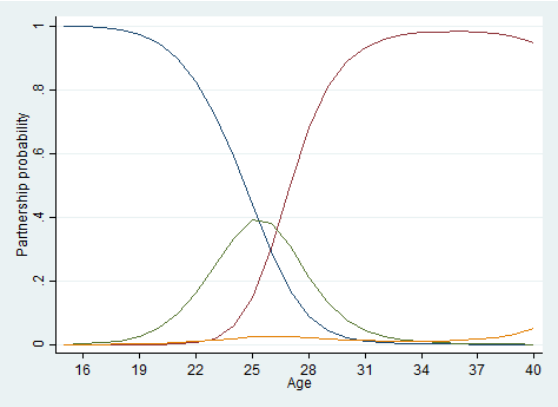


c) Low educated

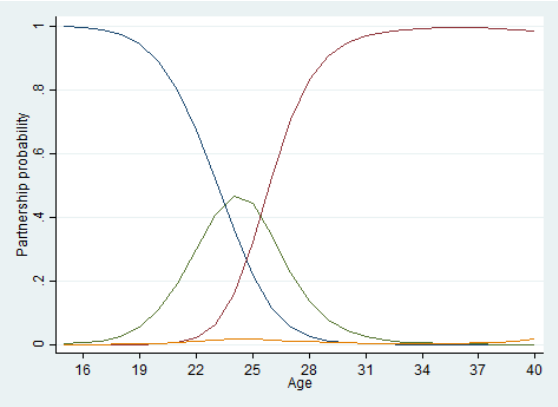


Panel D. Class 4: Marriage preceded by cohabitation (25.0%)

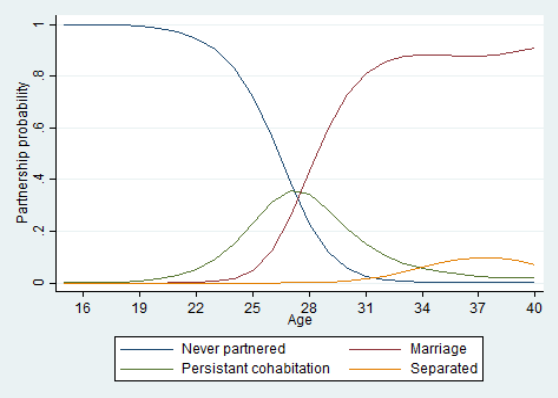
a) Highly educated



b) Medium educated

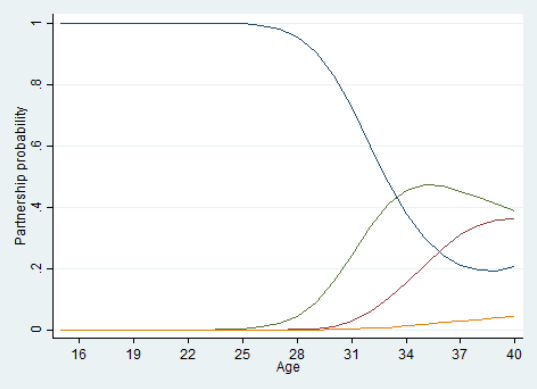


c) Low educated

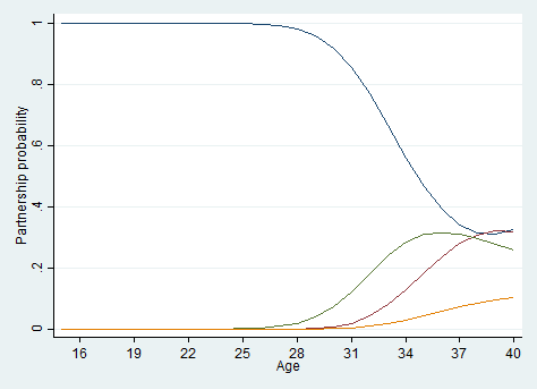


Panel E. Class 5: Late and heterogeneous partnership forms (10.0%)

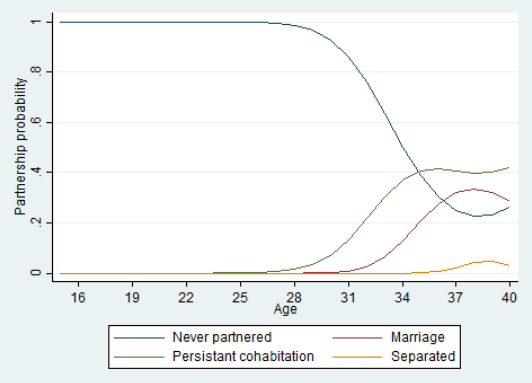
a) Highly educated



b) Medium educated



c) Low educated



To further facilitate the interpretation of educational differences across classes, Table 2.5 presents the predicted probabilities of class membership by education. This table indicates that medium and highly educated women have a higher probability to belong to the 'early marriage with some cohabitation' class (Class 3) and to the 'marriage preceded by cohabitation' class (Class 4) than their low educated counterparts. Additionally, low educated women have a much higher probability (0.52) to belong to the 'early, varied partnerships class' (Class 1) compared to those with medium education or higher (0.15 and 0.11, respectively). Last, we did not find large educational differences in the predicted probability of belonging to Class 2 ('early cohabitation with late transition to marriage') or Class 5 ('late and heterogeneous partnerships'). These results also indicate that women with higher educational attainment generally experience more complex partnership patterns. The modal class for women with low education is Class 1 ('early, varied partnerships') while for medium and highly educated women it is Class 3 ('early marriage with some cohabitation') although their probability to belong to Class 4 ('marriage preceded by cohabitation') is also larger than that of the other classes.

Table 2.5 Predicted probability of class membership by educational level

Class number	Educational level		
	Low	Medium	High
1	0.52	0.15	0.11
2	0.15	0.12	0.12
3	0.11	0.34	0.39
4	0.13	0.28	0.29
5	0.09	0.11	0.09

2.8.3 Multi-state event history model

Table 2.6 describes the number of women who were at risk of each transition (total entering) and the number and proportion of those who experienced them. In the examined sample, 45% of never partnered women formed a cohabiting union while 17% of them got married. Just over one third of cohabiting unions transitioned to marriage while 22% of them ended in union dissolution. A similar proportion (24%) of direct marriages ended with union dissolution. At the same time, the proportion of union dissolutions following

marriage that was preceded by cohabitation was somewhat lower (19%). Finally, 24% of women who experienced union dissolution formed a new partnership.

Table 2.6 Number (and proportion, %) of women who experience each partnership transition

	S	C	M	CM	D	R	no event	total entering
S	0	915 (45%)	341 (17%)	0	0	0	755 (38%)	2011
C	0	0	0	424 (37%)	250 (22%)	0	461 (41%)	1135
M	0	0	0	0	70 (24%)	0	222 (76%)	292
CM	0	0	0	0	106 (19%)	0	452 (81%)	558
D	0	0	0	0	0	133 (24%)	429 (76%)	562
R	0	0	0	0	0	0	0	0

The results of the multi-state event history model are summarised in Table 2.7. The findings indicate that higher educated never partnered women born between 1955 and 1964 have a higher risk of entering direct marriage than medium and low educated women when controlling for educational enrolment. Furthermore, education has a positive gradient on the transition from cohabitation to marriage; low and medium educated cohabiting women are about 60% less likely than their highly educated counterparts to marry their cohabiting partner. Finally, education has a positive gradient on the risk of re-partnering following union dissolution; low educated women have an almost 70% lower risk while medium educated women have a 54% lower risk of finding a new partner after union dissolution than highly educated women. Education does not have a significant influence on the transition to a first cohabitation, on the transition from cohabitation to union dissolution, and on the dissolution of a marital union, whether or not it was preceded by cohabitation. Additional analyses revealed that the differences in the transition risks of low and medium educated women were not significantly different after controlling for educational enrolment (results not shown).

Table 2.7 Results of the multi-state event history model, hazard ratios

	S → C	S → M	C → CM	C → D	M → D	CM → D	D → R
Education							
Low	1.05	0.64*	0.39***	0.79	1.21	1.49	0.31***
Medium	0.92	0.68*	0.38***	1.01	0.81	1.33	0.46***
High (ref)							
Enrolment							
No (ref)							
Yes	0.64***	0.53***	0.55***	1.53**	1.71	1.14	0.97

*Note: *p < .05. **p < .01. ***p < .001*

2.9 Conclusion and discussion

This chapter illustrated the applicability of three methodological approaches (i.e. sequence analysis, latent class growth models, and multi-state event history models) to the analysis of life course data focusing on the influence of education on partnership experiences with an application to Norwegian women born between 1955 and 1964. These methods have several similarities and differences. For example, sequence analysis and latent class growth models establish the relationship between education and the probability of belonging to certain groups (clusters or classes) based on women's partnership experiences. In our application, sequence analysis revealed three clusters based on women's partnership experiences (late, varied partnerships; cohabitation; and (direct) marriage); while latent class growth models suggested the existence of five partnership classes (early, varied partnerships; early cohabitation with late translation to marriage; early marriage with some cohabitation; marriage preceded by cohabitation; and late, heterogeneous partnerships). Multi-state event history models do not classify individuals but rather examine the influence of education on every partnership transition thereby enabling us to draw conclusions about the changing influence of education over the early family life course.

Overall, the examined methods arrive at similar conclusions with respect to the influence of education on partnership experiences. For example, sequence analysis suggests that higher educated women are more likely to belong to the late, varied partnerships cluster. Similar conclusions can be drawn from the results of multi-state models; more educated women were found to have a higher risk of finding a new partner following union dissolution than their lower educated counterparts. However, the results of the LCGMs did not

suggest significant educational differences in the probability of belonging to the 'late and heterogeneous partnerships' class (Class 5). Additionally, sequence analysis revealed that the more educated are less likely to belong to the cohabitation cluster than their lower educated counterparts. However, multi-state event history models did not detect significant differences between the risks of high and low or high and medium educated women to enter cohabitation between age 15 and age 40. Similarly, LCGMs did not find educational differences in the probability of belonging to Class 2 ('early cohabitation with late transition to marriage'). Moreover, while sequence analysis detected no educational differences in women's probability to belong to the (direct) marriage cluster, multi-state models revealed that the more highly educated have a higher risk of experiencing direct marriage than the lower educated. Additionally, the results of LCGMs showed that low educated women are the most likely to belong to the 'early, varied partnerships' class (Class 1). Finally, both LCGMs and multi-state event history models found that women with higher education are more likely to marry their cohabiting partner, while no conclusions can be drawn based on the results of SA with respect to this transition.

The examined methods have different properties and approach studying the life course in a different way. In order to emphasise the strengths of each technique and to accommodate their limitations, the presented analyses could not have been implemented in exactly the same way for the three techniques. For example, the multi-state event history model was estimated using monthly data while the other two approaches relied on yearly data due to computational issues. This implies that in LCGMs and SA the number of transitions might be underestimated and some variation in life courses might be lost. Additionally, the multi-state event history model incorporated a time-varying education variable while the other two methods investigated the association between the highest level of education (i.e. a time constant variable) and partnership formation. Finally, while the multi-state event history model estimated the influence of education on first, and second and higher order partnership transitions separately (in order to emphasise this feature of the model) LCGMs and SA did not distinguish between first and higher order unions. These differences in the implementation of the analyses could potentially explain the differences in the results of the multi-state event history model and the other

two methods but they cannot account for differences between the results of SA and LCGMs. However, it has been shown that SA and LCGMs should not be expected to give the same answer. Using simulated data, Warren et al. (2012) showed that the number of trajectories these methods produce might differ from each other as well as from the true number of trajectories. Moreover, LCGMs and SA might assign the same individuals to different trajectory groups. Replicating the result of SA with five clusters (results not shown) revealed that the cohabitation cluster was further split into three, more homogeneous (but also much smaller) clusters: a cohabitation cluster, a separation cluster, and a cluster which is very similar to what was shown in the results section for the second cluster. This indicates that specifying a larger number of clusters does not actually lead to the emergence of new patterns; only the already existing patterns can be further split into more homogeneous but not necessarily more unique or more meaningful clusters. This is in line with what the Calinski-Harabasz and Duda-Hart indices suggested.

Even though the applications are not exactly the same and occasionally provide somewhat different results, by illustrating the properties and application of the different techniques, we were able to identify similarities and differences between these methods with respect to their ability to address certain desirable aspects of studying the family life course. These are summarised in Table 2.8.

Based on this table, we can formulate broad recommendations for researchers choosing between different life course methods. First, sequence analysis is best applied to research questions which attempt to describe partnership behaviours of different groups of women and the overall associations of these groups with certain covariates. This can be achieved through the method's ability to classify individuals and allow for covariates to predict women's membership in the different clusters. Overall, fitting the model does not require a lot of computing power and due to the fact that the procedure is not model based, the user is protected against baseline misspecification (i.e. no baseline needs to be specified). Although not presented in this chapter, the method can also calculate transition intensities between the different states. As it is not possible to condition sequences, or more importantly transition probabilities, on covariate information or to allow for the incorporation of

changing covariate information over the life course, this method cannot answer research questions relating to the changing influence of a variable.

Table 2.8 Summary of the properties of sequence analysis, latent class growth models, and multi-state event history analysis

	SA	LCGM	Multi-state event history model
Transition intensities	(✓)	×	✓
Classifying individuals	✓	✓	×
Covariate information alters pattern	×	✓	✓
Computationally simple	✓	×	✓
Time-varying covariate	×	×	✓
Model based	×	✓	✓
Protection against baseline misspecification	✓	×	✓

Note: The given method is ✓ able to, × not able to or (✓) partially able to deal with this dimension of the family life course.

Second, latent class growth models have a number of similar properties to sequence analysis. Its main advantage compared to sequence analysis is that it is able to incorporate more complicated structures by, for example, allowing for covariate information to alter the shape of partnership trajectories. Unfortunately, the implementation of LCGMs is computationally intense and requires considerable computing power to estimate models for large datasets. Moreover, the fact that LCGMs are model based implies that a greater degree of robustness check is required particularly when estimating the shape of the growth curves. (It should be noted that while LCGMs allow for testing the model performance via simulation approaches (e.g. Nylund et al., 2007), such a test is not available for sequence analysis. The detailed exploration of this issue is beyond the scope of this chapter). On the other hand, this also means that a greater variety of fit-statistics is available than in sequence analysis, where the decision of the optimal number of clusters is more arbitrary than in LCGMs. Thus, LCGMs are most suited to studying complex research topics where the aim is to identify differences in covariate effects between groups of individuals. This chapter has demonstrated this by extracting different classes

of partnership behaviour and comparing the effect of educational attainment within these classes.

Finally, although multi-state event history models do not classify individuals in the same way as the previous two techniques, there are a number of distinct advantages to using this method. For example, the estimation of transition intensities allows for examining several transitions over the life course within the same model as well as for estimating the changing influence of covariates over the life course by allowing for the incorporation of time-varying covariates. Neither sequence analysis, nor latent class growth models are capable of studying changing covariate effects over the life course. Additionally, the use of a stratified Cox model provides some protection against baseline misspecification. To conclude, multi-state event history models can best answer research questions related specifically to changing covariate effects over the life course. For example, as this chapter has shown, it can estimate the changing influence of education on different partnership transitions over the early family life course.

The analyses presented in this study have some limitations. First, the applied the multi-state event history model assumes that the hazards of the examined transitions for women with different educational level are proportional. This assumption might not be realistic[23]. The multi-state event history model would allow for the incorporation of interaction effects between age and education in order to relax the assumption of proportional hazards. However, LCGMs and SA is unable to explicitly incorporate such interactions.[24] Therefore, to keep the models as comparable as possible, we refrained from including interactions between age and education in the multi-state event history model. Second, as explained earlier, next to education many factors may influence the timing and sequencing of partnership transitions. For LCGMs and SA, which included a time-constant education variable, the influence of other time-constant covariates on the timing and sequencing of the examined transitions could have been studied. However, in the examined dataset time-varying information,

[23] Although Chapter 5 investigates a slightly different cohort of women (those born between 1950 and 1969) the results indicate no significant interaction effects between age and education for the examined partnership transitions in Norway.
[24] It would be possible to build sequences of changes in educational level and examine these sequences together with sequences of partnership states.

which was used in the multi-state event history model, could only be reconstructed for education. Including more covariates for LCGMs and SA but not for the multi-state event history model would not have facilitated the comparison of the methods and the results they produce. Last, the transition to first birth is closely related to the examined partnership transitions. While such a transition could easily be incorporated in the multi-state framework (see Chapter 5) it is not straightforward to incorporate it into LCGMs. For sequence analyses, it would be possible to model the transition to first birth as a separate process using multi-channel sequence analyses.

Taken together, by comparing sequence analysis, latent class growth models, and multi-state event history models this chapter contributed to the discussion on the applicability of different methods to studying the life course. We showed that latent class growth models and multi-state event history models are a useful addition to a life course researcher's methodological toolkit and that these methods can address certain research questions better than the more commonly applied sequence analysis or simple event history analysis. In particular, we have stressed the types of research questions that may be better addressed using these techniques which provide new insights in the field of life course studies.

3. Chapter 3 – Exploring changes in the intersection between partnership experiences and the transition to motherhood in Europe and the United States

3.1 Background and motivation

Chapter 1 has highlighted that partnership experiences and the transition to first birth have changed dramatically across Europe and the United States over the past decades. Using aggregate level information Chapter 1 examined single transitions and showed that first births and first marriages are being delayed (if not completely forgone), more first unions start as cohabitation and fewer of these cohabiting unions translate to marriage. I also showed that these changes had consequences for the partnership context of first births; the proportion of non-marital first births and the proportion of first births in higher order unions have increased. However, aggregate level data do not provide insight into changes in individual family life courses. In order to better understand the nature of these processes, this chapter uses survey data and examines changes in the intersection between partnership experiences and the transition to motherhood at the individual level. Additionally, this chapter investigates more complex transitions. As mentioned before, life course theory suggests that family life courses consist of several interdependent events and that events which happen earlier in the life course influence the timing and occurrence of later events (Elder, 1975, 1977, 1985, 1992). Consequently, in order to fully understand the implications of changing family life courses entire partnership *histories* need to be examined. Partnership histories are defined as the sequences of several consecutive partnership transitions. Focusing on partnership histories enables me to explore the link between multiple partnership pathways and the transition to first birth.

Thus, this chapter aims to enhance our understanding of changing family life courses and to examine some of the driving forces behind changing family

processes. I study changes in family behaviours by two key predictors: age and education. Examining these processes by age will allow for investigating the postponement of family formation. Additionally, studying changing family behaviours by educational attainment will shed light on possible socio-economic differences in family change. Therefore, the following research question is asked: How has the intersection between union formation and fertility behaviours changed over time by age and educational level across Europe and the United States? As the interrelationship between partnership experiences and the transition to motherhood by age and by education are further examined in Chapter 4 and Chapter 5, respectively, using more complex analyses, this chapter also provides the background for the rest of this thesis. The next subsections discuss the motivation for examining changing family behaviours by age (Section 3.1.1) and by education (Section 3.1.2) in more detail.

3.1.1 Postponement of partnership transitions and the transition to motherhood

Examining changes in the intersection between partnership experiences and the transition to motherhood by age provides insight into the interplay between the postponement of partnerships and the postponement of fertility in different countries. This is important because, as further explained in Chapter 4, changes in partnership dynamics and in the structure of family life courses contribute to the postponement of motherhood (Balbo et al., 2013). For example, partnership formation is being delayed (Corijn & Klijzing, 2001) and more women experience multiple partnerships before settling down with one partner (Wu & Schimmele, 2005). Additionally, delays and difficulties in finding an appropriate partner also contribute to the postponement of childbearing (Billari et al., 2007; Bongaarts, 2001; Keizer et al., 2008; Mills et al., 2011; Schmidt et al., 2012). The presence of a partner, however, is usually an essential condition to have a child (Bongaarts, 1978; Hobcraft & Kiernan, 2001; Kravdal, 2002; Philipov et al., 2006). Thus, changes in the structure of family life courses might further enhance the postponement of motherhood which has implications both at the individual and societal level. At the individual level, it leads to increased uncertainty as to whether a woman will become a mother or remain childless (Berrington, 2004). At the societal level,

these changes would imply that more women delay having a first child until it might be too late (Billari et al., 2007). This would result in even lower levels of fertility (González & Jurado-Guerrero, 2006).

As discussed earlier (see Chapter 1), not only changes in partnerships are associated with the postponement of childbearing but many other factors influence fertility postponement (Balbo et al., 2013; Mills et al., 2011). For example, changes in individuals' norms and values played a role in the emergence of new family behaviours. It is argued that changes in family behaviours occurred as a result of emerging self-actualisation and individualisation (Inglehart, 1977, 1990; Lesthaeghe & van de Kaa, 1986; Van de Kaa, 2002). This argument predicts that younger, more liberal, and more individualistic people are more likely to approve of new forms of living arrangements, compared to older, less liberal, and less individualistic people. This means that younger women are more likely to lead changes in family behaviours than older women. Thus, I expect that younger women are more likely to experience non-marital cohabitation and first birth within non-marital cohabitation or within more unusual forms of partnerships compared to older women. I anticipate that this is especially the case among younger cohorts. While among older cohorts it is reasonable to assume that women would have formed partnerships (primarily direct marriage) and have had a child at younger ages, it is likely that across cohorts these behaviours shifted to later ages. Additionally, as the structure of life courses change, it is expected that there will be more variation in partnership experiences and in the partnership context of childbearing among younger cohorts compared to older cohorts.

3.1.2 Educational differences in the intersection between partnership experiences and the transition to motherhood

Chapter 1 discussed the different explanations behind changing family behaviours. Changes in norms, in women's labour market position, the expansion of higher education and technological changes did not have the same influence on women's lives from different socio-economic background (McLanahan, 2004). Women from more advantaged socio-economic background typically delay partnership and family formation to later ages, which leads to further gains in resources through increased employment opportunities. At the same time, women from disadvantaged background are

more likely to experience divorce and non-marital childbearing which, in turn, further reduces their resources (McLanahan, 2004). This has led to increasing polarisation between women from different socio-economic groups (McLanahan, 2004). The level of such polarisation is likely to differ across countries depending on their legal and welfare systems (Rendall et al., 2009). For example, in countries where social and financial support is available for divorced or single mothers, this gap is expected to be smaller than in countries where no such support is provided. Alternatively, in family-policy regimes where childbearing is less costly because of generous maternity leave and subsidised childcare women of all backgrounds can afford to have children at younger ages than in policy regimes where this is not the case. Additionally, women with fewer resources can use available financial support to begin childbearing earlier (Rendall et al., 2009).

It has been shown that, indeed, women from different socio-economic background follow different paths to family formation. For example, the least educated are the most likely to experience divorce (Amato & James, 2010) or a non-marital first birth (Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2010b). At the same time, in the US more educated women were found to be more likely to marry than their lower educated counterparts (Goldstein & Kenney, 2001). This is important because growing up in a family with a single mother might mean fewer resources and worse outcomes later in life for children compared to those who grow up with two parents (McLanahan, 2004). Additionally, cohabiting unions are on average less stable than marriages which means that many such unions might break down following the birth of a child (Perelli-Harris et al., 2012). Therefore, as further explained in Chapter 5, socio-economic differences in family behaviours may contribute to the reproduction of social inequalities. Although the United States has higher levels of poverty and greater economic disadvantage compared to Europe (Furstenberg, 2014) an increasing gap in socio-economic resources between the least and the most educated was found across Western Europe and the United States (McLanahan, 2004).

On the other hand, the Second Demographic Transition (SDT) theory (Lesthaeghe & van de Kaa, 1986; Van de Kaa, 2002) and the theory of postmaterialism (Inglehart, 1977, 1990) postulate that new family behaviours are the manifestation of life course choices as a result of ideational and value

change (Perelli-Harris et al., 2010b; Surkyn & Lesthaeghe, 2004). Higher education is often considered in the literature as a path to more liberal and individualistic values (Perelli-Harris et al., 2010b; Weakliem, 2002). In other words, contrary to the previous arguments, more educated women are argued to be more likely to experience new family behaviours such as non-marital cohabitation, non-marital childbearing or childbearing within more unusual forms of partnerships compared to those who are less educated.

This chapter contributes to the above debate by examining educational differences in the levels and magnitude of new family behaviours. Instead of only focusing on non-marital childbearing, I show the proportion of first births following different partnership histories such as while being never partnered, within cohabitation, direct marriage, marriage that was preceded by cohabitation, following union dissolution, and after re-partnering. Additionally, I investigate whether and how these educational differences have changed across cohorts. Examining changes in family behaviours by education will highlight the role of socio-economic background in the changing partnership context of first births and will provide the background for Chapter 5.

3.2 Data and methods

3.2.1 Data and sample

To answer the research questions, I use data from the Harmonized Histories, a set of harmonised, nationally representative surveys from several European countries and the United States. These datasets include rich and extensive retrospective union and fertility histories. In this chapter I analyse data from 13 European countries and the United States. For most countries (Austria, Belgium, Bulgaria, Estonia, France, Italy[25], Lithuania, Norway, Romania, and Russia), the data come from the first wave of the Generations and Gender Survey (GGS), which are complemented with data for the Netherlands (Dutch Fertility and Family Survey, 2003), Spain (Spanish Fertility Survey, 2006), the United Kingdom (British Household Panel Survey, 2005/06), and the United

[25] In the Italian GGS, the month of birth of the respondents is not available due to data protection. Therefore, a uniform distributed random variable was used to create this variable. Furthermore, the Italian GGS was based on a household sample as opposed to the other GGS surveys which sampled individuals.

States (National Survey of Family Growth, 2007)[26]. For more detailed description of the Harmonized Histories, see Perelli-Harris et al. (2010a) or www.nonmarital.org. Appendix 1 summarises the main characteristics of these surveys such as year of data collection, birth cohorts examined, the availability of weights and the original sample size.

Throughout this thesis I only investigate women. This is firstly because for some countries retrospective union and fertility histories are only available for women. Secondly, men's retrospective fertility histories tend to be less reliable than that of women's; they tend to underreport their fertility, especially in case of non-marital births and births from previous marriages (Rendall et al., 1999) . Moreover, only first births are investigated; transitions to higher order births are not considered as these transitions are likely to be driven by different processes than the transition to first birth (Perelli-Harris et al., 2012; Perelli-Harris et al., 2010b).

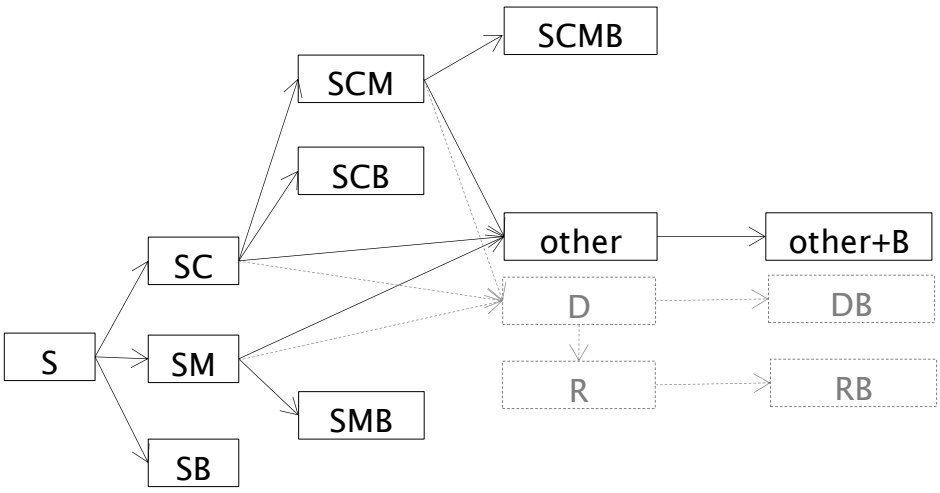
3.2.2 Analytical approach

In this chapter I calculate descriptive statistics and multi-state life tables. Multi-state life tables represent women's life histories (Willekens, 1999). I examine women's partnership experiences between age 15 and 40. In order to be able to examine the association between the transition to motherhood and partnership histories (as opposed to current partnership status) I focus on sequences of previous partnership experiences. Figure 3.1 shows the analytical framework. The boxes represent partnership states that women can occupy as they move along the life course and the arrows depict the possible transitions between these states. Women are observed from age 15 when they are never partnered and childless (S). Then, they can experience non-marital cohabitation (SC), direct marriage (SM), or a first birth while being never partnered (SB).

[26] Although data for Germany, Hungary, and Poland are also available in the Harmonized Histories, these countries are not included in the analyses presented in this thesis. For each of these countries, there is a different reason underlying this decision. Kreyenfeld et al. (2013) showed that the German GGS overestimates the fertility of younger cohorts and underestimates that of older cohorts. Additionally, at the time of conducting the analyses for this thesis, there were some data problems present in the Hungarian survey originating from the data provider. Some of the data cleaning procedures resulted in duplicating individuals who experienced non-marital cohabitation. Finally, the Polish Employment, Family and Education Survey only includes women born after 1966. These women were unfortunately too young (i.e. younger than age 40 which is taken as the age at which most women have completed fertility) to be included in the analyses in this thesis.

Cohabiting women might marry their cohabiting partner (SCM), split up (D) or have a first child within this cohabiting union (SCB). Women who were directly married may dissolve their union (D) or have a first birth within direct marriage (SMB). Similarly, women who married their cohabiting partner might experience union dissolution (D) or a first birth within marriage that was preceded by cohabitation (SCMB). Following union dissolution, women might re-partner (R) or experience a first birth (DB). Re-partnered women might have a first birth following re-partnering (RB). The states D, R, DB, and RB are only used for the descriptive statistics; for the multi-state life tables the states D and R are merged into the state "other" and a first birth following both union dissolution and re-partnering has been merged into the state "other + B". The reason for this is that the number of women who experienced these events was rather small in most countries which results in unreliable estimates for these transitions.

Figure 3.1Partnership histories leading to a first birth



Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution, R – re-partnering, B – first birth, other – union dissolution and re-partnering.
Note: SCM indicates that women married their cohabiting partner.
Note: Black boxes and solid arrows indicate transitions that are investigated using multi-state life tables. Grey boxes and dashed arrows indicate transitions which are also depicted in the simple descriptive analyses.

3.3 Variables

Educational level is measured at the time of the survey using the International Standard Classification of Education (ISCED, 1997). These categories have been merged into low (ISCED 0 to ISCED 2), medium (ISCED 3 to ISCED 4) and high (ISCED 5 to ISCED 6) education.

Cohort is measured with a categorical variable. As this chapter focuses on the interrelationship between partnership histories and the transition to first birth, it is necessary for women in our sample to have completed their reproductive career by the time of the survey in order to ensure completed fertility. As age 40 is usually chosen as the end of the reproductive years for women[27], this chapter examines the following cohorts: 1930-1939, 1940-1949, 1950-1959, and 1960-1969. Note that for some countries some women in the youngest cohort would have been too young to have achieved completed fertility. Nonetheless, examining family behaviours in this cohort of women might provide some indication of future trends.

Rather than comparing family behaviours across different calendar years, this chapter applies a cohort approach to examine changes in family behaviours over time. Period measures might give a distorted picture of the changes as they are a mixture of family behaviours of women from different birth cohorts. This means that these measures also include information on younger women who would not have yet finished or maybe even started partnership formation and childbearing. Therefore, as postponement becomes more and more the reality of partnership and family formation, examining family behaviours from a cohort perspective is well suited for studying changes in the intersection between partnership experiences and the transition to first birth.

Age is measured in months since age 15, when individuals become at risk of forming a union and/or having a first child.

3.4 Results

This section shows the results of the descriptive findings and the multi-state life tables. To answer the research question, I first show how the intersection between partnership dynamics and the context of first birth differs across countries by cohort to explore how these relationships have changed over time. Then, results of the multi-state life tables are shown to examine union formation and the partnership context of first childbirth by age across cohorts. Finally, changes in the proportion of first births by partnership histories are

[27] As it is explained in Chapter 4, very few first births happen after this age.

shown by educational level to understand whether there are educational differences in the partnership context of first births and whether these differences have changed over time and across countries.

3.4.1 Changes in the intersection between partnership histories and fertility by cohort

To show how the proportion of first births within different partnership histories has changed across cohorts in each country, Figure 3.2 depicts the proportion of first births while being never partnered (SB), within non-marital cohabitation (SCB), within direct marriage (SMB), within marriage that was preceded by cohabitation (SCMB), following union dissolution (DB), and after re-partnering (RB).

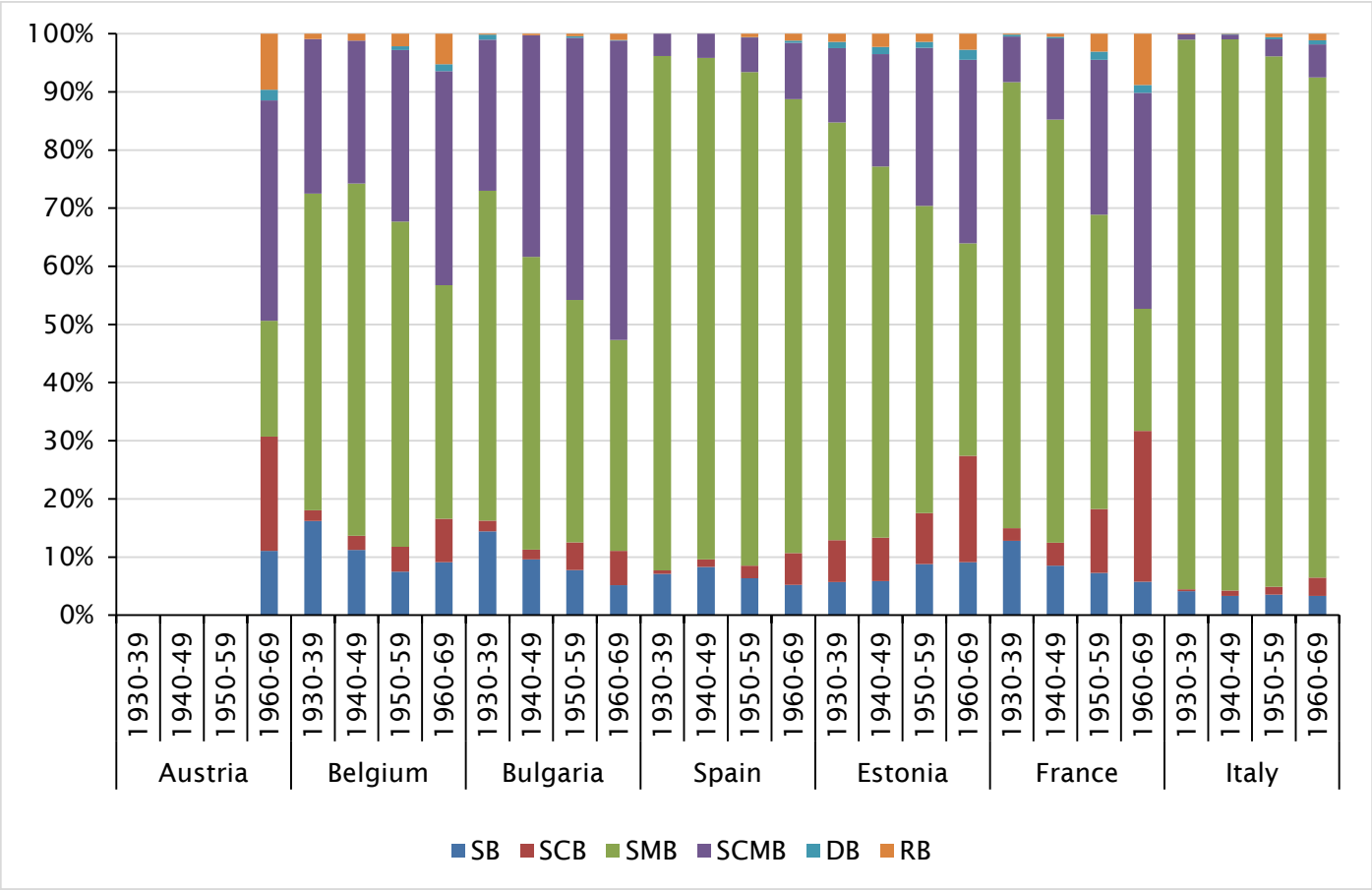
Overall, the proportion of first births to never partnered women decreased continuously from 10-15% among women born between 1930 and 1939 to 5-10% among those born between 1960 and 1969 in Belgium, Bulgaria, France, Romania, Russia, and Spain. This proportion remained fairly stable in Italy, the Netherlands (around 3% to 4%), and Lithuania (around 10%). On the other hand, in Estonia the proportion of first births to never partnered women has grown from almost 6% to 10% across the examined cohorts while this increase was much larger in the UK (from 2% to 14%).

The proportion of first births to cohabiting women increased in all countries over time but the magnitude of this increase differed across countries. In most countries, it has increased from around 1-2% to about 5-8% across the examined cohorts. However, in Norway and France it increased from around 2% among women born in the 1930s to 33% and 26%, respectively, among those born in the 1960s. Additionally, in Estonia (18%), the Netherlands (11%), and the UK (10%) the proportion of cohabiting first births was also relatively high among the 1960-1969 birth cohort compared to the other countries. Similarly to this trend, the proportion of first births to women who were un-partnered following union dissolution and to women who found a new partner following union dissolution has also increased in all countries. While having a first child following union dissolution still remains a marginal behaviour even among women born between 1960 and 1969, the proportion of first births to re-partnered women has increased to above 10% in the UK and Norway.

Moreover, the proportion of first births within direct marriage has decreased in all countries. Compared to the other countries, the changes were less remarkable in Italy, Spain, Lithuania, Romania, Russia, Bulgaria, and Belgium where the high proportion of first births within direct marriage has only decreased by 5 to 10 percentage points across the examined cohorts. However it has to be mentioned that among Russian, Bulgarian, and Belgian women born in the 1930s the proportion of first births within direct marriage was much lower (changing from 54% to 40% in Belgium, from 56% in Bulgaria, and from 66% to 61% in Russia) than in the other countries (80-90% among the 1930-1939 birth cohort).

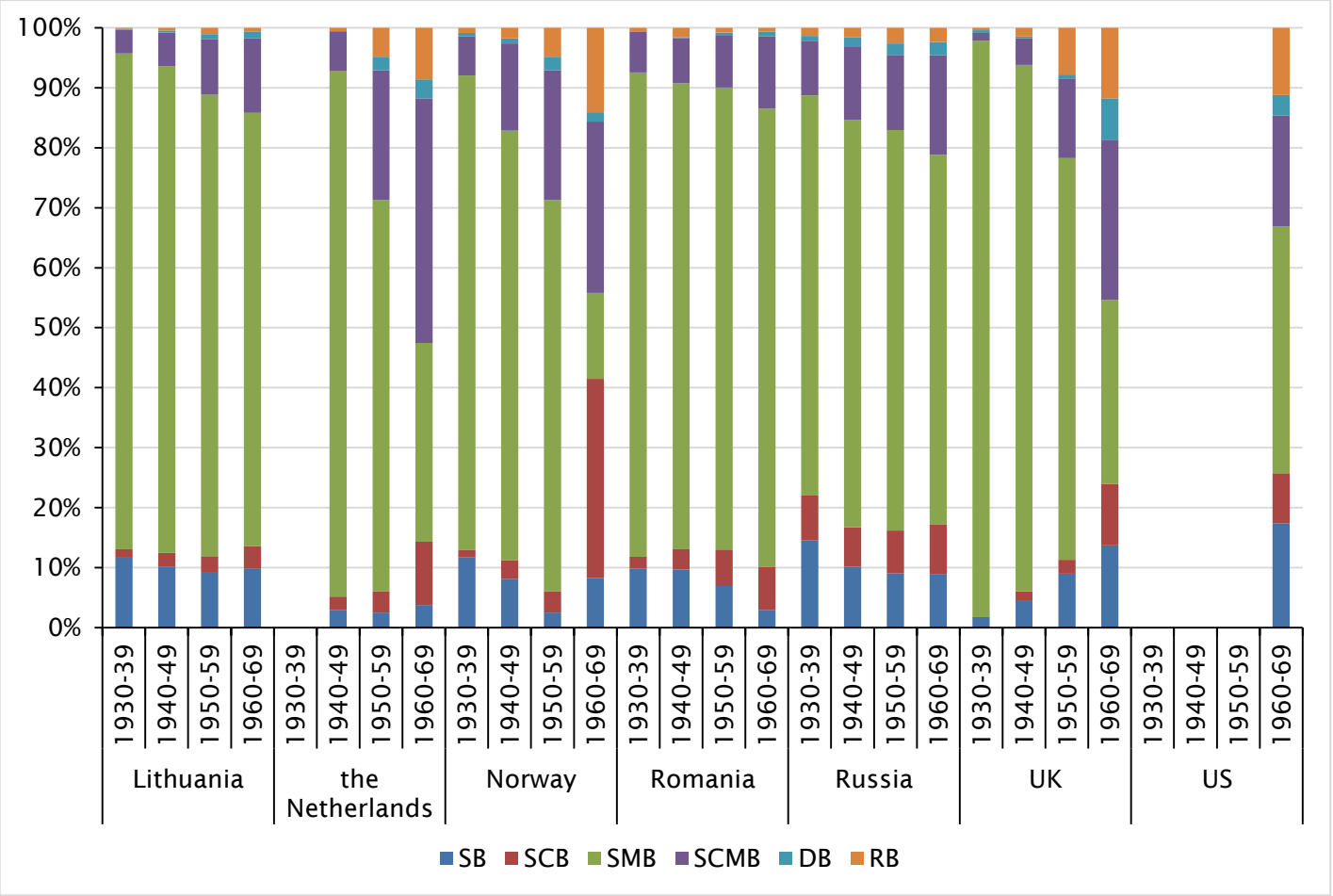
Corresponding to the marked decrease in the proportion of first births within direct marriage, the proportion of first births to women whose marriage was preceded by cohabitation with the same partner has increased in all examined countries. Again, the changes were less marked in Italy and Spain (from 1% to 6% and from 4% to 10%, respectively), somewhat more pronounced in Romania (from 7% to 12%), Russia (from 9% to 17%), and Belgium (17% to 27%) while they were much more remarkable in the other countries. For example, in the Netherlands, the proportion of first births within marriage that was preceded by cohabitation has increased from 6% to 41%, in France it increased from 8% to 37%, while in the UK it has grown from just over 1% to 27%. These findings are in line with the expectation that among younger cohorts there is more variation in the partnership context of first births than among older cohorts.

