Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft
Vol. 36, 2-3 (2011): 417-452 (Date of release: 06.09.2012)

Postponement and Recuperation in Cohort Fertility: Austria, Germany and Switzerland in a European Context*

Tomáš Sobotka, Kryštof Zeman, Ron Lesthaeghe, Tomas Frejka, Karel Neels

Abstract: Across developed countries, cohorts of women born after World War II have seen a shift of childbearing towards later ages and a concomitant decline in fertility level. We study this shift using the notions of fertility *postponement* (fertility decline at younger ages) and subsequent *recuperation* (a compensatory fertility increase at higher reproductive ages). We apply order-specific data and extend and elaborate on two broad approaches to this process: 1) a *basic benchmark model* extensively used by *Tomas Frejka* and his colleagues and 2) a *relational model* proposed by *Ron Lesthaeghe* (2001). Our work focuses especially on three predominantly German-speaking countries, Austria, Germany and Switzerland, and compares them with selected European countries and the United States. We illustrate the usefulness of these two approaches for constructing projection scenarios of completed cohort fertility among women of reproductive age. Using three key indicators of the postponement transition – initial fertility level, absolute fertility decline at younger ages, and the relative degree of fertility "recuperation" at older ages – we demonstrate that each of these components is salient for explaining contemporary cross-country differences in cohort fertility. *Recuperation* is especially important, but is also clearly patterned by birth order: whereas all the countries analysed have experienced a vigorous recovery of delayed first births, pronounced differentials are observed with regard to the recuperation of second and particularly of third and later births. In line with the differentials observed, projected values of completed fertility in five European countries vary widely for the cohorts born in the early 1980s, ranging from 1.3 in the lowest scenario for Spain to over 1.8 in the highest scenario for the Czech Republic.

Keywords: Fertility · Fertility postponement · Fertility recuperation · Cohort fertility · Fertility projections · Germany · Austria · Switzerland

* This article contains supplementary materials in the form of an online Appendix: DOI 10.4232/10.CPoS-2011-16en, URL: http://www.comparativepopulationstudies.de/index.php/CPoS/article/view/86/87.

URL: www.comparativepopulationstudies.de
DOI: 10.4232/10.CPoS-2011-10en
URN: urn:nbn:de:bib-cpos-2011-10en3

1 Introduction

1.1 Period and cohort analyses of the "postponement" process

Since the 1970s, fertility trends in Europe, the United States and other developed countries have been dominated by the shift in childbearing to ever later ages. This shift, often described as [*fertility] postponement*, constitutes a potential complication when studying period fertility change because the intensity with which births are being shifted to later ages has a temporary depressing effect on period fertility rates, thus exacerbating the general trend of declining fertility characteristic in most developed countries in the 1970s-1990s. Consequently, it is not easy to distinguish in a period perspective between a "real" decline in fertility (i.e. the change in fertility level or *fertility quantum*) and a temporary depressing effect of the shifting timing of childbearing (*tempo effect*). Considerable debate ensued around the methods that were proposed to estimate these two components and about period fertility measurement in general (e.g. *Bongaarts/Feeney* 1998; *Lesthaeghe/Willems* 1999; *Schoen* 2004; *Sobotka* 2004; *Ní Bhrolcháin* 2011; *Sobotka/Lutz* 2011; *Bongaarts/Sobotka* 2012). A systematic analysis of a recent shift in period fertility timing has been provided first by *Kohler et al.* (2002) and *Billari* and *Ortega* (2002), who coined the term *postponement transition*. This concept was subsequently elaborated by *Goldstein et al.* (2009).

Period fertility analysis provides one perspective on fertility change over time. We argue that a cohort perspective, which is often neglected, provides an equally valuable contribution, and that looking at only one of these two dimensions can lead to partial, distorted conclusions. In contrast to period fertility trends, the measurement of the *quantum* and *tempo* changes in cohort fertility is straightforward. The cohort approach does not need to take recourse to statistical constructs such as a synthetic cohort, and consequently it does not have to cope with the avalanche of problems related to it. Whilst each birth cohort can shift births to younger or older ages, its completed fertility rate (*CTFR*), conventionally measured at age 50, gives an unbiased measure of the cohort fertility level. Changes in both the cohort fertility level and timing can be analysed from data observed on age-specific cohort fertility rates and cumulated fertility rates at selected ages. Considering the time and effort that period analysts have spent on correcting tempo distortions in period indicators, the obvious layman's question would be why they have often abandoned the real cohort view to start with. The main obstacle in analysing cohort fertility obviously lies in the long "waiting time" until the cohort completes its reproductive history. While age 40 is frequently used as a safe threshold for making assessments about the cohort *CTFR*, there are still many years left before an almost complete fertility history of each cohort currently of reproductive age can be observed. For instance, the completed fertility of the cohort of 1982, which is in its prime reproductive age as of 2012, can be measured reliably only after 2020. However, cohort analysis is well-suited for studying long-term changes in fertility tempo and quantum, and the ongoing *postponement transition* constitutes such a case. This process has been initiated in many Western countries by women born during the years 1945-1950, who are now well past their reproductive ages and whose fertility trajectories can be compared with those of the younger cohorts.

Two key terms are frequently used to characterise the process of fertility ageing across age and time: *postponement* refers to a stage of life in which fertility rates are declining and *recuperation* (*recovery*, also termed *catching-up*) refers to subsequent ages when fertility rates are increasing. However, this terminology is also subjective and ambiguous, since at the time when *postponement* begins, it is unclear whether any *recovery* will eventually take place and, if so, what portion of presumably *postponed* births will be *recovered* (see *Ní Bhrolcháin/Toulemon* 2005 for a critical assessment). Similarly, analysts are divided between those who argue that period-driven changes, induced by social, cultural, or economic trends, are the main driving force of the observed fertility developments (a "period paramount" view advocated by *Ní Bhrolcháin* 1992) and those who believe that cohort effects are at least as important when it comes to driving observed fertility trends (*Lesthaeghe* 2001). One reason underpinning the cohort view is that changes in family formation at later stages of the reproductive span are also conditioned by ideational factors that, in tandem with education, tend to follow cohort dynamics (*Lesthaeghe/Surkyn* 1988).

