The transition of the reproductive life course in 19th century Europe

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1 Introduction

After half a century of extensive research in population history and historical demography, many scholars would agree with the claim that the history of the first fertility transition in Europe is now written. An important body of research carried out in a macro perspective has shown indeed *when*, *where* and *how fast* the first European fertility transition took place. Hundreds of case studies carried out in a micro perspective have analyzed the transition of individual reproductive behavior and shown *how* and *why* the fall in fertility took place.

Thanks to the seminal contributions of the Princeton group (Coale and Watkins 1986) we know when and where the decline in fertility started. The comparison of more than 600 European provinces has shown that the fall in fertility started in several regions of France, followed by provinces of Belgium and Switzerland. The onset of the decline in fertility was clearly later in Southern and Eastern Europe, as well as in Ireland, even if isolated spots of early fertility decline could also be found in parts of Spain, Hungary and the Baltic states (Coale and Treadway 1986). Early onsets in the fertility decline could also be found among several social and religious groups all over Europe (Livi Bacci 1986). In his analysis of 67 national transitional pathways, Chesnais (1992) has identified several subtypes of fertility transitions and shown that the decline was slowest in Northern Europe and fastest in Southern Europe.

Hundreds of studies on pretransitional Europe have shown that already before the secular decline in fertility, levels of total fertility were clearly lower than what could have been considered a biological maximum (Flinn 1985; Coale and Treadway 1986). For this reason,

Coale (1986) has qualified the European fertility decline at the turn of the 20th century as a transition from moderate to low levels of fertility. Analyses of individual reproductive behavior have shown that 4 behavioral proximate determinants (Bongaarts and Potter 1983) shaped the fertility transition. Before the decline, overall levels of fertility were predominantly inhibited by postpartum infecundability (a factor related to practices of breastfeeding) and by high ages at marriage and an important proportion remaining single. At the end of the transition, overall levels of fertility were mainly inhibited by the practice of contraception and to a lesser extent by abortion and the proportion married. In terms of behavior, the first decline in fertility in Europe has therefore been seen as a transition from "starting and spacing" to "stopping" (Knodel 1987). In the Princeton group, stopping behavior has been understood as deliberate parity-dependent birth control and identified as the main behavioral determinant of the secular decline in fertility. Recent research has qualified the role of birth stopping and amplified the importance of spacing (van Bavel 2004; Bengtsson and Dribe 2006; van Bavel and Kok 2010). It has been shown that in several pretransitional populations spacing behavior was also a form of deliberate family limitation. It has also been hypothesized that a least in the early stages of the fertility transition increased spacing could have played a major role.

Thus, even if we know when, where, how fast, and how or why (in terms of individual behavior) the first European fertility transition took place, still little is known about the changes in the reproductive life course during the fertility transition. Scholars' preoccupation with the analysis of stopping and spacing behavior in pretransitional and transitional populations, increasingly by means of sophisticated statistical models, has diverted us from looking at the general picture of the fertility transition.

In this paper we will explore the transition of the reproductive life course during the decline of fertility in Europe. We conceptualize the reproductive life course as the timing and the sequencing of events relating to reproduction, such as marriage and first and consecutive births. In a historical European population, the earliest stage of the reproductive life course typically relates to the "silent" phase between the beginning of the potentially reproductive or marriageable age and the entry into sexual union, mostly marriage. It is followed by the interval between marriage and the first birth. The childbearing period is marked by the rhythm of successive births. The last stage of the reproductive life course is a period of potentially reproductive age during which no more births occur.

In general, we expect to observe a shortening of the childbearing period and a lengthening of the last stage of the reproductive life course. However, given the regional diversity of demographic systems in pretransitional Europe (Livi Bacci 1999) and the geographic differences in the timing of the onset and in the speed of the fertility decline, we expect to find a variety of life course transitions. In some contexts, the fertility-inhibiting effect of late marriage, translated by a long waiting time until the onset of the childbearing period, may persist during the fertility transition, whereas in other contexts it may shorten during the decline in fertility. Accordingly, if intensified spacing behavior does explain the onset of the decline in fertility in some regions, then we should observe in the first phase of the decline process long or unchanged childbearing periods marked by increasing birth intervals.