Figure 3.2 Proportion of first births by partnership histories and birth cohort across European countries and the United States



Source: Harmonized Histories, author's own calculations, weights applied

Note: SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, DB – first birth following union dissolution (both the dissolution of cohabitation and marriage), RB – first birth following re-partnering



Source: Harmonized Histories, author's own calculations, weights applied

Note: SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, DB – first birth following union dissolution (both the dissolution of cohabitation and marriage), RB – first birth following re-partnering

3.4.2 Changes in the intersection between partnership histories and fertility by age across cohorts

After having explored how partnership experiences and the partnership context of a first birth have changed across cohorts, this section introduces two additional dimensions to this investigation, namely, partnership transitions and age. In other words, I examine the age pattern of both partnership transitions and the transition to first birth among women with different partnership histories across several birth cohorts of women. This enables me to examine the postponement of partnership formation and of the transition to first birth across cohorts.

Figure 3.3 shows a dynamic picture of how women's probability to experience certain partnership transitions and the transition to motherhood following different partnership histories changed over age and by birth cohort across countries. The following partnership histories are considered: being never partnered (S), non-marital cohabitation (SC), marriage preceded by cohabitation with the same partner (SCM), direct marriage (SM), and union dissolution which might be followed by re-partnering (other). Additionally, a first birth can occur within each of these partnership histories as explained in the previous section (these experiences are denoted by SB, SCB, SCMB, SMB, other + B). The probabilities of experiencing these events are shown using a stacked probability graph where the probability of being in a given state at a given age is the difference between two adjacent curves.

When examining partnership transitions and the intersection between partnership experiences and the transition to motherhood by age and across cohorts, it is challenging to discuss the findings as many countries seem to be unique in the way they experienced these changes. The following discussion, therefore, highlights the main trends which relate to the earlier derived expectations, namely 1) whether younger women are more likely to experience non-marital cohabitation and first birth within non-marital cohabitation and more unusual unions compared to older women (and increasingly so for women from younger cohorts), 2) whether partnership transitions and the transition to parenthood are postponed to later ages among younger cohorts compared to older cohorts, and 3) whether there is more variation in

partnership experiences and in the partnership context of childbearing among younger cohorts compared to older cohorts.

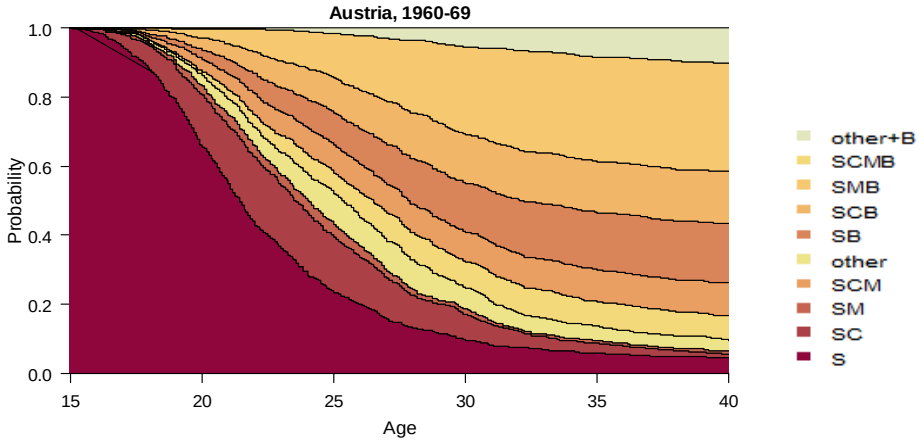
First, although in some countries women started to form cohabiting unions at a slightly younger age over time, in most countries the probability of cohabitation and childbearing within cohabitation was higher among older women than among younger women. This was the case in France, the UK, the Netherlands, and Norway. Interestingly, in Belgium, among the first two cohorts, the probability of cohabitation was higher among younger women than among older women. This might indicate that in these early cohorts some women formed families earlier and went on to marry or to have a first child soon after having formed a cohabiting union. In Bulgaria and Estonia, cohabitation and cohabiting first births appeared across all age groups but among younger cohorts the probability of a cohabiting first birth was higher at older ages. In Italy, Lithuania, Spain, Romania, and Russia the probability of experiencing cohabitation or a cohabiting first birth remained very low across all ages and all cohorts although the probability of these behaviours started to increase among women born between 1960 and 1969.

Second, I expected that partnership transitions and the transition to motherhood will be increasingly postponed among younger cohorts compared to older cohorts. However, in Russia, Estonia, Lithuania, the Netherlands, and Norway, partnership formation occurred at increasingly younger ages across the examined cohorts. In Belgium and France this trend was only prevalent between the 1930-39 and 1950-59 birth cohort but across the last two cohorts postponement of union formation can be observed. It is also this cohort of women where we see a dramatic delay in partnership formation in Italy and Spain (and to a smaller extent in the UK). While among women born between 1950 and 1959 the probability of being never partnered was around 30% at age 25 in Italy and Spain, among those born in the 1960s this probability increased to around 40% to 50%. In line with this trend, the transition to motherhood has also been delayed. Additionally, in Russia, Belgium, France, and Norway the transition to motherhood was also postponed while in Estonia and Lithuania we observe the opposite. Last, in Romania, and Bulgaria not many changes took place in either the type or the timing of different family transitions. The largest change in these countries was the increase in the proportion of first births within marriage that was preceded by cohabitation

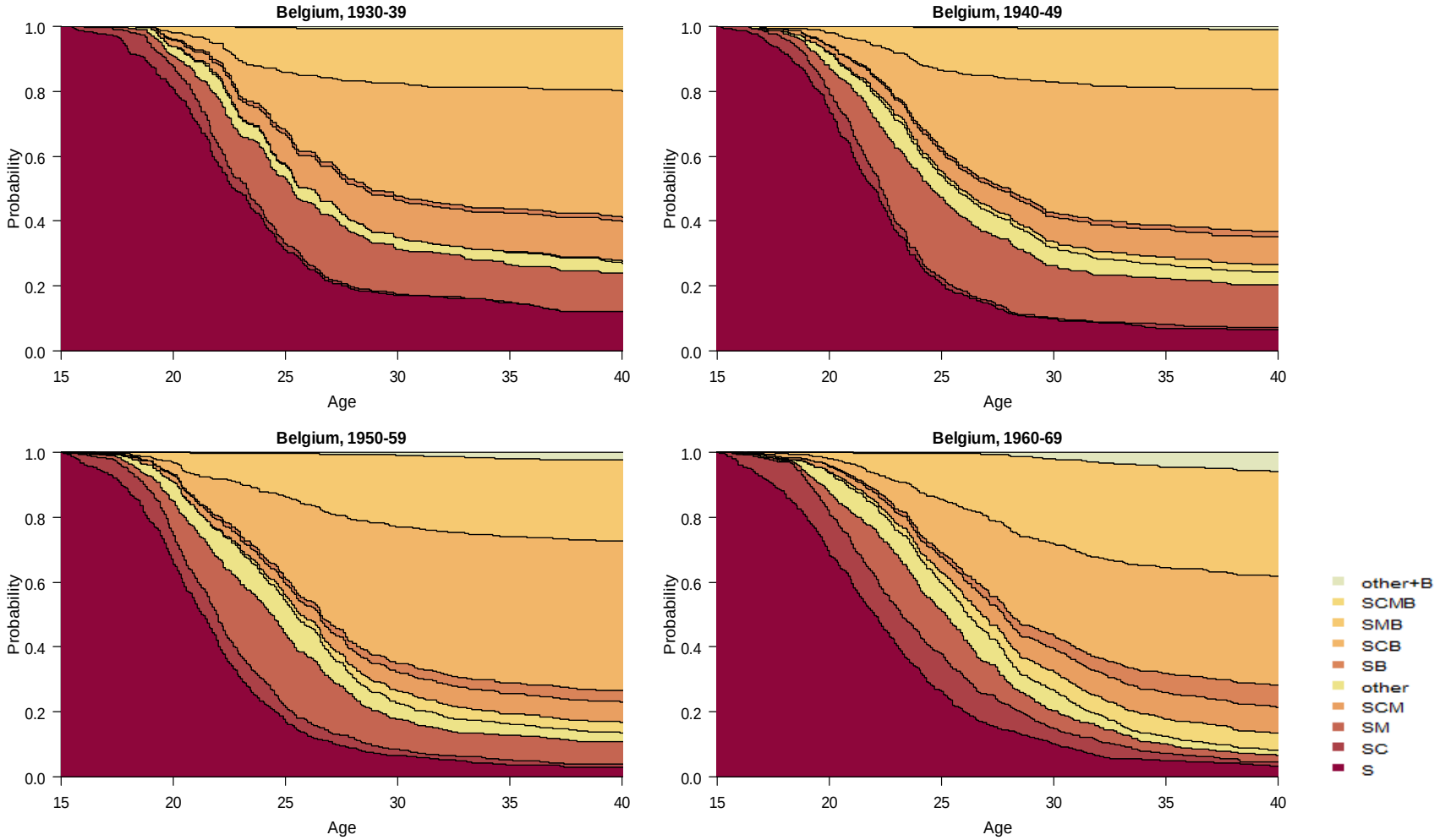
with the same partner, and consequently, a decrease in the proportion of first births within direct marriage (as discussed before in Section 3.4.1).

Last, I expected to find more variation in partnership experiences and in the partnership context of first childbirth among younger cohorts compared to older cohorts. This was indeed the case for most countries although the magnitude of changes differed greatly across countries. The most marked changes occurred in Belgium, Estonia, France, the Netherlands, Norway, and the UK. Additionally, although it is not possible to talk about trends in Austria and the US due to data availability issues, we see large variation in partnership experiences and the partnership context of a first birth among women born between 1960 and 1969. Finally, in Italy, Lithuania, Spain, Bulgaria, Romania, and Russia there was less variation in partnership experiences and the partnership context of first birth than in the other countries.

Figure 3.3 Stacked transition probability of partnership transitions and the transition to motherhood following these partnership histories by age and cohort across Europe and the United States

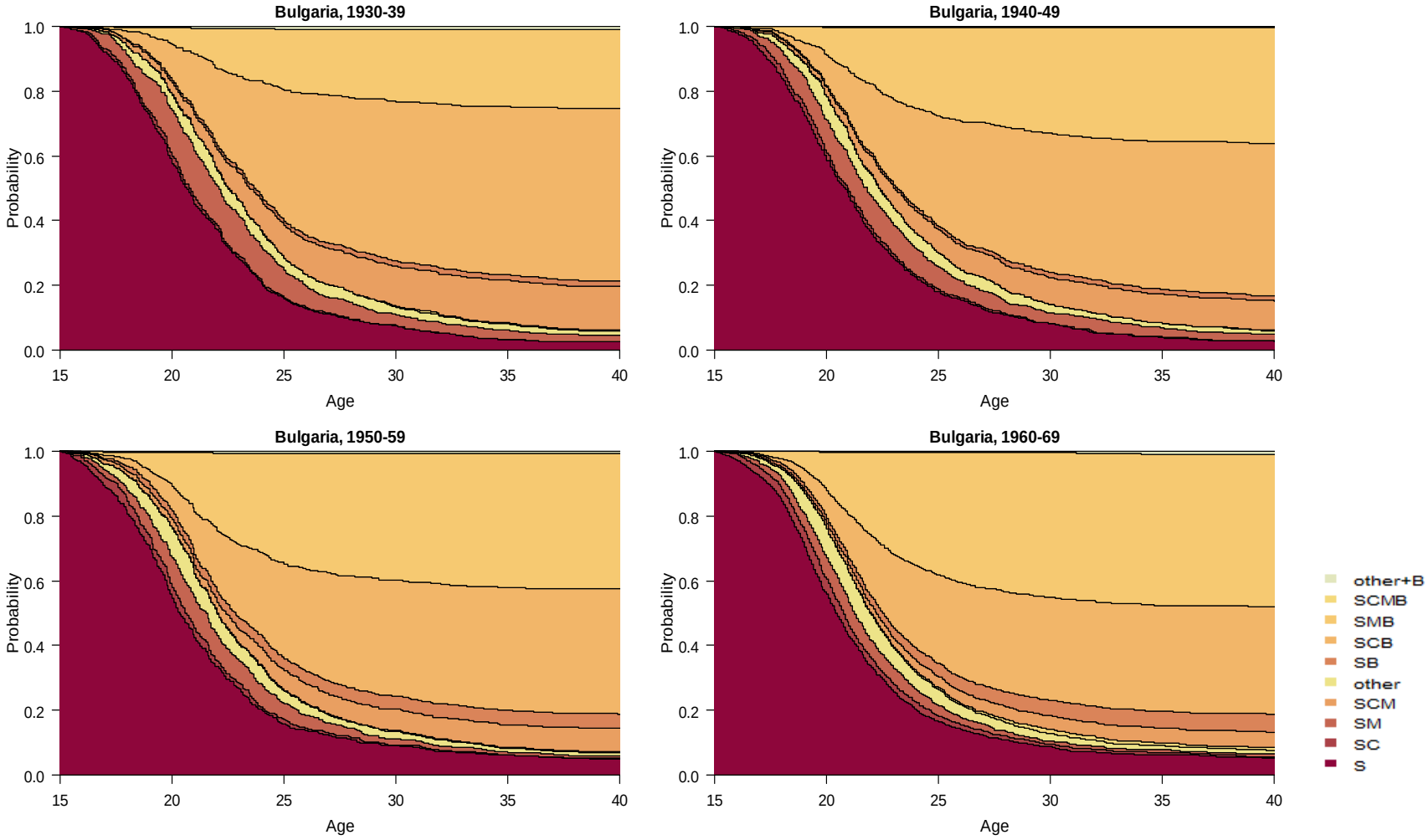


Source: Harmonized Histories, author's own calculations
Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



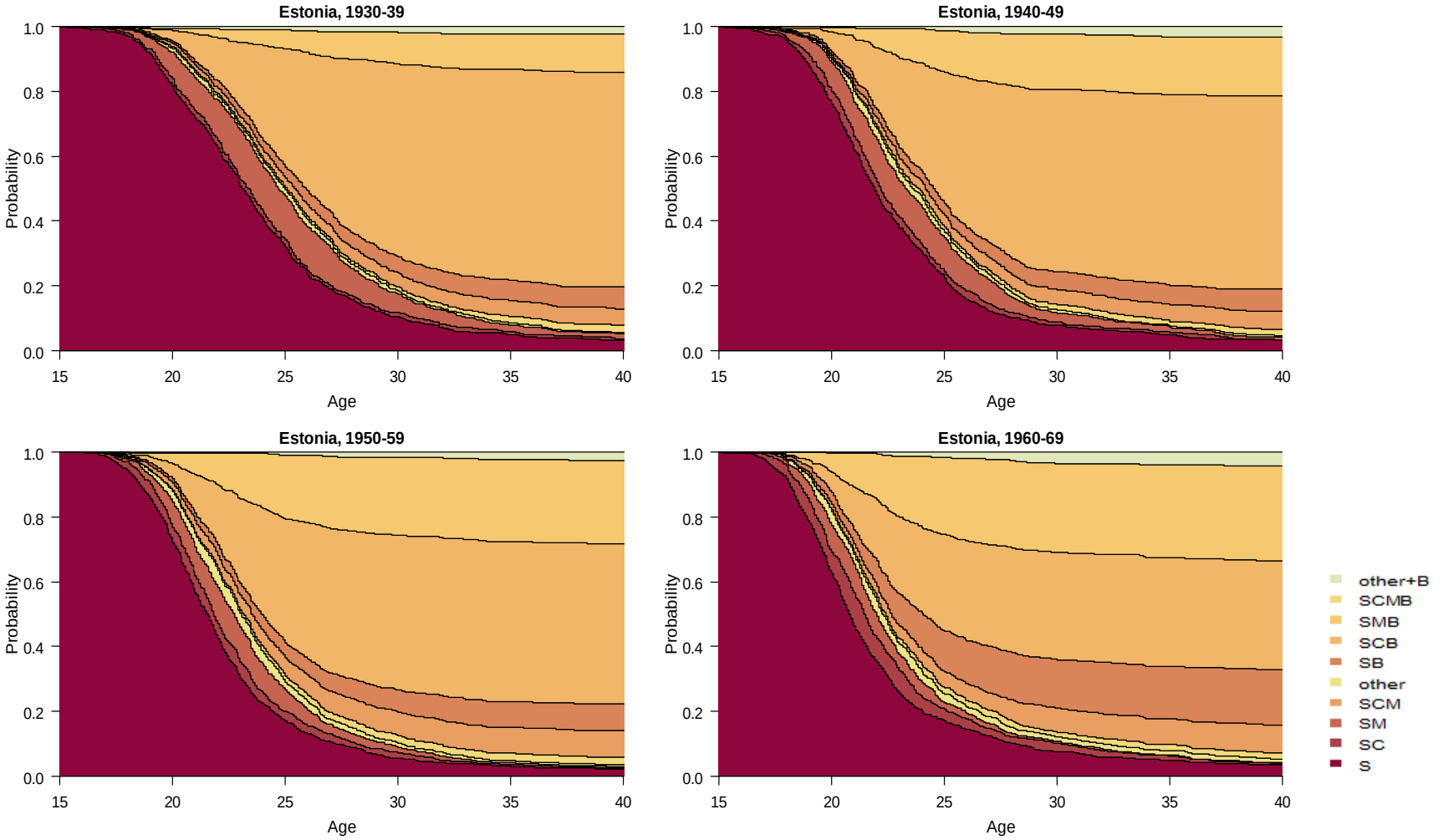
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



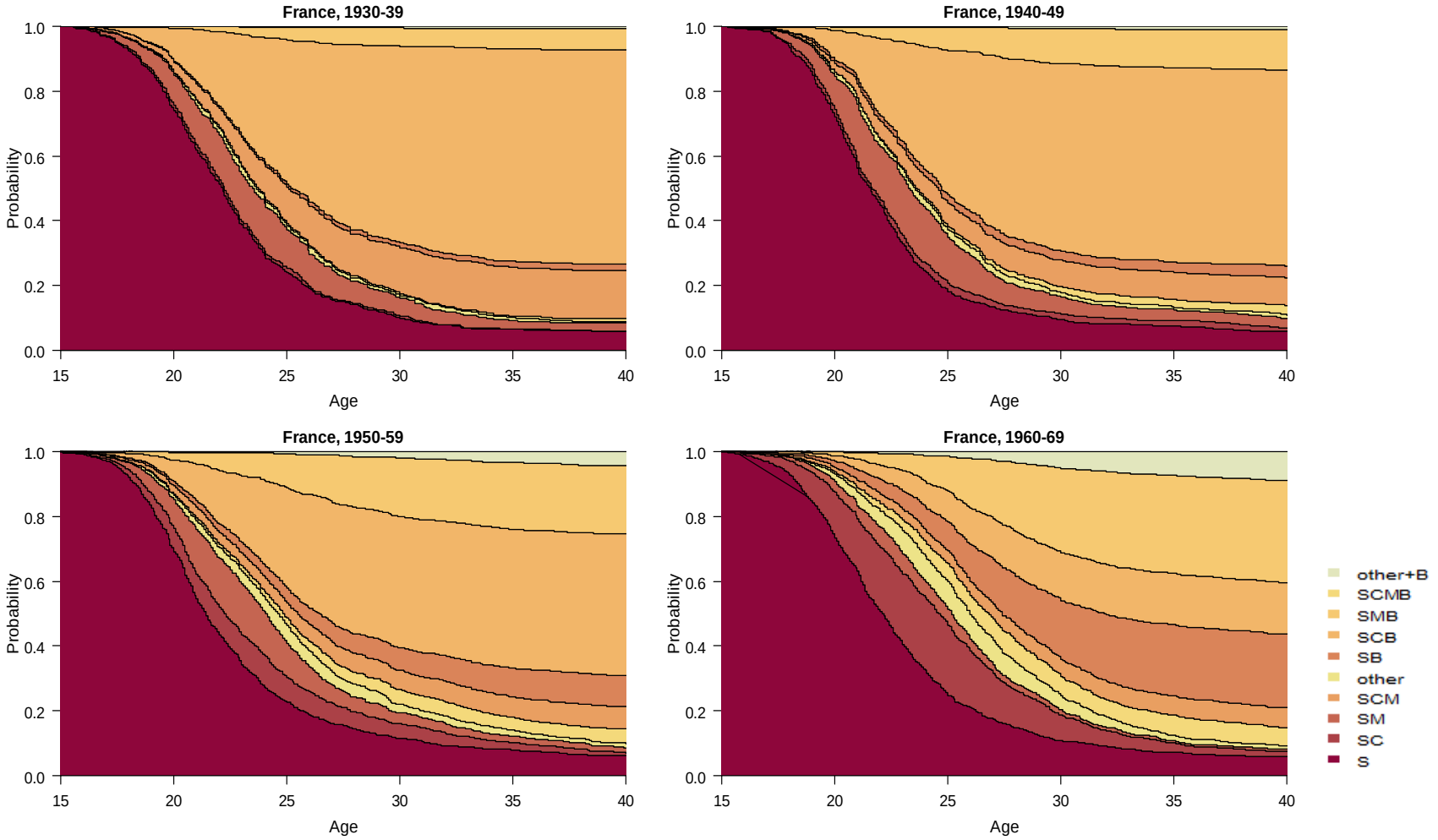
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



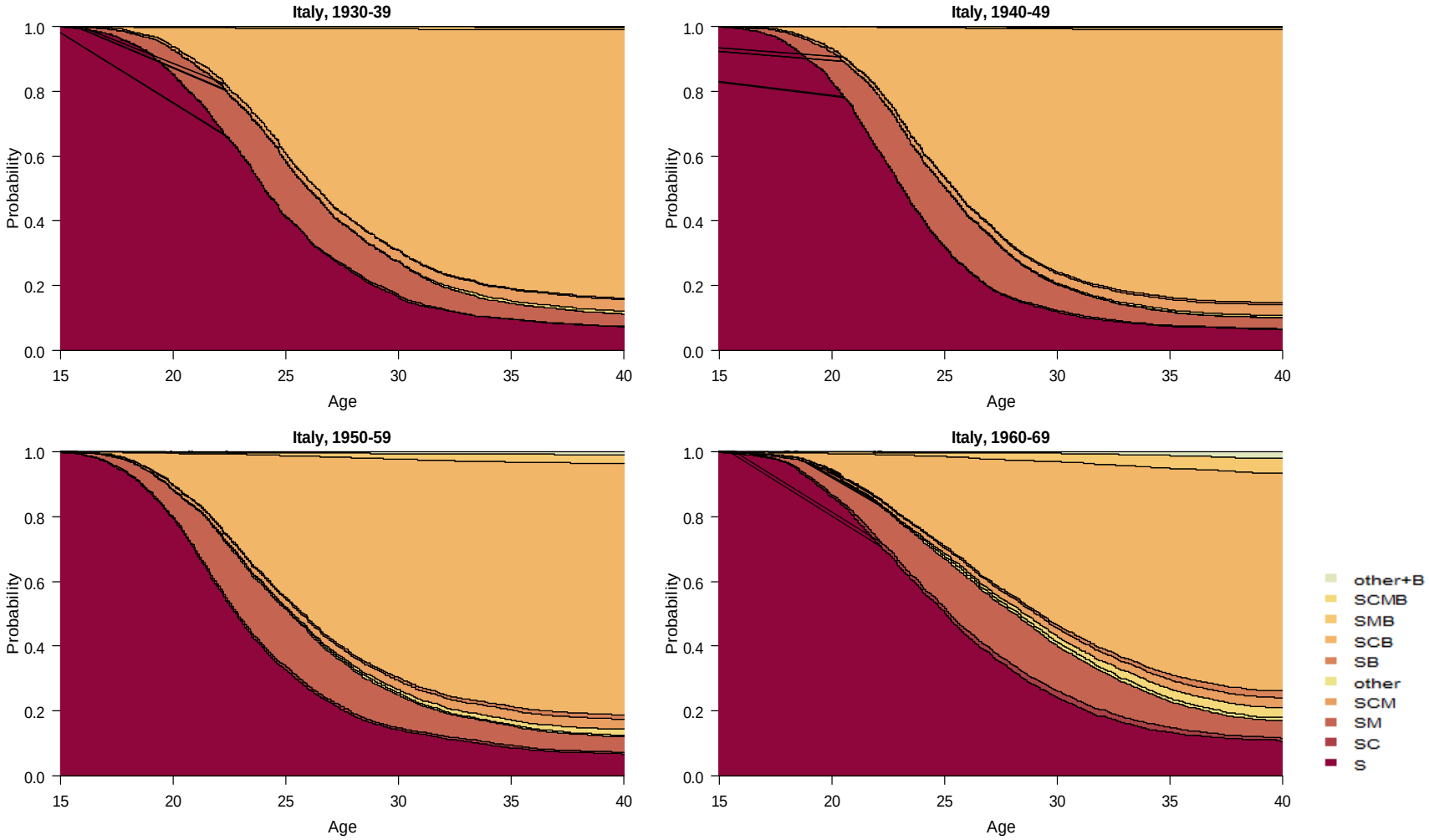
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



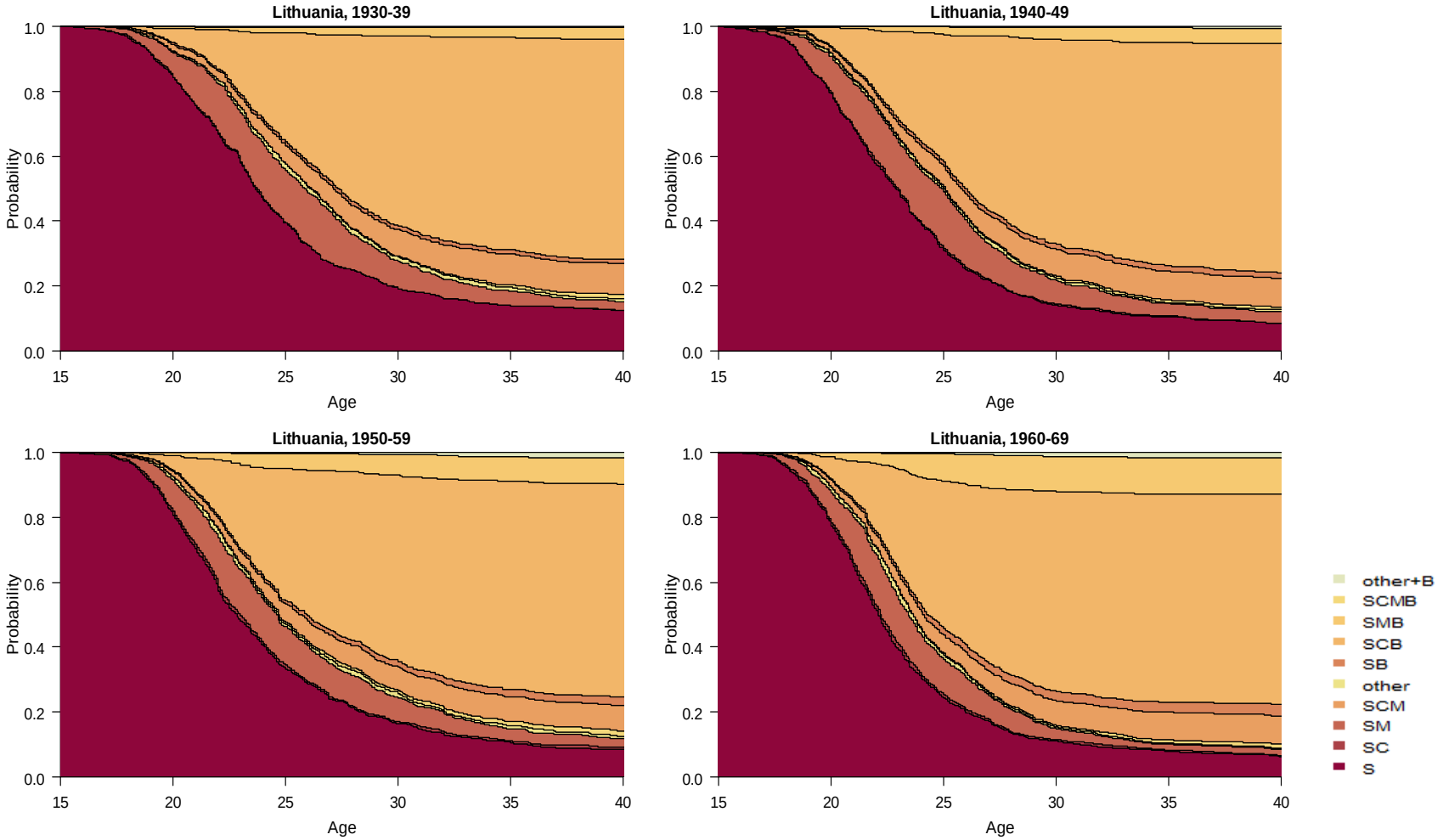
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



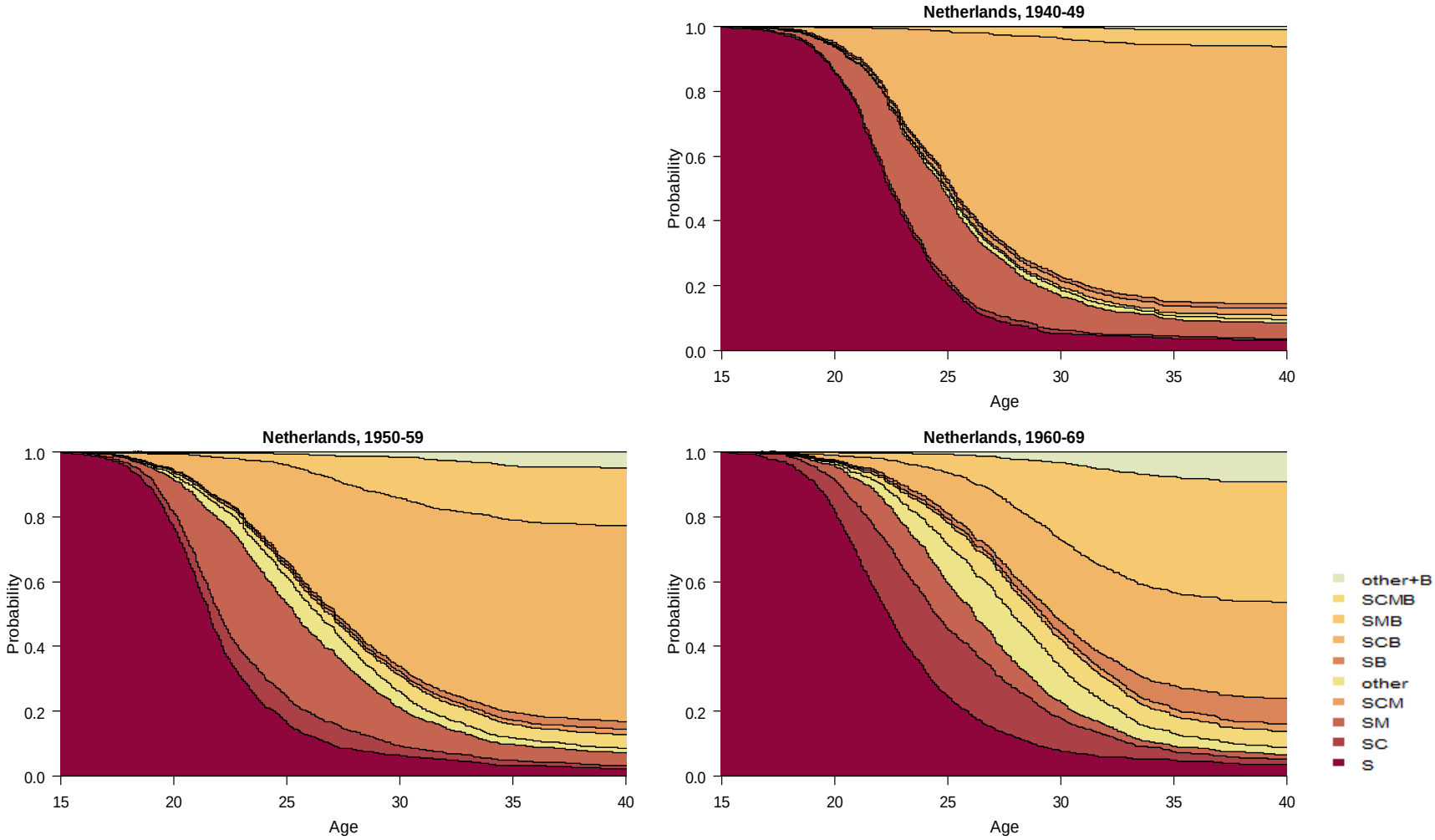
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



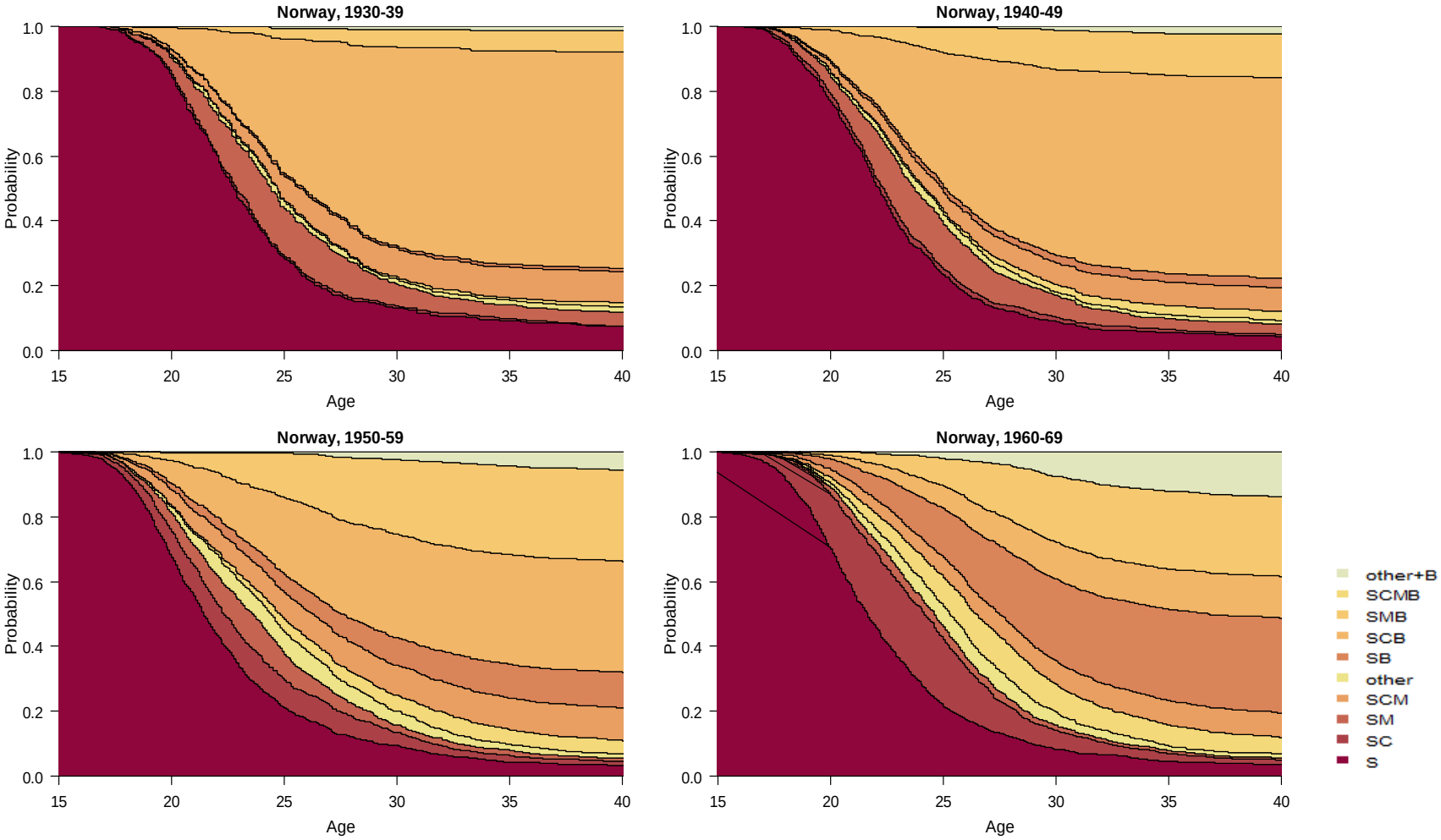
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



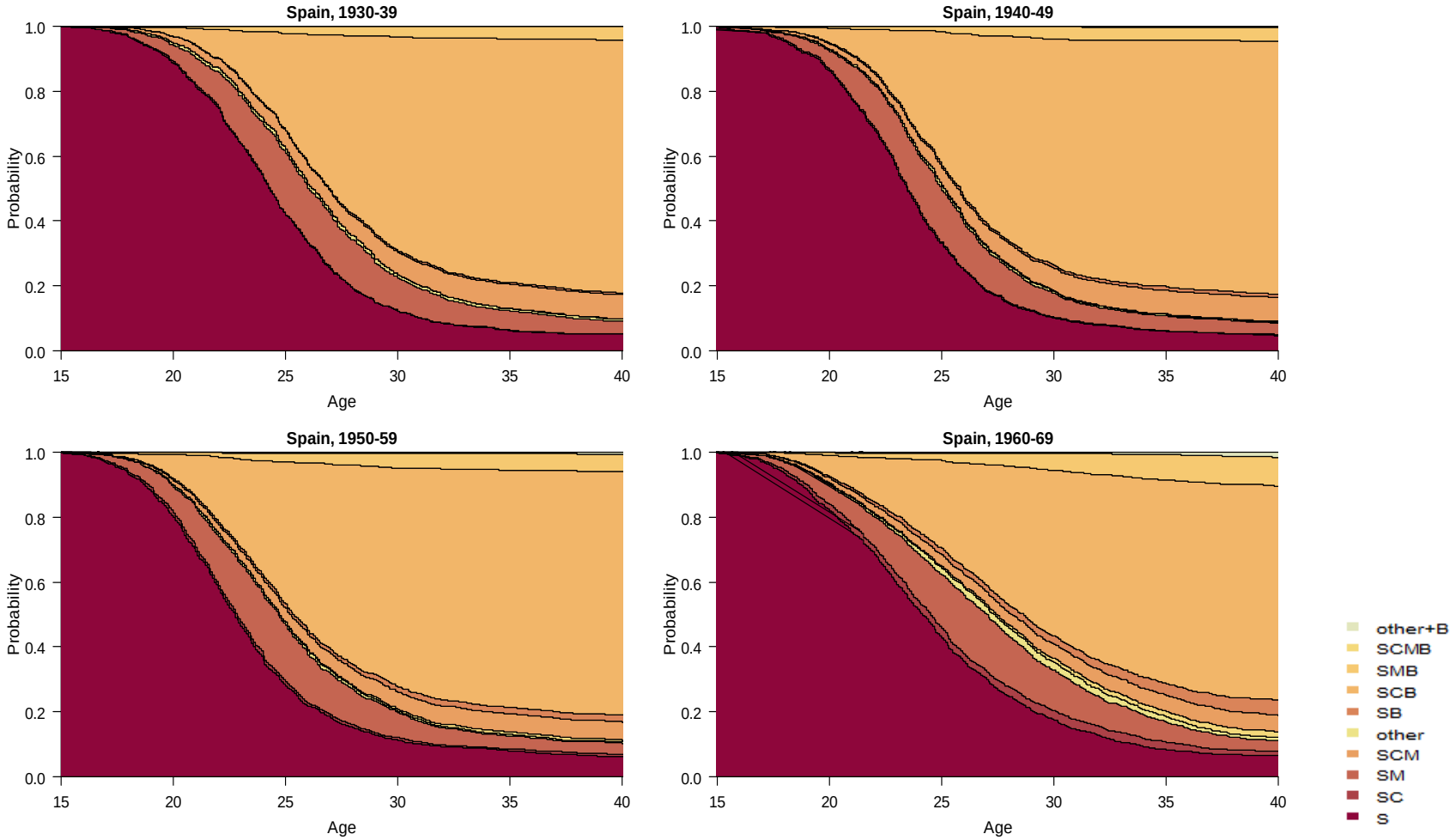
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