A cohort approach has the major advantage of following life events as they unfold sequentially over time and occurring to the same group of people amalgamated on the basis of a relevant criterion. In contrast to a classic Markov chain, where probabilities of transitions at any time t are totally independent of the transitions that occurred earlier, and are only conditioned by period-specific events, the cohort view studies such transitions as if they were interconnected. Period approaches in demography are best suited for studying single transitions and trend reversals in response to exogenous shocks (economic crisis, inventions, legal and political changes and upheavals, etc.), but they rarely interconnect sequential transitions over a lifetime. As *Ryder* (1951:117) noted, "regardless of the level of specificity for which fertility is studied from period to period, the interdependency of the reproductive experience […] of the same cohort of people in successive periods" must be respected. In other words, the cohort approach respects life course history, whereas the period mode does not.

Because the current "postponement transition" has evolved over long time periods of up to four decades and across many cohorts, it is particularly useful to analyse the cohort dynamics of this process. For our purpose, it is essential to link younger-age fertility decline, or *postponement* (by country, age and birth order) with the subsequent progression of fertility *recuperation*. We therefore study *postponement* and *recuperation* as aggregate (macro) concepts that disregard individual motivation and "reasons" for the shifting age at childbearing. What is often perceived as a *postponement* when analysing aggregate data, may in fact be motivated by many individual considerations that are often detached from any conscious effort to "postpone" having children (*Ní Bhrolcháin/Toulemon* 2005).

In the cohort view, *postponement* and *recuperation* are interconnected and embedded in the complex unfolding of the life cycle. They are both subject to period effects, but these period impulses may not explain the entire picture. In other words, it remains both wise and prudent not to cut up individuals' life histories a priori into unrelated vertical "period slices". Since cohort analyses in demography use the same data arrays as cross-sectional analyses with fictitious or synthetic cohorts, there is no additional data problem: Our exercise can also be seen as an analytical, descriptive framework that would be equally valid even if the change in fertility observed were entirely period-driven. Therefore, we do not argue about causality or supremacy of the cohort analysis in this study.

1.2 Overlapping cohorts and period fertility change

The rapid changes in fertility level and tempo during the last four decades have often been described primarily from a period perspective. However, they can be equally well captured through the lenses of transforming cohort fertility patterns, which may in turn be translated to the observed period fertility shifts. Because cohorts with very different childbearing trajectories overlap at the same period of time, period fertility ups and downs may also be seen as an outcome of different stages of cohort fertility transformations.[1] This process has been analysed in detail by *Tomas Frejka* (2011) and further illustrated by *Sobotka et al*. (2011, section 2); here we briefly outline its dynamics and refer for more details to these two studies.

Consider a rapid change in cohort timing, when the very low fertility at younger ages among the younger cohort may overlap with very low fertility in later ages among the older cohort that previously displayed an early pattern of childbearing. Assuming that this shift occurs along cohort lines, *recuperation* among the older group begins with a time lag after *postponement* among younger women starts. Such a shift may temporarily produce an extreme low level of period fertility.

Frejka (2011) provides an empirical investigation of this process across all developed countries with available data A generalizing model in his paper depicts two important aspects. Firstly, there is usually only a brief period when the period TFR bottoms out, without staying at these record-low levels for a protracted period. Secondly, the late stage of fertility postponement is often characterised by a prolonged period with relatively stable fertility rates. However, there are many exceptions and idiosyncratic trends to this general pattern which are described in detail in *Frejka's* (2011) study.

1.3 Concepts and terminology, goals of this study

The cohort analysis of the *postponement transition*, using rich graphical documentation, has been pioneered in numerous studies conducted by *Tomas Frejka* and his colleagues (see especially *Frejka* and *Sardon* 2004), by *Bosveld* (1996) and, from a

1 However, we are not attempting to test whether the changes observed were period- or cohort-driven. Rather than making causal statements about recent fertility trends, we focus on describing fertility dynamics from a cohort perspective during the "postponement transition".