The identification of different types of reproductive life course transitions is just one objective of our paper. Our analysis will go beyond average or typical life course patterns (Gabadinho et al. 2011b) and pay particular attention to individual variation. At every stage of the fertility transition, we will identify clusters or subtypes of the reproductive life course and assess to what extent social groups tend to be part of the one or the other life course subtype. Doing so, we will also address the destandardization of the pre-transitional life course as well as the standardization process towards the post-transitional reproductive life course.

2 Data

This paper will make use of several existing databases on historical European populations. At the present stage of our work we are using the COR-database on 19th century Antwerp and a family reconstitution dataset on 19th century Geneva. The COR-database has been constructed using the Belgian population registers and the vital registration records from the period 1846 to 1920 (Matthijs and Moreels 2010). The alphabetical sample consists of more than 30000 individuals from the Antwerp area whose life course could be partially or fully reconstructed. The Geneva dataset covers the period 1800 to 1900 and is, as a family reconstitution database, particularly well suited for the study of the reproductive life course. The alphabetical sample has been constructed using vital registration records, individual census records and annual population lists of the city of Geneva (Schumacher 2010). It contains the birth histories of more than 2200 couples who got married in Geneva. In the paper to be presented at the European Population Conference, we will also include data on 19th century Netherlands (HSN database), 19th century Sweden (POPUM database) and on 19th century Wallonia.

3 Methodology

In order to analyze the transition of the reproductive life course during the secular decline in fertility, we apply techniques of sequence analysis. Contrary to the widely used techniques of survival or event history analysis which focus on the occurrence and timing of single or multiple life events, sequence analysis represents life trajectories as sequences of states and allows therefore a holistic perspective on the life course. This technique has been frequently used in sociology and other social science disciplines (Abbott 1995; Abbott and Tsay 2000) but has only recently entered the field of population studies (Billary 2001; Aassve et al. 2007; Elzinga and Liefbroer 2007; Bras et al. 2010).
In this paper, we focus on female life courses with yearly states from ages 15 to 45. In a first step, we distinguish the four states 1 = "not yet married", 2 = "married, no children", 3 = "married with children" (childbearing period), 4 = "completed family size".

In a second step, we will also distinguish several categories of achieved parities during the childbearing period. At the present stage of the analysis, we only consider complete life courses. Therefore, each reproductive life course can be thought of as a sequence of 31 observed yearly states. In case this selection criterion of zero unobserved states will turn out too restrictive, we will allow for missing cases due to censoring.
Our sequence analyses will be carried out in two steps. In a first step, we will describe the sequences using the graphical analysis tools available in TraMineR, a recently developed R package for sequence analysis (Gabadinho et al. 2011a). The representation of the transversal distribution of the four states by age and generation already gives a good overview of the transition process of the reproductive life course. In a second step, we will identify subtypes of reproductive life courses at the different stages of the fertility transition. To do so, we will compute optimal matching distances between the individual sequences and then apply a cluster analysis on these distances. The dependency of membership of different clusters on individual profiles is then analyzed by means of regression analysis.

4 First results

In this section we briefly present two preliminary graphical analyses of the transition of the reproductive life course in 19th century Antwerp and 19th century Geneva. Figure 1 shows the transversal age distribution of the four distinguished states by generation in the Antwerp area. The four panels nicely demonstrate how the reproductive life course changed over time. In the first generation overall fertility is inhibited by the effect of a high age at marriage (the median age is over 25 years). The childbearing period is long, whereas the period of completed family size is short. During the transition, the age at marriage decreases, and, as consequence of the diffusion of stopping behavior, the childbearing period steadily shortens, whilst the period of completed family size substantially increases.
Figure 2 gives the same age distribution over time for the city of Geneva. Because in Geneva the fall in fertility started before the turn of the 19th century (Perrenoud 1988), the four panels show a completely different evolution. Among the women born before 1800, the age at marriage is very high (the median age is over 27 years) and as stopping behavior is already widespread, the childbearing period is short and the period of completed family size long. In the later generations, especially in the last generation considered, the Malthusian brake of late marriage appears weakened. As a consequence, the childbearing period increases and so does also the period of completed family size.
This second example perfectly illustrates the insights the sequential approach used here can produce. Schumacher (2010) has shown that in Geneva the Coale-Trussell index of marital fertility control m (Coale and Trussell 1974) decreased during the 19th century. Given this unexpected evolution, one is tempted to conclude that the practice of stopping behavior decreased over time. Our descriptive sequence analysis, looking at the entire

reproductive life course, allows us to qualify such a premature conclusion. The extension of the childbearing period in the life course which is responsible for the decrease in m does not stem from a less intense stopping behavior, but is clearly related to earlier starting.