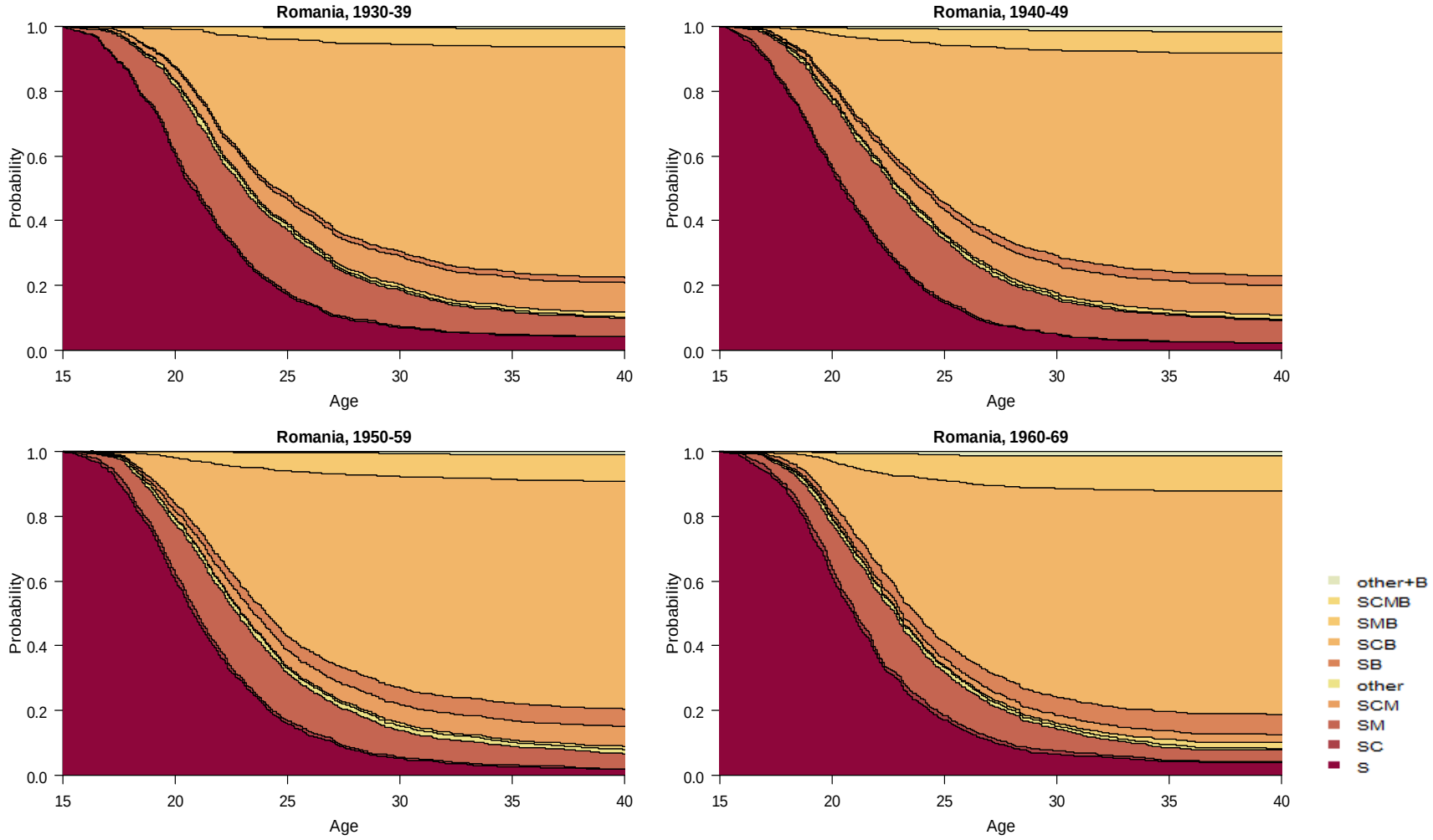
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



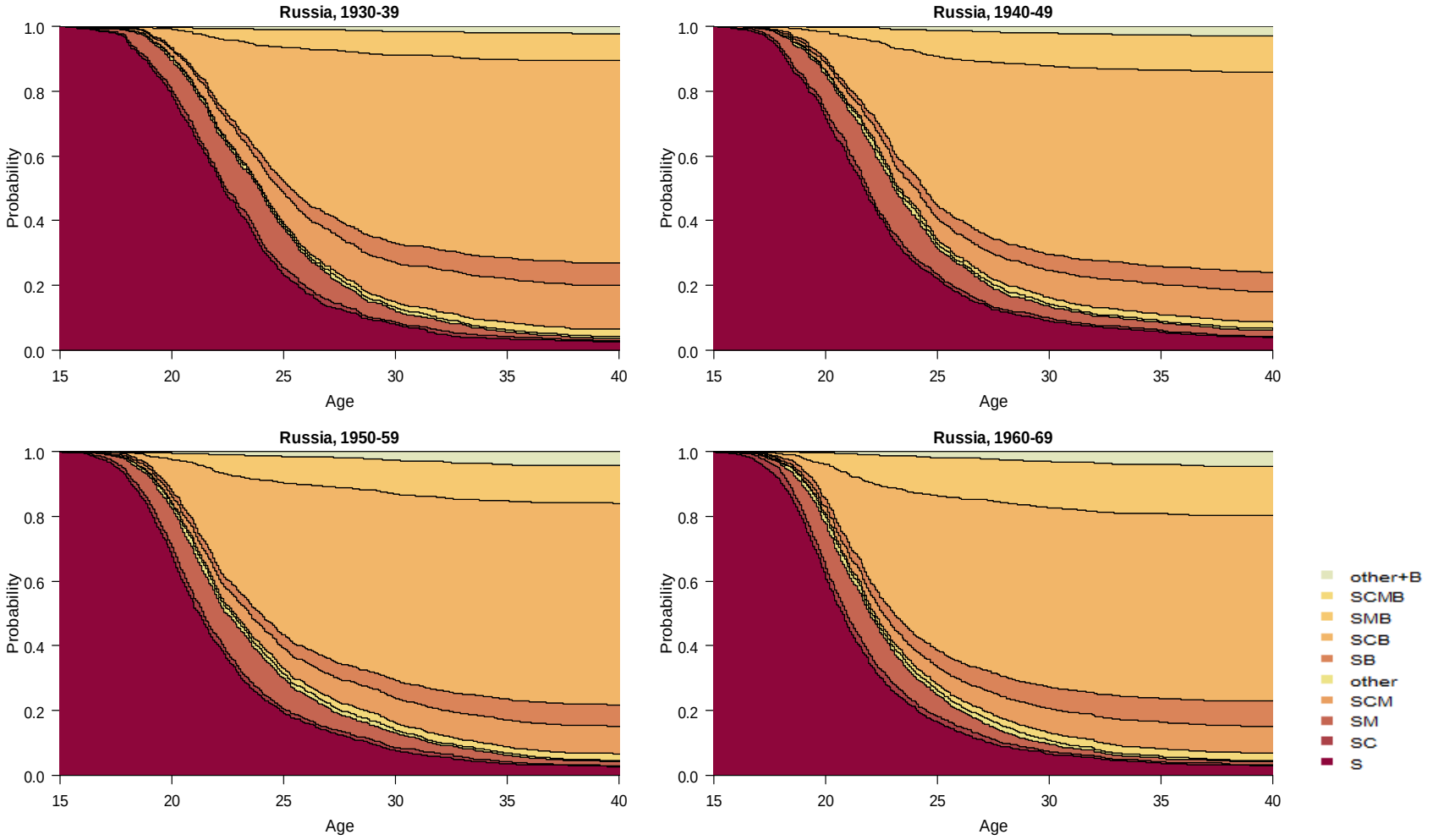
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



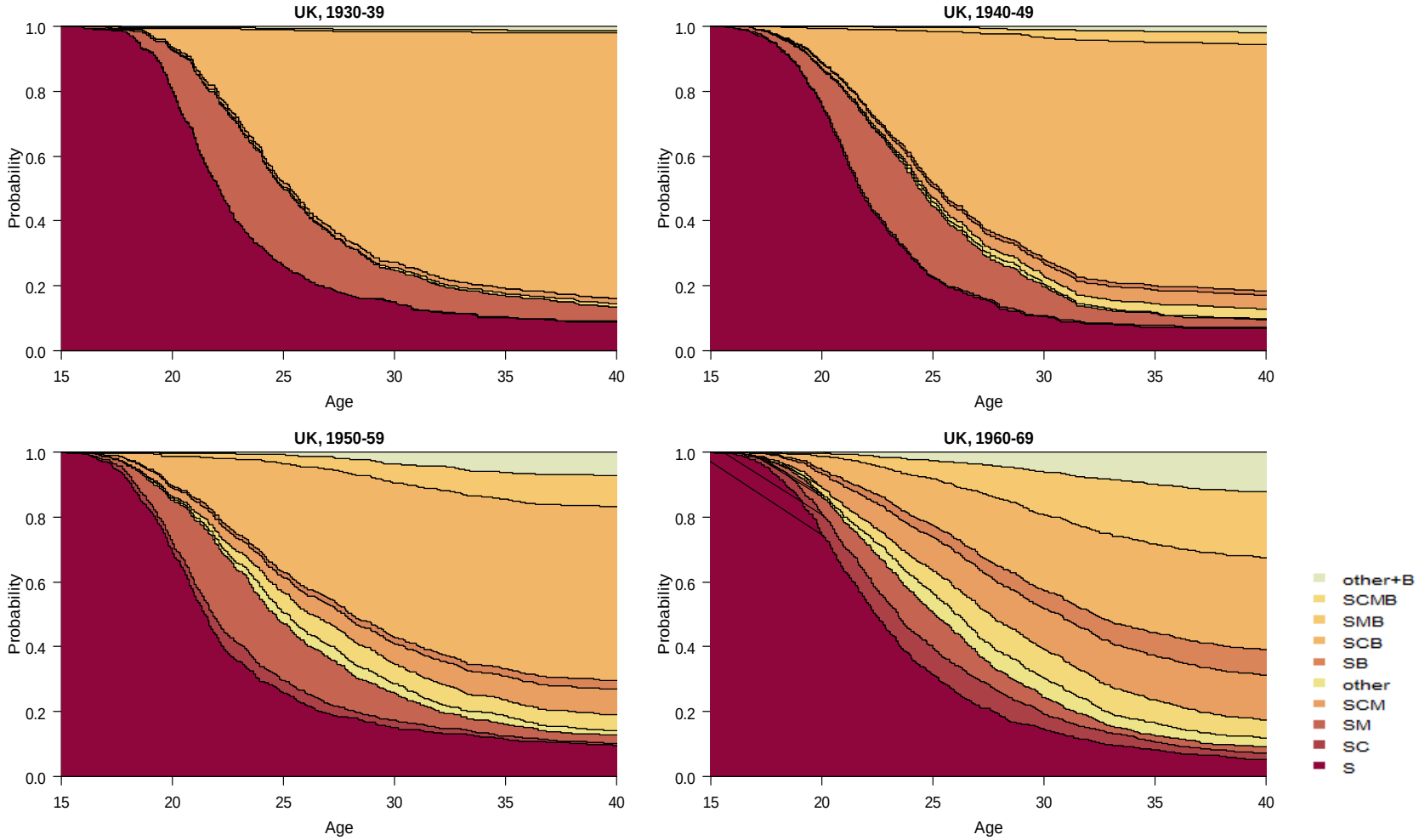
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



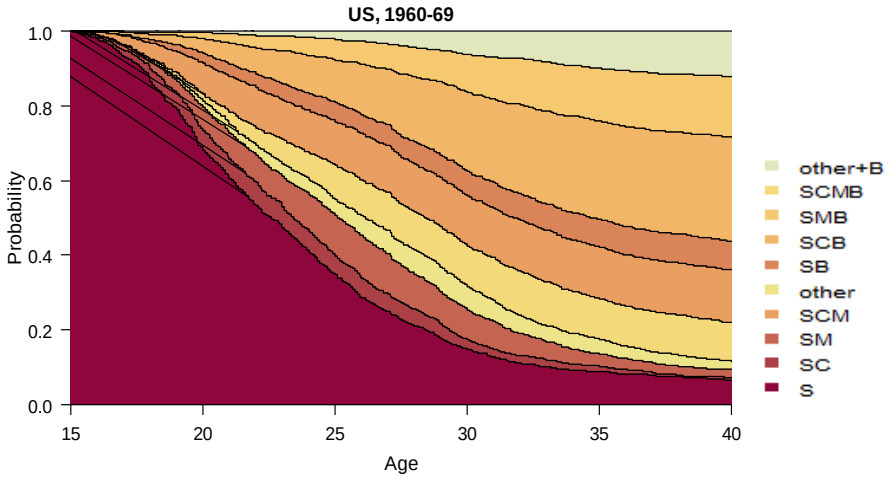
Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering



Source: Harmonized Histories, author's own calculations

Note: S – never partnered, SC – cohabitation, SM - direct marriage, SCM – marriage preceded by cohabitation, other – union dissolution and re-partnering, SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, other+B – first birth following union dissolution and re-partnering

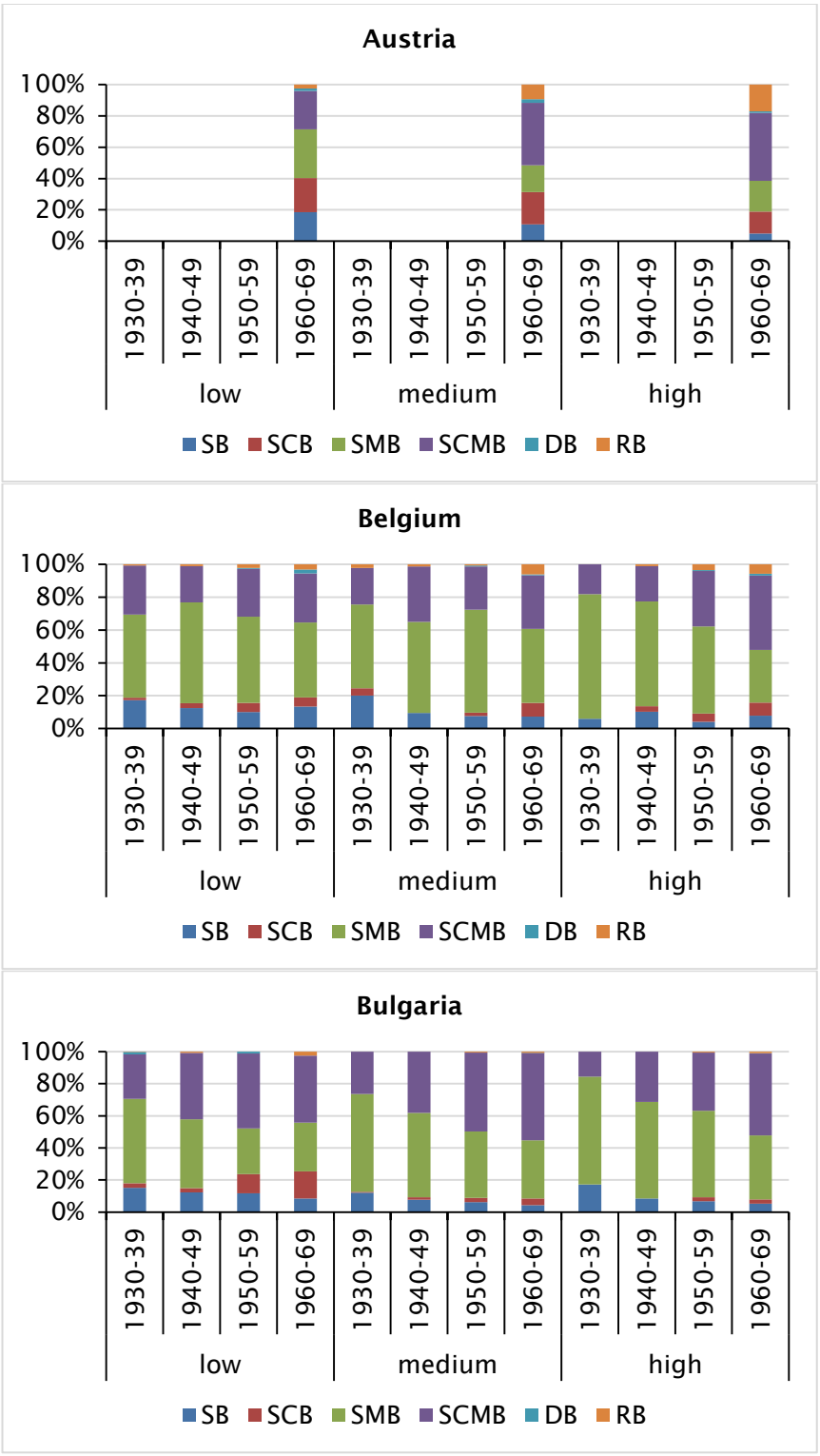
3.4.3 Changes in the intersection between partnership histories and fertility by education

Section 3.4.1 showed how the proportion of first births following different partnership histories has changed across cohorts. This section breaks down these changes by educational level. In other words, I examine how the proportion of first births following different partnership histories changed across the examined birth cohorts among low, medium, and highly educated women to explore socio-economic differences in the partnership context of first births.

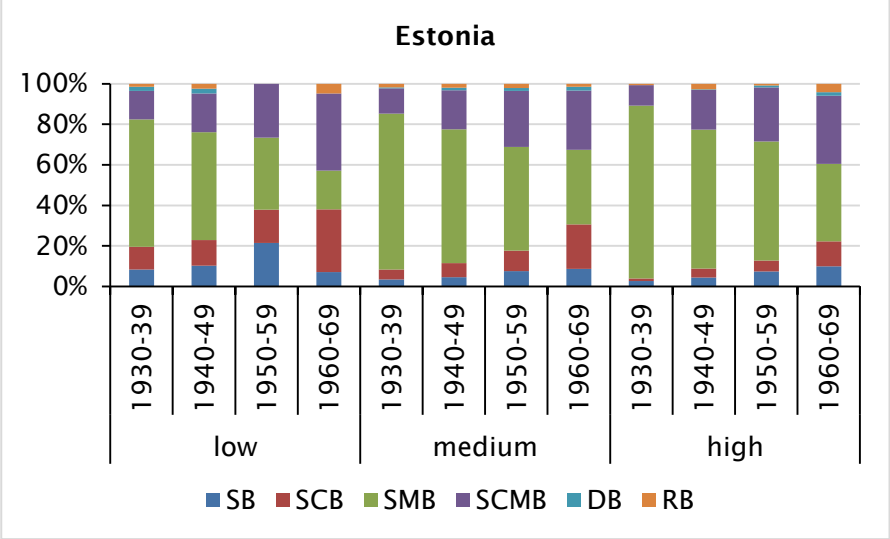
Before examining the results it needs to be mentioned that in some countries and cohorts cell sizes are rather small (see Appendix 2 to Appendix 5). This is especially the case for first births following union dissolution and re-partnering among women born between 1930 and 1959 in most examined countries. Additionally, among these women first births while being never partnered and within cohabitation were relatively rare especially among the medium and highly educated. Therefore, these results need to be interpreted with caution. Nonetheless, small cell sizes indicate that these behaviours were extremely rare in a given context. It is then even more astonishing to see the dramatic increase in the proportion of these once marginal behaviours.

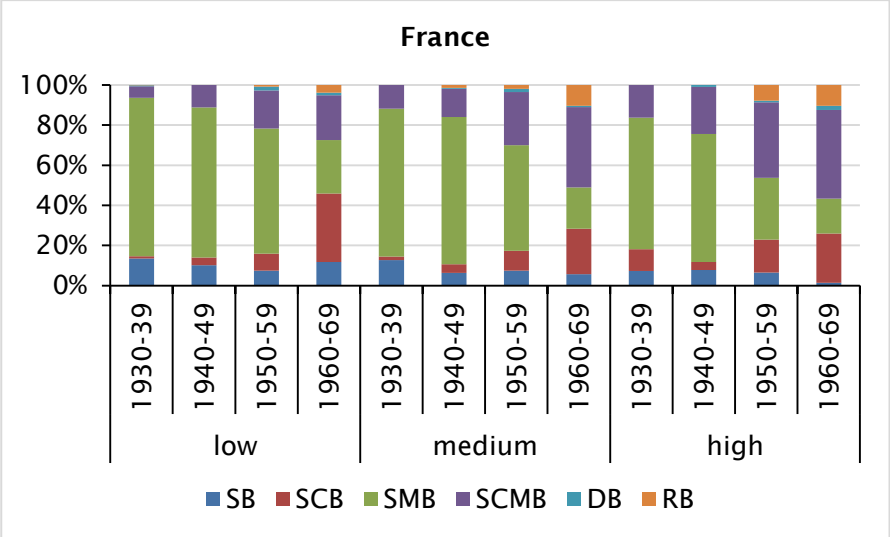
The proportion of first births following different partnership histories has changed substantially over time, across countries, and by education (Figure 3.4). Among low educated women the proportion of first births to never partnered women has decreased from about 10-20% to 5-15% across the examined cohorts in Belgium, Bulgaria, Estonia, France, Lithuania, and Romania. This proportion remained fairly stable in Italy (4%), Spain (7%), and Norway (20%). However, the proportion of first births to never partnered women has increased in Russia (from 18% to 28%), the Netherlands (from 3% to 8%) and the UK (from 2% to 43%). Among medium and highly educated women we observe very similar patterns but the level of this proportion decreases as education increases.

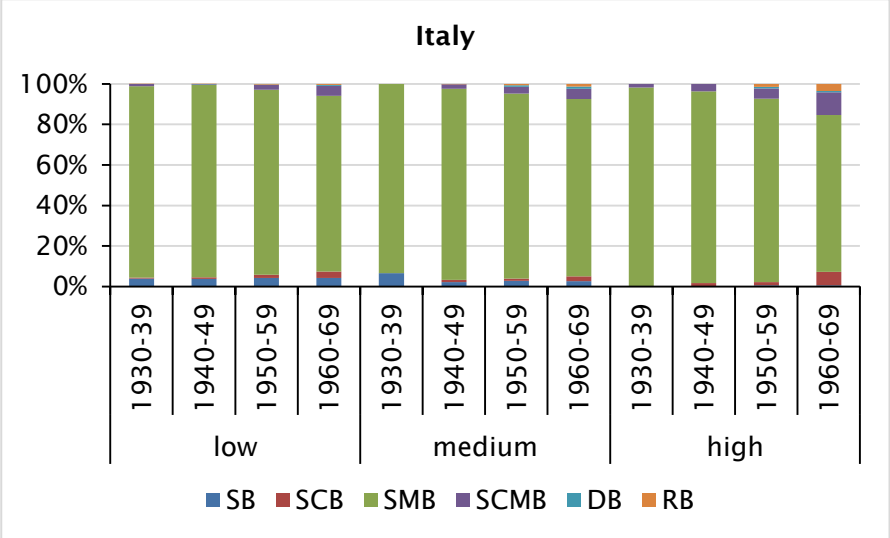
Figure 3.4 Proportion (%) of first births by partnership history within different educational levels, by cohort and country



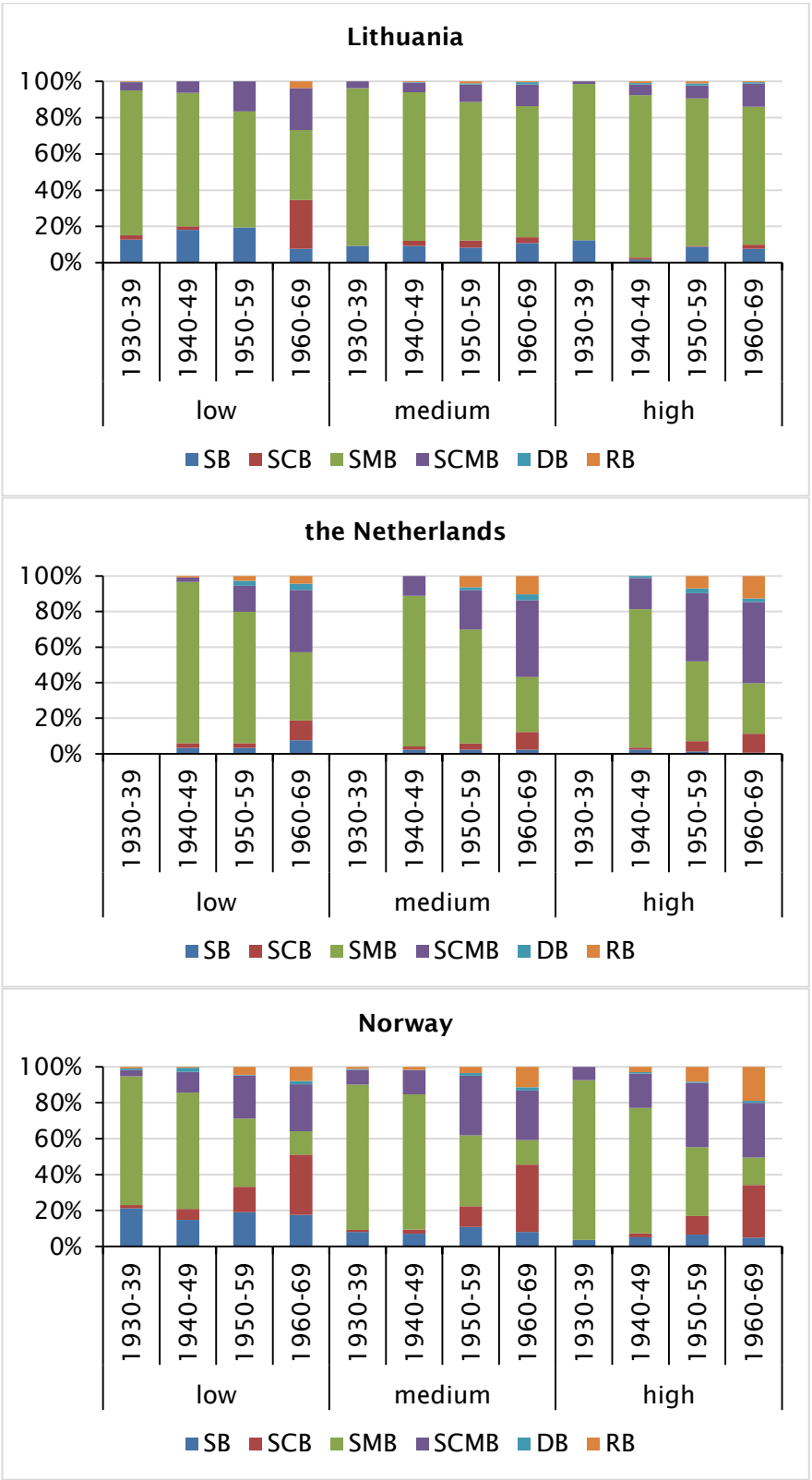
Source: Harmonized Histories, author's own calculations
Note: SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, DB – first birth following union dissolution, RB – first birth following re-partnering
Weights applied







Source: Harmonized Histories, author's own calculations
Note: SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, DB – first birth following union dissolution, RB – first birth following re-partnering
Weights applied



Source: Harmonized Histories, author's own calculations
Note: SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, DB – first birth following union dissolution, RB – first birth following re-partnering
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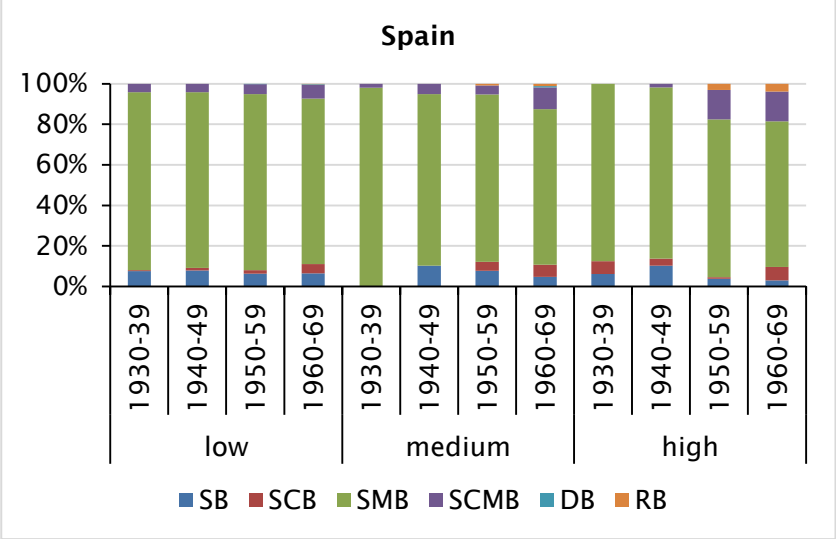

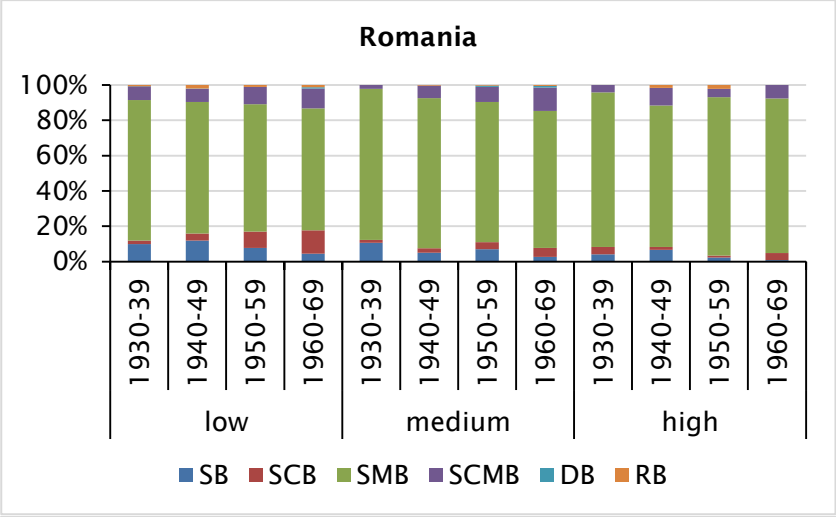

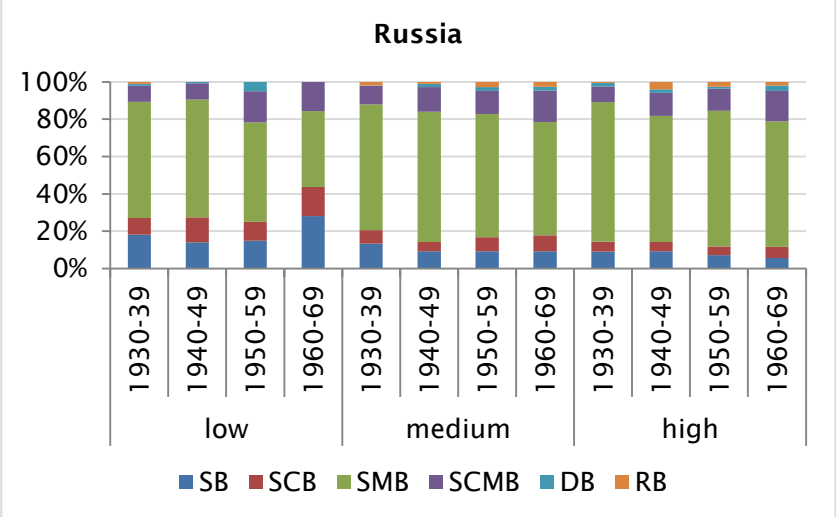

Source: Harmonized Histories, author's own calculations
Note: SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, DB – first birth following union dissolution, RB – first birth following re-partnering
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Source: Harmonized Histories, author's own calculations
Note: SB – first birth while never partnered, SCB – cohabiting first birth, SMB – first birth within direct marriage, SCMB – first birth within marriage that was preceded by cohabitation, DB – first birth following union dissolution, RB – first birth following re-partnering
Weights applied

In most countries, the proportion of first births within cohabitation has increased more among women with low education compared to the more educated. However, the magnitude of these changes was different across countries. For example, in Bulgaria the proportion of cohabiting first births increased from 3% to 17% among the low educated while among the more educated it only increased from less than 1% to 4% over time. In Romania and Russia the levels were relatively similar to that in Bulgaria. On the other hand, in Estonia and France there was a larger increase across all educational levels in the proportion of cohabiting first births. In Estonia, it increased from 11% to 31% among the low educated, from 5% to 22% among the medium educated

and from 1% to 12% among the highly educated. In France, these proportions were very similar. Finally, in the US the proportion of first births to cohabiting mothers born between 1960 and 1969 was 18% among low educated women but only 5% among those with the highest education. Although this is the overall trend in the proportion of cohabiting first births, not all countries fit this pattern. In Belgium, the Netherlands, Norway, and Spain the increase in the proportion of cohabiting first births was similar across educational groups. Additionally, in Italy and the UK it increased more among the more educated than among the less educated.

The proportion of first births within direct marriage has decreased more among women with higher education than among the lower educated in most countries. At the same time, the proportion of first births to women who cohabited with their partner before marriage increased more among the higher educated. This pattern was prevalent in Belgium, Bulgaria, France, Italy, the Netherlands, Norway, and Spain indicating that in these countries more educated women are less and less likely to have a first child following direct marriage compared to the less educated. However, in Estonia, Lithuania, and Russia the proportion of first births within direct marriage remained high for the highly educated.

As mentioned earlier, the prevalence of first births following union dissolution and re-partnering remained marginal in many countries. However, in the UK, Norway, the Netherlands, and France the proportion of first births to mothers who re-partnered following union dissolution increased more among women with higher education compared to the less educated. In the 1960-69 birth cohort, this proportion varied between 10% in France and 19% in Norway. Also, in Austria (17%) and the US (14%) this proportion was higher among those with the highest education among women born in the 1960s. In the other countries, this proportion was 4% or less.

To sum up, overall, the proportion of first births while being never partnered and within cohabitation was higher among lower educated women compared to the more educated in all examined cohorts. On the other hand, a larger share of highly educated women had a first child within direct marriage, marriage that was preceded by cohabitation, and following re-partnering compared to the lower educated in all examined birth cohorts. These findings

indicate that it was the lower educated women who were more likely to experience a first birth within the less conventional, new partnership forms.

3.5 Conclusion and discussion

To summarise, this chapter aimed to further explore changes in the intersection between partnership histories and the transition to motherhood in Europe and the United States using individual level data. In order to better understand the driving forces behind changing individual family life courses, I focused on two key elements of these changes, which will be further explored in later chapters of this thesis: postponement (measured by age at different transitions) and socio-economic background (measured by educational attainment).

The descriptive analyses of the proportion of first births to mothers with different partnership histories across cohorts revealed dramatic changes in the partnership context of first childbearing in most countries. In Italy, Spain, and in post-socialist countries, the changes were less marked whereas in the other countries, there was a very large increase in the proportion of first births to cohabiting mothers and to mothers whose marriage was preceded by cohabitation with the same partner. Thus, in line with the expectation, among younger cohorts there is more variation in the partnership context of first births compared to older cohorts. Additionally, the proportion of first births within marriage that was preceded by cohabitation has been increasing over time. This finding highlights the importance of distinguishing between direct marriage and marriage that was preceded by cohabitation which will be done throughout this thesis.

When examining changes in the intersection of partnerships and motherhood by age, I expected that younger women would be more likely to experience cohabitation and childbearing within new partnership forms. However, as first births are being postponed to later ages, older women had a higher probability to experience cohabitation and a first birth within cohabitation than younger women in France, the UK, the Netherlands, Norway, Bulgaria, and Estonia. As the ideal age of childbearing has shifted to later ages across cohorts due to, for example, educational expansion, increased labour force participation, the availability of more effective contraceptives, and changing norms and values

(Balbo et al., 2013; Mills et al., 2011), women in younger cohorts stay in unions which do not produce a child for a longer time. This might explain why older women are more likely to experience childbearing within cohabitation among younger cohorts compared to younger women. Additionally, young women in younger cohorts might be more likely to be in a non-residential union (compared to young women in older cohorts) which they only turn into cohabitation or marriage if they have childbearing plans or if they get pregnant. However, as information on non-residential partnerships is not available in the data, it is not possible to further investigate this idea.

I also showed that there is substantial cross-country variation in changes in the timing of first union formation and first birth across cohorts. In Russia, Belgium, the Netherlands, and Norway while the transition to motherhood is delayed to later ages among younger cohorts, as expected, partnership transitions were shifting to younger ages. In Estonia and Lithuania, on the other hand, both partnership formation and first births shifted to younger ages across the examined cohorts. Additionally, in Italy, Spain, and the UK, partnership formation and first births have been delayed between the 1950-59 and 1960-69 birth cohorts. Last, in Bulgaria, and Russia not many changes occurred either in the timing of first union formation or in the timing of first births.

Overall, these findings are in line with previous studies that compared the proportion of women ever in a co-residential union by a certain age (Billari, 2004, 2005b; Billari et al., 2002; Kiernan, 2002; Manting et al., 2002; Philipov & Jasilioniene, 2008). Where the presented results differ slightly from what has been shown previously (e.g. for Norway) might be due to differences in the choice of the examined cohorts. Previous studies typically investigated a narrower range of birth cohorts. This implies that changes in partnership formation could only be partially observed. By comparing a broader range of cohorts, this study showed long-term trends in first union and first birth timing across countries allowing for a more detailed examination of period and cohort effects across countries. Additionally, other studies usually examined changes in the timing of first unions by comparing the mean age at first union formation across birth cohorts (Sobotka & Toulemon, 2008). These studies usually conclude that first partnership formation has been delayed across Europe. It is possible that this approach and the one employed in this study

lead to different conclusions. By simply looking at the mean age at first union formation one cannot see the changing age-pattern of partnership formation. It might be that as there is more variation in the timing and sequencing of partnership and family transitions among younger cohorts, some women who experience these transitions at later ages are driving the trends of mean age at first union formation upwards. However, the presented approach allows us to investigate the proportion of women who were in a union by each age. France, for example, is an interesting case. When comparing the proportion of women who are never partnered at age 20 and age 25 across cohorts it seems that not many changes took place in the timing of first unions. However, when comparing these proportions at age 22 or 23, we find that between the last two cohorts the proportion of never partnered women increased at these ages. However, by age 25 these proportions are very similar across the two cohorts. This indicates that although up to age 22-23 first union formation was delayed, afterwards more rapid union formation took place.

The cross-national variation in the age pattern of the examined family life transitions highlights that during the examined period more rapid social change occurred in some countries than in others. For example, in post-socialist countries marriage and fertility was early and universal before the transition in 1989-1990 and the pace and magnitude of changes was much slower compared to other countries. In Northern and Western Europe, on the other hand, the timing of union and family formation was delayed from as early as the 1940 birth cohort. In Southern Europe, these changes started with the cohort of women born in the 1950s (Frejka & Sardon, 2007; Frejka & Sobotka, 2008). This implies that the meaning of age is likely to vary across countries. This issue is further discussed in Chapter 4.

Furthermore, in most examined countries, at age 30 approximately 30% to 40% of women are still childless whilst at age 40 this proportion is 10% to 20%. At the same time, as expected, I found increasing variation in women's partnership histories at later ages. In order to further investigate the role of partnership histories in the delayed transition to motherhood, Chapter 4 will examine this section of the reproductive life course to improve our understanding of how changing partnership dynamics play a role in whether women will eventually become mothers or remain childless.

Finally, when focusing on educational differences in the partnership context of first births across countries by cohort, I found that in most countries, cohabiting first births and a first birth while being never partnered were more prevalent among the low educated while a marital first birth and a first birth following re-partnering were increasingly more common among the more educated. While in many countries a first birth following re-partnering remains marginal, in the UK, Norway, the Netherlands, and France the proportion of first births to mothers who experienced re-partnering was higher among highly educated women than among the lower educated. These findings support the argument that societal changes influenced women from different socio-economic background differently.

This chapter did not find support for the Second Demographic Transition theory, according to which more educated women would be at the forefront of experiencing 'new' demographic behaviours such as non-marital childbearing. However, the SDT theory is not only about the association between educational level and 'new' family behaviours but also about value change and individualisation. Additionally, while there seems to be no support for the SDT theory at the individual level, diffusion of new family behaviours at the macro level might still be linked to changes associated with the SDT (Lappegård et al., 2014). For example, Vitali et al. (2015) found that the most important driver for the diffusion of childbearing within cohabitation in Norway was women's educational expansion.

Furthermore, it is possible that associations that exist at the individual level reflect on how the SDT created different trajectories for different people. For example, McLanahan (2004) argued that the changes associated with the SDT did not have the same influence on women from different socio-economic background and thus have led to increasing polarisation between women from different socio-economic groups. Last, it is possible that behaviours associated with the SDT diffuse in two different ways. First, consistent with the narrative of the SDT, new behaviours would be adapted by the more educated, economically advantaged social groups whose values, preferences, and orientation towards self-fulfilment provide ground for the emergence of these behaviours. However, the second pathway may lead to an emergence of new family behaviours among the more disadvantaged strata of the population as a

response to changed structural conditions and economic crisis (Sobotka, 2008).

As this chapter did not examine educational differences in partnership formation, it is not possible to tell whether the more educated with more resources follow pathways to family formation which, in turn, increases their resources compared to their lower educated counterparts (McLanahan, 2004). Additionally, it is possible that higher educated women are more likely to experience non-marital cohabitation, as suggested by the SDT theory. In order to further examine this question, Chapter 5 investigates the changing role of educational attainment on the pathway to a first birth. In other words, it examines educational differences in the different partnership transitions and in the transition to motherhood to find out where in the childbearing process the role of education is crucial.

This chapter has also shown that major changes in partnership and family formation started among women born in the 1950s and 1960s. Therefore, the remainder of this thesis will not examine women born between 1930 and 1949. Additionally, the results highlighted that the most prominent changes occurred in the partnership context of first births but these changes were largely similar across educational groups. Additionally, in most countries there was little variation in the partnership context of first births among the earliest cohorts. Therefore, when further investigating educational differences in family behaviours in Chapter 5, I will not examine changes over time.

This study has a few limitations. As the results are purely descriptive, it is not possible to tell whether the differences across cohorts, age groups, educational groups or countries are statistically significant. Additionally, it is possible that examining younger cohorts would have revealed even larger changes in partnership and family formation behaviours than what was found for women born between 1930 and 1969. However, in order to be able to examine the transition to first birth, information on completed fertility is needed. Nonetheless, this chapter presented a useful basic description of the main patterns of partnership formation and the transition to motherhood across cohorts and countries providing the background and the starting point for the rest of this thesis.