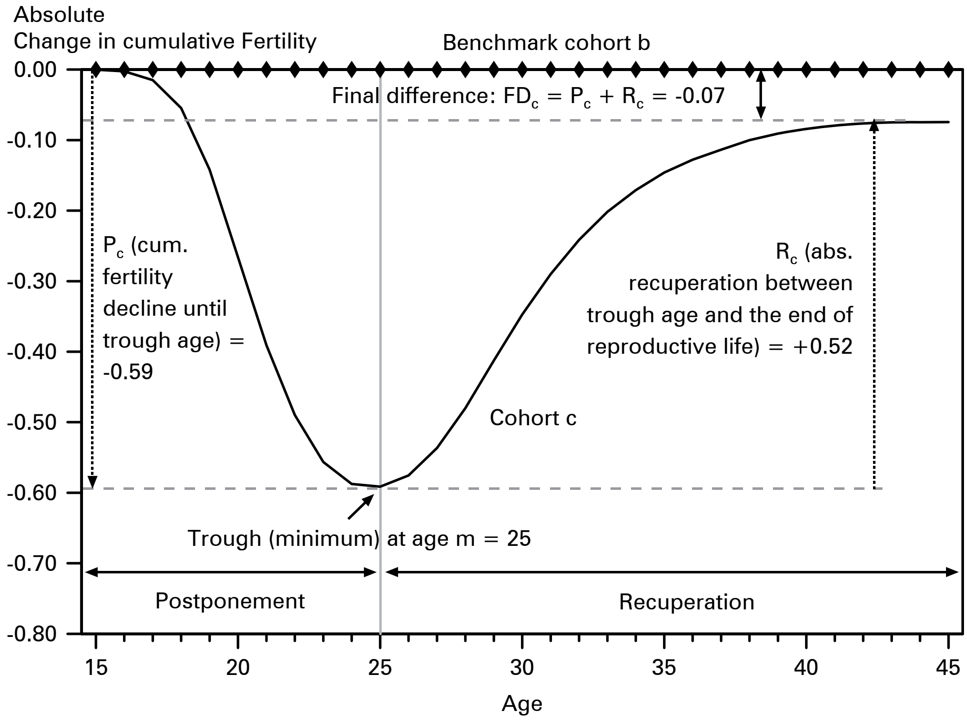
different perspective, by *Lesthaeghe* (2001).[2] In a cohort fertility analysis, the concept of fertility *postponement* (or, more precisely, younger-age fertility decline) and *recuperation* has a different meaning than in the period approach. Both *postponement* and *recuperation* can be measured for any cohort of interest, which is compared with an older *reference cohort* (*benchmark cohort,* labelled here as *b*). Usually, *postponement* is measured by cumulating absolute or relative fertility decline across all ages when fertility has fallen, while *recuperation* is measured by cumulating absolute or relative fertility gains across all ages when fertility has increased relative to the reference cohort. This is illustrated using hypothetical cohorts *b* and *c* in Figure 1. This approach, labelled here as the *basic benchmark model*, can be effectively employed only when the process of long-term fertility change during the *postponement transition* indeed follows a regular pattern, marked by continuous fertility declines at younger ages and subsequent compensatory increases at older ages. As in the period analysis, a large portion of what is labelled as a *postponement* may actually represent a decline in fertility level that has not been offset later in life. But, unlike in the period analysis, the cohort approach allows a precise delineation of what part of fertility decline at younger ages (termed as *fertility deficit* in the analysis by *Frejka* and *Calot* 2001 and *Frejka* and *Sardon* (2004) and denoted as P_c in Fig. 1) has eventually been *recuperated* later in life (*fertility surplus* in *Frejka* and *Sardon's* terminology, denoted as R_c in Fig. 1) and what part of that decline turned out to be permanent.

From a different perspective, *Lesthaeghe* (2001) focuses on the dynamics in cohort *postponement* and *recuperation* using a simple relational model based on the trajectories of the first three five-year cohorts that delayed childbearing (see section 3.3). This approach also allows projecting completed fertility in cohorts with incomplete trajectories, which was the author's original aim. However, the method does not lend itself so well to cross-national comparisons since the national schedules of deviations between cohorts in fertility by age (*national standard deviation schedules*) differ from country to country, and the initial levels of fertility among the *benchmark cohorts* further complicate the interpretation of results.

While the graphical and statistical analysis of cohort fertility *postponement* and *recuperation* has been employed in a variety of studies, there has been surprisingly little effort to further advance or elaborate this methodology. Simple graphical representations have been extended in some studies (e.g. *Tu/Zhang* 2004; *Neels* 2006; *Caltabiano* 2008; *Frejka et al*. 2010); also a more elaborate statistical analysis of the cycle of *postponement* and *recuperation* has been pursued (*Neels* 2010; *Sánchez-Barricarte et al.* 2007). However, only a few studies discussed the premises, methods and terminology of these approaches or attempted to add other dimensions, such as education, to the study of cohort fertility change during the *postponement transition* (*Neels/De Wachter* 2010). In addition, *Caltabiano et al*. (2009) used *Lesthaeghe's*

2 Here and elsewhere, our contribution focuses on birth cohorts, defined by the year of birth. However, many concepts discussed can also be applied to other cohorts, such as parity cohorts, marriage cohorts, education cohorts, etc.

Fig. 1: A simplified scheme of cohort *postponement* and *recuperation*



Source: own design.

model to analyse fertility recuperation in three broad regions of Italy and to draw some international comparisons.

Billari and *Kohler* (2004) have criticised the graphical analyses employed by *Frejka* and *Calot* (2001) on two counts: First, with respect to terminology, they perceive the notion of *fertility deficit* and *fertility surplus* as "unfortunate since it tends to imply that the reference cohort reflects a 'correct' or 'desirable' fertility pattern" (p. 166). Their second and more important critique pertains to the choice of the reference cohorts, which may have widely different fertility levels and timing patterns in the analysed countries, thus obscuring the results of cross-country comparisons. In a different vein, *Ní Bhrolcháin* and *Toulemon* (2005) criticise the notion of *postponement*, and argue that the declines in fertility rates at younger ages may be unrelated to the parallel increases in fertility rates at older ages. Finally, most of the initial analyses studied cohort fertility for all birth orders combined, ignoring the huge variability in parity-specific patterns of the *recuperation* process.

Despite these criticisms, we consider the existing methods useful for describing the ongoing cohort change in the developed world, but also see a need for their further development. This contribution, which is a condensed and reworked version of a more detailed study (*Sobotka et al.* 2011) elaborates on both approaches discussed above. Building upon the work of *Tomas Frejka, Gérard Calot,* and *Jean-Paul Sardon*, we propose an extended analysis of cohort *postponement* and *recuperation*, based on a set of simple rules, expanded graphical representations and selected summary indicators. Given the importance of relating changes in cohort fertility to the reference (or benchmark) cohort, we label this approach the *basic benchmark model*. Subsequently, we discuss cohort projection scenarios based on three key indicators of the postponement and recuperation process. We also experiment with the *relational model* proposed by Ron Lesthaeghe and critically examine its usefulness for fertility projections.

Following these methodological parts, we analyse transformations in selected countries of Europe, and in the United States, paying particular attention to Austria, Germany and Switzerland. Twenty years after German unification, Eastern and Western Germany have retained distinct fertility patterns and developments (*Mayer /Schulze* 2009; see also *Sobotka* 2011, in CPoS 36,2-3); therefore, we often analyse data for these two regions separately. We highlight the role of increasing education and the diversity in the trends of fertility *recuperation*, which has become a critical determinant for fertility trends in Europe, and which has been relatively weak in the three countries analysed.