5 Preliminary conclusion

This preliminary and descriptive sequence analysis of reproductive life trajectories in 19th century Antwerp and Geneva illustrates the potential of this new approach. The confrontation of previous findings obtained from rate and survival analysis with results obtained from sequence analysis promises to be particularly interesting. We are confident that a comparative sequence analysis of the transition of the reproductive life course in 19th century Europe will contribute to a refined understanding of the first fertility transition.

6 References

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Figure 1: Transversal age distribution of four life course states, by generation
City of Antwerp

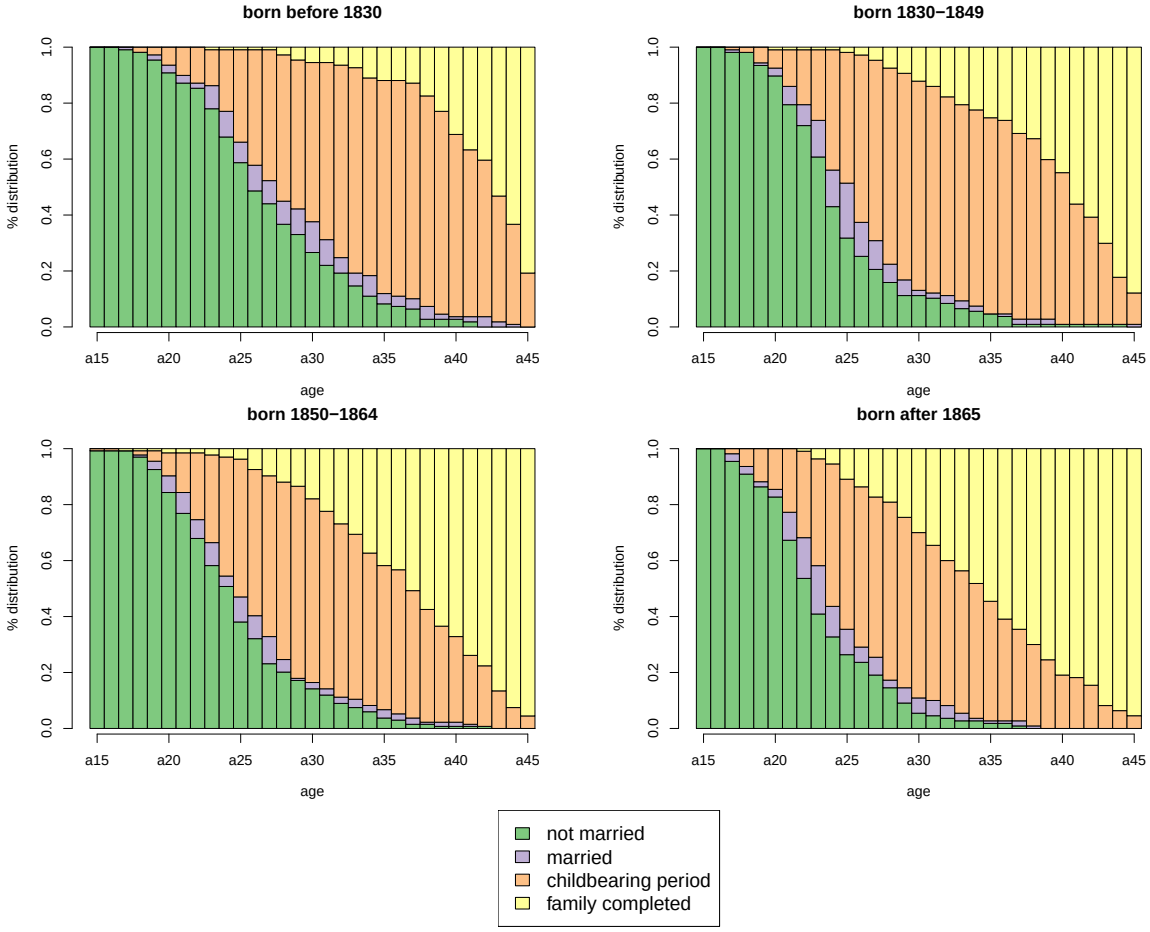

Figure 2: Transversal age distribution of four life course states, by generation
City of Geneva