4. Chapter 4 – Later or never? Partnership histories and the transition to motherhood in later reproductive ages in Europe

4.1 Introduction

While the transition to motherhood is being postponed to ever later ages across Europe (Mills et al., 2011; Sobotka et al., 2011), the biological age limit to female fecundity is relatively fixed (Billari et al., 2007; McKinlay, 1996). As fecundity declines with age (Heffner, 2004) and only a very limited group of women are able to benefit from medically assisted reproductive technologies (Schmidt et al., 2012), fertility postponement leads to increased uncertainty as to whether a woman will become a mother or remain childless unwillingly (Berrington, 2004; Billari et al., 2007; te Velde et al., 2012).

This chapter provides a description of how the postponement of motherhood is linked to changes in partnership experiences (Balbo et al., 2013). Previous studies showed that there is a parallel tendency to delay union formation and parenthood (Corijn & Klijzing, 2001). Additionally, the increased prevalence of non-marital cohabitation means later entry to marriage (if not completely forgone), which is associated with delayed marital first births (Balbo et al., 2013; Manning, 1995). At the same time, due to increased partnership instability more women experience multiple partnerships before settling down with one partner (Wu & Schimmele, 2005). Such complex partnership pathways are associated with a later entry to motherhood (Matsuo, 2003).

Many previous studies addressed the relationship between partnership status (e.g. cohabitation or marriage) and the transition to motherhood (e.g. Baizán et al., 2003, 2004; Berrington, 2001; Brien et al., 1999; Perelli-Harris et al., 2010b; Steele et al., 2005; Upchurch et al., 2002). However, as current partnership status is a result of a set of successive previous family life transitions (Dykstra & Hagestad, 2007; Elder, 1975, 1977, 1985, 1992; Elder et al., 2002; Hagestad & Call, 2007; Keizer et al., 2008), using information only on current partnership status might mask the influence of important past family life transitions (Keizer et al., 2008). For example, the occurrence of

certain family life events, such as pre-marital cohabitation or union dissolution, might alter the outcomes of later family life events. First birth probabilities of women who cohabited with their partner prior to marriage might be different from those who directly married their partner. Cohabitation can be seen as a learning experience before marriage; more stable cohabiting unions are likely to be converted to marriage while less stable unions are likely to dissolve. Thus, marriage that was preceded by cohabitation might be more stable than direct marriage. This would mean that the probability of a first birth is higher within marriage that was preceded by cohabitation with the same partner than within direct marriage. At the same time, cohabitation is associated with the postponement of marriage and fertility which might lead to smaller first birth probabilities compared to the directly married. Thus, to understand the link between partnership experiences and women's chances to remain childless from a life course perspective (Elder, 1977, 1985, 1992; van Wissen & Dykstra, 1999), entire partnership *histories* need to be examined.

The interrelationship between partnership histories and the transition to first birth is expected to vary across Europe because country-specific factors, such as social policies and welfare systems, varying levels of gender equity, cultural and historical background, and the legal status of children born outside marriage play a role in partnership formation as well as the transition to motherhood (Esping-Andersen, 1990; Goldstein et al., 2009). Yet, most previous papers examined the relationship between partnership status and first birth in a single country and only a few studies have compared this association across Europe (e.g. Perelli-Harris et al., 2012; Perelli-Harris et al., 2010b). Moreover, the available comparative studies focused only on one segment of the family life course. By using comparable data from 12 European countries and focusing on multiple partnership experiences this study sheds new light on whether the interrelationship between partnership experiences and the transition to motherhood is unique or similar across countries. This contributes to our knowledge about changing family formation processes and their implications for societies and individuals.

Therefore, this chapter addresses the following research questions: What are the partnership histories of women who remain childless? How do these partnership histories relate to the transition to motherhood in later reproductive ages? How do these associations differ across European

countries[28]? To answer these questions, we make use of an extended multi-state model which is a useful descriptive tool for studying entire partnership histories leading to a first birth. This technique allows for examining childless women's partnership histories as well as for predicting their first birth probabilities conditional on their partnership histories within the same model. More specifically, we first examine the proportion of women who are childless at age 30/35 by partnership histories. Then, we calculate transition probabilities to first birth by age 40 among women who are still childless at age 30 or 35, conditional on their partnership histories at this age. Age 30 and 35 were chosen because these represent significant milestones in the life cycle (Rindfuss & Bumpass, 1976; Settersten, 2003) and are critical for female fecundity (Heffner, 2004; Leridon, 2004, 2010; Schmidt et al., 2012). It is important to note that the meaning of age 30 and 35 for fertility might vary across countries. The implications of this are discussed later on in this chapter. This chapter focuses on women born between 1953 and 1962; one of the earliest cohorts of women to ever experience non-marital cohabitation, more diverse partnership forms, and less standardised pathways into parenthood.

Changing partnership dynamics is only one of several factors which contribute to fertility postponement. The increased age at which women leave full time education, increased female labour force participation, changes in norms and values, economic uncertainty, and the availability of more effective contraceptives, have all played a role in the delayed transition to motherhood (Balbo et al., 2013; Mills et al., 2011). There is a complex interrelationship between these processes and fertility postponement (Balbo et al., 2013) which is likely to be mediated by country-specific factors.

Additionally, previous research has shown that various individual characteristics (e.g. educational attainment, employment, socio-economic status, or values) may influence women's partnership experiences as well as

[28] In this chapter, the United States is not included in the comparison because data are only available for women born after 1961 in the Harmonized Histories (for the United States, data come from the 2006 National Survey of Family Growth (NSFG)). Including the United States in the analyses would leave us with only 140 women which is not a sufficient number of cases for examining several transitions. The NSFG data were also collected in 1995 and in 2002. Using information on women from the 1995 data collection would mean comparing a very different group of women with those from Europe as the data collection in Europe took place between 2003 and 2010 while fertility and partnership histories in the 2002 data are not reliable (Musick & Michelmore, 2014).

their fertility (Aassve, 2003; Aassve et al., 2006; Perelli-Harris et al., 2010b). However, due to data limitations, it is outside the scope of this chapter to unravel the (causal) linkages between partnership experiences, the transition to motherhood, and possible confounders. Rather, the focus is on describing the interrelationships between fertility postponement and partnership experiences across selected European countries. This is a useful first step to understand how the dynamics of changing family life courses are linked to women's chances to become a mother or, alternatively, to remain childless.

4.2 Expectations on the link between partnership histories and the transition to motherhood across Europe

I study the link between the transition to first birth at later reproductive ages and five possible partnership histories prior to age 30 or 35 across Europe: being never partnered, having cohabited with one partner and remaining in this cohabiting union, direct marriage with the first partner, marriage preceded by cohabitation with the same first partner, and experiencing at least one union dissolution which might have been followed by re-partnering. Below I discuss how the examined partnership histories are expected to be related to the transition to motherhood at later ages. Only arguments related to the direct link between partnership histories and the transition to motherhood are discussed and I do not explore how different mechanisms might work via possible confounders.

Women who remain childless and never partnered until age 30 or 35 might have had difficulties finding a partner (Billari et al., 2007; Bongaarts, 2001; Keizer et al., 2008; Mills et al., 2011; Schmidt et al., 2012). Older women have a reduced ability to adjust to unexpected shocks such as delays in finding an appropriate partner (Billari et al., 2007). Therefore, those who do not find an appropriate partner by age 30 or 35 are expected to be more likely to remain childless than those who have formed a co-residential relationship by this age (Billari, 2005b; Keizer et al., 2008; Kravdal, 2007). This is because these women are not exposed to regular sexual intercourse (Bongaarts, 2001) and because women prefer to raise a child within a stable relationship (Baizán et al., 2003; Hobcraft & Kiernan, 2001; Kravdal, 2002) where they can rely on the

economic and social support of a partner (Kravdal, 1994). It is possible that never partnered women would be more likely to achieve motherhood in post-socialist countries than in the other countries due to the higher level of non-marital fertility among single mothers during the examined period (Kiernan, 2004b; Muresan et al., 2008).

Most first births happen within a co-residential union (Kiernan, 1999, 2001). Childless women who are in a co-residential relationship at age 30 or 35 might be married or cohabiting. As the risk of a first birth is the highest in the first few years of marriage (Baizán et al., 2003; Billari & Kohler, 2002), it is possible that women who are married and childless at age 30 or 35 only recently got married and have not yet had enough time to have a child. Additionally, they might consider themselves too young to become mothers or might not want to have children at all. Cohabiting women who are childless at age 30 or 35 might not consider having a child within this union. They might either not find their partner appropriate for a more serious relationship in which case the union is most likely to break down, or they might marry their partner. Alternatively, these women might not intend to have children at all (Sobotka & Testa, 2008). Moreover, children are more likely to be born within marriage than in cohabitation (Baizán et al., 2003, 2004; Brien et al., 1999; Kiernan, 2004b; Manning, 1995) because cohabiting unions are generally less stable and involve a lower level of commitment than marriages (Baizán et al., 2004; Heuveline & Timberlake, 2004; Kravdal, 1997; Liefbroer & Dourleijn, 2006). Thus, I expect that childless women who are married at age 30 or 35 will be more likely to have a first child than those who are cohabiting. This would be even more so in Southern European and post-socialist countries where partnership and family formation events are more closely linked than in the other countries (Heuveline & Timberlake, 2004; Katus & Kingkade, 2004; Kohler et al., 2002; Koytcheva & Philipov, 2008; Muresan et al., 2008; Sigle-Rushton, 2008; Stankuniene & Jasilioniene, 2008; Zakharov, 2008). On the other hand, in Western and Northern Europe cohabiting women may be more likely to have a child than in the other countries as in these countries cohabitation was more widespread and more often context for childbearing (Berrington, 2001; Kravdal & Rindfuss, 2008; Toulemon et al., 2008).

It is important to differentiate women who were directly married by age 30 or 35 from those who cohabitated with their partner before marriage. Pre-marital cohabitation is often a learning experience before stronger commitments or investments are made (Ermisch & Francesconi, 2000; Oppenheimer, 1994, 1997) and thus it is used to cope with uncertainties arising in the relationship. If this is the case, marriage that was preceded by cohabitation with the same partner might be a more stable union than direct marriage. Alternatively, women might marry their cohabiting partner when they desire to have a child (Oppenheimer, 1994, 1997) or if they are already pregnant. These arguments lead to the expectation that the probability of a first birth is higher for childless women who married their cohabiting partner by age 30 or 35 than for those who directly married their partner by these ages. This might especially be the case in Northern and Western Europe, due to the higher prevalence of cohabitation (Kravdal & Rindfuss, 2008; Perelli-Harris et al., 2010b; Toulemon et al., 2008) compared to Southern European and post-socialist countries where non-marital cohabitation was rare among the examined cohort of women. On the other hand, the experience of cohabitation before marriage is likely to contribute to a delay in the timing of marriage and first birth (Oppenheimer, 1994, 1997). An important determinant of the timing of marriage and parenthood is whether and when couples convert their cohabiting relationships into marriage (Ermisch & Francesconi, 2000). This means that women who cohabited with their spouse before marriage might be more likely to delay having a first child to later ages, where some of them might experience fertility problems. Thus, it is also possible that childless women who married their cohabiting partner by age 30 or 35 are less likely to become mothers than those who are childless and directly married at these ages.

Childless women who have experienced the dissolution of a cohabiting or marital union at prime childbearing ages have a reduced ability to adjust to unanticipated union dissolution (Billari et al., 2007; Keizer et al., 2008; Menken, 1985) compared to younger women. As the process of finding a new appropriate partner may be lengthy, women who experience union dissolution by age 30 or 35 are expected to be less likely to become mothers than those who are married or cohabiting at this age. It is possible that in Southern European and post-socialist countries, where divorce rates were very low

compared to the other parts of Europe among the examined cohort of women (Sobotka & Toulemon, 2008), women who experienced union dissolution before the birth of a first child would have had more difficulties finding a new partner than in the other countries as the remarriage market might have consisted of a smaller number of available men at their age (de Graaf & Kalmijn, 2003). Therefore, I expect that in post-socialist and Southern European countries, women who experienced union dissolution would be less likely to have a first child than in the other countries.

4.3 Implications of cross-national context of first birth timing

In interpreting the findings we need to bear in mind the different patterns of fertility postponement across these countries and hence the relative likelihood of remaining childless until age 30 or 35. In Western and Northern Europe, women born as early as the 1940s had already started to delay having a first child while in Southern Europe, fertility postponement only began a decade later. In post-socialist countries, this process started among those born in the 1960s (Frejka, 2008b; Frejka & Sardon, 2007; Frejka & Sobotka, 2008). As a result, while in post-socialist countries, the mean age of women at the birth of their first child was between 22 and 23 among women born between 1953 and 1962, in the other countries it was around 25 to 26 ("Human Fertility Database," ; Council of Europe, 2006; De Rose et al., 2008; Delgado et al., 2008; Fokkema et al., 2008; Frejka & Sardon, 2007; Koytcheva & Philipov, 2008; Sigle-Rushton, 2008; Toulemon et al., 2008). This has two main implications.

First, having a first child at age 30 might have been considered rather “late” in post-socialist countries while in Northern and Western Europe, women at this age might have been thought to be “too young” or “on time” to start a family (Billari & Liefbroer, 2007; Settersten, 2003). Second, the cross-national differences in first birth timing imply that women’s propensity to remain childless until age 30 or 35 might vary across countries. In other words, selection into remaining childless by age 30 or 35 varies across Europe. The relatively young pattern of childbearing in post-socialist countries (Kohler et al., 2002) would imply that in these countries most women would already have

achieved motherhood by age 30 while this is less so in the other countries. Additionally, due to the closer link between partnership formation and childbearing in post-socialist and Southern European countries (Heuveline & Timberlake, 2004; Kohler et al., 2002), we would expect most women who are still childless at age 30 or 35 to be un-partnered (either never partnered or following a union dissolution). On the other hand, in Western and Northern Europe, where there is a weaker link between partnership formation and childbearing and a higher prevalence of cohabitation, one would expect to see more variation in the partnership histories of childless women at these ages.

4.4 Data and methods

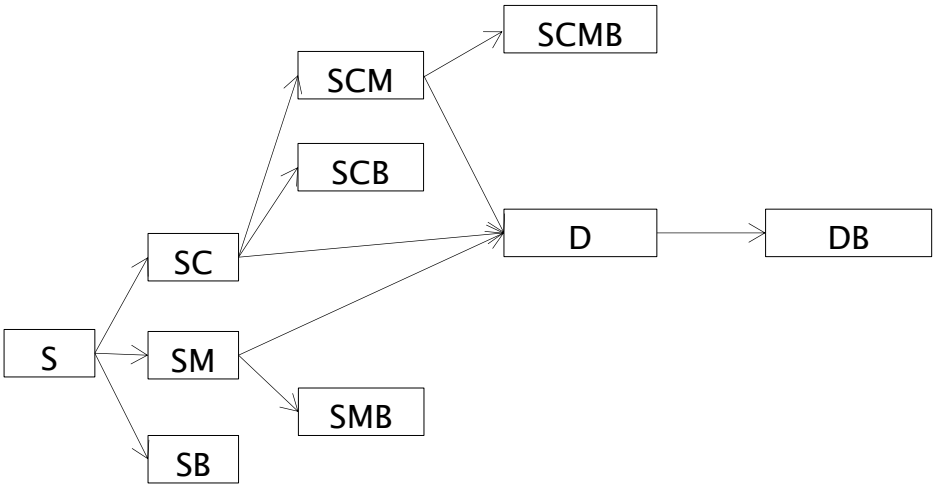
This chapter compares Southern European (Italy and Spain), Western European (Belgium, France, the Netherlands, and the United Kingdom), Northern European (Norway), and post-socialist countries (Bulgaria, Estonia, Lithuania, Romania, and Russia) using data from the *Harmonized Histories;* a comparative harmonised database of retrospective monthly union and fertility histories (Perelli-Harris et al., 2010a). For most countries, data are from the first wave of the Generations and Gender Surveys (from various years between 2004 and 2010), the British data come from the British Household Panel Survey (2005-2006), the Spanish data were collected as part of the Spanish Fertility Survey (2006), and the Dutch data are taken from the 2003 Fertility and Family Survey. Because not all surveys include retrospective information for men, the present analyses are restricted to women. Additionally, it has been shown that men tend to underreport their fertility, especially in case of non-marital births and births from previous marriages (Joyner et al., 2012; Rendall et al., 1999).

To study childless women's first birth probabilities, information on completed fertility is needed. Age 40 is chosen to indicate the end of the reproductive ages because in modern societies childbearing is usually completed by age 40 (Billari et al., 2007; Frejka & Sobotka, 2008). Indeed, only a few (0.6% or less) first births occurred after this age in all examined countries. Therefore, the sample consists of women born between 1953 and 1962 who are childless and never partnered at age 15. This approach allows for following events as they evolve over time and that occurred to a group of women who experienced the same period effects (Sobotka et al., 2011).

To study how partnership histories relate to the transition to motherhood in later reproductive ages in a cross-national context, this chapter estimates a multi-state model which is ideal for studying the family life course as it allows for keeping track of the partnership and parenthood experiences of the examined cohort of women (Willekens, 1987). Multi-state models represent an individuals' life course as a stochastic process, which at any time point occupies one of the defined discrete states (Namboodiri, 1991). Over time, individuals move among the defined states; these movements are called transitions (Hougaard, 2000). For the mathematical description of multi-state models, readers are referred to Rogers (1975), Namboodiri and Suchindran (1987), and Schoen (1988).

Multi-state models assume the Markov property. In other words, the model assumes that the present behaviour of an individual is enough to predict its future behaviour (Andersen & Keiding, 2002; Hougaard, 1999, 2000) and it does not matter through which path the individual arrived at the given state. More precisely, when, for example, calculating the probability of a first birth within a marital union, this approach would not differentiate between direct marriage and marriage that was preceded by cohabitation. As the probability of a first birth is argued to differ by previous partnership histories, the Markov assumption is not realistic. Therefore, this chapter makes use of the progressive model (Hougaard, 2000), where the states are defined as sequences of previous partnership events as compared to single events in the original approach. In such a model, the current state includes information on the number and order of previously visited states. This model allows for reconciling the multi-state approach with the life course perspective and enables us to distinguish between direct marriage and marriage that was preceded by cohabitation as well as between never partnered single women and those who became single following union dissolution. The multi-state models are estimated using the *mstate* package in *R* (de Wreede et al., 2011; Putter, 2011a; Putter et al., 2007).

Figure 4.1 Extended multi-state model



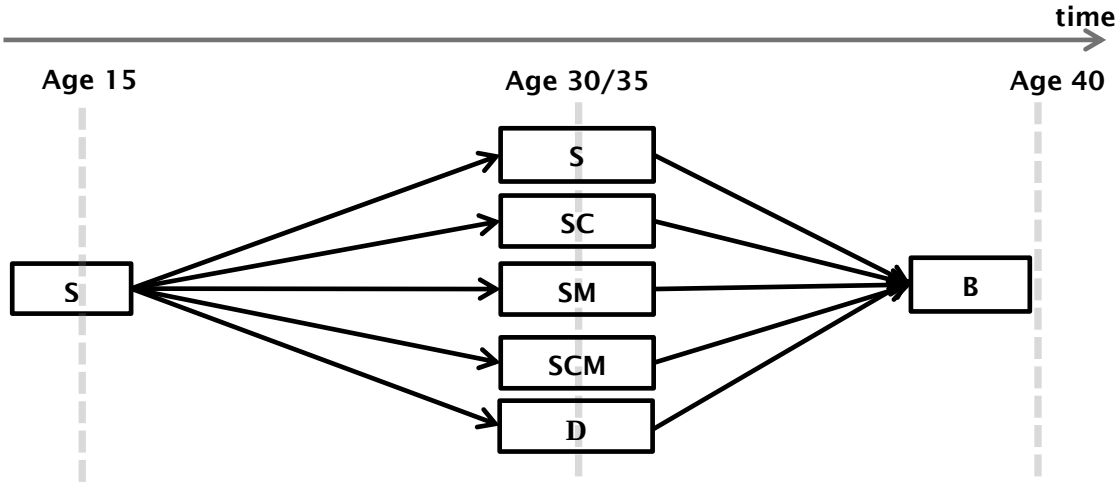
Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution, B – first birth.
Note: SCM indicates that women married their cohabiting partner

Figure 4.1 shows the extended multi-state model; the rectangular boxes depict states that an individual can occupy during the family life course and the arrows represent the possible transitions between these states. This model keeps track of the partnership histories of individuals, as indicated by the sequences of capital letters. For example, the state SCMB refers to the following partnership history: never partnered and childless (S), cohabitation (C), marriage with the cohabiting partner (M), and first birth (B). Additionally, a first birth might happen following the dissolution of a first union (DB). Note that due to the small number of union dissolutions that occur before the birth of a first child, this chapter does not differentiate between the dissolution of cohabitation, direct marriage, or marriage that was preceded by cohabitation with the same partner. Similarly, although women might experience re-partnering after union dissolution, these women were included in the union dissolution state.

The analytical framework is depicted in Figure 4.2. Between age 15 and 30/35, women move between the different partnership states, as explained above. As a result, women who are still childless at age 30 or 35 might be in either of the following partnership states: never partnered (S), cohabitation (SC), direct marriage (SM), marriage that was preceded by cohabitation with the same partner (SCM), or union dissolution (D). To better understand cross-national differences in remaining childless by age 30 and 35, I first examine the proportion of childless women at age 30 and 35 as well as their partnership

histories. Then, childless women's transition probabilities to motherhood between ages 30 or 35 and 40 are calculated conditional on their partnership histories at age 30 or 35. The same model is estimated for all countries.

Figure 4.2 Analytical framework



Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution (also includes women who experienced re-partnering following union dissolution), B – first birth.
Note: SCM indicates that women married their cohabiting partner

Between age 30 or 35 and 40, additional partnership transitions can take place. For example, never partnered or cohabiting women can marry or unions might dissolve. Thus, it is possible that, for example, women who are still never partnered at age 30 or 35 will have their first child within cohabitation or marriage. However, as the focus of this chapter is to examine the probability of a first birth by partnership histories at age 30/35, I am only interested in partnership transitions that take place up to these ages. Additionally, this chapter investigates the probability that women would eventually become mothers, irrespective of their partnership status at first birth. Therefore, the probabilities of partnership transitions between age 30/35 and 40 are not taken into account. Rather, the probability of a first birth between age 30 or 35 and 40 is calculated as the sum of the partnership-state specific first birth probabilities. For example, the probability of a first birth for women who are still never partnered and childless at age 30 is the sum of the probabilities that they would have a birth while being never partnered, cohabiting, married (whether within direct marriage or within marriage that was preceded by cohabitation with the same partner) or after having experienced union dissolution. A limitation of this approach is that the available software does

not provide standard errors for the measure of interest (i.e. the sum of the partnership-state specific first birth probabilities). This implies that we cannot statistically evaluate the differences in the estimates between and within countries. Additionally, due to varying sample sizes, the estimates might be more precise for some countries than for others. These limitations imply that care needs to be taken when interpreting and comparing the results within and across countries. However, because the aim of the study is to describe the probability of a first birth among women who are still childless at age 30 or 35, conditional on their partnership histories at this age, it is necessary to calculate these age-specific transition probabilities to first birth by partnership histories.

This chapter estimates and reports transition probabilities rather than transition rates. The reason for this is that transition rates only provide estimates of the risk of a subsequent event (Hougaard, 2000). However, in the current case, several subsequent partnership transitions can happen between age 30 or 35 and 40, as explained above. Transition probabilities are derived from transition rates using the Aalen-Johansen estimator (Hougaard, 2000).

Although weights are available for most countries, the applied package does not allow for incorporating weights. Exploratory analyses were conducted to compare the proportion of first births by partnership histories at age 30, 35, and 40 with and without weights. The results (not shown) indicated that the examined proportions are not significantly different in the weighted and unweighted datasets.

4.5 Results

To describe women's family life transitions between age 15 (when they are childless and never partnered) and age 40, Table 4.1 summarises the number of women at risk of the examined transitions and the number and proportion of those who experience them. Sample sizes vary considerably between 560 for Belgium and 3,615 for Italy. Note that the total sample size for each country equals the number of women who are at risk of the competing transitions SC, SM, and SB.

Table 4.1 Number of women at risk of all transitions and the number (and proportion) of those who experience these transitions by country, women observed from age 15 to 40

		SC	SM	SB	SCM	SCB	SMB	SCMB	D	DB
Estonia	at risk	916	916	916	383	383	433	274	1090	45
	event	383 (42%)	433 (47%)	82 (9%)	274 (72%)	91 (24%)	416 (96%)	254 (93%)	45 (4%)	25 (56%)
Bulgaria	at risk	1024	1024	1024	535	535	382	479	1396	13
	event	535 (52%)	382 (37%)	60 (6%)	479 (90%)	50 (9%)	371 (97%)	462 (96%)	13 (1%)	10 (77%)
Romania	at risk	1024	1024	1024	182	182	771	109	1062	32
	event	182 (18%)	771 (75%)	54 (5%)	109 (60%)	63 (35%)	713 (92%)	90 (83%)	32 (3%)	15 (66%)
Russia	at risk	1408	1408	1408	310	310	942	183	1435	86
	event	310 (22%)	942 (67%)	120 (9%)	183 (59%)	94 (30%)	884 (94%)	167 (91%)	86 (6%)	57 (66%)
Lithuania	at risk	829	829	829	117	117	583	88	788	34
	event	117 (14%)	583 (70%)	74 (9%)	88 (75%)	22 (19%)	539 (92%)	79 (90%)	28 (4%)	15 (44%)
Belgium	at risk	560	560	560	225	225	278	186	689	43
	event	225 (40%)	278 (50%)	40 (7%)	186 (83%)	21 (9%)	247 (89%)	147 (79%)	43 (6%)	20 (47%)
France	at risk	968	968	968	487	487	360	273	1120	112
	event	487 (50%)	360 (37%)	69 (7%)	273 (56%)	132 (27%)	329 (91%)	245 (90%)	112 (10%)	54 (48%)
Netherlands	at risk	1072	1072	1072	408	408	622	290	1320	120
	event	408 (38%)	622 (58%)	17 (2%)	290 (71%)	41 (10%)	552 (89%)	252 (87%)	120 (9%)	68 (57%)
UK	at risk	809	809	809	242	242	459	143	844	118
	event	242 (30%)	459 (57%)	66 (8%)	143 (59%)	26 (11%)	391 (85%)	109 (76%)	118 (14%)	75 (64%)
Norway	at risk	1317	1317	1317	758	758	384	428	1570	167
	event	758 (58%)	384 (29%)	143 (11%)	428 (56%)	207 (27%)	351 (91%)	375 (88%)	167 (11%)	101 (60%)
Spain	at risk	1380	1380	1380	153	153	1080	96	1329	29
	event	153 (11%)	1080 (78%)	77 (6%)	96 (63%)	34 (22%)	1021 (95%)	85 (89%)	29 (2%)	13 (45%)
Italy	at risk	3615	3615	3615	295	295	2989	153	3437	158
	event	295 (8%)	2989 (83%)	109 (3%)	153 (52%)	63 (21%)	2735 (92%)	119 (78%)	158 (5%)	44 (28%)

Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution, B – first birth.
Note: SCM indicates that women married their cohabiting partner

In most countries, the majority (47-83%) of never partnered women marry directly (SM) except in Bulgaria, France, and Norway, where most women (50-57%) enter cohabitation (SC). Additionally, between 2% and 11% of never partnered women have a first child without forming a co-residential union (SB). Consequently, about 2% to 7% of women remain never partnered between age 15 and 40. Moreover, in most countries, cohabiting women often marry their partner; this proportion varies between 56% in France and Norway and 90% in Bulgaria. The proportion of cohabiting women who have a first child within cohabitation varies between 11% in the UK and 35% in Romania. Between 85% (the UK) and 97% (Bulgaria) of directly married women have a first child within this union while this proportion varies between 76% and 96% among those who married their cohabiting partner. In most countries, only a few women (1-6%) experience the dissolution of a union before the occurrence of a first birth but this proportion is somewhat higher in the Netherlands (9%), France (10%), Norway (11%), and the UK (14%). Less than half of these women experience a first birth sometime after union dissolution in Lithuania, Belgium, France, Spain, and Italy while this proportion is above 55% in the other countries. These figures are in line with what we know from previous literature on union and family formation behaviours in the examined countries.

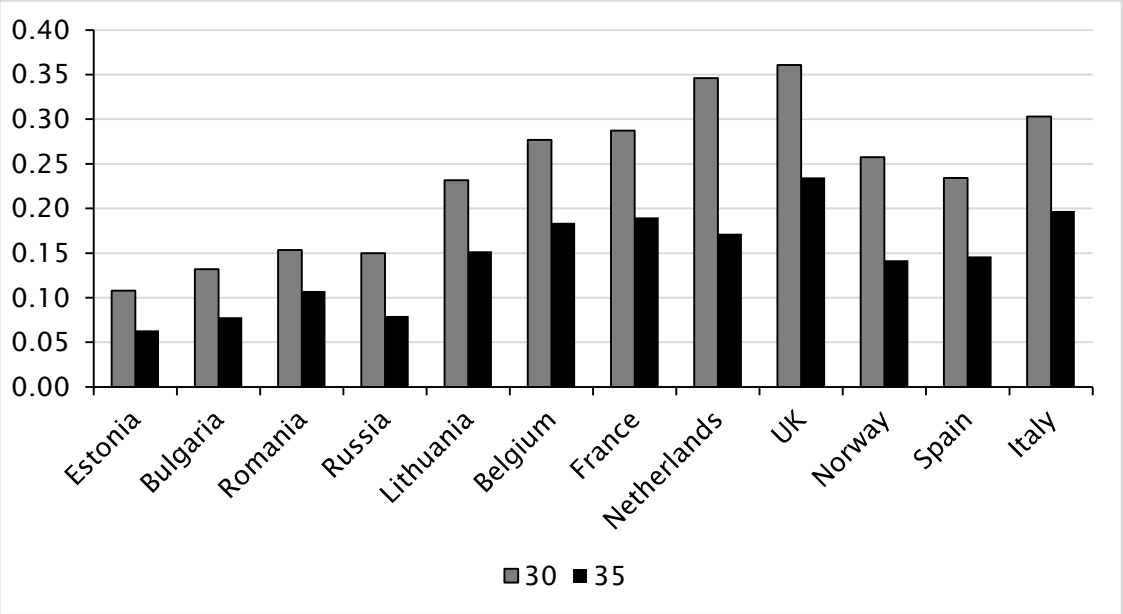
4.5.1 The probability of remaining childless until age 30 or 35

To examine cross-national differences in the age pattern of childbearing in the 1953-1962 birth cohort, Figure 4.3 depicts the probability of women to remain childless by age 30 and 35 in each country given that they were childless and never partnered at age 15. These results come from an extended multi-state model where women's probabilities of experiencing a first birth between age 15 and 40 are estimated[29]. There are large cross-national differences in the proportion of childless women at age 30 ranging between 11% and 15% in most post-socialist countries except for Lithuania, where it is 23%. This proportion is considerably larger in the other countries. In Western European countries, 28% to 36% of women are childless at age 30, while this proportion is 23% in Spain and Lithuania, 26% in Norway, and 30% in Italy. At age 35, the proportion of childless women is much lower in all countries; this is especially

[29] Although these results were obtained from the extended multi-state model, they are equivalent to simple proportions of women who are childless at age 30/35 by partnership histories.

the case in post-socialist countries (6-11%, but 15% in Lithuania). In Western European countries, it varies between 17% and 23%; it is around 15% in Norway, and 15-20% in Southern Europe. These figures mirror cross-national differences in the age pattern of childbearing (Billari & Liefbroer, 2007). As discussed before, indeed, most women in post-socialist countries seem to have achieved a first birth by age 30 while in Western, Northern, and Southern European countries, there are larger differences between the probability of remaining childless by age 30 and by age 35. Thus, women who are still childless at ages 30 and 35 may constitute a more selective group in post-socialist countries where it was more common to have a first child by age 30 than in the other countries.

Figure 4.3 Probability of women to remain childless by age 30 or 35 given that they were childless and never partnered at age 15, by country

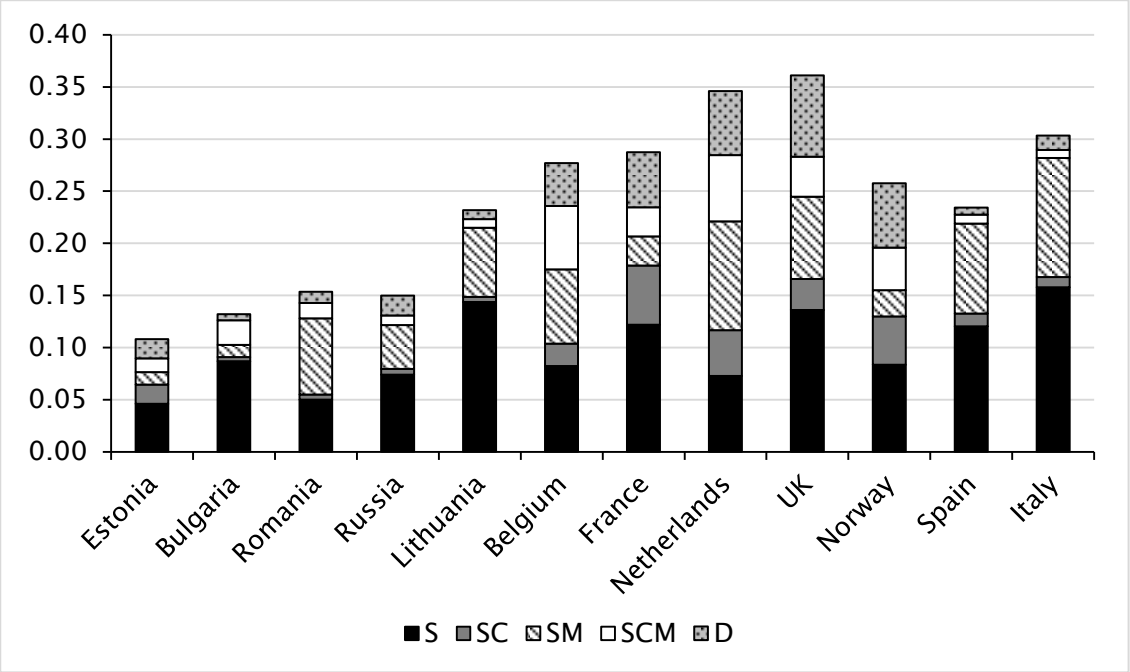


4.5.2 Partnership histories of childless women at age 30 and 35

To examine the role of partnership histories in remaining childless by age 30 and 35, Figure 4.4 and Figure 4.5 show the probability of women to be in each of the possible partnership states and to be childless by age 30 and 35, respectively. The height of the stacked bars equals to the proportion of childless women at the examined ages (previously shown in Figure 4.3). The probability of being never partnered and childless at age 30 is between 5% and 16% in the examined countries. Among women who are childless at age 30, the share of never partnered women is the largest in all countries, except in

Romania and the Netherlands, where the proportion of directly married women is the highest (7% and 10%, respectively). In the other countries, the probability of being directly married and childless is between 1% and 11%. In post-socialist countries and Southern Europe, the probability of being in one of the other three partnership states (cohabitation, marriage with previous cohabitation experience, or union dissolution) and being childless is very small (1-2%). However, in the other countries, these proportions are somewhat larger (2-8%).

Figure 4.4 Probability of women to remain childless until age 30, by partnership history and country

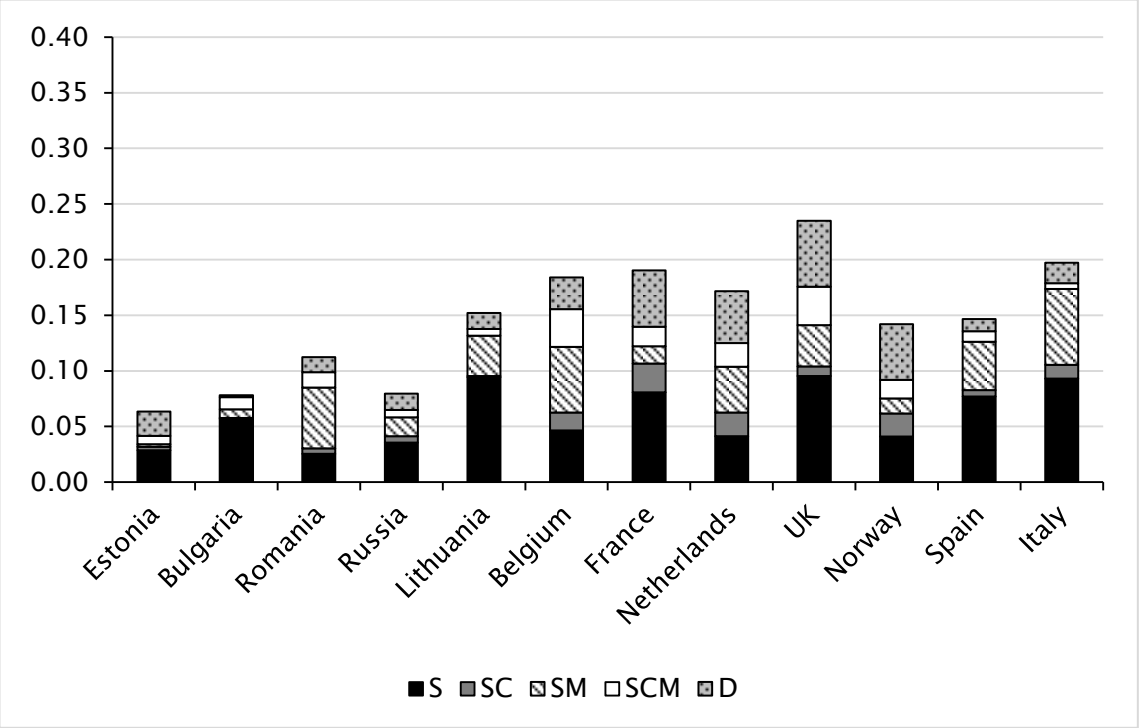


Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution, B – first birth.
Note: SCM indicates that women married their cohabiting partner

Although the patterns are similar among childless women at age 35, the probability of being childless by partnership status is smaller than at age 30. In Romania and Belgium, the largest probabilities belong to the directly married while in the other countries most 35-year-old childless women are never partnered. While in Belgium this result might reflect considerably later first birth timing, it is possible that in Romania these women are infertile. In the Netherlands and Norway, women who are still childless at age 35 are most likely those who had seen their first union dissolve. This is in line with the argument that union dissolution at an age which is crucial for childbearing might result in childlessness (Keizer et al., 2008). These results are in line with the expectations. Most childless women in post-socialist and Southern

European countries are never partnered (except for Romania). This is also generally the case in the examined Western and Northern European countries at both ages although in these countries there is also more variation in the partnership histories of childless women at both ages. Again, these findings are in line with the earlier discussion on the varying meanings of age 30 and 35 for fertility across countries.

Figure 4.5 Probability of women to remain childless until age 35, by partnership history and country



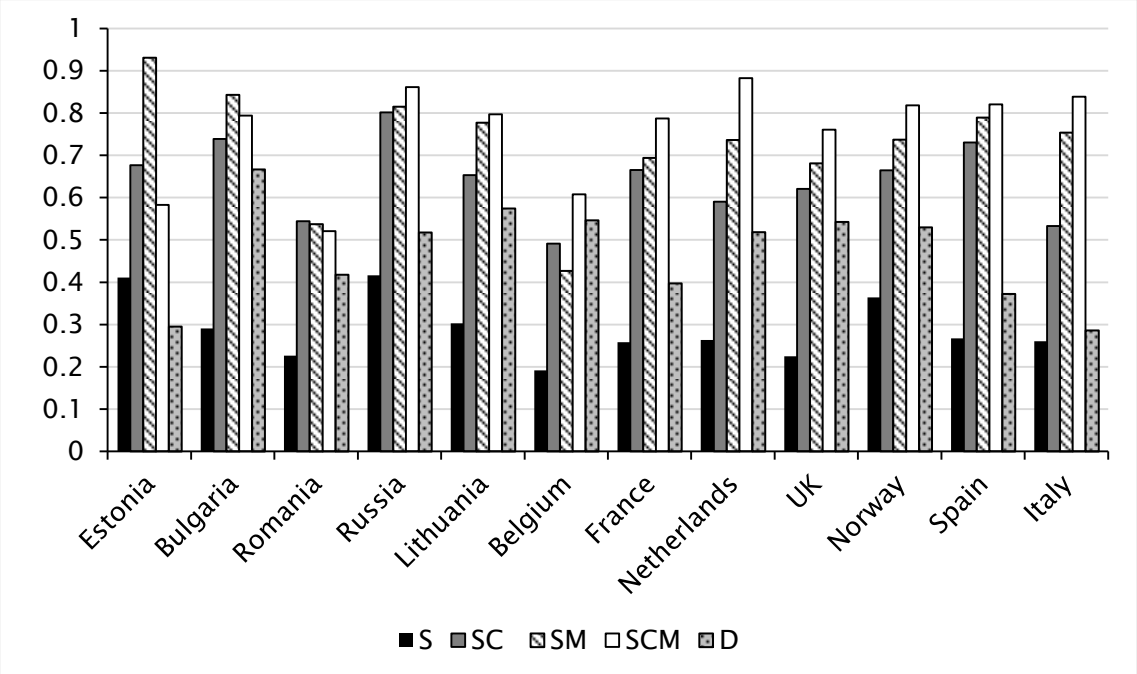
Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution, B – first birth.
Note: SCM indicates that women married their cohabiting partner

4.5.3 First birth probabilities of childless women at age 30 and 35 by partnership history

The results of the extended multi-state model are used to predict transition probabilities to first birth by age 40 for women who are still childless at age 30 and 35 conditional on their partnership histories at these ages (Figure 4.6 and Figure 4.7, respectively). When examining women's probabilities of becoming a mother by age 40 conditional on their partnership histories at age 30, a general pattern seems to emerge in all countries except Estonia, Bulgaria, Romania, and Belgium (Figure 4.6). As expected, women who are married at age 30 have the highest probability (69-88%) of achieving a first birth by age

40. Those who also experienced pre-marital cohabitation have slightly higher (2-9 percentage points) first birth probabilities than those who experienced direct marriage in Russia, Lithuania, France, the UK, Norway, Italy, and Spain whilst in the Netherlands, women who married their cohabiting partner have 15 percentage points larger probability to become a mother by age 40 than those who married directly. Additionally, women who cohabit at age 30 are 5-25% less likely to achieve parenthood than their married counterparts. Moreover, women who experienced union dissolution by age 30 have a 40-57% chance to have a child by age 40 in most of these countries, except in Italy and Spain, where these percentages are smaller (28% and 37%, respectively). Finally, as expected, women who are still never partnered at age 30 are the least likely to experience the transition to first birth by age 40; their probabilities vary between 19% in Belgium and 42% in Russia.