2 Data

We use detailed cohort fertility data by age of mother and birth order, collected from different sources and databases. Data for the *Czech Republic*, the *Netherlands, Sweden* and the *United States* originate from the Human Fertility Database (*www.humanfertility.org*, accessed in July 2010), which also provides detailed data documentation.

Data for *Spain* were computed by combining cohort order-specific fertility rates by age realised until 1997 that were formerly available in Eurostat *New Cronos Database* (2003) with the period fertility data on births by birth order and age of mother and female population by age, downloaded from *Eurostat database* (2010). The statistics of births by birth order in Spain were not entirely reliable in some years (*Devolder/Ortiz* 2010), but such irregularities should not have a large impact on our computations.

Cohort fertility data for *Austria* were assembled by combining two datasets: 1) Vital statistics data in 1984-2009, provided by Statistics Austria (and also displayed in the *Human Fertility Database*) and 2) estimates of age-specific fertility rates by birth order in 1952-1983, compiled by Anna Šťastná and Tomáš Sobotka (unpublished dataset, 2008). This latter dataset was mostly based on a retrospective distribution of births, using the question on the dates of birth of the first four live-born children that was asked to all resident women aged 15+ in the Austrian census of 1981 (*Statistics Austria* 1989).

Data for *Switzerland* were estimated by Marion Burkimsher from the vital statistics data published by the Swiss Federal Statistical Office (see also *Kreyenfeld et al.,* in CPoS 36,2-3). Cohort fertility histories by birth order and age of mother for women born since 1950 were reconstructed by M. Burkimsher by estimating data on live births by biological birth order and age of mother in the period 1969-1997 from the dataset on birth order within marriage and the subsequent data on biological birth order in 1998-2008. In addition, a portion of data with unknown birth order in 1998-2004 had to be redistributed as well.[3] Because of these estimations and redistributions, Swiss data should be treated as "best estimates" that may contain some inaccuracies in order-specific indicators.

Data for *Germany*, distinguishing between *Eastern Germany (former GDR)* and *Western Germany (former FRG)*, were assembled by *Kreyenfeld et al.* (2010) from hospital birth records and later included in the *Human Fertility Database*. Because of administrative changes, the data pertaining to the period after 2001 exclude the territory of Berlin. For the period through 2001, data for East Berlin were included in the dataset for Eastern Germany, and the data for West Berlin were part of the Western German dataset (see more details in *Kreyenfeld et al*. 2010).

3 Elaborating the analysis of cohort postponement and recuperation

3.1 The *basic benchmark model*: Layers of analysis and main organising principles

Relatively simple graphical illustrations can provide key insights into cohort fertility changes during the process of the *postponement transition*, and serve for a comparison of its trajectory across different countries, cohorts and birth orders. However, this type of analysis depends critically on the choice of the reference cohort (*Billari/Kohler* 2004), and also on order-specific fertility trends, as the process of cohort *recuperation* is hugely differentiated by birth order. To lend more precision to the *basic benchmark model*, we propose an expanded set of graphical illustrations and analytical indexes and demonstrate their application for selected countries. This analysis is based on a simple set of organising rules that aim to be flexible enough to capture subtle trends in the ongoing transformation of cohort fertility patterns. We refer readers to the expanded version of our study (*Sobotka et al.* 2011) for detailed illustrations.

As in the case of period fertility, the design of cohort fertility analysis should reflect analysts' purposes and aims (*Ní Bhrolcháin* 2011). To overcome some deficiencies in the existing approaches to cohort fertility, we have formulated the following organising principles, which are particularly suitable for studying the cohort "postponement transition".

3 These order-specific data for the period since 1998 have also recently been included in the *Human Fertility Database.*

1) The choice of a benchmark cohort should reflect aims of the analysis

The choice of a reference cohort influences the outcome of the analysis. Since our focus is on the dynamics of fertility *postponement* and *recuperation*, we anchor our study in the cohorts that have initiated this trend. We choose one of the cohorts that first experienced an onset of the increase in the mean age at first birth that spanned over at least five consecutive cohorts. Therefore, the reference cohorts are allowed to vary by country. Although this flexible definition does not completely eliminate differences in the initial *CTFR* levels, we see this as a more objective criterion than using the same *benchmark cohort* for all countries (*Sobotka et al*. 2011, Section 4.1).

2) Focus on order-specific differences

Many countries experience pronounced differentials in cohort fertility trends by birth order. Ignoring these differentials may lead to an erroneous reading of the overall trend for all birth orders combined. Whenever data allow, we advocate performing an order-specific analysis. We expect that most of the presumably *postponed* first births and many second births will be *recuperated*, while the decline in third and higher-order births is often likely to become permanent (*Frejka/Sardon* 2007). This expected trend of declining higher-order births stems in part from the long-term decline of larger-family preferences that characterised the first demographic transition and in part from the *postponement-quantum interaction* (*Kohler et al.* 2002), whereby a pronounced postponement of first births makes it almost impossible for many women to achieve a larger family size.

3) Correct identification of the age at maximum decline

Most of the past studies used a fixed age delineating the *postponement* and *recuperation* phases of fertility. *Frejka* and *Sardon* (2004 and other studies) repeatedly used age 27, whereas Lesthaeghe, working with five-year age groups, chose age 30 as a boundary. Rather than using a fixed age category, we specify the age of the maximum cumulative fertility decline separately for each cohort and birth order.

These relatively simple analytical "rules" can be elaborated further. The dynamics of the postponement transition by age can be analysed using a set of flexible benchmark cohorts, rather than one fixed reference cohort (*Sobotka et al.* 2011, Section 4.2). Another potentially useful extension involves shifting the benchmark to a "target" value of completed fertility, such as the population replacement level (around 2.07 in today's Europe).

While these methods are well suited for descriptive analyses, they do not provide a parameterization of the effect of potentially relevant explanatory factors, such as increasing education, trends in the business cycle or changes in family policies. To move beyond sophisticated descriptions and projections of cohort fertility change, we outline a model estimating the effect of expanding educational attainment on first birth hazards during the stages of postponement and recuperation, which is presented in a supplementary online Appendix.