Figure 4.6 Probability of childless women to achieve a first birth by age 40 given partnership history at age 30, by country

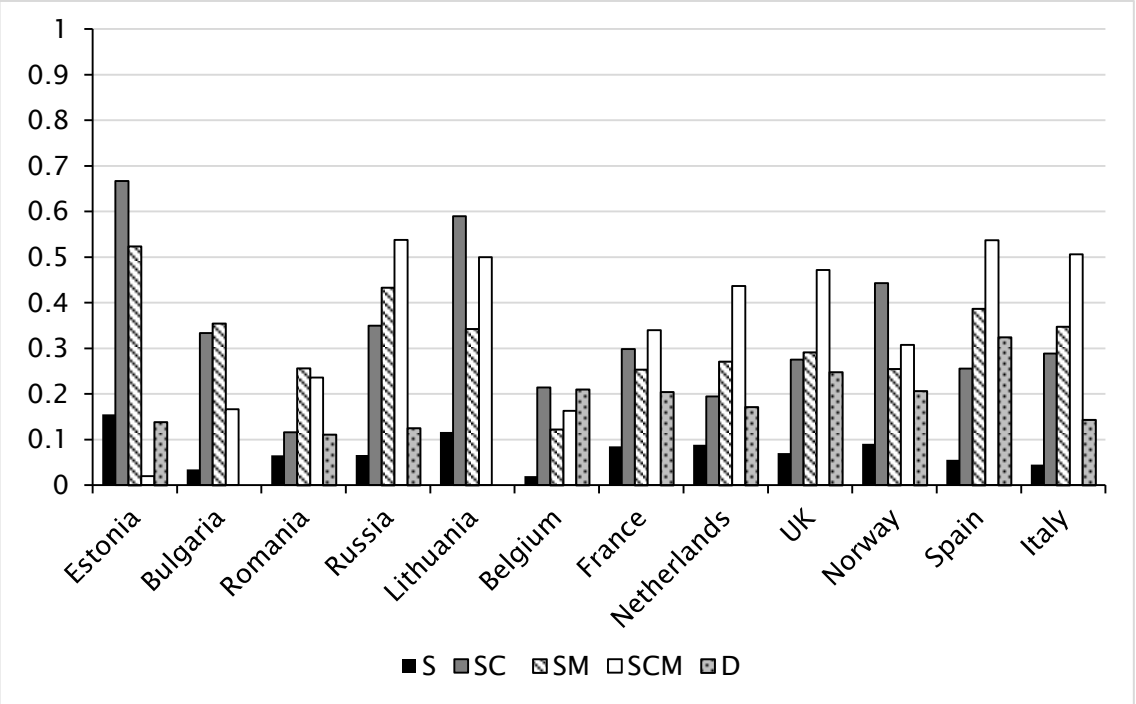


Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution, B – first birth.
Note: SCM indicates that women married their cohabiting partner

First birth probabilities of women in Estonia, Bulgaria, Romania, and Belgium do not follow these general patterns. In Bulgaria, the order of the probabilities belonging to direct marriage and marriage preceded by cohabitation are reversed while in Estonia, women who are directly married at age 30 have the highest probability of achieving a first birth. This is closely followed by the

probability of those who cohabit and by those who married their cohabiting partner. In Romania, these probabilities are just over 50% for all types of co-residential relationships. In Belgium, the largest probability of a first birth by age 40 belongs to women who married their cohabiting partner; this probability is followed by those who experienced union dissolution, those who are cohabiting, and finally, the directly married. Similarly to what is found for the other countries, in these countries, the lowest probability of a first birth by age 40 belongs to women who have not yet had a co-residential partner by age 30 (varies between 19% in Belgium and 42% in Russia) except in Estonia, where the lowest probability belongs to women whose first union dissolved.

Figure 4.7 Probability of childless women to achieve a first birth by age 40 given partnership history at age 35, by country



Note: S – never partnered, C – cohabitation, M – marriage, D – union dissolution, B – first birth.
Note: SCM indicates that women married their cohabiting partner

There is more cross-country variation in the patterns of the transition probabilities to first birth conditional on women's partnership histories at age 35 than at age 30. In general, the probability of a first birth is much lower at age 35 than at age 30 in all countries (Figure 4.7). While women with a partner have a 42-93% probability to experience a first birth depending on their partnership histories at age 30, this probability is between 10% and 67% at age 35. In Russia, the Netherlands, the UK, and Italy, the pattern is similar to the

general pattern that I found for first birth probabilities conditional on partnership histories at age 30. In these countries, the highest probability of achieving a first birth by age 40 belongs to women who married their cohabiting partner (between 44% and 54%), followed by those who married directly, those in a cohabiting union, those who experienced union dissolution, and those who have not had a partner by age 35. Notably, in Estonia, Lithuania, Belgium, and Norway, the probability of a cohabiting first birth is even higher than that of a first birth within direct marriage. Additionally, in France and Bulgaria, the second largest probability of achieving a first birth by age 40 belongs to women who cohabit at age 35. Again, women who were never partnered at age 35, have the smallest chance of becoming a mother by age 40 except in Estonia, where women who experienced dissolution are the least likely to have a first birth. Whereas the probability of this transition was between 19% and 42% at age 30, by age 35 it is below 10% for all countries except Estonia and Lithuania, where it is 15% and 12%, respectively. To sum up, most findings are in line with the general and cross-national expectations.

4.6 Conclusions and discussion

The aim of this study was to describe the link between partnership histories and the transition to motherhood among women born between 1953 and 1962 across Europe. More specifically, I first examined partnership histories of women who were still childless at age 30 and 35. Then, I investigated their first birth probabilities conditional on their partnership histories at these ages.

As expected, in post-socialist and Southern European countries, most childless women were never partnered at both ages while in the other countries there was more variation in the partnership histories of childless women. This is in line with the argument that the meaning of age 30 and 35 might vary across countries. In post-socialist countries where fertility was relatively early, childless women were mainly never partnered or directly married. The same was true for Italy and Spain, where there was a close link between partnership formation and childbearing. However, in the other countries there was more variation in the partnership experiences of 30 and 35-year-old childless women. These findings suggest that different selection processes into childlessness might be at play across the examined countries. Nonetheless, the

cross-national comparison highlighted a general pattern in the link between partnership histories and the transition to motherhood.

In all countries except Estonia, Bulgaria, and Romania childless women who married their cohabiting partner had a larger first birth probability than the directly married. This finding supports the argument that marriage which was preceded by cohabitation with the same partner is a more stable union than direct marriage. Premarital cohabitation is a learning experience (Ermisch & Francesconi, 2000) which is less costly to dissolve in case the partners are dissatisfied. Or it can be that cohabiting women who would like to have children (or are perhaps already pregnant) are more likely to turn their relationship into marriage which makes them more likely to have a child than the directly married. Alternatively, a selection effect might be at play; as first births usually occur soon after marriage, the childless, directly married women in our sample might be a selective group who did not yet have a child possibly due to a lack of desire or the inability to have a child. By distinguishing between direct marriage and marriage that was preceded by cohabitation, this study highlighted that it is important to take into account previous family life events when studying the occurrence of later events. Only accounting for current union status might mask the role of partnership histories in the transition to motherhood.

Directly married childless women at age 30/35 had the second highest probability of having a first birth in most countries; as expected, they were more likely to achieve motherhood than those who were cohabiting at both ages. Although in Western and Northern Europe, cohabiting women were expected to have higher first birth probabilities than in the other countries due to the higher prevalence of non-marital cohabitation, this expectation was only confirmed by the results for Norway and Belgium where the highest first birth probabilities belonged to childless women who were cohabiting at age 35. A possible explanation for this finding is that in these countries, 35-year-old childless women might not feel the need to legalise their relationship before the birth of a child. Perhaps these women have been waiting for a long time to find an appropriate partner for establishing a family and they prefer to have a child as soon as possible.

Never partnered and childless women were found to be the least likely to become mothers. As expected, in post-socialist countries, women who never had a co-residential partner by age 30 were more likely to become mothers than in the other countries but this was not the case for those who were never partnered at age 35. This finding indicates that even in post-socialist countries, where the level of non-marital fertility among single mothers is higher, women who are never partnered by age 35 have a reduced likelihood to become mothers.

Finally, those who experienced union dissolution had smaller first birth probabilities than those who were in a co-residential partnership at both ages, as expected. Interestingly, at both ages those who experienced union dissolution were more likely to have a child than the never partnered. This might mean that women who were once attractive in the marriage market have more favourable characteristics and are therefore more likely to find a partner than those who have never had a co-residential relationship by these ages (Upchurch et al., 2002). Moreover, this finding indicates that currently single women are different from the never partnered; they have different experiences and might have developed different skills and expectations than those who have never had a partner (Dykstra & Wagner, 2007). Again, this result points out the importance of accounting for partnership histories as opposed to current union status when studying the transition to motherhood at later ages. Those who experienced union dissolution were also expected to be less likely to have a child in post-socialist and Southern European countries due to structural constraints of the re-marriage market (de Graaf & Kalmijn, 2003). The findings showed that this is especially the case for women who are still childless at age 35 and not so much for those who are childless at age 30.

This study has some limitations. First, various observed (e.g. educational attainment or values) and unobserved factors (e.g. preference for having no partner and/or children) may influence women's partnership histories as well as their fertility. Although information on educational attainment is available in the Harmonized Histories, due to small sample sizes in many countries it was not possible to produce reliable estimates of transition probabilities by education. Second, retrospective data might be subject to recall error. It is expected that recall error is more likely to influence the quality of retrospective information on the start and end date of cohabitation (Hayford & Morgan,

2008) and separation while it is less likely to be the case for remembering the date of marriage and childbirth. Third, the examined countries are not representative of the different European regions; the selection of countries was primarily driven by data availability and data quality. Last, as explained earlier, the applied approach does not produce standard errors; this means that differences in the probability of a first birth by partnership history within and across countries could not be statistically compared.

Nonetheless, this study contributes to the life course literature by pointing out that childless women's probabilities to achieve a first birth at later reproductive ages differ by partnership histories in the examined European countries. This study showed that it is important to differentiate between direct marriage and marriage that was preceded by cohabitation as well as between currently single and never partnered women when studying the relationship between partnership histories and the late transition to motherhood. These findings corroborate the theoretical approach emphasised in this chapter according to which it is essential to focus on partnership histories, rather than simply examine the occurrence of previous events, to be able to understand how women's opportunities to become a mother at later ages are linked to changing family life courses.

5. Chapter 5 - Pathways to first birth and the changing role of education in Europe and the United States

5.1 Introduction

Union and family formation behaviours have changed considerably in the last few decades in Europe and the United States. For example, first marriages are being delayed (Kiernan, 2004a), non-marital cohabitation has replaced marriage as the form of first union (Berrington, 2003; Bumpass & Lu, 2000), and the proportion of extramarital births has increased (Perelli-Harris et al., 2010b; Seltzer, 2004). Additionally, unions have become more unstable, as indicated by the large share of marriages ending with divorce (Amato & James, 2010). In the European context, these changes are usually interpreted in the framework of the Second Demographic Transition (SDT) theory (Lesthaeghe & Neidert, 2006; Lesthaeghe & van de Kaa, 1986; Surkyn & Lesthaeghe, 2004) which postulates that changing norms and values, modernisation, and individualisation have led to the increase in 'new' family behaviours. This implies that more liberal, individualistic and secularised people would be at the forefront of demographic change.

However, in the US context it is argued that the changes associated with the SDT did not have the same influence on women from different socio-economic background and thus have led to increasing polarisation between women from different socio-economic groups (McLanahan, 2004). This implies that the emergence of 'new' family behaviours might play a role in increasing social inequalities. Additionally, the intergenerational transmission of such family behaviours (Amato, 1996; Barber, 2000, 2001; Högnäs & Carlson, 2012) might contribute to the reproduction of social inequalities (Goldstein & Kenney, 2001; Högnäs & Carlson, 2012). Therefore, it is important to understand how partnership and family formation differ across social groups in Europe and the United States.

This chapter focuses on educational differences in family behaviours. Educational differentials are particularly interesting because education

captures several dimensions of advantage as it is closely linked to labour market opportunities and earnings, socio-economic status, and values (Ní Bhrolcháin & Beaujouan, 2013). Previous research studied educational differences in marital and non-marital childbearing in several European countries (Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2010b) and the United States (Aassve, 2003; Upchurch et al., 2002). These studies found a consistent negative educational gradient of non-marital first births. In other words, lower educated women are more likely to experience a first birth outside marriage than within marriage compared to higher educated women.

However, these studies did not investigate how partnership transitions leading to marital or non-marital first births differ across societal groups. Are the least educated more likely to experience a non-marital first birth because they are more likely to cohabit or because they are less likely to marry following cohabitation than the more educated? Moreover, these studies also did not explore possible educational differences in the risk of a single birth to never partnered single women and to those who are single following union dissolution. Similarly, are educational differences in the risk of a marital first birth similar for direct marriage and for marriage that was preceded by cohabitation?

Although the literature has looked at several pieces of this puzzle (e.g. Berrington, 2001, 2003; Berrington & Diamond, 2000; Ermisch & Francesconi, 2000; Härkönen & Dronkers, 2006; Kalmijn, 2011, 2013; Lyngstad & Jalovaara, 2010; Poortman & Kalmijn, 2002; Steele et al., 2005; Vignoli & Ferro, 2009; Wiik, 2011), research has typically focused on a single transition or a set of competing transitions in a number of countries using different datasets and covariates. This makes it difficult to compare the findings across studies and to interpret them in a cross-national context. Additionally, this implies that it is challenging to piece together evidence on educational differences across different partnership transitions leading to a first birth from the available literature. Therefore, it is not clear whether the role of education is important for entering partnerships (i.e. marriage, cohabitation, and union dissolution) or for the transition to motherhood within these partnerships. In other words, the literature does not provide an answer for *where* in the pathway to a first birth education plays a crucial role. This chapter aims to fill this gap in the literature by answering the following research questions: What is the role of education

on the entry into and exit from cohabitation, marriage, and union dissolution? And how does education influence the transition to motherhood once women have entered these partnerships? Are these patterns similar across Europe and the United States?

Additionally, I examine whether and how the influence of education on the examined partnership transitions and the transition to motherhood changes over age. By definition, higher educated women spend longer in education and they are older when they first leave school than the lower educated (Lappegård & Rønsen, 2005). This implies that more educated women have a different "social age" (Skirbekk et al., 2004) than lower educated women who left school early (Ní Bhrolcháin & Beaujouan, 2013) meaning that they will experience union and family formation at later ages. Additionally, normative expectations in the society prescribe that young women who are at school finish education before taking on the responsibilities of marriage and family formation (Blossfeld & Huinink, 1991; Thornton et al., 1995). Therefore, women who are enrolled in school are less likely to become mothers and to form a first marital or co-residential union than those who already left school (Kravdal, 1994; Rindfuss et al., 1988). Examining this question will contribute to the literature which currently lacks comparable cross-national evidence on the role of age in educational differences in partnership and family formation (Ní Bhrolcháin & Beaujouan, 2013).

This study focuses on women born between 1950 and 1969 using data from the Harmonized Histories, a comparative database of extensive retrospective union and fertility histories. Multi-state event history models are utilised to explore the influence of education on each transition on the path to a first birth in a cross-national context. This innovative approach enables me to pinpoint the transitions in the path to a first birth where education plays a crucial role as well as to examine whether and how the role of education changes over age. I focus on the influence of education on partnership transitions leading to a first birth because the transition to higher order births is likely to be driven by different processes.

To sum up, examining the changing influence of education on the pathway to a first birth in a cross-national context and by age enables us to explore whether and how socio-economic differences in partnership transitions and the

transition to motherhood within different partnerships might contribute to social inequalities.

5.2 Background and theory

Several possible partnership pathways can lead to a first birth. Women can experience a first birth (1) while being never partnered, (2) within non-marital cohabitation, (3) within marriage that was preceded by cohabitation with the same partner, (4) within direct marriage, and (5) following union dissolution and possibly, re-partnering. Pathways 2 to 3 are the outcomes of several consecutive transitions. For example, the transition to first birth within marriage that was preceded by cohabitation with the same partner includes the transition from being never partnered to cohabitation, from cohabitation to marriage and finally, the transition to a marital first birth. As previous research typically focused on the influence of education on one element or a set of competing elements of these pathways, I first review the theoretical arguments and previous findings relating to these transitions. These arguments and the empirical evidence are then combined to understand their implications for the educational gradient of the different partnership pathways leading to a first birth.

5.2.1 Education and the transition to first union

There are competing expectations on how educational attainment influences whether a never partnered woman enters cohabitation or marriage as a first union. It is important to mention that the theoretical arguments do not specifically distinguish between the transition to direct marriage and to marriage that was preceded by cohabitation. First, it is possible that women with higher education are more likely to marry (and thus less likely to cohabit) than the lower educated. They might be more attractive in the marriage market not only because they usually have higher earnings and a better financial ability to marry (Aassve, 2003; Goldstein & Kenney, 2001; Lichter & Qian, 2008; Thornton et al., 1995) but also because their increased labour force participation provides access to more attractive partners (Oppenheimer, 1997, 2000). Additionally, lower educated women are more likely to have partners with uncertain employment opportunities who are not able to fulfil the role of breadwinner. These men are less attractive marriage partners than those with

more stable opportunities (Oppenheimer, 1988). As cohabitation is a trial stage before marriage, uncertainty might be seen as less of a problem in cohabitation than in marriage (Oppenheimer, 2003). These arguments imply that lower educated women with partners who themselves also have fewer resources would be more likely to cohabit rather than marry compared to more educated women.

On the contrary, the theory of the Second Demographic Transition (SDT) suggests that the higher educated, more liberal, more egalitarian and more individualistic women are the forerunners of 'new' demographic behaviours such as non-marital cohabitation (Lesthaeghe & van de Kaa, 1986). Additionally, as women become economically more independent, due to their increased labour force participation and earnings, they have less to gain from marrying (Becker, 1981). This is especially true for higher educated women who usually have higher earnings and are thus more economically independent. Thus, highly educated women are expected to be more likely to cohabit and less likely to marry than lower educated women

Previous research studied the antecedents of the transition to first union formation in different ways and settings. Studies examining the relationship between education and entry into first union found that higher education was associated with a lower rate of entry into first union in Europe (Aassve et al., 2006; Berrington & Diamond, 2000; Billari & Philipov, 2004; Dominguez-Folgueras & Castro-Martin, 2013; Köppen, 2011; Liefbroer & Corijn, 1999) and the United States. Others investigated the entry into either cohabitation or marriage and showed that higher educated women were less likely to enter marriage in Spain (Baizán et al., 2003) and more likely in the United States (Goldstein & Kenney, 2001; Thornton et al., 1995) than lower educated women. Furthermore, a recent study in Spain showed no educational differences in the risk of a first marriage compared to a first cohabitation (Dominguez-Folgueras & Castro-Martin, 2013). Additionally, more educated women were found to be more likely to enter cohabitation in Norway (Wiik, 2011) compared to their lower educated counterparts. In the US, lower educated women were more likely to enter cohabitation than those with higher education (Thornton et al., 1995). In the UK, Ní Bhrolcháin and Beaujouan (2013) showed that the relationship between education and having ever cohabited changes over age and across cohorts. Education did not have a significant influence on the

transition to first cohabitation in Spain (Baizán et al., 2003). To summarise, the available evidence on the role of education in the entry into cohabitation or direct marriage is mixed.

5.2.2 Education and the transition from premarital cohabitation to marriage or union dissolution

Cohabiting women who do not stay in cohabitation might experience two types of partnership transitions: they either marry their partner or dissolve their union. Cohabitation is seen as a trial stage in a relationship when individuals gather information about the quality of their match (Brien et al., 1999). Women with higher education have more resources and therefore more favourable marriage prospects than lower educated women from poorer social backgrounds (Lichter & Qian, 2008; Lichter et al., 2006). Furthermore, lower educated women might cohabit with partners who have fewer resources themselves and thus are less attractive marriage partners (Lichter et al., 2006; Upchurch et al., 2002). If this is the case, lower educated women are expected to remain within cohabitation or to dissolve their union and higher educated women are expected to have higher marriage risks. However, according to the SDT theory, one would expect higher educated women to be more likely to remain in a cohabiting relationship and thus less likely to marry their cohabiting partner.

Previous research investigated the competing transitions from cohabitation to marriage or union dissolution. For example, in Britain, the level of education did not have a significant influence on cohabiting women's entry rate into marriage or into separation (Berrington, 2001; Ermisch & Francesconi, 2000; Steele et al., 2005). Similarly, in the United States Lichter et al. (2006) found no educational differences in marriage or dissolution risks of cohabiting women using data from 1979-2000 waves of the National Longitudinal Survey. Some studies only investigated the transition from cohabitation to union dissolution. After controlling for other factors, Liefbroer and Dourleijn (2006) found no significant effect of education on dissolution risks of a cohabiting union in a number of European countries except for Spain, where women with fewer years of schooling were more likely to experience the dissolution of a cohabiting union. Studies that examined the influence of education on the transition from cohabitation to marriage focused on pregnant cohabiting women and found no

educational differences in their marriage risks (Berrington, 2001). Additionally, examining men in a number of European countries Kalmijn (2011) found a positive educational gradient; men with tertiary education were more likely to marry their cohabiting partner than those with primary school level education.

5.2.3 Education and the partnership context of a first birth

Women can experience a first birth while being single, within cohabitation, or within marriage. As mentioned earlier, according to the SDT theory, more liberal and more individualistic women are more likely to experience 'new' types of family behaviours such as non-marital cohabitation or non-marital childbearing (Lesthaeghe & Surkyn, 2002). As higher education is often seen as a path to more liberal values (Perelli-Harris et al., 2010b; Weakliem, 2002), more educated women are expected to have higher non-marital first birth risks and lower marital first birth risks than women with lower education.

On the contrary, the Pattern of Disadvantage (POD) argument proposes that it is the more disadvantaged groups in the society (i.e. those with low education and fewer resources) who are more likely to experience a non-marital first birth (Hobcraft & Kiernan, 2001; Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2010b). Also, Upchurch et al. (2002) suggest that non-marital childbearing is a more common strategy among economically disadvantaged women because of the low economic benefits of a potential marriage provided by the father or due to poor women's inability to afford a big wedding (Berrington, 2001; Perelli-Harris et al., 2012). In other words, lower educated women are argued to be more likely to bear a child within cohabitation or while being single and less likely to have a first child within marriage than higher educated women.

Previous studies found consistent results; higher education was associated with a lower rate of entry into non-marital first birth in the United States (Aassve, 2003; Upchurch et al., 2002), the United Kingdom (Berrington, 2001, 2003; Steele et al., 2006), and in many European countries (Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2010b). However, previous work did not differentiate between transition rates to a first marital birth within direct marriage and marriage that was preceded by cohabitation. Additionally, only some of these studies distinguished between a cohabiting and a single non-marital first birth.

5.2.4 Education and the transition from marriage to union dissolution

According to micro-economic theory, more educated women tend to gain less from specialization in the household because they are more economically independent and have better labour market opportunities than lower educated women (Becker, 1981). Additionally, more educated women are likely to hold more liberal values (Härkönen & Dronkers, 2006) or have better resources for handling the divorce process (Blossfeld et al., 1995). These arguments predict that higher educated women would be more likely to dissolve a marital union compared to the low educated (Härkönen & Dronkers, 2006; Matysak et al., 2014). At the same time, highly educated women have greater earning potential which might have a stabilising effect on a marital union by, for example, improving the couple's living standards and thereby reducing marital strains (Hoem, 1997; Matysak et al., 2014).

The results of empirical studies on the educational gradient of marital dissolution are mixed and vary by countries. In Italy (De Rose, 1992; Härkönen & Dronkers, 2006), the Netherlands (Poortman & Kalmijn, 2002), Lithuania, Austria, the US, France, and Spain (Härkönen & Dronkers, 2006) studies showed that more educated women have higher divorce risks. Others found the opposite for the UK (Berrington & Diamond, 1999; Chan & Halpin, 2002) and Sweden (Hoem, 1997).

5.2.5 Education and the transition to first birth after union dissolution

Following union dissolution (i.e. the dissolution of a cohabiting or a marital union), women might find a new partner with whom they have a first child, they might experience a first birth outside of a co-residential union or might not experience further family life transitions. One could argue that having a first birth following union dissolution and without having formed a new partnership is similar to the experience of a single first birth. Thus, it may be that lower educated, more disadvantaged women are more likely to experience such a transition. On the contrary, some studies argued that women who were once attractive in the marriage market (i.e. higher educated women) probably have more favourable characteristics and thus are more likely to get married again (Upchurch et al., 2002). If more educated women select themselves into

re-partnering, they might also be more likely to experience a first birth following union dissolution compared to lower educated women.

Literature on the transition to first birth following union dissolution is scarce as most studies focused on the formation of new families where at least one child is present from a previous union (Prskawetz et al., 2003; Thomson, 2004; Thomson et al., 2012) rather than examining the occurrence of a first birth within higher order unions or after union dissolution but without having formed a new partnership. This also implies that previous studies did not distinguish between first births to never partnered single women and to women who became single following union dissolution.

5.2.6 Education and pathways to a first birth

To reiterate, the transitions that were described above constitute five partnership pathways to a first birth: first birth while being never partnered, within non-marital cohabitation, within marriage that was preceded by cohabitation with the same partner, within direct marriage, and following union dissolution and possibly, re-partnering. Examining the influence of education across the entire pathway to a first birth enables us to better understand whether the role of education is expected to be crucial in partnership transitions or in the transition to motherhood. Existing theoretical arguments do not provide explicit explanations for where education would be expected to play a role in the pathway to a first birth. Therefore, the aim of this section is to combine these arguments in order to derive expectations on the link between education and the different pathways to first birth. The previous subsections utilised arguments primarily from four main theories: the pattern of disadvantage (POD) argument, the SDT, and Oppenheimer's and Becker's arguments. In the following, I discuss whether based on these theories one would expect education to play an important role in partnership transitions or in the transition to motherhood and I will also summarise the expected direction of this relationship.

The POD argument predicts that disadvantaged women (approximated by low education in this chapter) are likely to experience a first birth as lone mothers (either as never partnered or following union dissolution), and as cohabiting mothers. Additionally, McLanahan (2004) argues that more educated women

will be more likely to delay having a first child. These arguments solely focus on the partnership context of first births and do not provide explanations for how education would be linked to partnership transitions that lead to these births. In other words, the POD argument expects the role of education to be important in the transition to first birth.

On the contrary, both Oppenheimer's and Becker's theory formulate expectations about the relationship between education and partnership transitions (but not about the role of education in the transition to first birth within these partnerships). However, these arguments have opposing predictions with respect to the direction of the relationship between education and the transition to marriage or cohabitation. Oppenheimer states that women with more resources are more likely to get married and those with fewer resources are more likely to cohabit. On the contrary, from Becker's theory the opposite follows; more educated women are expected to be less likely to marry and more likely to cohabit. In short, these arguments predict that education plays an important role in partnership transitions.

The SDT is the only theory which has expectations on the role of education in partnership transitions as well as in the transition to motherhood. It argues that more educated women are more likely to cohabit, remain single, experience union dissolution as well as to have a child within these partnership forms. Consequently, the lower educated are expected to be more likely to follow the more traditional pathway of marriage to first birth. What is not clear from this theory is whether highly educated cohabiting women would be expected to marry. To sum up, based on the SDT, it is expected that education plays an important role in partnership transitions as well as in the transition to motherhood.

5.2.7 Variation across countries

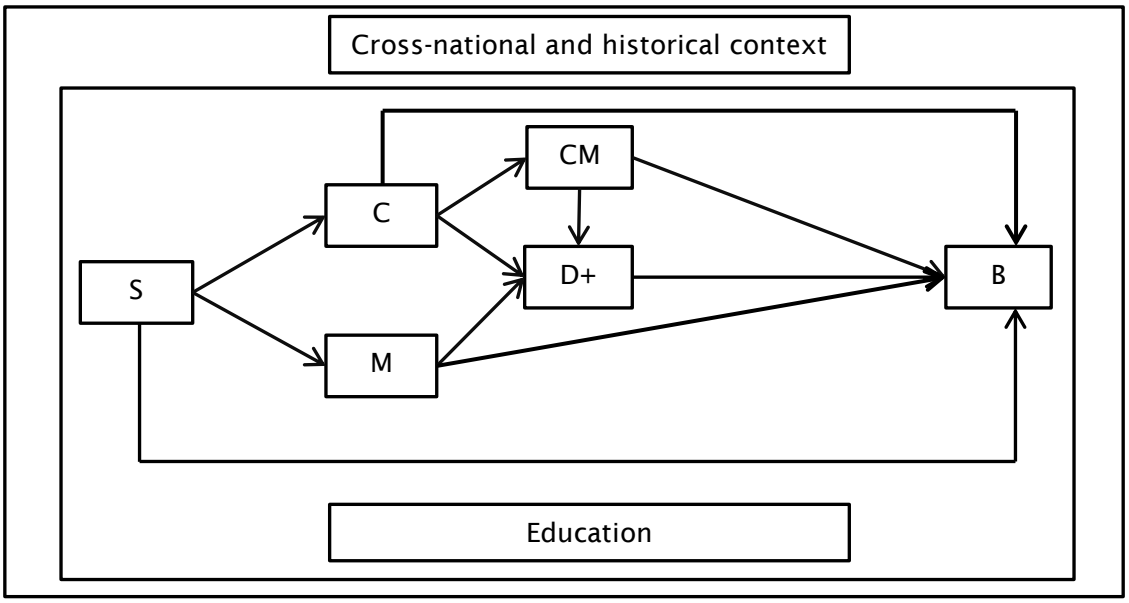
The impact of educational attainment on the different pathways to a first birth might vary across countries due to cultural, historical, and institutional differences (Esping-Andersen, 1990; Mayer, 2001). Indeed, previous studies suggest that there is cross-national variation in the influence of education on the different family transitions (e.g. Billari & Liefbroer, 2010; Elzinga & Liefbroer, 2007; Kalmijn, 2007; Perelli-Harris et al., 2010b). Additionally, some

studies showed the complex interrelationship between country characteristics and educational differences in family formation. For example, Kalmijn (2013) found that in countries with traditional gender roles, more educated women are less likely to marry compared to the lower educated while in gender egalitarian countries this relationship is the opposite. It is likely that other country level factors might mediate the link between education and different partnership transitions and the transition to motherhood. Investigating the role of such mediators is, however, outside the scope of this chapter firstly, because such data are not available in the Harmonized Histories. Secondly, the aim of this chapter is to provide a first description of the changing role of education in the pathways to a first birth across Europe and the United States to understand whether this relationship is unique or similar across countries.

5.3 Data and methods

This study analyses data from the Harmonized Histories (Perelli-Harris et al., 2010a), a set of nationally representative surveys which include retrospective monthly information on union formation and childbearing. The data primarily come from the first wave of the Generations and Gender Surveys (collected between 2004 and 2010) except for the Netherlands (Fertility and Family Survey, 2003), Spain (Spanish Fertility Survey, 2006), the UK (British Household Panel Study, 2005/06), and the United States (National Survey of Family Growth, 2007). This study examines data from Austria, Belgium, Bulgaria, Estonia, France, Italy, Lithuania, the Netherlands, Norway, Romania, Russia, Spain, the UK, and the US. Retrospective data might be subject to recall errors, especially in case of the start and end date of cohabiting unions. This might result in an underestimation of cohabiting unions and/or cohabiting first births.

Figure 5.1 Multi-state event history model to examine the influence of education across the family life course in a cross-national context



Note: S – never partnered, C – cohabitation, M – marriage, CM – marriage preceded by cohabitation with the same partner, D+ – union dissolution (also includes women who experienced re-partnering following union dissolution), B – first birth.

Although cross-sectional weights are available in most surveys, the multivariate analyses do not present weighted estimates because cross-sectional weights are only representative of the population structure of each country in the year of the survey. In other words, estimating the models using these weights would assume that the weights are constant across transitions and over time. Additionally, this study aims to explore the relationship between educational attainment and the possible pathways to first birth rather than to provide population estimates of the influence of education.

The influence of education on the hazard of each examined partnership and parenthood transition is estimated using a multi-state event history model. These models are widely used in biomedical sciences (e.g. Al Mamun, 2003; Beyersmann et al., 2012; de Wreede et al., 2011; Putter, 2011c, 2011b; Putter et al., 2006) but their application in demography is limited (Bonetti et al., 2013). Figure 5.1 defines the discrete state space, where the rectangular boxes represent the examined partnership and parenthood states and the arrows indicate the possible transitions between these states. Over time individuals move between the different partnership and parenthood states: being never partnered (S), cohabitation (C), direct marriage (M), marriage preceded by

cohabitation with the same partner (CM), the dissolution of both a cohabiting and a marital union (D+), and the birth of a first child (B). These relationships are embedded in a cross-national and historical context.

This model differentiates between direct marriage and marriage that was preceded by cohabitation allowing for the influence of education on the transition hazards to first birth to differ for direct marriage and for marriage that was preceded by cohabitation. Previous studies typically assumed no differences in the influence of education on the transition to first birth from direct marriage and from marriage that was preceded by cohabitation. By differentiating between these transitions one can learn more about the role of premarital cohabitation in the early family life course.

Note that due to the small number of cases who experience the transition to union dissolution (D+), I do not distinguish between the dissolution of a cohabiting and a marital relationship. Additionally, although union dissolution could be followed by re-partnering (as indicated by the '+' sign), this chapter does not investigate the influence of education on the transition to re-partnering as only very few women experience re-partnering before the birth of a first child.

A multi-state event history model has two basic assumptions. First, it assumes that the observed events are generated by a stochastic process (Rajulton, 2001) and that the movements between the different states are stochastic (Andersen & Keiding, 2002; Hougaard, 1999). Second, it assumes the Markov property which means that the transition from the origin state to the destination state only depends on the occurrence of the origin state (Rajulton, 2001). In other words, the present behaviour of an individual is enough to predict its future behaviour (Andersen & Keiding, 2002; Hougaard, 1999) and it does not matter through which path the individual arrived at the destination state. The above defined model is an extension to the Markov model; by defining the multi-state model to include the state 'marriage preceded by cohabitation' (CM), the exact pathway that women followed until the occurrence of a union dissolution is known. As explained earlier, after the occurrence of a union dissolution, it is not possible to trace which states women came from.

The multi-state event history model is estimated by fitting a continuous-time stratified Cox regression where each transition is represented by a different stratum. Covariates are incorporated as transition-specific covariates allowing for the effect of each variable to differ across transitions. The transition hazards for individual k are given by:

$$\lambda_{ij}(t|\boldsymbol{Z}) = \lambda_{ij,0}(t)\exp\left(\boldsymbol{\beta_{ij}}^T \boldsymbol{Z}_{ij}\right) \qquad (5.1)$$

where ij indicates a transition from state i to state j, $\lambda_{ij,0}(t)$ is the baseline hazard of this transition, $\boldsymbol{Z}$ is the vector of covariates at baseline and $\boldsymbol{Z}_{ij}$ is the vector of transition-specific covariates. This model allows for the covariate effects to differ across transitions as well as for a separate baseline hazard for each transition.

In principle, estimating a Cox model stratified by transitions is analogous to fitting several Cox regressions for each transition separately on an augmented dataset where each line represents a possible transition that the individuals are at risk of (Putter et al., 2006). However, it has been argued that separate models fail to reveal the relations between different types of events (Putter et al., 2006) and that estimating a single stratified Cox model using data in long format makes further calculations easier (Putter, 2011c).

The estimates $\widehat{\boldsymbol{\beta}}$ and $\widehat{\Lambda}_{ij,0}(t)$ can be found by maximising the partial likelihood

$$L(\boldsymbol{\beta}) = \prod_{\substack{transition \\ i \to j}} \prod_{\substack{k=1 \\ d_{ij,k}=1}}^{n} \frac{\exp(\beta^T Z_{ij,k})}{\sum_{l \epsilon R_i(t_{ij,k})} \exp(\beta^T Z_{ij,l})} \qquad (5.2)$$

where $t_{ij,k}$ is the event or censoring time of individual k for transition $i \to j$, $d_{ij,k} = 1$ if individual k has an event for transition $i \to j$, 0 otherwise, and where $R_i(t)$ is the risk set of state i at time t, i.e. the set of individuals who are in state i at time t. The estimate of the cumulative baseline hazard of transition $i \to j$ is the Nelson-Aalen estimate of:

$$\widehat{\Lambda}_{ij,0}(t) = \sum_{\substack{k=1 \\ t_{ij,k} \leq t}}^{n} \frac{d_{ij,k}}{\sum_{l \epsilon R_i(t_{ij,k})} \exp(\beta^T Z_{ij,l})} \qquad (5.3)$$

The stratified Cox model is estimated separately for each country. In the analyses, women are observed from age 15 until age 45, the time of the survey

or the time of first birth, whichever happens earlier. Time t is measured in months since age 15. The models are estimated using the *mstate* package in R (de Wreede et al., 2011).

5.4 Variables

5.4.1 Level of education

The highest level of education is measured at the time of the survey and is classified into six categories based on the International Standard Classification of Education (ISCED, 1997). This study compares low (ISCED 0, ISCED 1, and ISCED 2) and highly educated (ISCED 5 and ISECD 6) women to their medium educated (ISCED 3 and ISCED 4) counterparts. A time-varying indicator is created using information on the year and month of reaching the highest level of education, assuming continuous education from age 15 and that attaining medium level of education takes on average 4 years while obtaining high education takes 3 additional years on average. In most countries, some information (less than 2.5%) is missing on the year and/or month of reaching the highest level of education. However, in some countries, the proportion of missing information is somewhat larger (7.9% in Norway and 6.3% in the United Kingdom) or substantially larger (57% in the US and 62% in Spain). For all countries except the United States, the missing values are imputed using information on the median age of finishing education by educational level, birth cohort and country. In the United States, the year and month of reaching the highest education is missing for all respondents who have higher than college education. Therefore, external information on the length of completing each educational level is used to estimate the age at leaving school (Snyder et al., 2008). Nonetheless, the dataset used provides unique and comparable information for studying the educational gradient of partnership and family formation in a cross-national context. However, the influence of educational attainment on the examined transitions should not be interpreted as causal because several unobserved or unmeasured factors, which are not accounted for in this study, could potentially explain some of these relationships.

5.4.2 Educational enrolment

Previous research showed that women who are enrolled in school are less likely to become mothers and to form a first marital or co-residential union than those who already left school (Kravdal, 1994; Rindfuss et al., 1988). Therefore, the analyses are controlled for a time-varying educational enrolment variable which takes the value 1 for each period when the respondents are enrolled in education and 0 otherwise (reference category). As the data are retrospective, no information is available on possible interruptions of the educational career. This means that this variable is 1 for periods before the respondent has reached her highest educational level and 0 afterwards. Controlling for educational enrolment is especially important in younger ages when respondents are more likely to be enrolled in education. As union dissolution and transitions thereafter are more likely to occur at somewhat later ages, educational enrolment is not controlled for when examining transitions into and out of union dissolution.

5.4.3 Birth cohort

Respondents are grouped into two birth cohorts: women born between 1950 and 1958 (reference) and those born between 1959 and 1969. Note that in the United States and Austria, only respondents born after 1961 and 1963, respectively, were interviewed. Thus, in these countries all respondents belong to the second birth cohort. Therefore, for the United States and Austria, the analyses were not controlled for birth cohort.

5.5 Descriptive results

Table 5.1 shows the proportion of first births to un-partnered (SB), cohabiting (CB), and married (MB) mothers of different educational levels born between 1950 and 1969 for the examined countries. The table presents a common measure of the prevalence of non-marital childbearing, which has previously been used to provide insights into the role of cohabitation in childbearing (Perelli-Harris et al., 2010b).

Table 5.1 Proportion of first births by partnership status at first birth and country within different educational levels (%), women born between 1950 and 1969

	Low			Medium			High			Total		
	SB	CB	MB	SB	CB	MB	SB	CB	MB	SB	CB	MB
Austria	19	27	54	12	29	59	4	31	65	13	29	58
Belgium	14	9	78	8	8	84	6	11	83	9	9	81
Bulgaria	9	10	82	5	4	91	6	3	91	6	6	88
Estonia	12	15	72	29	52	19	12	11	77	16	23	61
France	12	22	66	8	22	70	4	31	65	9	24	67
Italy	5	2	93	4	2	94	2	6	92	4	3	93
Lithuania	13	5	82	10	4	86	9	3	88	11	4	86
the Netherlands	8	7	85	4	12	84	3	15	82	5	10	84
Norway	18	28	54	8	34	58	5	37	58	12	32	56
Romania	7	10	83	5	4	90	0	2	98	6	7	88
Russia	13	9	78	11	9	80	10	8	82	12	9	80
Spain	7	3	90	5	6	88	4	6	90	6	4	89
the UK	27	5	68	11	13	75	6	14	80	12	12	76
United States	37	19	45	28	14	58	10	15	75	21	16	63

Note: SB - first birth while being un-partnered, CB - first birth within cohabitation, MB - first birth within marriage
Note: Weights applied; weights are not available for Bulgaria and Russia

For un-partnered women, I find a clear and consistent negative educational gradient of a first birth in all countries except in Estonia and Bulgaria. In other words, the proportion of un-partnered births is larger among low educated women than among medium or high educated women. In Estonia, both low and high educated women have a lower proportion of un-partnered births than medium educated women while in Bulgaria this is the other way around. Only Bulgaria and Romania show a clear negative educational gradient of cohabiting first births and I find indication of a somewhat negative gradient in Estonia, Lithuania, Russia, and the US. For the other countries the gradient is either flat or somewhat positive. However, from these results it is not possible to tell whether these educational differences are significant. Moreover, I find a positive educational gradient for marital first births, that is, the proportion of women who have a marital first birth is higher among higher educated women than among the lower educated in most countries. However, this gradient is not very steep in most countries, it is less consistent in Estonia, France, Italy, and Spain and it is negative in the Netherlands.

While it is interesting to examine the relationship between education and childbearing within different union types, it is also important to investigate how education influences partnership transitions prior to the transition to first birth. For example, births to un-partnered women also include those who had a child following union dissolution but without having formed a new partnership. Furthermore, marital first births can happen within direct marriage, marriage that was preceded by cohabitation and it can also be a second or higher order marriage. Similarly, in this framework, cohabitation is not necessarily a first union or a first cohabitation.

To provide an indication of the level of cohabitation, marriage, and union dissolution and their role in family formation in the examined countries, Table 5.2 describes the proportion of women who experienced each transition between age 15 and age 45. The total number of women at risk of each transition is shown following each set of transitions. Note that the proportion of women who experienced each set of transitions does not add up to 100% because some women do not experience any transitions but stay in the state of origin.

Cohabitation is the most widespread in Austria and Norway, where the first union of more than 60% of women is a cohabiting union. On the contrary, this proportion is less than 20% in Spain, Italy, Lithuania, and Romania and it is between 20-40% in the UK and Russia. In all other countries, 40-60% of never partnered women form a first cohabiting union. In line with these findings, where cohabitation is less common, direct marriage is more prevalent; the proportion of never partnered women who marry directly is between 70% and 80% in Spain, Italy, and Romania. Additionally, the proportion of never partnered women who have a first child is below 10% in all countries except in the United States (16%).

When examining women whose first union is cohabitation (column 5 to 8 in Table 5.2), I find that in Austria, France, Italy, Norway, Spain, the UK, and the US, around 45-55% of cohabiting unions transition to marriage while 15-25% of them ends with dissolution (this proportion is smaller in Spain). This finding indicates that in these countries cohabitation might be less stable than in the other countries where the proportion of cohabiting unions that end with dissolution remains below 10%. In countries where cohabitation is more

widespread, cohabiting women constitute less of a selective group than in countries where cohabitation is less common. For example, while in Belgium, Bulgaria, the Netherlands, the UK, and the US a large share of never partnered women experienced cohabitation as a first union, the proportion of those who have a first child within cohabitation is relatively small. Interestingly, in Spain, Italy, Lithuania, and Romania, only a small proportion of never partnered women experienced cohabitation but a relatively large share of these women went on to have a child within cohabitation. This might indicate that cohabiting women are a more selective group in these countries, who are also more likely to have a child within this union.

The majority (more than 80%) of directly married women (column 9 to 11 in Table 5.2) have a child within this union while in most countries only 2-7% of direct marriages end with a divorce (higher proportions in the UK and the US). Dissolution is somewhat more prevalent in case of marriages that were preceded by cohabitation and, in turn, a somewhat smaller proportion of women have a first child within a marital union that was preceded by cohabitation compared to direct marriages (column 12 to 14 in Table 5.2). In most countries, the majority (50-67%) of women who experienced the dissolution of cohabitation or marriage will eventually have a child. This proportion is somewhat lower in Romania and Spain (44% and 41%, respectively) and much smaller in Italy (29%). Caution is needed when interpreting these numbers as in some countries the number of women who experienced union dissolution is small.

Table 5.2 Proportion of women who experience each of the examined partnership and parenthood transitions (%), women born between 1950 and 1969

	From S			Total entering S	From C			Total entering C	From M		Total entering M	From CM		Total entering CM	From D+	Total entering D+
	to				to				to			to			to	
	C	M	B		CM	D+	B		D+	B		D+	B		B	
Austria	66.4	17.7	8.8	855	55.5	19.7	23.6	568	6.0	90.7	151	10.5	82.5	315	51.9	154
Belgium	44.5	46.2	7.0	1137	77.7	9.3	11.5	506	0.8	89.9	525	11.2	82.7	393	49.5	95
Bulgaria	53.0	36.3	5.5	2396	88.5	0.9	9.6	1271	1.6	96.3	870	1.2	96.6	1125	57.9	38
Estonia	44.5	44.1	8.3	1776	66.8	4.4	27.8	791	4.5	94.9	784	5.5	91.7	528	60.6	99
France	58.5	35.8	6.1	2061	54.5	13.9	29.4	1205	3.7	93.1	738	4.6	91.2	657	60.9	225
Italy	8.8	78.5	2.7	7246	50.9	20.9	22.0	640	2.6	90.6	5685	5.2	78.5	326	28.9	301
Lithuania	15.1	69.2	8.5	1641	71.8	6.0	20.6	248	2.4	94.4	1135	3.4	89.9	178	52.1	48
Netherlands	44.7	43.3	2.4	2069	63.3	20.7	11.9	924	6.9	86.6	895	6.7	83.9	585	52.4	292
Norway	64.8	25.5	9.8	2767	47.7	17.8	32.9	1794	4.3	92.9	705	7.2	88.2	856	66.2	411
Romania	17.7	74.8	4.5	2185	61.4	4.4	33.4	386	2.1	92.4	1635	3.4	86.5	237	44.1	59
Russia	24.4	64.3	8.4	2573	60.7	9.4	29.1	629	5.0	93.5	1655	7.1	90.3	382	65.1	169
Spain	14.3	75.1	5.1	2761	56.6	5.8	26.9	394	2.0	93.7	2074	4.0	89.2	223	41.1	73
UK	33.5	37.8	5.9	1766	55.8	27.2	15.4	591	8.5	87.6	668	6.4	83.6	330	67.4	239
United States	42.0	49.0	15.7	1396	56.9	24.9	17.9	587	15.4	81.1	684	18.3	75.1	334	64.1	312

Source: Harmonized Histories, author's own calculations

Note: S – never partnered, C – cohabitation, M – marriage, D+ – union dissolution (also includes women who experienced re-partnering following union dissolution), B – first birth.

Note: CM indicates that women married their cohabiting partner

Note: Weights applied; weights are not available in Bulgaria and Russia

5.6 Multivariate results

In the following sections, the results of the multi-state event history models are presented for each pathway to a first birth. These pathways are the following: transition to first birth while (1) being never partnered (S → B), (2) within non-marital cohabitation (S → C → B), (3) within marriage that was preceded by cohabitation (S → C → CM → B), (4) within direct marriage (S → M → B), and (5) after union dissolution (D+ → B). As explained earlier, although women might have experienced re-partnering following union dissolution (indicated by '+'), due to the small number of cases in many countries, it is not possible to examine the educational gradient of re-partnering.

Two sets of models are estimated (Table 5.3). First, the influence of educational attainment on the risk of the examined family life transitions is investigated controlling for educational enrolment (where relevant) and birth cohort. Second, to explore whether the influence of education on the examined pathway to a first birth changes over age, interaction terms between educational attainment and age are added to the models. Table 5.3 shows only the results of these interaction models for countries where there is a significant interaction between educational attainment and age. Then, to examine the influence of educational attainment on the five pathways to a first birth, results of the no-interaction models and the interaction models are combined in Table 5.4. Where no significant interaction between educational attainment and age is found, hazard ratios are interpreted from the no-interaction models. Where a significant interaction term is found, I interpret results of the interaction models. Finally, as explained earlier, due to small sample size, once women arrive at the union dissolution state, it is not possible to tell which partnership state they came from. Therefore, the estimates of the educational gradient of transitions into union dissolution (C → D+, M → D+, and CM → D+) are not reported in Table 5.3. However, these results are summarised in Table 4.5 together with the educational gradient of the transition to first birth following union dissolution.

For categorical variables, hazard ratios (i.e. the exponential of the regression coefficients) are interpreted as relative risks, that is, a hazard ratio larger than 1 indicates that the risk of the given transition is higher for this group of

women than for the reference group while a hazard ratio smaller than 1 means that this group of women have a smaller risk of experiencing that particular transition compared to women in the reference group.

5.6.1 Transition to first birth while being never partnered

Overall, in all countries (except Lithuania), the transition to first birth while being never partnered has a negative educational gradient; never partnered low educated women have a higher risk than their medium educated counterparts to have a first birth. However, no significant educational differences could be detected in Belgium, Romania, and Lithuania (Table 5.3, panel a).

In Italy, Norway, the UK, and the US, the influence of educational attainment on the risk of a first birth while being never partnered changes over age as indicated by the significant interaction effects between educational attainment and age. In Norway and the UK, higher educated women are less likely to have a first birth while never partnered than the medium educated at younger ages, but over time (after age 30 in Norway and age 32 in the UK), they become more likely to do so. Additionally, in Italy, low educated women are more likely than medium educated women to have a first birth while being single before age 35 after which their risk of a single birth becomes smaller compared to the medium educated. This means that in these countries, the educational gradient is negative at younger ages but it becomes positive as women get older. Additionally, in the US the significant interaction indicates a negative educational gradient which becomes stronger over time. In the other countries, the influence of education on the risk of a first birth while being never partnered does not change over age.

5.6.2 Transition to first birth within non-marital cohabitation

The pathway to first birth within non-marital cohabitation has two elements: the transition from being childless and never partnered to non-marital cohabitation, and the transition to first birth within this cohabiting union. Overall, the transition to cohabitation has a negative educational gradient in post-socialist countries while it has a positive educational gradient in the other countries (except the Netherlands) although significant differences between

low and/or high and medium educated women are only detected in France, Belgium, Bulgaria, and Romania (Table 5.3, panel b). Additionally, the educational gradient of a first birth within cohabitation is generally negative in all examined countries.

In Estonia, Italy, Russia, and the US, the influence of education on the risk of a transition from being never partnered to cohabitation changes over age. In Estonia and Italy, low educated women are more likely to cohabit than medium educated women at young ages but after age 25-26 they have a smaller risk to do so. This means that in these countries, education has a negative gradient on the transition to cohabitation at younger ages and a positive gradient at older ages. In Russia and the US I find the opposite. At younger ages low educated women are less likely to cohabit (up to age 19 in Russia and age 23 in the US) compared to their medium educated counterparts (positive gradient) but then they become more likely to do so (negative gradient).

Also, there were significant interactions between education and age on the risk of a cohabiting first birth in France, Belgium, Estonia, and Norway. In these countries, while at younger ages education has a negative gradient on the risk of a cohabiting first birth, this gradient becomes positive after age 33 in Belgium and Estonia, and after age 37 in France. In Norway, significant interactions were found both between low and high education and age indicating that higher educated women are less likely to experience a cohabiting first birth than their medium educated counterparts until age 28 after which they are more likely to do so. Furthermore, low educated women are less likely to have a cohabiting first birth than the medium educated up to age 31 after which they are more likely to do so.

5.6.3 Transition to first birth within marriage that was preceded by cohabitation

The pathway to a first birth within marriage that was preceded by cohabitation has three components: the transition to first cohabitation (discussed in the previous section), the transition from cohabitation to marrying the same partner, and the transition to first birth within this marital union. In Estonia, Norway, Spain, and the US, highly educated women had higher transition rates into marrying their cohabiting partner than their medium educated

counterparts when holding other variables in the model constant (Table 5.3, panel d). In Romania, low educated cohabiting women were significantly less likely to marry their partner than the medium educated. Additionally, in Bulgaria, significant educational differences were found between low/high and medium educated women. To sum up, in these countries (Estonia, Norway, Spain, US, Romania, and Bulgaria), educational attainment had a positive gradient on the transition from premarital cohabitation to marriage. In the other countries, no significant differences between low/high and medium educated cohabiting women's risk to marry their partner were detected.

Additionally, in Lithuania and the Netherlands the relationship between education and the risk of marrying one's cohabiting partner changes over age. In Lithuania, lower educated women have a higher risk of marrying their cohabiting partner at younger ages than their medium educated counterparts but after age 21, their risk becomes smaller. Additionally, in the Netherlands, cohabiting women with high education have a lower risk of marrying their partner than medium educated women but this risk increases over time and these women have a higher risk after age 29 to marry their partners than medium educated women. In other words, in Lithuania and the Netherlands, the negative educational gradient of the transition from marriage to cohabitation becomes positive over age.

The educational gradient of the transition to first birth within marriage that was preceded by cohabitation is positive in Norway and Romania (Table 5.3, panel e). Interestingly, this relationship pointed in the opposite direction in Austria and the UK. In the other countries, education does not have a significant influence on this transition. Additionally, when including interactions between educational attainment and age, the influence of education on the risk of a first birth within a marital union that was preceded by cohabitation changes over age in some countries. In general, in France, the Netherlands, Belgium, and Lithuania education has a negative gradient on the transition from marriage that was preceded by cohabitation to first birth only at younger ages (up to age 24 in Belgium and Lithuania) after which this gradient becomes positive. More specifically, in France and the Netherlands, both interactions between low and high education and age are significant; highly educated women within these unions are less likely to have a child than the medium educated (until age 26 in France and 28 in the Netherlands) and

lower educated women are more likely to have a child than medium educated women (until age 28 in France and 32 in the Netherlands).

5.6.4 Transition to first birth within direct marriage

The transition to a first birth via direct marriage involves two consecutive transitions: the transition to direct marriage and the transition to first birth within this marriage. In Austria, France, the Netherlands, and Spain, low educated women have a greater risk of marrying their partner directly but in Bulgaria, Estonia, and Norway, it is the higher educated whose risk of direct marriage is higher (Table 5.3, panel f). Additionally, in Italy and Romania, the influence of education on the transition to direct marriage changes over age; a first negative gradient becomes positive over age indicating that in these countries higher educated women are more likely to experience a transition to direct marriage at later ages. The opposite is found for the US.

When examining the influence of education on the transition to first birth within direct marriage (Table 5.3, panel g) it seems that in the UK, education has a negative gradient while in Russia it has a positive gradient on this transition. When also accounting for possible timing differences in the influence of education on the transition to first birth within direct marriage, in Bulgaria, France, Italy, the Netherlands, Norway, Romania, Spain, and the US the influence of education on the risk of a first birth within direct marriage changes over age. More specifically, at younger ages, lower educated women have a higher risk of experiencing this transition whereas at older ages more educated women are more likely to do so.

5.6.5 Transition to first birth following union dissolution

When examining the educational gradient of the transition to first birth following union dissolution, in Estonia, highly educated women have a higher risk of experiencing this transition than their medium educated counterparts (Table 5.3, panel h). Additionally, in Belgium, the influence of education on the risk of a first birth after union dissolution changes over age; at younger ages low educated women are less likely to experience a first birth following union dissolution than the medium educated (positive gradient) but they become more likely to do so as they get older (negative gradient). In the other

countries, no significant educational differences were detected in the risk of a first birth after union dissolution.

Table 5.3 Results of the multi-state event history models, no-interaction model and interaction model (where significant), hazard ratios, by country

a) Transition to first birth while being never partnered (S → B)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands[a]	Norway	Romania[a]	Russia	Spain	UK	US
Education														
low	2.63 ***	1.45	1.89 **	1.91 **	1.71 **	4.21 ***	0.98	3.04 **	2.95 *	1.43	1.89 **	1.77 **	2.35 **	1.00
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	0.97	0.62	0.87	1.17	0.71	0.06	0.64	0.33	0.10 *	0.00	0.70	0.50	0.06 ***	0.55
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		1.134	0.69 *	1.17	0.95	0.88	1.27	0.98	0.68 **	0.63 *	1.03	0.89	2.09 ***	
Enrolment														
not enrolled	1	1	1	1	1	1	1	1	1	1	1	1	1	1
enrolled	0.14 ***	0.25 ***	0.23 ***	0.18 ***	0.22 ***	0.09 ***	0.35 ***	0.00	0.29 ***	0.18 ***	0.63 ***	0.37 ***	0.35 ***	0.18 ***
Education*age														
low*age						0.99 *			1.00				1.00	1.01 *
high*age						1.01			1.01 *				1.01 **	1.00

*Note: *p < .05. **p < .01. ***p < .001*
Note: [a] indicates that some estimation problems were encountered during the analyses

b) Transition from being never partnered to cohabitation (S → C)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands	Norway	Romania	Russia	Spain	UK	US
Education														
low	0.97	1.00	1.12	2.09 **	0.89	1.70 *	1.43	0.91	1.02	1.66 ***	0.81	0.83	0.87	0.64 *
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	1.16	1.44 **	0.78 *	0.53 *	1.32 **	0.92	0.74	1.15	1.00	0.72	1.16	1.23	1.16	0.83
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		1.18	1.13	1.65 ***	1.76 ***	1.31 **	1.83 ***	1.82 ***	1.45 ***	1.45 ***	1.35 ***	1.45 **	2.11 ***	
Enrolment														
not enrolled	1	1	1	1	1	1	1	1	1	1	1	1	1	1
enrolled	0.71 **	0.65 ***	0.37 ***	0.50 ***	0.63 ***	0.50 ***	0.38 ***	0.72 ***	0.62 ***	0.25 ***	0.53 ***	0.81	1.00	0.46 ***
Education*age														
low*age				0.99 *		1.00 **					1.00 *			1.01 *
high*age				1.00		1.00					1.00			1.00

*Note: *p < .05. **p < .01. ***p < .001*

c) Transition from cohabitation to first birth (C → B)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands	Norway	Romania	Russia	Spain	UK	US
Education														
low	1.29	1.34	2.13 ***	1.31	3.69 ***	1.67 *	1.44	1.52	2.19 **	1.06	1.35	1.36	0.85	1.78 *
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	0.58	0.06 *	0.49	0.18 **	0.37 *	1.19	0.55	0.65	0.33 *	0.89	0.49 **	0.67	0.42 ***	0.38 ***
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		0.91	1.01	1.17	1.13	0.68 *	1.37	0.95	1.39 **	1.10	1.01	0.96	1.12	
Enrolment														
not enrolled	1	1	1	1	1	1	1	1	1	1	1	1	1	1
enrolled	0.28 ***	0.31 *	0.24 ***	0.38 ***	0.43 ***	0.07 **	0.35	0.10 *	0.60 ***	0.56	0.44 **	0.23	0.64	0.49 **
Education*age														
low*age		1.00		1.00	1.00 *				1.00 *					
high*age		1.01 *		1.01 *	1.00				1.01 *					

*Note: *p < .05. **p < .01. ***p < .001*

d) Transition from cohabitation to marriage (C → CM)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands	Norway	Romania	Russia	Spain	UK	US
Education														
low	0.74	1.09	0.73 ***	1.01	1.00	0.83	5.30 *	1.52	0.96	0.49 ***	1.07	1.34	1.18	1.20
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	1.25	1.05	1.278 *	1.44 **	0.91	1.34	2.13	0.22 *	1.49 ***	1.80	1.15	1.60 *	1.14	1.53 **
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		0.75 **	0.92	0.79 **	0.63 ***	1.01	1.33	0.72 ***	0.42 ***	0.96	1.01	0.78	0.93	
Enrolment														
not enrolled	1	1	1	1	1	1	1	1	1	1	1	1	1	1
enrolled	0.69 *	0.37 ***	0.99	1.15	0.53 ***	0.29 ***	1.37	0.48 ***	0.97	1.72 **	0.95	0.75	0.48 **	1.11
Education*age														
low*age							0.98 *	1.00						
high*age							1.00	1.01 **						

*Note: *p < .05. **p < .01. ***p < .001*

e) Transition to first birth within marriage that was preceded by cohabitation (CM → B)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands	Norway	Romania	Russia	Spain	UK	US
Education														
low	1.70 *	2.87 **	0.87	1.31	2.22 *	1.25	1.87	3.40 *	1.08	1.08	0.87	0.97	1.62 *	1.28
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	0.95	0.69	1.15	1.08	0.45 *	0.99	0.26	0.24 *	1.33 **	2.33 *	1.03	0.69	1.02	0.95
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		1.36 **	1.151 *	1.36 **	1.36 **	1.72 ***	1.18	1.38 ***	1.11	2.05 ***	1.27 *	0.82	1.57 **	
Enrolment														
not enrolled	1	1	1	1	1	1	1	1	1	1	1	1	1	1
enrolled	0.48 **	0.96	1.24 *	0.80	0.96	0.30 *	1.05	0.68	0.84	0.54 *	0.87	0.91	0.66	0.50 *
Education*age														
low*age		0.99 **			0.99 *		0.99	0.99 ***						
high*age		1.00			1.01 *		1.01 *	1.01 *						

*Note: *p < .05. **p < .01. ***p < .001*

f) Transition to direct marriage (S → M)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands	Norway	Romania	Russia	Spain	UK	US
Education														
low	1.82 **	0.89	0.86	0.80 *	1.36 ***	2.94 ***	0.89	1.30 ***	0.97	1.67 ***	0.88	1.27 ***	0.93	0.53 *
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	1.57	0.88	1.38 **	1.25 *	0.90	0.83	1.04	0.75	1.42 *	0.69	1.03	0.83 *	0.961	0.45 *
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		0.66 ***	0.85 *	0.78 ***	0.44 **	0.70 ***	1.19 **	0.42 ***	0.38 ***	0.96	1.03	0.80 ***	0.51 ***	
Enrolment														
not enrolled	1	1	1	1	1	1	1	1	1	1	1	1	1	1
enrolled	0.19 ***	0.17 ***	0.47 ***	0.61 ***	0.27 ***	0.18 ***	0.57 ***	0.31 ***	0.54 ***	0.30 ***	0.50 ***	0.37	0.65 ***	0.45 ***
Education*age														
low*age						0.99 ***				0.99 ***				1.01 *
high*age						1.00				1.00				1.01

*Note: *p < .05. **p < .01. ***p < .001*

g) Transition to first birth within direct marriage (M → B)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands	Norway	Romania	Russia	Spain	UK	US
Education														
low	0.72	1.01	1.16	1.21	1.46	1.65 ***	0.95	1.85 **	1.28	1.09 *	1.02	1.57 **	1.31 *	1.73
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	1.05	1.09	0.54	0.96	1.26	0.52 **	1.04	0.60	0.26 **	0.40 *	1.31 **	0.66	1.02	0.49 *
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		1.30 **	1.21 *	1.01	0.89	0.93 **	1.08	1.11	0.74 ***	1.09	1.01	0.82 ***	1.04	
Enrolment														
not enrolled	1	1	1	1	1	1	1	1	1	1	1	1	1	1
enrolled	0.71	0.65	0.87	0.73 **	0.70 *	0.76 **	0.88	0.70	0.66 ***	0.94	0.86	0.74 **	0.84	0.56 **
Education*age														
low*age			1.00		1.00 *	1.00 ***		1.00 *	1.00	1.00		1.00 **		1.00
high*age			1.01 *		1.00	1.00 **		1.00	1.01 ***	1.01 **		1.00		1.01 *

*Note: *p < .05. **p < .01. ***p < .001*

h) Transition to first birth after union dissolution (D+ → B)

	Austria	Belgium	Bulgaria	Estonia	France	Italy	Lithuania	Netherlands	Norway	Romania	Russia	Spain	UK	US
Education														
low	0.76	0.06 *	0.63	1.35	0.83	1.06	1.08	1.20	0.98	1.28	0.80	0.76	1.52	1.08
medium (ref)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
high	0.90	0.49	0.98	2.31 **	1.04	1.24	1.10	1.08	1.32	0.65	0.72	1.08	1.22	1.45
Cohort														
1950-1958 (ref)		1	1	1	1	1	1	1	1	1	1	1	1	
1959-1969		1.37	0.31	1.47	1.26	1.29	1.95	1.17	1.38 *	0.66	1.01	1.41	1.11	
Education*age														
low*age		1.01 *												
high*age		1.00												

*Note: *p < .05. **p < .01. ***p < .001*

5.6.6 The educational gradient of pathways to first birth

To summarise the influence of educational attainment on the five examined pathways to a first birth, Table 5.4 combines the results of the no-interaction models and the interaction models. As explained earlier, where no significant interaction between educational attainment and age is found, hazard ratios from the no-interaction models are interpreted. Where a significant interaction term is found, results of the interaction models are interpreted.

In most countries, transition to a first birth while being never partnered has a negative educational gradient (Table 5.4, column 1). Over age, this gradient gets steeper in the US and becomes positive in Italy, Norway, and the UK while it is not significant in Belgium, Romania, and Lithuania. These findings suggest that having a first child while being never partnered is a pathway to first birth experienced by women from more disadvantaged background across the examined countries.

When examining the influence of education on the pathway to a first birth within non-marital cohabitation (Table 5.4, column 2 and 3), even in countries where more educated women have a higher risk to enter cohabitation as a first union (Belgium, France, and at younger ages Russia and the US), it is the lower educated who have a higher risk of a first birth within cohabitation. Additionally, in Bulgaria (and at younger ages in Estonia and Italy) both the transition to cohabitation and to a first birth within cohabitation has a negative educational gradient. Furthermore, in Romania, education only has a significant influence on the transition to cohabitation and not on the transition to first birth. On the contrary, in Norway and the UK, the influence of education is only important in the transition to first birth within cohabitation but not in the transition into cohabitation. In other words, in these countries women of all educational levels are equally likely to enter a cohabiting union but once they cohabit, lower educated women have a higher risk to experience a cohabiting birth than their more educated counterparts. Finally, in Austria, Spain, Lithuania, and the Netherlands, education does not seem to have a significant influence on this pathway; higher and lower educated women are equally likely to enter cohabitation and to have a first child within cohabitation. All in all, these results indicate that it is not the transition to a first cohabiting union where educational attainment plays an important role but it is the transition to a first birth within cohabitation that, in itself, is a pathway to first birth experienced by the

more disadvantaged. Additionally, in Belgium, Estonia, France, and Norway, more educated women delay childbearing within cohabitation.

Studying the influence of education on the pathway from being never partnered to a first birth within a marital union that was preceded by cohabitation (Table 5.4, column 4 to 6) reveals that irrespective of the educational gradient of the transition to cohabitation, in most countries higher educated women are more likely to marry their cohabiting partner than the less educated. In the Netherlands and Lithuania, this is only the case at older ages. In Austria and the UK, where education does not have a significant influence on the transition to cohabitation or on the transition from cohabitation to marriage, the transition to first birth within marriage that was preceded by cohabitation had a negative educational gradient. In Norway and Romania, both the transition from cohabitation to marriage and from this marriage to first birth had a positive educational gradient. These results indicate that it is mainly the transition from cohabitation to marriage where education plays an important role in the pathway to first birth within marriage that was preceded by cohabitation and that women from more advantaged backgrounds are more likely to marry their cohabiting partner than their more disadvantaged counterparts. Additionally, in some countries, the educational gradient of a first birth within marriage that was preceded by cohabitation changes from negative to positive over age indicating that higher educated women have their first children at later ages within such a marital union in Belgium, France, Lithuania, and the Netherlands.

When looking at the influence of education on the pathway to first birth within direct marriage (Table 5.4, column 7 and 8), I find that in countries where education has a significant influence on both the transition to direct marriage and to first birth within direct marriage, irrespective of the educational gradient of direct marriage, women have a negative educational gradient at younger ages and a positive gradient at older ages to experience a first birth within direct marriage. This finding indicates that highly educated women who married their partner without having lived together with them delay having a first child. Additionally, in Belgium and Lithuania, no significant influence of education on the risk of a direct marriage or on the risk of a first birth within direct marriage could be detected.

Table 5.5 summarises the results of the educational gradient of the transitions into and out of union dissolution. There are no significant educational differences in the risk of the dissolution of cohabitation in the examined countries. Additionally, more

educated women have smaller divorce risks in Norway and the US when marriage was preceded by cohabitation than the lower educated. The dissolution of direct marriage has a significant negative gradient only in Estonia; and it has an inverted U shape in Italy. Additionally, in Russia and the UK, the first positive gradient of education turns into a negative gradient at older ages. Finally, education only has a significant influence on the transition from union dissolution to first birth in Estonia (positive gradient) and Belgium (positive gradient at younger ages and negative gradient thereafter). To sum up, the educational gradient for the transitions into and out of union dissolution is not consistent.

Table 5.4 Summary of findings from Table 5.3: Educational gradient of the four main pathways to first birth

	First birth while never partnered	First birth within cohabitation		First birth within marriage that was preceded by cohabitation			First birth within direct marriage	
	S → B	S → C	C → B	S → C	C → CM	CM → B	S → M	M → B
Austria	-	+	-	+	+	-	-	+
Belgium	-	+	-/+	+	U	-/+	I	U
Bulgaria	-	-	-	-	+	+	+	-/+
Estonia	-	-/+	-/+	-/+	+	U	+	-
France	-	+	-/+	+	-	-/+	-	-/+
Italy	-/+	-/+	-	-/+	+	-	-/+	-/+
Lithuania	I	-	-	-	-/+	-/+	+	+
the Netherlands	-	+	-	+	-/+	-/+	-	-/+
Norway	-/+	-	-/+	-	+	+	+	-/+
Romania	-	-	-	-	+	+	-/+	-/+
Russia	-	+/-	-	+/-	U	+	+	+
Spain	-	+	-	+	+	I	-	-/+
the UK	-/+	+	-	+	U	-	I	-
US	-	+/-	-	+/-	+	-	+/-	-/+

Note: A negative (-) sign indicates a negative educational gradient for a given transition. A positive (+) sign indicates a positive educational gradient for that transition. The letter U indicates a U-shaped relationship between education and this transition. The letter I indicates an inverse relationship between education and this transition.
Note: A slash (/) indicates that the influence of education on this transition changes over age; before the slash a '+' or '-' sign refers to the educational gradient of that transition at younger ages. After the slash, a '+' or '-' sign refers to the educational gradient of that transition at older ages.
Note: Shading indicates that the effect of education was significant at least at the 5 percent level.
Note: The analyses control for educational enrolment and birth cohort.

Table 5.5 Summary of findings from Table 5.3 for the educational gradient of pathways to first birth through partnership experiences that include union dissolution

	C → D+	CM → D+	M → D+	D+ → B
Austria	U	-	+	I
Belgium	-	I	U	+/-
Bulgaria	-	-	U	I
Estonia	U	-	-	+
France	U	U	U	+
Italy	+	U	I	U
Lithuania	+	+	-	U
the Netherlands	I	I	I	U
Norway	-	-	U	+
Romania	+	I	+	-
Russia	U	I	+/-	I
Spain	-	I	U	+
the UK	I	+	+/-	U
US	+	-	-	U

Note: A negative (-) sign indicates a negative educational gradient for a given transition. A positive (+) sign indicates a positive educational gradient for that transition. The letter U indicates a U-shaped relationship between education and this transition. The letter I indicates an inverse relationship between education and this transition.
Note: A slash (/) indicates that the influence of education on this transition changes over age; before the slash a '+' or '-' sign refers to the educational gradient of that transition at younger ages. After the slash, a '+' or '-' sign refers to the educational gradient of that transition at older ages.
Note: Shading indicates that the effect of education was significant at least at the 5 percent level.
Note: The analyses control for birth cohort.

5.7 Conclusion and discussion

To better understand the role of partnership trajectories in the transition to parenthood for women with different socio-economic background, this study examined the educational gradient of five possible pathways to first birth: while being never partnered, within non-marital cohabitation, within marriage that was preceded by cohabitation, within direct marriage, and following union dissolution. I investigated whether the role of education is important for partnership transitions or the transition to first birth once women have entered these partnerships across Europe and the US. Moreover, I examined whether the role of education on the examined transitions changes over age.

Childbearing among never partnered women had a consistent negative educational gradient supporting the argument that women from more disadvantaged backgrounds are more likely to have a birth outside marriage (Hobcraft & Kiernan, 2001; Perelli-Harris & Gerber, 2011). Additionally, in some countries at older ages, higher educated women have a higher risk compared to their lower educated counterparts to have a first child while being never partnered. It is possible that in these countries some highly educated women experience difficulties in finding a stable partner but once they do, they have a birth more quickly than lower educated women.

The findings for entrance into cohabitation were less consistent, with some countries having a significant negative educational gradient, others having a positive gradient, and yet others having a gradient that changed over time. However, childbearing within cohabitation had a consistent negative educational gradient across countries. In other words, low educated women were found to be more likely to have a first child within cohabitation than those with higher education. This means that even in countries where more educated women are more likely to cohabit, it is the least educated for whom cohabitation represents a context for childbearing. Thus, it seems that cohabitation is a more permanent stage in the childbearing process for low educated women, unless they marry after the birth, and it may even represent an "alternative to marriage" (Heuveline & Timberlake, 2004) for them, although they are also more likely to dissolve their relationships (Lyngstad & Jalovaara, 2010). Similarly, when examining the impact of education on the pathway to a first birth within marriage preceded by cohabitation, higher educated women had a higher risk of marrying their cohabiting partner

irrespective of the educational gradient of the transition to cohabitation. This supports the argument that these women have more resources and are more attractive marriage partners than their lower educated counterparts who are more likely to remain in cohabitation (McLanahan, 2004; Perelli-Harris et al., 2010b).

However, the results are less consistent for the transition to first birth from marriage that was preceded by cohabitation, suggesting that once marriage occurs education matters less. In most countries, higher educated women have smaller first birth risks within such a marital union but usually this gradient becomes positive over age indicating that highly educated women tend to delay having a first child within a marital union that was preceded by cohabitation. All in all, these findings indicate that the pathway to a first birth via marriage that was preceded by cohabitation is associated with more advantage. The role of the transition to cohabitation is not important *per se* in this pathway, but education plays a crucial role in whether the cohabiting union transitions into marriage. This is exactly what happens to higher educated women. This finding highlights the importance of differentiating between direct marriage and marriage that was preceded by cohabitation. Additionally, this result supports the idea that for highly educated women, cohabitation is usually a short-lived, temporary life stage which precedes marriage and is less frequently context for childbearing.

The impact of education on the pathway to a first birth via direct marriage was found to be similar to what was found for the pathway to first birth via marriage that was preceded by cohabitation. Again, whether the transition to direct marriage had a positive or negative gradient, highly educated directly married women were likely to delay having a first child to later ages in most countries. Finally, I did not find a consistent educational gradient of the transitions into and out of union dissolution.

To conclude, the findings show that overall education has a more consistent educational gradient on the transition to motherhood than on partnership transitions. Supporting the expectations derived from the Pattern of Disadvantage argument, women from more disadvantaged backgrounds (measured by low education) were more likely to experience a first birth while being never partnered and within cohabitation compared to women from more advantaged backgrounds. These results contradict the expectations of the SDT. Additionally, highly educated women tend to delay having a first child within direct marriage as well as within

marriage that was preceded by cohabitation. This finding is in line with the argument that more educated women delay having a first child; this leads to further gains in resources through increased employment opportunities (McLanahan, 2004). There is one partnership transition where education seems to play a crucial role, namely, the transition from cohabitation to marriage; more educated women are more likely to marry their cohabiting partner than those with lower education. This finding corroborates the argument that higher educated women have more resources and are more attractive in the marriage market compared to lower educated women (Oppenheimer, 1997, 2000).

This study has also showed that it is important to account for possible changes in the influence of education on the risk of different transitions by age. Not accounting for changing age patterns means that the differences in the transition risks of higher and lower educated women are assumed to be proportional across all ages. However, because higher and lower educated women have different 'social age' (Skirbekk et al., 2004), highly educated women tend to delay partnership formation and childbearing within different union types. This argument was confirmed by the results presented in this chapter even though there is substantial cross-national variation in the direction and magnitude of the changing impact of education over age.

While this study highlighted the importance of examining the educational gradient of partnership trajectories leading to a first birth, it also has some limitations. It is possible that there is reverse causality between educational attainment and the experience of certain family life transitions. Additionally, family life transitions and educational transitions as well as partnership transitions and the transition to first birth could be interrelated processes. It is likely that decisions relating to co-residential union formation, childbearing, and school attendance are not made independently (Aassve et al., 2006; Coppola, 2004). Although some scholars argue that these processes should be modelled simultaneously (Upchurch et al., 2002) they also acknowledge that using simultaneous models lead to results which are extremely hard to interpret (Baizán et al., 2003, 2004). This also limits the number of transitions that can be examined within the same model. Additionally, applying these models for a number of countries would make the interpretation of the results even more difficult and unfeasible. This study did not attempt to identify a causal relationship between education and the different family transitions. Rather, by applying multi-state event history models, it aimed to provide a first description

of the changing role of education in several pathways to motherhood in a cross-national context. Moreover, it is possible that the influence of education on the examined pathways to first birth changes across birth cohorts. The small sample sizes did not allow for testing such interactions leaving scope for future research to investigate these possible changes.

To summarise, this study demonstrated that women from different socio-economic backgrounds follow different pathways to a fist birth. Women from disadvantaged backgrounds are more likely to have a first birth while being never partnered and within cohabitation while women from more advantaged backgrounds will marry their cohabiting partner and delay having a first child to later ages. This, in turn, may further contribute to their advantage by creating increased opportunities for them. To conclude, this chapter highlighted the importance of changing partnership and family dynamics for social inequalities and, potentially, for the reproduction of social inequalities.

6. Chapter 6 – Conclusion and discussion

The aim of this thesis was to examine the intersection between partnership experiences and the transition to motherhood in Europe and the United States. I examined the following overarching research questions: How are partnership transitions and the transition to motherhood interrelated? Does this interrelationship vary by socio-economic background? Are there similarities across Europe and the United States? And how can we examine interdependent partnership and fertility dynamics? To answer these questions, readers were presented with four chapters (Chapter 2 to Chapter 5) that aimed to investigate different elements and aspects of these questions. The following section (Section 6.1) summarises the research questions and key findings of each of these chapters. This is followed by the discussion of the contributions (Section 6.2) and limitations of this thesis together with suggestions for future research (Section 6.3). Finally, the theoretical implications of the findings are discussed (Section 6.4).

6.1 Summary of key findings

6.1.1 The first research question

'How can sequence analysis, latent class growth models and multi-state event history models be used for studying the influence of education on partnership transitions over the early family life course? What types of research questions can be answered using these methods? And are these methods applicable to the same problems to the same extent or is one of them better than the other and if so in which situation?'

Although there is an increased interest among demographers to study family life courses, the discussion in the literature has mainly been limited to comparing the properties of event history models and sequence analysis to studying the family life course. Chapter 2 contributed to this literature by describing and empirically comparing sequence analysis and two other promising techniques: latent class growth models and multi-state event history models to studying family life courses with their complexities. This chapter showed that multi-state event history models and latent class growth models

are a useful addition to our methodological toolkit for studying the (family) life course. More specifically, multi-state event history models are especially useful for addressing research questions specifically related to the influence of changing covariate effects over the life course while latent class growth models are a useful tool for identifying differences in covariate effects between groups of individuals. Although overall the examined methods showed similar results in some cases their results were different. The reasons behind these differences may lie in the slightly different implementation of the methods. At the same time it is likely that some of these differences are due to their underlying properties and their different approach to studying the life course.

6.1.2 The second research question

'How has the intersection between union formation and fertility behaviours changed across Europe and the United States?'

Chapter 3 provided the descriptive background for this thesis. It utilised survey data to examine individual family life courses of women born between 1930 and 1969. Additionally, this chapter focused on multiple family life transitions. I calculated basic descriptive statistics and multi-state life tables to show how partnership transitions and the partnership context of a first birth have changed across cohorts by age and by educational level. This allowed me to examine some of the individual level driving forces behind changing family processes. The analyses revealed that among younger cohorts there was more variation in the partnership context of first births compared to older cohorts. With respect to the intersection between partnership experiences and the transition to motherhood by age I found that as first births are being postponed to later ages, older women were more likely to experience a first birth within cohabitation and within new partnership forms compared to younger women. Last, the descriptive results by education suggest that family behaviours of women from different educational background were influenced differently by the societal changes that took place in the last five to six decades. A first birth within cohabitation and while being never partnered was more prevalent among low educated women while a first birth within marriage and after re-partnering was more common among the more educated.

6.1.3 The third research question

'What are the partnership histories of women who remain childless? How do these partnership histories relate to the transition to motherhood in later reproductive ages? How do these associations differ across European countries?'

To answer these questions, Chapter 4 examined the intersection between partnership histories and first birth probabilities of women who were still childless at age 30 or 35. The analyses focused on women born between 1953 and 1962. I found that most women who were childless at age 30/35 were never partnered. This was especially the case in post-socialist and Southern European countries whereas in the other countries there was more variation in the partnership histories of childless women. Women who experienced union dissolution had high probabilities of remaining childless highlighting the importance of union dissolution for remaining childless unwillingly. Previous research has not investigated the probability of remaining childless by partnership histories and age across several European countries. This chapter has also highlighted that in most countries women who married their cohabiting partner had the highest first birth probabilities; higher than directly married women. This probability was followed by those who were cohabiting, who experienced union dissolution, and finally by the never partnered. These findings highlight the importance of examining entire partnership histories (as opposed to current partnership status) in the transition to motherhood to better understand how the dynamics of changing family life courses are linked to women's chances to become a mother or to remain childless.