3.2 The expanded *basic benchmark model* in a nutshell: summary graphs and indicators

To summarise a potentially vast amount of analysis, we propose using a set of graphs specified by birth order (1, 2, and 3+), which track major indicators of cohort fertility change during the *postponement transition*. Specifically, we aim to identify and show the following indicators side by side, starting with some of the cohorts immediately preceding the onset of the *postponement*:

- *b*: *Benchmark cohort* – the first cohort that experienced an increase in the mean age at first birth that continued for at least five cohorts. For practical purposes, the nearest quinquennial cohort (i.e. a cohort ending with 0 or 5) is chosen as the benchmark. Thus, when the *postponement* trend is initiated by a cohort born in 1948 or 1951, the cohort of 1950 is selected as the benchmark.
- $F_c(y)$ is the *cumulated fertility rate* (number of births per woman) born up to age *y* in any cohort *c*:

$$F_c(y) = \sum_{x=12}^{y-1} f_c(x),$$

-
- where $f_c(x)$ is the age-specific fertility rate of cohort *c* at age *x*.
- *m* is the age at which the gap between the cumulated fertility rate of the benchmark cohort and of the observed cohort reaches a maximum. We refer to it as the "trough age" (see Fig. 1).
- $F_c(m)$ is the cumulated fertility in cohort *c* up to age *m* of the trough.
- P_c: Decline in cumulated cohort fertility of cohort *c* compared to that of the *benchmark cohort b* at the trough age *m*. P_c thus measures the maximum difference in cumulated fertility between the benchmark and the observed cohort, and is usually negative. It measures the "depth" of the trough, and can be labelled as the *postponement measure* of cohort *c* (hence, P_c):

$$P_c = \sum_{x=12}^{m-1} [f_c(x) - f_b(x)] = F_c(m) - F_b(m) \tag{1}$$

- R_c: *Recuperation measure* or the absolute increase in cohort fertility, as compared to the *benchmark cohort b*, between age *m* (the *trough* age) and the end of the reproductive period:

$$R_c = \sum_{x=m}^{50} [f_c(x) - f_b(x)] = CTFR_c - CTFR_b - P_c \tag{2}$$

  Here we often use age 40 as a simplified endpoint for our cohort fertility analysis.
- FD_c: *Final difference*: permanent difference, usually decline, in fertility between the benchmark cohort and the cohort of interest, computed as $FD_c = P_c + R_c$;

- RI_c*: Recuperation Index*,[4] measuring the degree of *recuperation* relative to the *decline* at younger ages: $RI_c = (R_c / - P_c)$

$$RI_c = (R_c / - P_c). \tag{3}$$

  It can also be expressed as a percentage, ranging from 0 (no recuperation) to 100 % (full recuperation) or even above ("over-compensation").

Each of these indicators can be specified by birth order. The *Recuperation Index* is a relative indicator that needs to be studied in conjunction with the initial fertility level of the benchmark cohort and the absolute value of fertility decline at the trough, P_c.

Figure 2 shows all the essential indicators of the *postponement transition* for first births in Austria, starting with the benchmark cohort of 1950, and featuring each single birth cohort through 1983. It shows the absolute *recuperation R* and the *Recuperation Index RI* by age 42, as well as the absolute degree of *recuperation* at age 36, which gives an early assessment of the progressing *recuperation* among the cohorts of higher reproductive ages. The graph depicts a continuous fall in fertility at younger ages before the trough was reached (which occurred at ages 22-23 for the 1950s and 1960s cohorts and at age 25 for the early 1980s cohorts) and then a steady pattern of *recuperation*, with the *RI* hovering around 80 % for the mid-1960s cohorts.[5] The postponement transition still continued among the youngest women analysed, born in the early 1980s. *Recuperation* is slightly less vigorous for second births and almost non-existent for third and later births (no graphs provided here).

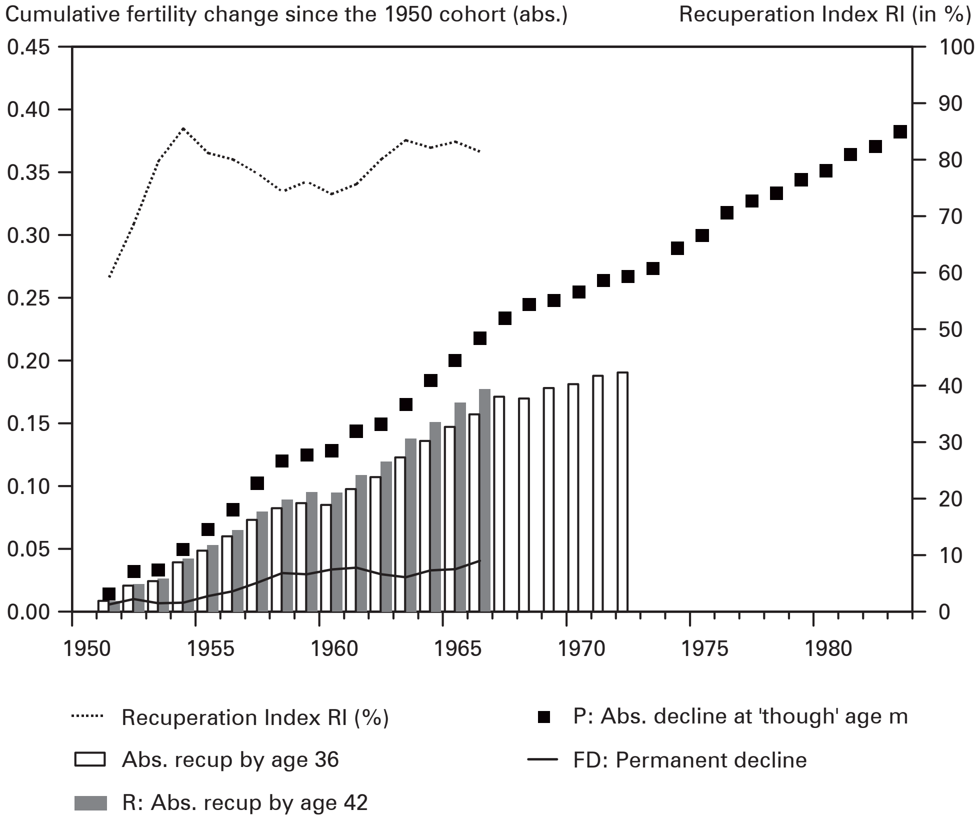
It is also useful to compare different indicators by birth order, as we illustrate in an extended study (*Sobotka et al*. 2011). The indicators for the fertility decline at younger ages, *P*, and permanent decline, *FD*, for all birth orders combined, often differ from a simple summation of order-specific indicators P^i and FD^i because of diverse age-specific trajectories of declines and increases and different *trough* ages m_i in order-specific indicators. Thus, two sets of indicators for total birth orders can be derived: One, based on the data observed for total birth orders, and the other, derived from the order-specific indicators, either by summation (e.g.,) $P_c = \sum_i P_c^i$