6.1.4 The fourth research question

'What is the role of education on the entry into and exit from cohabitation, marriage, and union dissolution? And how does education influence the transition to parenthood once women have entered these partnerships? Are these patterns similar across Europe and the United States? Does the role of education change over age?'

Chapter 5 applied multi-state event history models to study the educational gradient of five pathways to first birth for women born between 1950 and 1969 in 13 European countries and the United States. Controlling for

educational enrolment and birth cohort, I found a persistent negative educational gradient of first birth within cohabitation which remains negative even in countries where the transition into cohabitation has a positive educational gradient. Similarly, the transition to first birth while being never partnered is associated with low education in all countries. Moreover, on the pathway to first birth within marriage that was preceded by cohabitation, what seems to matter is that the more educated women have a higher risk to marry their cohabiting partner. Once they do so, they are, however, more likely to delay having a first child than their lower educated counterparts. Although the educational gradient of direct marriage shows less consistent results, the timing pattern of the transition to first birth within direct marriage resembles that of the transition to first birth within marriage preceded by cohabitation. I also showed that the role of education on the different pathways to a first birth changes over age in many countries; highly educated women tend to delay partnership transitions and the transition to motherhood. All in all, these findings suggest that education plays an important role in the transition to first birth within cohabitation or while being never partnered and in the transition to marriage following cohabitation.

6.2 Contributions of this thesis

This thesis contributes to the literature in several ways. First, by comparing several countries across Europe and the United States, it gives an up-to-date picture of the different union and family formation processes that occurred to women across several birth cohorts and several strata of the population. This cross-national comparison has highlighted that trying to grasp the increasing complexity of partnership trajectories and their interplay with fertility is difficult in a cross-national context as there is more variation within each country group that is accounted for by available theoretical explanations for cross-country differences. This means that caution is needed when trying to group European countries for studying partnerships and fertility.

Second, this work has contributed to addressing some of the criticisms of life course research. Although a large body of literature examined the family life course, not many studies have focused on multiple transitions and over a longer life span, on several interrelated trajectories and domains, on linking earlier and later life course experiences, or on transitions across the life course

(Elder, 2001; Mayer, 2000, 2009). Rather than focusing only on one segment of the family life course, this work examined partnership trajectories (i.e. multiple partnership transitions) across the family life course leading to a first birth. Additionally, this thesis emphasised the importance of examining the interrelationship between earlier and later events by studying the link between entire partnership *histories* and the transition to motherhood. Last, this thesis explored the interrelated trajectories of partnership formation and dissolution, motherhood, and education (in Chapter 5).

Last, applying an innovative methodology, multi-state models, provided new insights into the intersection between partnership experiences and the transition to motherhood by shedding light on the following key findings that have not previously been shown in the literature.

(a) Focusing on entire partnership histories enabled me to differentiate between direct marriage and marriage that was preceded by cohabitation. I showed that this distinction is important; married women who are still childless at age 30/35 have different first birth probabilities depending on whether they directly married their partner or cohabited with them before marriage. Those who experienced pre-marital cohabitation followed by marriage had higher first birth probabilities than the directly married in all countries except Estonia, Bulgaria, and Romania.

(b) This distinction also revealed that in the pathway to a first birth via marriage that was preceded by cohabitation, the role of education is most crucial in the transition from cohabitation to marriage. Highly educated cohabiting women have higher marriage risks than lower educated cohabiting women.

(c) By examining partnership pathways leading to a first birth by socio-economic status (measured by the level of education) I showed that women from more disadvantaged backgrounds have a higher risk of a first birth while being never partnered or within cohabitation compared to those from more advantaged backgrounds. The results indicated that education has a more consistent influence on the transition to first birth across countries than on the different partnership transitions.

(d) The influence of education on the different pathways to a first birth varies by age. Although we know from previous literature that highly educated women tend to delay union and family formation compared to their lower educated counterparts, cross-nationally comparable evidence on the changing role of education over age is not available in the literature to date (Ní Bhrolcháin & Beaujouan, 2013). Chapter 5 provided these results not only for a number of countries but also for several partnership transitions and the transition to motherhood.

(e) I also showed that it is important to differentiate between two types of single births: single births to never partnered women and single births to those who became single following union dissolution. I found that women who are still childless and never partnered at age 30/35 had smaller first birth probabilities than those who experienced union dissolution. This highlights the importance of age and how the role of partnership histories is changing with age as women get closer to the end of the reproductive period.

(f) The results highlighted the changing age pattern of partnership transitions and the transition to motherhood across the examined countries. Results from multi-state life tables revealed that in some countries partnership transitions were shifting to younger ages across cohorts. These findings highlighted that examining trends in the mean age at first union formation (the typical approach in the literature) might mask changes in the age pattern of union formation.

(g) By illustrating the properties and application of three different techniques available for life course researchers, Chapter 2 showed that multi-state event history models can best answer research questions related to changing covariate effects over the life course. Sequence analysis is best applied when the aim is to describe partnership behaviours of different groups of individuals and the overall associations of these groups with certain covariates. Last, latent class growth models are most suited to studying questions related to identifying differences in covariate effects between groups of individuals.

6.3 Limitations and suggestions for future research

This study has some limitations. For studying the transition to motherhood, data on completed fertility are needed. This necessarily implies that the youngest women I could examine in this study were born between 1960 and 1969. This was one of the first cohorts of women to experience vast changes in partnership experiences and fertility. It can be expected that partnership and family formation experiences of women born after 1969 will be even more turbulent and diverse. However, it will not be possible to study this cohort of women until these women get to the end of their reproductive career. As mentioned earlier, one of the limitations of multi-state models is that as the number of states gets larger cell sizes become rather small. This might result in unreliable estimates of transition probabilities. However, it is likely that when data become available for younger cohorts, future research will be able to examine some of the more complicated pathways to first birth.

This work is predominantly descriptive. This implies that it is not possible to make causal inference with respect to the association between partnership histories/education and the transition to motherhood. There are many possible observable and unobservable factors that might influence partnership transitions as well as the transition to first birth which were not accounted for in this study. The main reason for this is that the retrospective nature of the analyses in this thesis requires any time-varying information to be measured throughout the family life course in order to maintain the temporal order of events. Such data are, however, not readily available for the examined countries. Perhaps when later waves of the Generations and Gender Surveys become available future research could expand this study by also incorporating information on employment histories and, potentially, other time-varying variables.

It is possible that selection into different partnership experiences and into motherhood is influenced by common unobserved factors. In order to account for such factors, simultaneous modelling of the different partnership formation processes and the transition to motherhood would be necessary. However, simultaneously estimating these multi-state models would have been difficult in a cross-national context because, as mentioned earlier, these models produce relatively complex results which are sometimes difficult to interpret

(Baizán et al., 2003, 2004). This limits the number of transitions and the number of countries that can be investigated within the same model.

Additionally, events related to childbearing (e.g. conception or pregnancy) are also likely to influence partnership transitions. For example, literature has shown that cohabiting women who become pregnant are likely to marry and have a marital first birth (Berrington, 2001; Holland, 2013; Manning, 1993; Perelli-Harris et al., 2012). It has also been shown that there are educational differences in the timing of marriage within the childbearing process. Higher educated women are more likely to marry their partner before the birth of the first child compared to low educated women (Holland, 2013). However, this thesis did not include conception or pregnancy as an additional state to the investigation because the primary interest was in first births and the partnership status at first birth. Changes in partnership status due to pregnancy were explored in the literature before in a cross-national context (see Perelli-Harris et al., 2012).

In this thesis women who never had a co-residential partner for at least three months are considered to be never partnered. However it is possible that some of these women were actually in a non-co-residential relationship. However, this information is only available for women at the time of the interview and no retrospective information was collected on such 'living apart together' relationships. As these unions become more common and as research interest in these unions increases it is possible that cross-national data will become available to study differences between women who never had a partner and those who never had a co-residential partner but were in a steady relationship.

This work made use of the Harmonized Histories which contains retrospective partnership and fertility histories. Retrospective data might be subject to recall error. As mentioned earlier, recall error is more likely to occur when reporting the start and end date of cohabiting unions and separation and less likely to influence the quality of retrospective information the date of marriage and childbirth (Hayford & Morgan, 2008). Additionally, the datasets which compile the Harmonized Histories all have different response rates, survey designs, methods of data collection, and representativity. This might influence the comparability of these data. Nonetheless, the Harmonized Histories is a unique

collection of surveys with high quality partnership and fertility histories and relatively comparable measures for education for many countries.

This thesis analysed 14 countries. It is acknowledged throughout this work that the examined European countries are not representative of Europe or of the different regions of Europe. In order to further extend our understanding of the relationship between partnerships and fertility future research could extend the analyses presented in this work to include more European countries. This suggestion is subject to the availability of comparable data, which might become available with upcoming waves of the Generations and Gender Surveys or other nationally representative surveys which collect reliable and comparable retrospective union and fertility histories and measures of educational attainment.

Although most country datasets include cross-sectional weights, throughout this thesis weighted estimates were only produced for some descriptive statistics but not for the results of multi-state models. The primary reason for this is that the utilised software does not allow for the incorporation of weights. This implies that the estimates might not be representative of the overall distribution of the examined partnership formation behaviours in the study countries. Although this is a limitation, unweighted estimates can give a first description of the interrelationship between partnership histories and the transition to motherhood in a cross-national context, which was the primary goal of this thesis.

Multi-state models in this research were estimated separately for each examined country. This means that findings across countries could only be qualitatively compared but not statistically. The primary reason for this is that the estimated models were already complex and the datasets were large. Additionally, comparable country-level information on possible factors that might drive cross-national similarities and differences in partnership and family behaviours is not available. Nonetheless, the qualitative comparisons provided new insights into cross-national similarities and differences in union and family formation patterns.

Next to within-country differences it is likely that partnership and family behaviours are also heterogeneous within a country (Klüsener et al., 2012a; Lappegård et al., 2014). It is well known that several of the examined countries

have regions with very distinct union and family formation patterns (e.g. north and south of Italy (Castiglioni & Dalla Zuanna, 2009), east and west of Germany (Klüsener et al., 2012b), or the Walloon and Flemish part of Belgium (Lesthaeghe & Neels, 2002)). Additionally, there are large regional differences in partnership and family formation within different states across the United States (Lesthaeghe & Neidert, 2006). Future research could study whether the interrelationship between partnership histories/education and the transition to motherhood would change across different regions.

Last, this thesis only focused on women because retrospective data on partnership and fertility experiences of men are generally less reliable than for women (Joyner et al., 2012; Rendall et al., 1999). For this reason, most literature in family demography focuses on women and only a few studies are available on men's partnership or fertility experiences (e.g. Bukodi, 2012b, 2012a; Kalmijn, 2011; Lappegård & Rønsen, 2013; Lappegård et al., 2011). Additionally, men's and women's partnership and family behaviours are likely to be related to that of their partners' as partnership and fertility decisions within a couple are usually made jointly. Still, literature studying couples' partnership or fertility behaviours remains limited (Balbo et al., 2013). Replicating the analyses presented in this thesis for men and for couples would extend our knowledge on a possibly gendered nature of the interrelationship between partnership experiences and the transition to parenthood. Again, this suggestion is subject to the availability of comparable data.

6.4 Conclusion and discussion

This dissertation examined the interrelationship between partnership experiences and the transition to motherhood in a cross-national context. The four main pillars of this investigation were: cohort, age, education, and partnership histories. In what follows, the findings and their implications are discussed according to these dimensions.

6.4.1 Cohort

First, examining changes in the link between partnership experiences and the transition to motherhood across cohorts revealed that vast changes occurred in family life transitions between women born in the 1930s and in the 1960s.

While among the oldest cohorts the majority of first births occurred within direct marriage, in all examined countries the proportion of first births within cohabitation and within marriage that was preceded by cohabitation has increased. Additionally, in Western and Northern European countries the proportion of first births in second or higher order unions have also increased. The most prominent changes took place between the two youngest cohorts (1950-1959 and 1960-1969).

These findings are in line with the literature and indicate that over time 'new', less traditional family behaviours, such as cohabitation, non-marital childbearing, and union dissolution became more widespread. According to the Second Demographic Transition theory, these changes were not only demographic in their nature but ideational and value changes contributed to changing family behaviours (Lesthaeghe & van de Kaa, 1986; Van de Kaa, 2002). However, it is likely that changes in norms and values was not the only factor leading to an increase in the prevalence of these behaviours; rather changing family life courses are probably the result of an interplay between changing norms and values, the expansion of higher education, increased female labour force participation, wide availability of the contraceptive pill, and changes in the meaning of partnerships and parenthood (Balbo et al., 2013).

With the increasing prevalence of such 'new' behaviours, the sequences of family life events became more varied, more complex, and less predictable than before (Liefbroer, 1999). As mentioned previously, it can be expected that partnership and family formation experiences of women born after 1969 will be even more turbulent and diverse if these trends continue. Among younger cohorts, more women would be expected to experience cohabitation, union dissolution, divorce, and higher order unions than among older cohorts. Such complex partnership pathways might accentuate the postponement of motherhood and might further decrease fertility. On the contrary, some scholars argue that increasing union instability might lead to rise in fertility by increasing the pool of people who are at risk of forming a new partnership (Thomson et al., 2012). Couples in a new partnership have higher fertility intentions and birth risks than would be predicted based on the number of children they already have (Thomson, 2004; Vikat et al., 1999). This is because a shared child signals the couple's commitment to each other (Griffith et al., 1985). If this is the case, the prevalence of multi-partner fertility and step

families would also be expected to increase. In turn, this would have consequences for the family structure in which children grow up.

The pace and magnitude of changes in family behaviours differ across countries. Focusing on changes in family formation by cohort revealed a relatively clear cross-national pattern; in Western and Northern Europe the changes were more prominent across the examined cohorts than in Southern Europe and in post-socialist countries. A possible explanation for such differences is that societal change was more rapid in some countries than in others among the examined cohorts of women. Due to differing cultural and historical background, institutional settings, legislation, and the level of gender equity, 'new' family behaviours emerged earlier and became more prevalent in Western and Northern Europe than in the other countries. In Italy and Spain it is likely that the influence of the church played a role in the persistence of more traditional family behaviours (De Rose et al., 2008). In post-socialist countries, the more moderate changes are probably a result of the pro-natalist family policies of the socialist regimes which promoted early and universal marriage and childbearing (Koytcheva & Philipov, 2008; Muresan et al., 2008; Sobotka, 2004).

6.4.2 Age

The second element of the investigation was studying changes in the link between partnership experiences and the transition to motherhood by age. Age is an important dimension to investigate in changing family life courses because of the postponement of union and family formation that took place over the past few decades. Using multi-state life tables to study changes in the probability of first union formation across all ages (from age 15 to age 40) revealed some changes that could not have been observed calculating mean or median age at transition to first union, which is the conventional way to depict postponement of first union formation.

Additionally, the results showed that the meaning of age in partnership transitions and the transition to motherhood differs by educational level. More educated women were more likely to delay the transition to first birth and union formation although there was substantial cross-national variation in the relationship between age and education across the examined transitions.

Nonetheless, these findings corroborate the idea that higher and lower educated women have different 'social age' (Skirbekk et al., 2004) and that spending longer in education leads to delayed family formation due to social norms and expectations (Blossfeld & Huinink, 1991; Thornton et al., 1995). Additionally, this work highlights the importance of accounting for potential changes in the influence of education over the life course not only by life course stages (i.e. partnership states) but also by age.

Whereas the results which described changing family behaviours across cohorts revealed a relatively clear cross-national pattern, when also introducing age countries became more unique in the way they experienced family change. As explained earlier, this is probably related to the varying pace and magnitude of societal change across countries during the examined period. Therefore, the meaning of age for fertility is also likely to vary across countries. This was reflected by the finding that in post-socialist countries most women (85-90%) had a first child already by age 30 while in the other countries roughly 30-35% of women were still childless at this age. Nonetheless, the role of age for the transition to motherhood was consistent within countries; women who are still childless at age 35 were less likely to have a child in all countries than women at age 30. This was especially the case for never partnered women and those who experienced union dissolution by age 35. This implies that the role of partnership histories of childless women for the transition to motherhood is more important at age 35 than at age 30 across the examined countries.

6.4.3 Education

The third dimension of the investigation of the link between partnership experiences and the transition to motherhood was educational attainment. Educational differences in family behaviours are important because education encapsulates several dimensions of societal advantage and disadvantage (Ní Bhrolcháin & Beaujouan, 2013). Therefore, education is often used as a proxy for socio-economic background and values (for example in Perelli-Harris & Gerber, 2011; Perelli-Harris et al., 2010b). If women from poorer background are more likely to experience 'new' family behaviours (e.g. cohabitation, non-marital childbearing, union dissolution) which are associated with disadvantage (McLanahan, 2004), the emergence of such behaviours might increase the level

of social inequalities in societies. Additionally, family behaviours, such as age at first birth (Barber, 2000, 2001), divorce (Amato, 1996), or non-marital childbearing (Högnäs & Carlson, 2012) are transmitted between parents and their children. This implies that an increasing prevalence of 'new' family behaviours might not only increase social inequalities but it is likely to contribute to the reproduction of social inequalities through the intergenerational transmission of family behaviours (Goldstein & Kenney, 2001; Högnäs & Carlson, 2012).

The descriptive results by education (Chapter 3) suggest that changes associated with the second demographic transition (e.g. increasing prevalence of cohabitation, non-marital childbearing, union dissolution, and delayed transition to first birth) have affected women from different social background differently. This implies that over time, the gap in socio-economic resources of women from different background have widened (McLanahan, 2004). Similarly, multivariate results from Chapter 5 found support for the pattern of disadvantage argument; lower educated women have a higher risk of a first birth within cohabitation and while being never partnered compared to their more educated counterparts. At the same time, highly educated cohabiting women have higher marriage risks than lower educated women.

These findings indicate that the pathway to a first birth via non-marital cohabitation or while being never partnered is associated with disadvantage whereas the pathway via non-marital cohabitation followed by marriage is experienced by women from more advantaged social backgrounds. This suggests that it is the inability (or perhaps unwillingness) of low educated women to marry their partner (Berrington, 2001; Oppenheimer, 1988, 2003; Perelli-Harris et al., 2012) which plays a key role in socio-economic differences in family behaviours. Therefore, it would be interesting to study the meaning of marriage (Holland, 2013) and the possible barriers to marriage across social groups in a cross-national context. These results challenge the Second Demographic Transition theory which expects higher educated women to be at the forefront of changing family behaviours.

Examining the influence of education across several pathways to a first birth also contributed to our understanding of whether and how the meaning of different partnership experiences in the transition to motherhood differs for

women with different educational backgrounds. Literature that examines the meaning of cohabitation in a cross-national context usually focuses on classifying countries according to the most prevalent type of cohabitation within a country (Heuveline & Timberlake, 2004; Hiekel et al., 2014). These typologies assume that the examined countries represent different developmental stages in the diffusion of 'new' family behaviours. Additionally, these typologies do not take into account the diversity of cohabiting women in each country (Sobotka & Toulemon, 2008). The findings of this thesis suggest that the meaning and role of cohabitation in the childbearing process does not primarily depend on the country's developmental stage and on the prevalence of cohabitation in a given country but rather it differs by individuals' socio-economic status. As highly educated women are more likely to marry their cohabiting partners, for them cohabitation is only a temporary stage which precedes marriage ("prelude to marriage") but which does not play a role in childbearing. Lower educated women, however, are more likely to slide into and remain in cohabitation. Thus, for lower educated women cohabitation seems to be a more permanent union ("alternative to marriage") which is also often context for childbearing.

Additionally, the descriptive findings showed (Chapter 1) that cohabitation is marginal (less than 20% of first unions starting as cohabitation) in Italy, Spain, Lithuania and Romania whereas it is widespread (at least 80% of first unions starting as cohabitation) in Austria, France, and Norway. In the other countries, around 60-70% of first unions started as cohabitation. These results are broadly in line with studies that established different cohabitation typologies (Heuveline & Timberlake, 2004; Hiekel et al., 2014). Based on these typologies one would expect that in countries where cohabitation is more widespread women would be more likely to have a child within cohabitation compared to countries where cohabitation is marginal. The results of this thesis did not confirm this expectation. Even among the youngest cohort, a first birth within marriage was more likely than within cohabitation across all examined countries highlighting that cohabitation is primarily a step in the marriage process even in countries where cohabitation is more widespread.

Thus, this thesis suggests that the meaning of cohabitation in family formation is not necessarily determined by the prevalence and acceptance of cohabitation and the attitudes towards cohabitation in a given country – at least not at the

individual level. It would be interesting to see how the prevalence of different cohabitation types change across countries and by educational level. This would not only enable us to gain insight into the various meanings of cohabitation across societal groups in different countries but would also enhance our understanding of the magnitude of selection into cohabitation and cohabiting first births across countries and by educational level.

Educational differences in family behaviours might disappear among younger cohorts. If it is the case that some educational groups are leading the changes in family behaviours and other groups adapt this behaviour over time, we would expect educational differences in family behaviours to disappear. This idea is, however, not supported by the findings of this thesis (Chapter 3). If current trends continue, it is likely that educational differences in family formation behaviour will stay similar especially because of the intergenerational transmission of family behaviours.

Although the main findings with respect to the influence of education on the link between partnerships and fertility are similar across countries, it is possible that these changes are driven by different forces across countries. In other words, it is possible that the same educational gradient across countries is the result of different processes. This would imply that the same explanations are not applicable to all examined countries. Furthermore, it is possible that the meaning of high and low education varies across time and space. The expansion of higher education started and accelerated at different periods across countries. This might mean that we are not comparing the same group of women across countries. If this is the case it would be expected that the meaning of education is more similar in countries with similar histories and that the differences would be larger between groups of countries where similar changes took place at a similar period and pace. Nonetheless, the educational attainment variable is consistent within each country and represents a relative measure of the level of education within countries.

6.4.4 Partnership histories

The fourth important dimension of the relationship between partnership experiences and fertility which was investigated in this dissertation is partnership histories. The results showed that having a partner remains

important for childbearing and that marriage is still the preferred living arrangement (especially among the more educated). However, it is not only current partnership status that is of importance when studying the transition to motherhood. As suggested by life course theory (Elder, 1985, 1992), previous family life experiences influence the occurrence of later family life events. This has been shown in Chapter 4 where I found that directly married women and those who married their partner following a period of non-marital cohabitation have different first birth probabilities. The same applies to never partnered single women and those who are currently single (following union dissolution).

Additionally, in Chapter 5, differentiating between direct marriage and marriage that was preceded by cohabitation revealed the importance of education in the transition from cohabitation to marriage for highly educated women. As it can be expected that variation in partnership experiences leading to a first birth will increase among younger cohorts, incorporating previous family life events when studying the family life course might become even more crucial. This might generate a need for the use of innovative methods that are able to cope with increased complexities in the life course. Inspired by this idea, three promising techniques were illustrated and compared in this thesis (Chapter 2).

Similarly to what was found for age, the results relating to partnership histories did not display a clear cross-national pattern. In other words, countries could not be grouped according to the commonly applied cross-national typologies. What is more, although there is substantial cross-national variation in the levels of different family behaviours, both Chapter 4 and Chapter 5 revealed that with respect to the main conclusions, the examined countries are rather similar to each other when it comes to studying the probability of a first birth among childless 30/35 year-olds by partnership histories, and the educational gradient of pathways to a first birth. As mentioned before, cross-national variation in the findings might be explained by cultural, historical, and institutional differences. Furthermore, cross-country differences in the prevalence of different partnership experiences might influence the results. For example, Liefbroer and Dourleijn (2006) showed using data from 16 European countries that the impact of pre-marital cohabiting unions on marital union dissolution risks depend on the prevalence of cohabitation in a country.

Former cohabiters were found to have higher dissolution risks than the directly married only in countries where cohabitation was either a large majority or a small minority phenomenon.

6.4.5 Concluding remarks

To summarise, I investigated changing partnership dynamics and its implications on the transition to motherhood across a number of European countries and the United States. Using an innovative approach, this study revealed the importance of age, socio-economic status, and partnership histories when studying the link between partnerships and motherhood. This thesis highlighted that changing family behaviours are a potential source of social inequalities. Therefore, as family transitions are likely to be further delayed and family life courses are expected to become more complex, it becomes even more important that changing family behaviours are considered when policies and political decisions are made.

Appendix 1

Characteristics of national surveys included in the Harmonized Histories

	Survey Name	Survey Dates	Cohorts	Availability of Weights	Original N
Austria	Austrian Generations and Gender Survey Wave 1	2008/2009	1963-1990	Yes	5000
Belgium	Belgian Generations and Gender Survey Wave 1	2008/2010	1928-1990	Yes	7163
Bulgaria	Bulgarian Generations and Gender Survey Wave 1	2004	1919-1987	No	12858
Estonia	Estonian Generations and Gender Survey Wave 1	2004/2005	1924-1983	Yes	7855
France	French Generations and Gender Survey Wave 1	2005	1926-1987	Yes	10079
Italy	Italian Generations and Gender Survey Wave 1	2003	1901-1985	Yes	21454
Lithuania	Lithuanian Generations and Gender Survey Wave 1	2006	1926-1989	Yes	10036
Netherlands	Dutch Fertility and Family Survey	2003	1940-1984	Yes	8145
Norway	Norwegian Generations and Gender Survey Wave 1	2007/2008	1927-1988	Yes	14881
Romania	Romanian Generations and Gender Survey Wave 1	2005	1925-1987	Yes	11986
Russia	Russian Generations and Gender Survey Wave 1	2004	1923-1987	No	11261
Spain	Spanish Fertility Survey	2006	1908-1991	Yes	9737
United Kingdom	British Household Panel Survey	2005/2006	1925-1989	Yes	14539
United States	National Survey of Family Growth	2007	1961-1993	Yes	13495

Appendix 2

Number of first births by partnership history within different educational levels, 1930-1939 birth cohort

	Low						Medium						High						Total					
	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB
Austria																								
Belgium	26	2	70	42	0	1	9	2	23	10	0	1	2	0	24	6	0	0	37	4	117	58	0	2
Bulgaria	53	10	184	97	5	1	22	1	111	48	0	0	11	0	43	10	0	0	86	11	338	155	5	1
Estonia	29	39	219	49	7	5	8	11	173	28	1	4	4	2	127	15	0	1	41	52	519	92	8	10
France	76	6	325	72	2	1	17	2	78	12	0	0	6	5	34	9	0	0	99	13	437	93	2	1
Italy	86	10	1030	18	0	3	12	0	190	1	0	0	0	0	54	1	0	0	98	10	1274	20	0	3
Lithuania	43	9	266	15	1	1	18	0	156	8	0	0	7	0	57	1	0	0	68	9	479	24	1	1
the Netherlands																								
Norway	24	2	82	5	1	1	12	2	142	17	1	2	2	0	48	5	0	0	38	4	272	27	2	3
Romania	74	14	570	53	1	5	15	2	111	3	0	0	1	1	21	1	0	0	90	17	702	57	1	5
Russia	68	33	232	32	4	4	56	30	282	41	1	8	15	9	124	14	3	1	139	72	638	87	8	13
Spain	58	2	599	34	0	0	0	0	49	1	0	0	1	1	27	0	0	0	59	3	675	35	0	0
UK	6	0	207	2	2	1	1	0	102	1	0	0	1	0	82	1	0	2	8	0	391	4	2	3
US																								

Appendix 3

Number of first births by partnership history within different educational levels, 1940-1949 birth cohort

	Low						Medium						High						Total					
	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB
Austria																								
Belgium	22	5	99	38	0	2	7	0	40	25	0	1	9	3	55	18	0	1	38	8	194	81	0	4
Bulgaria	33	7	115	111	0	2	24	5	163	119	0	0	12	0	84	44	0	0	69	12	362	274	0	2
Estonia	17	21	88	32	4	4	15	22	211	62	4	6	10	10	155	44	1	6	42	53	454	138	9	16
France	40	17	260	42	1	1	22	10	186	35	1	4	9	4	58	26	1	0	71	31	504	103	3	5
Italy	87	14	2123	10	3	1	18	4	476	12	0	1	0	4	155	4	0	1	105	22	2754	26	3	3
Lithuania	28	3	113	9	0	0	34	9	299	19	1	2	2	1	95	5	1	1	64	13	507	33	2	3
the Netherlands	12	8	390	9	0	4	3	2	146	17	1	0	1	1	70	14	1	0	16	11	606	40	2	4
Norway	29	12	111	25	3	1	30	9	319	62	1	7	12	5	166	43	2	8	71	26	596	130	6	16
Romania	72	21	422	42	1	12	13	6	200	17	0	1	4	1	46	6	0	1	89	28	668	65	1	14
Russia	21	20	94	13	1	0	42	23	317	60	8	5	19	10	137	25	4	8	82	53	548	98	13	13
Spain	55	8	642	33	0	0	7	0	86	5	0	0	5	1	55	2	0	0	67	9	783	40	0	0
UK	15	3	162	4	3	3	5	3	162	4	1	2	9	2	169	14	0	3	29	8	493	22	4	8
US																								

Appendix 4

Number of first births by partnership history within different educational levels, 1950-1959 birth cohort

	Low						Medium						High						Total					
	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB
Austria																								
Belgium	18	10	93	52	1	4	11	3	89	39	1	1	6	7	75	49	1	5	35	20	257	140	3	10
Bulgaria	20	20	48	79	2	0	22	9	144	171	0	2	13	5	104	70	0	1	55	34	296	320	2	3
Estonia	17	13	28	21	0	0	32	43	217	117	6	9	26	19	207	94	3	6	75	75	452	232	9	15
France	28	31	196	61	5	4	29	33	181	78	4	7	15	35	69	76	3	20	72	99	446	215	12	31
Italy	78	31	1560	43	2	5	27	10	866	33	7	7	2	4	247	18	2	4	107	45	2673	94	11	16
Lithuania	7	0	22	6	0	0	37	18	335	43	3	4	15	1	139	13	2	2	59	19	496	62	5	6
the Netherlands	10	8	321	53	6	11	6	10	222	69	2	18	1	8	64	81	2	10	17	26	607	203	10	39
Norway	39	31	79	47	1	9	58	63	203	164	7	18	31	46	160	151	4	33	128	140	442	362	12	60
Romania	35	43	347	47	0	5	34	20	399	43	3	2	2	1	79	4	0	2	71	64	825	94	3	9
Russia	9	6	32	10	3	0	89	74	637	120	19	27	20	13	201	33	3	7	118	93	870	163	25	34
Spain	46	11	591	32	2	0	16	9	191	12	0	2	5	2	107	15	0	1	67	22	889	59	2	3
UK	24	3	79	11	1	5	14	7	133	13	1	3	19	7	165	40	5	33	57	17	377	64	7	41
US																								

Appendix 5

Number of first births by partnership history within different educational levels, 1960-1969 birth cohort

	Low						Medium						High						Total					
	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB	SB	SCB	SMB	SCMB	DB	RB
Austria	26	27	32	27	3	4	47	102	73	190	10	44	7	19	23	53	1	23	80	148	128	270	14	71
Belgium	18	7	58	39	3	4	14	16	77	59	1	12	15	16	59	86	2	11	47	39	194	184	6	27
Bulgaria	20	40	72	99	0	6	36	36	307	461	1	6	21	11	160	205	1	4	77	87	539	765	2	16
Estonia	3	13	8	16	0	2	91	121	3	153	8	6	34	42	130	115	6	14	128	176	141	284	14	22
France	30	65	49	49	4	9	26	101	73	155	4	37	7	70	44	122	6	29	63	236	166	326	14	75
Italy	71	34	1219	68	6	11	40	30	1077	73	14	15	2	15	228	24	3	11	113	79	2524	165	23	37
Lithuania	2	7	10	6	0	1	59	18	396	65	7	3	16	5	170	28	2	1	77	30	576	99	9	5
the Netherlands	16	29	122	108	8	12	5	32	135	185	6	36	1	16	49	84	3	21	22	77	306	377	17	69
Norway	37	73	28	58	4	17	44	200	71	133	8	55	29	159	88	172	8	109	110	432	187	363	20	181
Romania	10	32	169	28	2	3	14	27	440	74	5	3	1	4	91	8	0	0	25	63	700	110	7	6
Russia	9	5	13	5	0	0	75	70	491	135	17	21	14	15	168	41	7	5	98	90	672	181	24	26
Spain	43	24	463	43	4	2	23	25	360	52	2	3	7	16	165	37	1	8	73	65	988	132	7	13
UK	34	3	23	12	2	3	58	39	110	59	5	36	40	34	142	121	20	48	132	76	275	192	27	87
US	56	30	22	46	8	7	73	46	58	105	11	20	67	32	237	147	29	91	196	108	317	298	48	118

List of References

Aassve, A. (2003). The impact of economic resources on premarital childbearing and subsequent marriage among young American women. *Demography, 40*(1), 105-126. doi: 10.1353/dem.2003.0001

Aassve, A., Arpino, B., & Billari, F. C. (2013). Age norms on leaving home: Multilevel evidence from the European Social Survey. *Environment and Planning A, 45*, 383-401.

Aassve, A., Billari, F. C., & Piccarreta, R. (2007). Strings of adulthood: A sequence analysis of young British women's work-family trajectories. *European Journal of Population, 23*(3-4), 369-388. doi: 10.1007/s10680-007-9134-6

Aassve, A., Burgess, S., Propper, C., & Dickson, M. (2006). Employment, family union and childbearing decisions in Great Britain. *Journal of the Royal Statistical Society: Series A (Statistics in Society), 169*(4), 781-804. doi: 10.1111/j.1467-985X.2006.00432.x

Abbott, A. (1995). Sequence analysis: New methods for old ideas. *Annual Review of Sociology, 21*, 93-113. doi: 10.1146/annurev.soc.21.1.93

Abbott, A., & Tsay, A. (2000). Sequence analysis and optimal matching methods in sociology: Review and prospect. *Sociological Methods & Research, 29*(1), 3-33. doi: 10.1177/0049124100029001001

Al Mamun, A. (2003). *Life History of Cardiovascular Disease and Its Risk Factors. Multistate Life Table Approach and Application to the Framingham Heart Study*. Amsterdam, The Netherlands: Rozenberg Publishers.

Amato, P. R. (1996). Explaining the intergenerational transmission of divorce. *Journal of Marriage and Family, 58*(3), 628-640. doi: 10.2307/353723

Amato, P. R., & Irving, S. (2005). A historical perspective on divorce in the United states. In M. Fine & M. Harvey (Eds.), *Handbook of divorce and relationship dissolution* (pp. 41–58). Hillsdale, NJ: Lawrence Erlbaum.

Amato, P. R., & James, S. (2010). Divorce in Europe and the United States: Commonalities and differences across nations. *Family Science, 1*(1), 2-13.

Andersen, P. K., & Keiding, N. (2002). Multi-state models for event history analysis. *Statistical Methods in Medical Research, 11*(2), 91-115. doi: 10.1191/0962280202SM276ra

Avdeev, A., & Monnier, A. (2000). Marriage in Russia: A complex phenomenon poorly understood. *Population: An English Selection, 12*, 7-49.

Baizán, P., Aassve, A., & Billari, F. C. (2003). Cohabitation, marriage, and first birth: The interrelationship of family formation events in Spain. *European Journal of Population, 19*, 147-169.

Baizán, P., Aassve, A., & Billari, F. C. (2004). The interrelations between cohabitation, marriage and first birth in Germany and Sweden. *Population and Environment, 25*(531-560). doi: 10.1023/B:POEN.0000039064.65655.3b

Balbo, N., & Barban, N. (2014). Does fertility behavior spread among friends? *American Sociological Review, 79*(3), 412-431.

Balbo, N., Billari, F. C., & Mills, M. (2013). Fertility in advanced societies: A review of research. *European Journal of Population, 29*(1), 1-38.

Barban, N., & Billari, F. C. (2012). Classifying life course trajectories: A comparison of latent class and sequence analysis. *Journal of the Royal Statistical Society Series C Applied Statistics, 61*, 765-784.

Barber, J. S. (2000). Intergenerational influences on the entry into parenthood: Mothers' preferences for family and non-family behavior. *Social Forces, 79*, 319-348.

Barber, J. S. (2001). The intergenerational transmission of age at first birth among married and unmarried men and women. *Social Science Research, 30*, 219-247.

Beck, U., & Beck-Gernsheim, E. (2002). *Individualization. Institutionalized Individualism and its Social and Political Consequences*. London: Sage.

Becker, G. S. (1981). *A Treatise on The Family*. Cambridge: Harvard University Press.

Bernardi, F., & Martínez-Pastor, J. (2011). Divorce risk factors and their variations over time in Spain. *Demographic Research, 24*, 771-800.

Berrington, A. (2001). Entry into parenthood and the outcome of cohabiting partnerships in Britain. *Journal of Marriage and Family, 63*(1), 80-96. doi: 10.1111/j.1741-3737.2001.00080.x

Berrington, A. (2003). Change and continuity in family formation among young adults in Britain: Social Statistics Reseach Centre, University of Southampton.

Berrington, A. (2004). Perpetual postponers? Women's, men's and couple's fertility intentions and subsequent fertility behaviour. *Population Trends, 117*(Autumn), 9-19.

Berrington, A., & Diamond, I. (1999). Marital dissolution among the 1958 British birth cohort: The role of cohabitation. *Population Studies, 53*(1), 19-38. doi: 10.1080/00324720308066

Berrington, A., & Diamond, I. (2000). Marriage or cohabitation: A competing risks analysis of first-partnership formation among the 1958 British birth cohort. *Journal of Royal Statistical Society, A, 163*, 127-151.

Beyersmann, J., Schumacher, M., & Allignol, A. (2012). *Competing Risks and Multistate Models with R*: Springer.

Billari, F. C. (2001a). The analysis of early life courses: Complex descriptions of the transition to adulthood. *Journal of Population Research, 18*(2), 119-142. doi: 10.1007/bf03031885

Billari, F. C. (2001b). Sequence analysis in demographic research. *Canadian Studies in Population, 28*(2), 439-458.

Billari, F. C. (2004). Becoming and adult in Europe: A macro (/micro)-demographic perspective. *Demographic Research, Special Collection 3*(Article 2), 15-44.

Billari, F. C. (2005a). Life course analysis: Two (complementary) cultures? Some reflections with examples from the analysis of the transition to adulthood. *Advances in Life Course Research, 10*(0), 261-281. doi: 10.1016/s1040-2608(05)10010-0

Billari, F. C. (2005b). Partnership, childbearing and parenting: Trends of the 1990s. In M. Macura (Ed.), *The New Demographic Regime. Population Challenges and Policy Responses* (pp. 63-94): United Nations.

Billari, F. C., Castiglioni, M., Castro-Martin, T., Michielin, F., & Ongaro, F. (2002). Household and union formation in a Mediterranean fashion: Italy and Spain *Dynamics of fertility and partnership in Eruope*. New York: United Nations.

Billari, F. C., Goisis, A., Liefbroer, A. C., Settersten, R. A., Aassve, A., Hagestad, G., & Spéder, Z. (2011). Social age deadlines for the childbearing of women and men. *Human Reproduction Update, 26*(3), 616-622. doi: 10.1093/humrep/deq360

Billari, F. C., & Kohler, H.-P. (2002). The impact of union formation dynamics on first births in West Germany and Italy: Are there signs of convergence? In E. Klijzing & M. Corijn (Eds.), *Comparative Research on Fertility and the Family in Contemporary Europe: Findings and Lessons*. Geneva/New York: United Nations.

Billari, F. C., Kohler, H.-P., Andersson, G., & Lundström, H. (2007). Approaching the limit: Long-term trends in late and very late fertility. *Population and Development Review, 33*(1), 149-170.

Billari, F. C., & Liefbroer, A. C. (2007). Should I stay or should I go? The impact of age norms on leaving home. *Demography, 44*(1), 181-198.

Billari, F. C., & Liefbroer, A. C. (2010). Towards a new pattern of transition to adulthood? *Advances in Life Course Research, 15*(2-3), 59-75. doi: 10.1016/j.alcr.2010.10.003

Billari, F. C., & Philipov, D. (2004). Women's education and entry into a first union. A simultaneous-hazard comparative analysis of Central and Eastern Europe. *Vienna Yearbook of Population Research*, 91-110.

Billari, F. C., & Piccarreta, R. (2001). Life courses as sequences: an experiment in classification via monothetic divisive algorithms. In S. Borra, R. Rocchi, M. Vichi & M. Schader (Eds.), *Advances in Classification and Data Analysis* (pp. 351-358). Berlin and New York: Springer Verlag.

Billari, F. C., & Piccarreta, R. (2005). Analyzing demographic life courses through sequence analysis. *Mathematical Population Studies, 12*(2), 81-106. doi: 10.1080/08898480590932287

Blossfeld, H. P. (1995). Changes in the process of family formation and women's growing economic independence: A comparison of nine countries. In H. P. Blossfeld (Ed.), *The New Role of Women: Family Formation in Modern Societies* (pp. 3-32). Boulder: Westview Press.

Blossfeld, H. P., De Rose, A., Hoem, J. M., & Rohwer, G. (1995). Education, modernization, and the risk of marriage disruption in Sweden, West Germany and Italy. In M. K. Oppenheim & A. Jensen (Eds.), *Gender and family change in industrialised societies* (pp. 200-222). Oxford: Clarendon Press.

Blossfeld, H. P., & Huinink, J. (1991). Human capital investments or norms of role transition? How women's schooling and career affect the process of family formation. *American Journal of Sociology, 97*(1), 143-168. doi: 10.2307/2781641

Bonetti, M., Piccarreta, R., & Salford, G. (2013). Parametric and nonparametric analysis of life courses: An application to family formation patterns. *Demography, 50*, 881-902.

Bongaarts, J. (1978). A framework for analyzing the proximate determinants of fertility. *Population and Development Review, 4*(1), 105-132.

Bongaarts, J. (2001). Fertility and reproductive preferences in post-transitional societies. *Population and Development Review, 27*, 260-281. doi: 10.2307/3115260

Bras, H., Liefbroer, A. C., & Elzinga, C. H. (2010). Standardization of pathways to adulthood? An analysis of Dutch cohorts born between 1850 and 1900. *Demography, 47*(4), 1013-1034. doi: 10.1007/bf03213737

Brien, M. J., Lillard, L. A., & Waite, L. J. (1999). Interrelated family-building behaviors: Cohabitation, marriage, and nonmarital conception. *Demography, 36*(4), 535-551. doi: 10.2307/2648089

Brzinsky-Fay, C., & Kohler, U. (2010). New developments in sequence analysis. *Sociological Methods & Research, 38*(3), 359-364. doi: 10.1177/0049124110363371

Brzinsky-Fay, C., Kohler, U., & Luniak, M. (2006). Sequence analysis with Stata. *The Stata Journal, 6*(4), 435-460.

Bukodi, E. (2012a). The relationship between work history and partnership formation in cohorts of British men born in 1958 and 1970. *Population Studies, 66*(2), 123-145. doi: 10.1080/00324728.2012.656853

Bukodi, E. (2012b). Serial cohabitation among men in Britain: Does work history matter? *European Journal of Population*, 1-26. doi: 10.1007/s10680-012-9274-1

Bumpass, L., & Lu, H.-H. (2000). Trends in cohabitation and implications for childrens' family contexts in the United States. *Population Studies, 54*(1), 29-41. doi: 10.1080/713779060

Calinski, R. B., & Harabasz, J. A. (1974). A dendrite method for cluster analysis. *Communications in Statistics-Theory and Methods, 3*, 1-27.

Casper, L. M., & Bianchi, S. M. (2002). *Continuity and change in the American family*. Thousand Oaks, CA: Sage.

Castiglioni, M., & Dalla Zuanna, G. (2009). Marital and reproductive behavior in Italy after 1995: Bridging the gap with Western Europe? *European Journal of Population, 25*(1), 1-26.

Chan, T. W., & Halpin, B. (2002). Union dissolution in the United Kindgdom. *International Journal of Sociology, 32*(4), 76-93.

Cherlin, A. J. (1999). Going to extremes: Family structure, children's well-being, and social science. *Demography, 36*(4), 421-428.

Cherlin, A. J. (2004). The deinstitutionalization of American marriage. *Journal of Marriage and Family, 66*(4), 848-861. doi: 10.1111/j.0022-2445.2004.00058.x

Cherlin, A. J. (2010). *The marriage-go-round: the state of marriage and the family in America today*. New York: Vintage Books.

Coale, A. J. (1992). Age of entry into marriage and the date of the initiation of voluntary birth control. *Demography, 29*(3), 333-341.

Coppola, L. (2004). Education and union formation as simultaneous processes in Italy and Spain. *European Journal of Population, 20*, 219-250.

Corijn, M., & Klijzing, E. (2001). *Transitions to adulthood*. Dordrecht: Kluwer.

Council of Europe. (2006). Recent demographic developments in Europe 2005. Strasbourg.

de Graaf, P. M., & Kalmijn, M. (2003). Alternative routes in the remarriage market: Competing-risk analyses of union formation after divorce. *Social Forces, 81*(4), 1459-1498.

De Rose, A. (1992). Socio-economic factors and family size as determinants of marital dissolution in Italy. *European Sociological Review, 8*(1), 71-91.

De Rose, A., Racioppi, F., & Zanatta, A. L. (2008). Italy: Delayed adaptation of social institutions to changes in family behaviour. *Demographic Research, 19*, 665-704.

de Wreede, L. C., Fiocco, M., & Putter, H. (2011). mstate: An R package for the analysis of competing risks and multi-state models. *Journal of Statistical Software, 38*(7), 1-30.

Deacon, B. (2000). Eastern European welfare states: The impact of the politics of globalization. *Journal of European Social Policy, 10*(2), 146-161.

Delgado, M., Meil, G., & Lopez, F. Z. (2008). Spain: Short on children and short on family policies. *Demographic Research, 19*, 1059-1104.

Dominguez-Folgueras, M., & Castro-Martin, T. (2013). Cohabitation in Spain: No longer a marginal path to family formation. *Journal of Marriage and Family, 75*(2), 422-437. doi: 10.1111/jomf.12013

Duda, R. O., & Hart, P. E. (1973). *Pattern Classification and Scene Analysis*. New York: Wiley.

Dykstra, P. A., & Hagestad, G. O. (2007). Childlessness and parenthood in two centuries: Different roads-different maps? *Journal of Family Issues, 28*(11), 1518-1532. doi: 10.1177/0192513x07303881

Elder, G. H. J. (1975). Age differentiation and the life course. *Annual Review of Sociology, 1*, 165-190.

Elder, G. H. J. (1977). Family history and the life course. *Journal of Family History, 2*, 279-304.

Elder, G. H. J. (1985). *Life course dynamics. Trajectories and transitions, 1968–1980*. Ithaca, NY: Cornell University Press.

Elder, G. H. J. (1992). Models of the life course. *Contemporary Sociology, 21*(5), 632-635.

Elder, G. H. J. (1994). Time, human agency, and social change: Perspectives on the life course. *Social Psychology Quarterly, 57*(1), 4-15.

Elder, G. H. J. (2001). Life Course: Sociological Aspects. In J. S. Editors-in-Chief: Neil & B. B. Paul (Eds.), *International Encyclopedia of the Social & Behavioral Sciences* (pp. 8817-8821). Oxford: Pergamon.

Elder, G. H. J., Kirkpatrick Johnson, M., & Crosnoe, R. (2002). The emergence and development of Life Course Theory. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the Life Course* (pp. 3-19). New York: Kluwer Academic Publishers.

Elzinga, C. H., & Liefbroer, A. C. (2007). De-standardization of family-life trajectories of young adults: A cross-national comparison using sequence analysis. *European Journal of Population/Revue européenne de Démographie, 23*(3-4), 225-250. doi: 10.1007/s10680-007-9133-7

Ermisch, J., & Francesconi, M. (2000). Cohabitation in Great Britain: not for long but here to stay. *Journal of Royal Statistical Society, 163*, 153-171.

Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. Cambridge: Polity Press.

Fokkema, T., de Valk, H. A. G., de Beer, J., & van Duin, C. (2008). The Netherlands: Childbearing within the context of a "Poldermodel" society. *Demographic Research, 19*, 743-794.

Frejka, T. (2008a). Overview Chapter 5: Determinants of family formation and childbearing during the societal transition in Central and Eastern Europe. *Demographic Research, 19*, 139-170. doi: 10.4054/DemRes.2008.19.7

Frejka, T. (2008b). Parity distribution and completed family size in Europe: Incipient decline of the two-child family model? *Demographic Research, 19*, 47-72.

Frejka, T., & Sardon, J. (2007). Cohort birth order, parity progression ratio and parity distribution trends in developed countries. *Demographic Research, 16*, 315-374.

Frejka, T., & Sobotka, T. (2008). Overview Chapter 1: Fertility in Europe: Diverse, delayed and below replacement. *Demographic Research, 19*, 15-46.

Furstenberg, F. F. (2014). Fifty years of family change: From consensus to complexity. *The ANNALS of the American Academy of Political and Social Science, 654*(1), 12-30. doi: 10.1177/0002716214524521

Gabrielli, G., & Vignoli, D. (2013). The breaking-down of marriage in Italy. *Population Review, 52*(1), 87-109.

Gauthier, A. H. (2002). Family policies in industrialized countries: Is there convergence? *Population, English Edition, 57*(3), 447-474.

George, L. K. (2003). Life course research: achievements and potential. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the Life Course* (pp. 671-680). New York: Kluwer Academic.

Giddens, A. (1992). *The transformation of intimacy. Sexuality, love and eroticism in modern societies*. Cambridge: Polity Press.

Giele, J. Z., & Elder, G. H. J. (1998). *Methods of Life Course Research*: SAGE Publications.

Goldin, C., & Katz, L. F. (2002). The power of the pill: Oral contraceptives and women's career and marriage decisions. *Journal of Political Economy, 110*(4), 730-770.

Goldstein, J. R., & Kenney, C. T. (2001). Marriage delayed or marriage forgone? New cohort forecasts of first marriage for US women. . *American Sociological Review, 66*, 506–519.

Goldstein, J. R., Sobotka, T., & Jasilioniene, A. (2009). The end of "lowest-low" fertility? *Population and Development Review, 35*(4), 663-699.

González, M.-J., & Jurado-Guerrero, T. (2006). Remaining childless in affluent economies: A comparison of France, West Germany, Italy and Spain, 1994–2001. *European Journal of Population, 22*(4), 317-352. doi: 10.1007/s10680-006-9000-y

Griffith, J. D., Koo, H. P., & Suchindran, C. M. (1985). Childbearing and family in remarriage. *Demography, 22*, 73-88.

Hagestad, G. O., & Call, V. R. A. (2007). Pathways to childlessness: A life course perspective. *Journal of Family Issues, 28*(10), 1338-1361. doi: 10.1177/0192513x07303836

Hajnal, J. (1965). European marriage patterns in perspective. In V. D. Glass & D. E. C. Eversley (Eds.), *Population in History: Essays in Historical Demography* (pp. 101-143). London: Edward Arnold.

Härkönen, J., & Dronkers, J. (2006). Stability and change in the educational gradient of divorce. A comparison of seventeen countries. *European Sociological Review, 22*, 501-517.

Hayford, S. R., & Morgan, S. P. (2008). The quality of retrospective data on Cohabitation. *Demography, 45*(1), 129-141. doi: 10.1353/dem.2008.0005

Heckhausen, J. (1999). *Developmental Regulation in Adulthood. Age-Normative and Sociostructural Constraints as Adaptive Challenges.* Cambridge: Cambridge University Press.

Heffner, L. J. (2004). Advanced maternal age - How old is too old? *The New England Journal of Medicine, 351*(19), 1927-1929.

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

Heuveline, P., Timberlake, J. M., & Furstenberg, F. F. (2003). Shifting childrearing to single mothers: Results from 17 Western countries. *Population and Development Review, 29*(1), 47-71. doi: 10.1111/j.1728-4457.2003.00047.x

Hiekel, N. (2014). *The different meanings of cohabitation across Europe.* Amsterdam.

Hiekel, N., Liefbroer, A. C., & Poortman, A. R. (2014). Understanding diversity in the meaning of cohabitation across Europe. *European Journal of Population, 30*(4), 391-410.

Hobcraft, J., & Kiernan, K. (2001). Childhood poverty, early motherhood and adult social exclusion. *British Journal of Sociology, 52*(3), 495-517. doi: 10.1080/00071310120071151

Hoem, J. M. (1997). Educational gradients in divroce risks in Sweden in recent decades. *Population Studies, 51*(1), 19-27.

Hoem, J. M., Gabrielli, G., Jasilioniene, A., Kostova, D., & Matysiak, A. (2010). Levels of recent union formation: Six European countries compared. *Demographic Research, 22*, 199-210.

Hoem, J. M., Kostova, D., Jasilioniene, A., & Muresan, C. (2009). Traces of the Second Demographic Transition in four selected countries in Central and Eastern Europe: Union formation as a demographic manifestation. *Eur J Popul, 25*(3), 239-255. doi: 10.1007/s10680-009-9177-y

Högnäs, R. S., & Carlson, M. J. (2012). "Like parent like child?": The intergenerational transmission of nonmarital childbearing. *Social Science Research, 41*(6), 1480-1494.

Holland, J. A. (2013). Love, marriage, then the baby carriage? Marriage timing and childbearing in Sweden. *Demographic Research, 29*, 275-306.

Hougaard, P. (1999). Multi-state models: A review. *Lifetime Data Analysis, 5*, 239-264.

Hougaard, P. (2000). *Analysis of Multivariate Survival Data*. New York: Springer Verlag.

Huinink, J., & Kohli, M. (2014). A life-course approach to fertility. *Demographic Research, 30*, 11293-11326.

Human Fertility Database. from Max Planck Institute for Demographic Research (Germany) and Vienna Institute of Demography (Austria). Available at www.humanfertility.org (data downloaded on 30/11/2013).

Inglehart, R. (1977). *The silent revolution: Changing values and political styles in advanced industrial society*. Princeton, NJ: Princeton University Press.

Inglehart, R. (1990). *Culture Shift in Advanced Industrial Society*. Princeton, NJ: Princeton University Press.

Inglehart, R., & Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review, 65*, 19-51.

ISCED. (1997). International Standard Classification of Education «http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm».

Joyner, K., Peters, H. E., Hynes, K., Sikora, A., Taber, J. R., & Rendall, M. S. (2012). The quality of male fertility data in major U.S. surveys. *Demography, 49*(1), 101-124. doi: 10.1007/s13524-011-0073-9

Jung, T., & Wickrama, K. A. S. (2008). An introduction to Latent Class Growth Analysis and Growth Mixture Modeling. *Social and Personality Psychology Compass, 2*(1), 302-317. doi: 10.1111/j.1751-9004.2007.00054.x

Kääriäinen, J., & Lehtonen, H. (2006). The variety of social capital in welfare state regimes - A comparative study of 21 countries. *European Societies, 8*(1), 27-57. doi: 10.1080/14616690500491399

Kalmijn, M. (2007). Explaining cross-national differences in marriage, cohabitation, and divorce in Europe, 1990–2000. *Population Studies, 61*(3), 243-263. doi: 10.1080/00324720701571806

Kalmijn, M. (2011). The influence of men's income and employment on marriage and cohabitation: Testing Oppenheimer's theory in Europe. *European Journal of Population, 27*, 269-293.

Kalmijn, M. (2013). The educational gradient in marriage: A comparison of 25 European countries. *Demography, 50*, 1499-1520.

Katus, K., & Kingkade, W. W. (2004). Baltic region. In T. Frejka & J. Sardon (Eds.), *Childbearing Trends and Prospects in Low-Fertility Countries* (pp. 253-270). Dordrecht: Kluwer.

Keizer, R., Dykstra, P. A., & Jansen, M. D. (2008). Pathwyas into childlessness: Evidence of gendered life course dynamics. *Journal of Biosocial Sciences, 40*(6), 863-878.

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

Kiernan, K. (1999). Childbearing outside marriage in Western Europe. *Population Trends, 98*(Winter), 11-20.

Kiernan, K. (2001). The rise of cohabitation and childbearing outside marriage in Western Europe. *International Journal of Law, Policy and the Family, 15*, 1-21.

Kiernan, K. (2002). The state of European unions: An analysis of partnership formation and dissolution *Dynamics of fertility and partnership in Europe. Insights and lessons from comparative research* (Vol. 1, pp. 57-75). New York and Geneva: United Nations Economic Commission for Europe.

Kiernan, K. (2004a). Unmarried cohabitation and parenthood in Britain and Europe. *Law & Policy, 26*(1), 33-55. doi: 10.1111/j.0265-8240.2004.00162.x

Kiernan, K. (2004b). Unmarried cohabitation and parenthood: Here to stay? European perspectives. In D. P. Moynihan, T. M. Smeeding & L. Rainwater (Eds.), *The Futrue of the Family* (pp. 66-95). New York: Russel Sage.

Kiernan, K., & Cherlin, A. J. (1999). Parental divorce and partnership dissolution in adulthood: Evidence from a British cohort study. *Population Studies, 53*(1), 39-48.

Klüsener, S., Perelli-Harris, B., & Sanchez-Gassen, N. (2012a). Spatial aspects of the rise of nonmarital fertility across Europe since 1960: The role of states and regions in shaping patterns of change. *European Journal of Population, 29*, 137-165.

Klüsener, S., Szołtysek, M., & Goldstein, J. R. (2012b). Towards an intergrated understanding of demographic change and its spatio-temporal dimensions: Concepts, data needs, and example case studies. *Die Erde, 143*(1-2), 75-104.

Kohler, H.-P., Billari, F. C., & Ortega, J. (2002). The emergence of lowest-low fertility in Europe during the 1990s. *Population and Development Review, 28*, 641-660.

Köppen, K. (2011). *Marriage and cohabitation in western Germany and France.* (Doctoral Dissertation), University of Rostock.

Koytcheva, E., & Philipov, D. (2008). Bulgaria: Ethnic differentials in rapidly declining fertility. *Demographic Research, 19*, 361-402.

Kravdal, Ø. (1994). The importance of economic activity, economic potential and economic resources for the timing of first birth in Norway. *Population Studies, 48*, 249-267.

Kravdal, Ø. (1997). Wanting a child without a firm commitment to the partner: Interpretations and implications of a common behaviour pattern among Norwegian cohabitants. *European Journal of Population, 13*, 269-298.

Kravdal, Ø. (2002). The impact of individual and aggregate unemployment on fertility in Norway. *Demographic Research, 6*, 263-294.

Kravdal, Ø. (2007). Effects of current education on second and third-birth rates among Norwegian women and men born in 1964: Substantive interpretations and methodological issues. *Demographic Research, 17*(9), 211-246.

Kravdal, Ø., & Rindfuss, R. R. (2008). Changing relationships between education and fertility: A study of women and men born in 1940 to 1964. *American Sociological Review, 73*, 854-873.

Kreyenfeld, M., Hornung, A., & Kubisch, K. (2013). The German Generations and Gender Survey: Some critical reflections on the validity of fertility histories. *Comparative Population Studies, 38*(1), 3-28.

Kuijsten, A. C. (1996). Changing family patterns in Europe: a case of divergence? *European Journal of Population, 12*(2), 115-143.

Lappegård, T., Klüsener, S., & Vignoli, D. (2014). Social norms, economic conditions and spatial variation of childbearing within cohabitation across Europe. *MPIDR Working Paper WP2014-002*.

Lappegård, T., & Rønsen, M. (2005). The multifaceted impact of education on entry into motherhood. *European Journal of Population, 21*, 31-49.

Lappegård, T., & Rønsen, M. (2013). Socioeconomic differences in multipartner fertility among Norwegian men. *Demography, 50*(3), 1135-1153.

Lappegård, T., Rønsen, M., & Skrede, K. (2011). Fatherhood and fertility. *Fathering, 9*(1), 103-120.

Lawlor, D. A. (2004). Teenage pregnancy rates: high compared with where and when? *Journal of the Royal Society of Medicine, 97*, 121-123.

Leridon, H. (2004). Can assisted reproduction technology compensate for the natural decline in fertility with age? A model assessment. *Human Reproduction Update, 19*(7), 1548-1553.

Leridon, H. (2010). Human fecundity: Situation and outlook. *Population and Societies*(471).

Lesnard, L., Cousteaux, A., Chanvril, F., & Le Hay, V. (2010). Do transitions to adulthood converge in Europe? An Optimal Matching Analysis of work-family trajectories of young adults from 20 European countries *Notes & Documents* (Vol. 2010-04). Paris: OSC, Sciences Po/CNRS.

Lesthaeghe, R. (2010). The unfolding story of the Second Demographic Transition. *Population and Development Review, 36*, 211-251.

Lesthaeghe, R., & Meekers, D. (1986). Value changes and the dimensions of familism in the European community. *European Journal of Population, 2*, 225-268.

Lesthaeghe, R., & Moors, G. (2000). Recent trends in fertility and household formation in the industrialized world. *Review of Population and Social Policy, 9*, 121-170.

Lesthaeghe, R., & Neels, K. (2002). From the first to the second demographic transition: An interpretation of the spatial continuity of demographic innovation in France, Belgium, and Switzerland. *European Journal of Population, 18*(4), 325-360.

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

Lesthaeghe, R., & Surkyn, J. (2002). New forms of household formation in Central and Eastern Europe: Are they related to newly emerging value orientations? *Economic Survey of Europe 2002/1* (pp. 197-216). New York and Geneva: Economic Commission for Europe, United Nations.

Lesthaeghe, R., & van de Kaa, D. J. (1986). Twee demografische transities? [Two demographic transitions?]. In D. J. van de Kaa & R. Lesthaeghe

(Eds.), *Bevolking: Groei en krimp [Population: Growth and crimp]* (pp. 9-24). Deventer: Van Loghum Slaterus.

Lichter, D. T., & Qian, Z. (2008). Serial cohabitation and the marital life course. *Journal of Marriage and Family, 70*, 861-878.

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

Lichter, D. T., Turner, R. N., & Sassler, S. (2010). National estimates of the rise in serial cohabitation. *Social Science Research, 39*(5), 754-765.

Liefbroer, A. C. (1999). From youth to adulthood: Understanding changing patterns of family formation from a life course perspective. In L. J. C. van Wissen & P. A. Dykstra (Eds.), *Population Issues. An interdisciplinary focus* (pp. 53-86). New York: Kluwer Academic/ Plenum Publishers.

Liefbroer, A. C., & Billari, F. C. (2010). Bringing norms back in: a theoretical and empirical discussion of their importance for understanding demographic behaviour. *Population, Space and Place, 16*(4), 287-305. doi: 10.1002/psp.552

Liefbroer, A. C., & Corijn, M. (1999). Who, what, where, and when? Specifying the impact of educational attainment and labour force participation on family formation. *European Journal of Population, 15*, 45–75.

Liefbroer, A. C., & Dourleijn, E. (2006). Unmarried cohabitation and union stability: Testing the role of diffusion using data from 16 European countries. *Demography, 43*(2), 203-221.

Liefbroer, A. C., & Toulemon, L. (2010). Demographic perspectives on the transition to adulthood: An introduction. *Advances in Life Course Research, 15*(2-3), 53-58. doi: 10.1016/j.alcr.2010.10.002

Lillard, L. A., & Waite, L. J. (1993). A joint model of marital childbearing and marital disruption. *Demography, 30*(4), 653-681. doi: 10.2307/2061812

Lyngstad, T., & Jalovaara, M. (2010). A review of the antecedents of union dissolution. *Demographic Research, 23*, 257-292. doi: 10.4054/DemRes.2010.23.10

Manning, W. D. (1993). Marriage and cohabitation following premarital conception. *Journal of Marriage and the Family, 55*(4), 839-850. doi: 10.2307/352766

Manning, W. D. (1995). Cohabitation, marriage and entry into motherhood. *Journal of Marriage and the Family, 57*(1), 191-200. doi: 10.2307/353827

Manting, D., Kuijsten, A. C., & Helleman, J. (2002). From youth to adulthood: transitions of female birth cohorts in the Netherlands. *Bevolking en Gezin, 1*, 55-75.

Marini, M. M. (1984). Age and Sequencing Norms in the Transition to Adulthood. *Social Forces, 63*(1), 229-244.

Maslow, A. H. (1954). *Motivation and Personality*. New York: Harper.

Mathews, T. J., Brandy, E., & Hamilton, B. E. (2009). Delayed childbearing: More women are having their first child later in life *NCHS data brief*. Hyattsville, MD: National Center for Health Statistics.

Matsuo, H. (2003). *The transition to motherhood in Japan. A comparison with the Netherlands.* (PhD Thesis), Rijkuniversiteit Groningen, Amsterdam.

Matysak, A., Styrc, M., & Vignoli, D. (2014). The educational gradient in marital disruption: A meta-analysis of European research findings. *Population Studies, 68*(2), 197-215.

Mayer, K. U. (2000). Promises fulfilled? A review of 20 years of life course research. *European Journal of Sociology, 41*(2), 259-282.

Mayer, K. U. (2001). The paradox of global social change and national path dependencies. In A. Woodward & M. Kohli (Eds.), *Inclusions and exclusions in European societies* USA and Canada: Routledge.

Mayer, K. U. (2009). New directions in life course research. *Annual Review of Sociology, 35*, 413-443.

McDonald, P. (2000a). Gender equity in theories of fertility transition. *Population and Development Review, 26*(3), 427-439.

McDonald, P. (2000b). Gender equity, social institutions and the future of fertility. *Journal of Population Research, 17*(1), 1-16. doi: 10.1007/BF03029445

McKinlay, S. M. (1996). The normal menopause transition: An overview. *Maturitas, 23*, 137-145.

McLanahan, S. (2004). Diverging destinies: How children are faring under the Second Demographic Transition. *Demography, 41*(4), 607-627. doi: 10.1353/dem.2004.0033

Menken, J. (1985). Age and fertility: How late can you wait? *Demography, 22*(4), 469-483. doi: 10.2307/2061583

Meyer, J. W., Ramirez, F. O., & Soysal, Y. (1992). World expansion of mass education, 1970-1980. *Sociology of Education, 65*, 128-149.

Mikolai, J., Berrington, A., & Perelli-Harris, B. (2013). *The role of education in the partnership and family formation process in Europe and the United States*. Paper presented at the Changing Families and Fertility Conference, Oslo, Norway.

Mills, M. (2004). Stability and change: The structuration of partnership histories in Canada, the Netherlands, and the Russian Federation. *European Journal of Population, 20*(2), 141-175. doi: 10.1023/B:EUJP.0000033862.83081.ad

Mills, M., Rindfuss, R. R., McDonald, P., & te Velde, E. (2011). Why do people postpone parenthood? Reasons and social policy incentives. *Human Reproduction Update, 0*(0), 1-13.

Muresan, C., Vano, B., Pilinska, V., & Jurcova, D. (2008). Romania: Childbearing metamorphosis within a changing context. *Demographic Research, 19*, 855-906.

Musick, K., & Michelmore, K. (2014). Change in the stability of marital and cohabiting unions following the birth of a child. *California Center for Population Research On-Line Working Paper Series*.

Namboodiri, K. N. (1991). *Demographic Analysis. A Stochastic Approach*. San Diego: Academic Press.

Namboodiri, K. N., & Suchindran, C. M. (1987). *Life Table Techniques and Their Applications*. Orlando: Academic Press.

Neyer, G. (2003). Family policies and low fertility in Western Europe. *MPIDR Working Paper WP2003-021*.

Neyer, G., & Andersson, G. (2008). Consequences of family policies on childbearing behavior: Effects or artifacts? *Population and Development Review, 34*(4), 699-724. doi: 10.1111/j.1728-4457.2008.00246.x

Ní Bhrolcháin, M., & Beaujouan, E. (2013). Education and cohabitation in Britain: A return to traditional patterns? *Population and Development Review, 39*(3), 441-458.

Nylund, K. L., Asparouhav, T., & Muthen, B. O. (2007). Deciding on the number of classes in Latent Class Analysis and Growth Mixture Modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(4), 535-569.

Oppenheimer, V. K. (1988). A theory of marriage timing. *American Journal of Sociology, 94*, 563-591.

Oppenheimer, V. K. (1994). Women's rising employment and the future of the family in industrial societies. *Population and Development Review, 20*, 293–342.

Oppenheimer, V. K. (1997). Women's employment and the gain to marriage: The specialization and trading model. *Annual Review of Sociology, 23*, 431-453.

Oppenheimer, V. K. (2000). The continuing importance of men's economic position in marriage formation. The changing shape of ties that bind: An overview and synthesis. In L. J. Waite (Ed.), *The Ties That Bind: Perspectives on Marriage and Cohabitation* (pp. 283-301). New York: Aldine de Gruyter.

Oppenheimer, V. K. (2003). Cohabiting and marriage during young men's career-development process. *Demography, 40*(1), 127-149.

Perelli-Harris, B., & Gerber, T. P. (2011). Nonmarital childbearing in Russia: Second Demographic Transition or Pattern of Disadvantage? *Demography, 48*(1), 317-342. doi: 10.1007/s13524-010-0001-4

Perelli-Harris, B., Kreyenfeld, M., & Kubisch, K. (2010a). Harmonized Histories: Manual for the preparation of comparative fertility and union histories. *Rostock, MPIDR Working Paper WP-2010-011.*

Perelli-Harris, B., Kreyenfeld, M., Sigle-Rushton, W., Keizer, R., Lappegård, T., Jasilioniene, A., . . . Di Giulio, P. (2012). Changes in union status during the transition to parenthood in eleven European countries, 1970s to early 2000s. *Population Studies, 66*(2), 167-182. doi: 10.1080/00324728.2012.673004

Perelli-Harris, B., & Lyons-Amos, M. (2013). The heterogeneity of relationship patterns: An examination of 15 countries using latent class growth models. *CPC Working Paper, 37*.

Perelli-Harris, B., & Sánchez-Gassen, N. (2012). How similar are cohabitation and marriage? Legal approaches to cohabitation across Western Europe. *Population and Development Review, 38*(3), 435-467. doi: 10.1111/j.1728-4457.2012.00511.x

Perelli-Harris, B., Sigle-Rushton, W., Kreyenfeld, M., Lappegård, T., Keizer, R., & Berghammer, C. (2010b). The educational gradient of childbearing within cohabitation in Europe. *Population and Development Review, 36*(4), 775-801. doi: 10.1111/j.1728-4457.2010.00357.x

Philipov, D., & Jasilioniene, A. (2008). Union formation and fertility in Bulgaria and Russia: A life table description of recent trends. *Demographic Research, 19*, 2057-2114.

Philipov, D., Spéder, Z., & Billari, F. C. (2006). Soon, later, or ever? The impact of anomie and social capital on fertility intentions in Bulgaria (2002) and Hungary (2001). *Population Studies, 60*(3), 289-308. doi: 10.1080/00324720600896080

Piccarreta, R., & Billari, F. C. (2007). Clustering work and family trajectories using a divisive algorithm. *Journal of Royal Statistical Society, A, 170*(4), 1061-1078. doi: 10.1111/j.1467-985X.2007.00495.x

Pinnelli, A. (2001). Determinants of fertility in Europe: New family forms, context and individual characteristics. In A. Pinnelli, H. J. Hoffman-Novotny & B. Fux (Eds.), *Fertility and new types of households and family formation in Europe* (Vol. 35, pp. 47-181). Strasbourg: Council of Europe.

Pinnelli, A., De Rose, A., Di Giulio, P., & Rosina, A. (2002). Chapter 6. Interrelationships between partnership and fertility behaviour. In M. Macura & G. Beets (Eds.), *Dynamics of fertility and partnership in Europe. Insights and lessons from comparative research* (Vol. 1, pp. 77-98). New York and Geneva: United Nations Economic Commission for Europe.

Poortman, A., & Kalmijn, M. (2002). Women's labor market position and divorce in the Netherlands: Evaluating economic interpretations of the work effect. *European Journal of Population, 18*(2), 175-202.

Prskawetz, A., Vikat, A., Philipov, D., & Engelhardt, H. (2003). Pathways to stepfamily formation in Europe: Results from the FFS. *Demographic Research, 8*, 107-150.

Putter, H. (2011a). Documentation of the mstate package in R.

Putter, H. (2011b). Special issue about competing risks and multi-state models. *Journal of Statistical Software, 38*(1), 1-4.

Putter, H. (2011c). Tutorial in biostatistics: Competing risks and multi-state models. Analyses using the mstate package.

Putter, H., Fiocco, M., & Geskus, R. B. (2007). Tutorial in biostatistics: Competing risks and multi-state models. *Statistics in Medicine, 26*(11), 2389-2430. doi: 10.1002/sim.2712

Putter, H., van der Hage, J., de Bock, G. H., Elgalta, R., & van de Velde, C. J. H. (2006). Estimation and prediction in a multi-state model for breast cancer. *Biometrical Journal, 48*(3), 366-380. doi: 10.1002/bimj.200510218

Rajulton, F. (2001). Analysis of life histories - A state space approach. *Canadian Studies in Population, 28*(2), 341-359.

Raley, K. R. (2001). Increasing fertility in cohabiting unions: Evidence for the second demographic transition in the United States? . *Demography, 38*, 59-66.

Ravanera, Z. R., Burch, T. K., & Rajulton, F. (2006). Men's life course trajectories: Exploring the differences by cohort and social class. *Biodemography and Social Biology, 53*(3-4), 120-139. doi: 10.1080/19485565.2006.9989122

Reher, D. S. (1998). Family ties in Western Europe: Persistent contrasts. *Population and Development Review, 24*(2), 203-234. doi: 10.2307/2807972

Rendall, M. S., Clarke, L., Peters, H. E., Ranjit, N., & Verropoulou, G. (1999). Incomplete reporting of men's fertility in the United States and Britain: A research note. *Demography, 36*(1), 135-144. doi: 10.2307/2648139

Rendall, M. S., Ekert-Jaffé, O., Joshi, H., Lynch, K., & Mougin, R. (2009). Universal versus economically polarized change in age at first birth: A French-British comparison. *Population and Development Review, 35*(1), 89-115.

Rindfuss, R. R., & Bumpass, L. L. (1976). How old is too old? Age and the sociology of fertility. *Family Planning Perspectives, 8*(5), 226-230.

Rindfuss, R. R., Morgan, S. P., & Swicegood, G. (1988). *First Births in America: Changes in the Timing of Parenthood*. Berkeley: University of California Press.

Rindfuss, R. R., & VandenHeuvel, A. (1990). Cohabitation: A precursor to marriage or an alternative to being single? . *Population and Development Review, 16*, 703-726.

Robette, N. (2010). The diversity of pathways to adulthood in France: Evidence from a holistic approach. *Advances in Life Course Research, 15*(2–3), 89-96. doi: 10.1016/j.alcr.2010.04.002

Rogers, A. (1975). *Introduction to Multiregional Mathematical Demography*. New York: Wiley.

Ryder, N. (1979). The future of American fertility. *Social Forces, 26*, 359-370.

Schmidt, L., Sobotka, T., Bentzen, J. G., & Andersen, A. N. (2012). Demographic and medical consequences of the postponement of parenthood. *Human Reproduction Update, 18*(1), 29-43.

Schoen, R. (1988). *Modeling Multigroup Populations*. New York: Plenum Press.

Schofer, E., & Meyer, J. W. (2005). The worldwide expansion of higher education in the twentieth century. *American Sociological Review, 70*, 898-920.

Seltzer, J. A. (2004). Cohabitation in the United States and Britain: Demography, kinship, and the future. *Journal of Marriage and Family, 66*, 921-928.

Settersten, R. A. (2003). Age structuring and the rhythm of the life course. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the Life Course*. Hingham, USA: Kluwer Academic Publishers.

Settersten, R. A., & Hagestad, G. O. (1996). What's the latest? Cultural age deadlines for family transitions. *The Gerontologist, 36*(2), 178-188.

Shanahan, M. J. (2000). Pathways to adulthood in changing societies: Variability and mechanisms in life course perspective. *Annual Review of Sociology, 26*, 667-692.

Sigle-Rushton, W. (2008). England and Wales: Stable fertility and pronounced social status differences. *Demographic Research, 19*, 455-502.

Skirbekk, V., Kohler, H. P., & Prskawetz, A. (2004). Birth month, school graduation, and the timing of births and marriages. *Demography, 41*(3), 547-568.

Smock, P. J., Manning, W. D., & Gupta, S. (1999). Marriage, divorce, and women's economic well-being. *American Sociological Review, 64*(6), 794-812.

Snyder, T. D., Dillow, S. A., & Hoffman, C. M. (2008). Digest of Education Statistics 2007 (NCES 2008-022). Washington, DC.

Sobotka, T. (2004). *Postponement of Childbearing and Low Fertility in Europe.* Rijksuniversiteit Groningen, Amsterdam.

Sobotka, T. (2008). Overview Chapter 6: The diverse faces of the Second Demographic Transition in Europe. *Demographic Research, 19*, 171-224. doi: 10.4054/DemRes.2008.19.8

Sobotka, T., & Testa, M. R. (2008). Attitudes and intentions towards childlessness in Europe. In C. Höhn, D. Avramov & I. E. Kotowska (Eds.), *People, Population Change and Policies* (pp. 177-211): Springer.

Sobotka, T., & Toulemon, L. (2008). Overview Chapter 4: Changing family and partnership behaviour: Common trends and persistent diversity across Europe. *Demographic Research, 19*, 85-138. doi: 10.4054/DemRes.2008.19.6

Sobotka, T., Zeman, K., Lesthaeghe, R., Frejka, T., & Neels, K. (2011). Postponement and recuperation in cohort fertility: Austria, Germany and Switzerland in a European context. *Comparative Population Studies, 36*(2-3), 417-452.

Stankuniene, V., & Jasilioniene, A. (2008). Lithuania: Fertility decline and its determinants. *Demographic Research, 19*, 705-742.

Steele, F., Joshi, H., Kallis, C., & Goldstein, H. (2006). Changing compatibility of cohabitation and childbearing between young British women born in 1958 and 1970. *Population Studies, 60*(2), 137-152. doi: 10.1080/00324720600598009

Steele, F., Kallis, C., Goldstein, H., & Joshi, H. (2005). The relationship between childbearing and transitions from marriage and cohabitation in Britain. *Demography, 42*(4), 647-673. doi: 10.1353/dem.2005.0038

Surkyn, J., & Lesthaeghe, R. (2004). Value orientations and the Second Demographic Transition (SDT) in Northern, Western and Southern Europe: An update. *Demographic Research, Special Collection*(3), 45-86.

Tanturri, M. L., & Mencarini, L. (2008). Childless or childfree? Paths to voluntary childlessness in Italy. *Population and Development Review, 34*(1), 51-77.

te Velde, E., Habbema, D., Leridon, H., & Eijkemans, M. (2012). The effect of postponement of first motherhood on permanent involuntary childlessness and total fertility rate in six European counties since the 1970s. *Human Reproduction, 27*(4), 1179-1183.

Testa, M. R. (2007). Childbearing preferences and family issues in Europe: evidence from the Eurobarometer 2006 survey. *Vienna Yearbook of Population Research*, 357–379.

Thomas, A. D., Morgan, S. P., Engelhardt, H., & Pacalova, H. (2003). Do cross-national differences in the costs of children generate cross-national differences in fertility rates? *Population Research and Policy Review, 22*, 439-477.

Thomson, E. (2004). Step-families and childbearing desires in Europe. *Demographic Research, Special Collection 3*, 117-134.

Thomson, E., Winkler-Dworak, M., Spielauer, M., & Prskawetz, A. (2012). Union instability as an engine of fertility? A microsimulation model for France. *Demography, 49*(1), 175-195. doi: 10.1007/s13524-011-0085-5

Thornton, A., Axinn, W. G., & Teachman, J. D. (1995). The influence of school enrolment and accumulation on cohabitation and marriage in early adulthood. *American Sociological Review, 60*, 762-774.

Thornton, A., & Young-DeMarco, L. (2001). Four decades of trends in attitudes toward family issues in the United States: the 1960s through the 1990s. *Journal of Marriage and Family, 63*, 1009-1037.

Toulemon, L., Pailhé, A., & Rossier, C. (2008). France: High and stable fertility. *Demographic Research, 19*, 503-556.

Upchurch, D. M., Lillard, L. A., & Panis, C. W. A. (2002). Nonmarital childbearing: Influences of education, marriage, and fertility. *Demography, 39*(2), 311-329. doi: 10.1353/dem.2002.0020

Van de Kaa, D. J. (2002). *The idea of the Second Demographic Transition in industrialized countries*. Paper presented at the Sixth Welfare Policy Seminar of the National Institute of Population and Social Security Tokyo, Japan.

van Wissen, L. J. C., & Dykstra, P. A. (1999). *Population Issues: An Interdisciplinary Focus*. New York: Kluwer Academic/Plenum Publishers.

Vignoli, D., & Ferro, I. (2009). Rising marital disruption in Italy and its correlates. *Demographic Research, 20*, 11-36.

Vikat, A., Thomson, E., & Hoem, J. M. (1999). Stepfamily fertility in contemporary Sweden: The impact of childbearing before the current union. *Population Studies, 53*(2), 211-225. doi: 10.1080/00324720308082

Vitali, A., Aassve, A., & Lappegård, T. (2015). Diffusion of childbearing within cohabitation. *Demography, 52*(2), 355-377.

VitalStats. Retrieved from: http://www.cdc.gov/nchs/vitalstats.htm

Vogel, J. (2002). European Welfare regimes and the transition to adulthood: A comparative and longitudinal perspective. *Social Indicators Research, 59*(3), 275-299. doi: 10.1023/A:1019627604669

Wang, C. P., Hendricks Brown, C., & Bandeen-Roche, K. (2005). Residual diagnostics for growth mixture models: examining the impact of a preventive intervention on multiple trajectories of aggressive behavior. *Journal of the American Statistical Association, 100*, 1054-1076.

Warren, J. R., Halpern-Manners, A., Luo, L., & Raymo, J. (2012). *A comparison of alternative methods for describing life-course trajectories*. Paper presented at the Annual Meeting of the Population Association of America, San Francisco.

Weakliem, D. L. (2002). The effects of education on political opinions: An international study. *International Journal of Public Opinion Research, 13*(2), 141-157.

Widmer, E. C., & Ritschard, G. (2009). The de-standardization of the life course: Are men and women equal? *Advances in Life Course Research, 14*, 28-39.

Wiik, K. A. (2011). Socioeconomic differentials in the transition to first cohabitation in Norway. *International Review of Sociology, 21*(3), 533-548. doi: 10.1080/03906701.2011.625662

Willekens, F. J. (1987). The marital status life table. In J. Bongaarts, T. Burch & K. Wachter (Eds.), *Family Demography. Methods and their Applications* (pp. 125-149). Oxford: Clarendon Press.

Willekens, F. J. (1999). The life course: Models and analysis. In L. J. C. Van Wissen & P. A. Dykstra (Eds.), *Population Issues. An interdisciplinary focus* (pp. 23-52). New York: Kluwer Academic/ Plenum Publishers.

Wu, Z., & Schimmele, C. M. (2005). Repartnering after first union disruption. *Journal of Marriage and Family, 67*(1), 27-36. doi: 10.1111/j.0022-2445.2005.00003.x

Zakharov, S. (2008). Russian Federation: From the first to the second demographic transition. *Demographic Research, 19*, 907-972.