or, in the case of the recuperation index *RI,* by weighting order-specific results with the completed fertility rate by birth order, $CTFR_c^i$.

4 The Recuperation Index was first employed by *Frejka et al.* (2010). A similar index, referred to as DR (Degree of Recuperation) was introduced in the study on fertility in Hong Kong and Taiwan by *Tu* and *Zhang* (2004).

5 Note, however, that the ongoing decline in fertility at younger ages implies gradually declining completed fertility when combined with the stable *Recuperation Index*.

Fig. 2: Graphical summary of the postponement and recuperation process: first births in Austria among women born since 1950



Source: see section 2.

3.3 *Lesthaeghe's* (2001) relational model and its extensions

Lesthaeghe's model of cohort fertility postponement and recuperation was first formulated in a 2001 working paper for an IUSSP seminar (*Lesthaeghe* 2001), but since it has not been widely circulated, we first summarise its main ideas.

The paper proposed a relational model of cohort cumulative fertility deviations relative to the schedule of a benchmark cohort, using two variables to manipulate a standard schedule of deviations at ages 30 and 50. The benchmark cohort is chosen as the one at the very beginning of the postponement trend, which in *Lesthaeghe's* examples for Western European countries were cohorts born around 1942-48. The analysis proceeds with the differences $d_c(x)$ in cumulative fertility $F_c(x)$ between the observed cohort c and the benchmark cohort b (i.e., $F_c(x) - F_b(x)$). The schedule of these differences by age was referred to as the "deficit function" of values of $d_c(x)$ for each cohort c. Subsequently, a national standard schedule of deviations is chosen for each country, namely $d_n(x)$, which is taken to be representative of the underlying age pattern of cumulative deficits from the fertility schedule of the benchmark cohort in subsequent cohorts, $d_c(x)$. The observed $d_c(x)$ and the national standard $d_n(x)$ schedules are related to each other by two parameters only. The postponement ratio PR_c manipulates (accelerates or decelerates) the degree of postponement as defined in the national standard d_n for age 30, and the recuperation ratio, RR_c, determines the degree of fertility deficit reduction (i.e. "recuperation") at age 50. The model is a very parsimonious one, but crucially hinges on the stability of the shape of the national standard deficit function $d_n(x)$. If that condition is met, the model can be used profitably for completing cumulative fertility schedules of cohorts between ages 30 and 50.

The original formulation was conditioned by data limitations, and could only make use of fertility rates by five-year age groups. The availability of single-year data obviously offers several opportunities for improvement. The other major limitation of the original was the lack of parity specificity, but the philosophy of the relational model can be readily applied to parity-specific schedules as well. Finally, we extended the model to compute postponement ratios at all ages, to have the age at a maximum deviation, m, variable and not fixed at age 30, and to compute recuperation ratios at all ages $x \geq m$. We shall demonstrate the improved relational model below.

Figure 3 illustrates two trajectories of cumulated fertility by age as related to the *benchmark cohort b*.[6] One trajectory depicts the national schedule of deviations, d_n, which is defined in our study as an average value over two cohorts: 1) the youngest cohort that reached the age of 40 at the time when most recent data were available (typically, this is a cohort born in 1968 or 1969) and 2) the cohort born five years earlier.[7] Age-specific fertility rates $f_n(x)$ of the "national standard schedule" can simply be derived as an average of the two cohorts used for its computation:

$$f_n(x) = \frac{f_{n1}(x) + f_{n2}(x)}{2} \quad \text{or} \quad F_n(x) = \frac{F_{n1}(x) + F_{n2}(x)}{2} \tag{4}$$

Then, the "national standard schedule of deviations" is computed as a difference between cumulated fertility of the national standard schedule n and benchmark cohort b:

$$d_n(y) = \sum_{x=12}^{y-1} [f_n(x) - f_b(x)] = F_n(y) - F_b(y) \tag{5}$$

6 The *benchmark cohort* is defined in the same way as in the descriptive approach introduced above, namely as a cohort experiencing the onset of first birth postponement (rounded to the nearest cohort ending with 0 or 5).

7 Alternatively, only one recent cohort could be used to define the national schedule of deviations. While the results are likely to be similar in most cases, we expect that choosing two cohorts to define this standard schedule gives more stable results of the projections.

Analogously, for any cohort younger than the benchmark cohort *b*, its deviations from the fertility schedule of the benchmark cohort can be computed as follows:

$$d_c(y) = \sum_{x=12}^{y-1} [f_c(x) - f_b(x)] = F_c(y) - F_b(y) \qquad (6)$$

By definition, the deviations of the benchmark cohort *b* at any age *x* are nil: $d_b(x) \equiv 0$.

The *trough age m* is defined as an age when the absolute value of the deficit $d_n(x)$ in the national standard schedule reaches the maximum.[8] This does not necessarily mean that $d_c(x)$ for other cohorts also reaches a maximum at that age. However, in contrast to the *basic benchmark* model presented above, in the *relational model* we use single age *m* for all cohorts and always depict it as *m.* For ages $x \geq m$ the absolute value of *recuperation* (i.e. fertility increase after age *m*), as compared to the benchmark cohort, can be computed for any cohort $c>b$:

$$r_c(x) = d_c(x) - d_c(m) \qquad (7)$$

Analogously, the absolute recuperation can also be derived for the national standard schedule:

$$r_n(x) = d_n(x) - d_n(m) \qquad (8)$$

By definition, recuperation is nil at age *m*: $r_n(m) = 0$; $r_c(m) = 0$

Two key indicators that show progression in the pace of *postponement* and *recuperation* at different ages across cohorts are called the "postponement ratio" PR_c and the "recuperation ratio" RR_c. Both are measured relative to the national standard schedule $d_n(x)$. For x > m:

$$PR_c(x) = \frac{d_c(x)}{d_n(x)} \qquad (9);$$

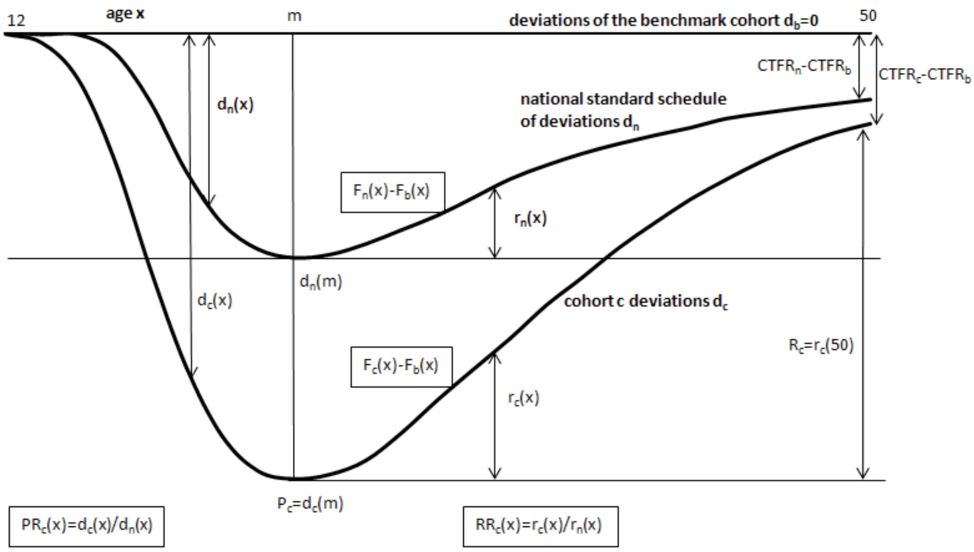
for $x > m$: $$RR_c(x) = \frac{r_c(x)}{r_n(x)} \qquad (10)$$

By definition, both these ratios equal 0 in the benchmark cohort and are equal to 1 in the national standard schedule: $PR_n(x) = 1$; $PR_b(x) = 0$; $RR_n(x) = 1$; $RR_b(x) = 0$.

It should be noted that the $PR_c(x)$ and $RR_c(x)$ ratios are relative indices that are valid for a specific population, and should only be used as aids in projecting or completing cohort fertility schedules (see section 4.2). Since both the benchmark

8 The trough age can however not be identified in the absence of any recuperation at older ages. Such a pure quantum decline, without any subsequent compensatory increase, usually occurs at higher birth orders, e.g. among Spanish women having third or higher-order birth (Fig. 5a in *Sobotka et al*. 2011).

Fig. 3: Graphical illustration of the cohort postponement and recuperation as conceptualised in the relational model based on *Lesthaeghe* (2001)



Source: own design based on *Lesthaeghe* (2001).

schedule and the standard schedule of deviations are population-specific, these ratios are not tools for comparisons between different populations. Empirical illustrations showing the analytical usefulness of this model on the example of first births in Austria are provided in our detailed study (*Sobotka et al*. 2011, section 5.2).

3.4 Adding explanatory dimensions

The descriptive methods introduced in the preceding sections can be complemented by adding additional dimensions. Age- and order-specific fertility rates can be further stratified, including other covariates considered relevant (*Ní Bhrolcháin* 1992). However, the effect of important factors such as the level of education often cannot be assessed with population-level data, as they do not usually provide the required detail to standardize fertility rates for additional covariates.[9] Alternatively, hazard models based on surveys or census data allow estimating the impact of substantive predictors on trends of *postponement* and *recuperation* over subsequent birth cohorts.

9 In some countries, census data containing reproductive histories can be used to reconstruct past fertility rates and decompose order-specific fertility by selected covariates (e.g. region, education, labour force participation). Such decomposition allows an assessment of the impact of changes in these covariates on fertility changes over time and across cohorts (see *Neels* 2006 and *Neels* and *De Wachter* 2010 for an analysis of Belgian census data).

However, it is important to note that terminology and concepts often differ between the studies anchored at an aggregate-level and those focused on individual-level data. Hazard-based "micro" models have a great advantage of controlling simultaneously for a number of important determinants, the effects of which cannot be isolated in a purely "macro" analysis. At the same time, hazard models – even when they use large-scale surveys with sufficient sample size and covering the entire reproductive span – often focus on slicing reproductive life courses into distinct age categories, thus making it difficult to estimate the cumulative effect of specific covariates on fertility postponement and recuperation as well as on completed fertility. For instance, rising hazard rates at ages above 30 give a clear signal about the ongoing *recuperation*, but do not allow a direct assessment about the share of previously postponed births being "recuperated". To make inferences about the *degree of recuperation*, the results of the hazard models have to be translated back into cumulative proportions of women having a first birth at specific ages. Alternatively, simulations might be used to assess changes across cohorts in their timing of childbearing and the influence of changing education, employment, partnership histories and other relevant factors on parity-specific transitions.

Ideally, macro and micro perspectives should be combined to obtain an overall picture of the progression of *postponement* and *recuperation* across cohorts, but also to gain an understanding of the most relevant factors behind these observed aggregate trends. The scope of our paper does not allow us to elaborate on this option. Instead, we provide an illustration of the insights gained by considering the influence of changing educational attainment over time in a supplementary online appendix.

4 Projecting completed cohort fertility using the postponement-recuperation framework

The real cohort view avoids the *synthetic cohort* distortions, but it faces the issue of incomplete schedules of cohorts that have not reached the end of their reproductive period. This induces analysts to explicitly formulate hypotheses and methods for forecasting cohort completion schedules. In other words, cohort analysis forces forecasters to be very explicit about the futures of each incomplete longitudinal set of life cycles. We address this issue by proposing projection scenarios based on the two broader analytical approaches to cohort fertility discussed above. Projecting period rates only often leads to odd and even impossible outcomes when translated into the cohort format.

4.1 Approach 1: Projections using the *basic benchmark model*

The key indicators of the postponement transition, discussed in section 3.2, can be readily used for formulating cohort projection scenarios when the process of the *postponement transition* is underway. For any cohort of women, which has already reached the point of the maximum fertility decline relative to the *benchmark cohort*, the completed fertility rate *CTFR* at a given birth order *i* can be projected as follows (*p* stands for the projected values):

$$pCTFR_c^i = CTFR_b^i + P_c^i .(1 - pRI_c^i) \tag{11}$$

where *b* represents the *benchmark cohort*, *RI* the recuperation index and *P* denotes maximum decline in cumulated fertility relative to the *benchmark cohort*. In this simple form only the values of RI_c need to be projected, ideally at the end of reproductive life, which puts the projection horizon at each birth order analysed to the last cohort that has reached the *trough* age. The projected completed fertility for all birth orders combined can either be obtained by a direct computation of the *pCTFR* using formula [11] above, or, preferably, by summing up the results of order-specific projections:

$$pCTFR_c = pCTFR_c^1 + pCTFR_c^2 + pCTFR_c^{3+} .$$

We argue that considering birth order improves the projection and its reliability by taking into account differential trajectories of *postponement* and *recuperation*. These order-specific trajectories may be hidden in the overall analysis for total birth orders when the parity distribution of births is changing across cohorts.

Further extensions and elaborations to this projection framework can be considered. First, there are different possibilities of projecting the *RI*, starting from “freezing” the last observed values, through trend projections, up to the scenarios assuming various trajectories of *recuperation*. Such alternative scenarios may also give an assessment of the impact of different degrees of *recuperation* on completed fertility rates. Second, the projection horizon can be extended by projecting the values of P_c for the cohorts that have not yet reached the *trough* age. Obviously, more assumptions are then needed, resulting in higher uncertainty about the projected values.

This projection framework, illustrated extensively in our expanded study (*Sobotka et al.* 2011) has some drawbacks that should be taken into account, particularly when used for situations for which it was not designed. When based on the observed values of *P* and projected values of *RI*, the projection will not extend into the young birth cohorts of women in their early- to mid-20s, and may not even capture women in their early 30s for the higher-order births (depending on the observed age at *trough*). The projection is designed for the countries that are still undergoing the *postponement transition*, and will not work well for the countries not undergoing long-standing, systematic shifts in the cohort timing of births. It also does not perform well in the early stages of the postponement shift, where none of the analysed cohorts have reached higher reproductive ages and hence the recuperation index *RI* cannot yet be computed. Finally, the order-specific projection is highly sensitive to data quality: Problems with proper birth order reporting or its changes over time may strongly affect the computation of the main projection parameters and of the projection itself.

4.2 Approach 2: Using the *relational model* for projecting cohort fertility schedules

The projection approach analysed above only yields final values of completed fertility, and does not allow the whole schedule of cohort age-specific fertility rates to be computed. This task can be accomplished by using the relational model of cohort postponement and recuperation, introduced in section 3.3. The idea is to project either the postponement ratio at age 40 $pPR_c(40)$ or the recuperation ratio at that age $pRR_c(40)$, and then use these projected ratios to recalculate age-specific fertility rates and cumulated fertility at age 40 (see *Sobotka et al.* 2011). The indicators derived at age 40 can be used for rough estimates of the completed fertility rate, but we advise adjusting the data for fertility rates that occur after that age.

Because there are two different projection frameworks for employing the relational model – one relying on the postponement ratios only and the other combining postponement ratios and recuperation ratios – and various possibilities of how to project these ratios, our expanded study (*Sobotka et al.* 2011, sections 6.3 and 6.4) discusses three different methods derived from the relational model and compares them to two simpler projection scenarios based on the *Recuperation Index*.

Here we outline one projection method, denoted *Method 3* in *Sobotka et al.* (2011), which uses the postponement ratios (*PR*) only, and which provides more stable results than the other two methods. The use of both postponement and recuperation ratios in Methods 1 and 2 made it more complicated to project an entire schedule of age-specific fertility rates, especially when the trough age moves across cohorts. Our method of choice uses the postponement ratios PR_c across the whole reproductive age range (we apply it up until age 40 only to make use of a longer series of observed cohort data). We use linear regression to predict the *PRs* for the unknown (future) part of the fertility schedule. Initially, we simply regressed *PR*s across age *x* as dependent on the cohort birth year ***c***, but this approach gave implausible results. Using the postponement ratio in the preceding age *PR(x–1)* as an explanatory variable turned out to be considerably more promising with respect to stability and plausibility of results. For example, when we have fertility data up to the year 2010, we may compute fertility rates for the cohort of 1985 up to age 25. The postponement ratio for the next age $PR_{1985}(26)$ is then predicted using the relation between the known data series at ages 25 and 26 for the cohorts observed since the onset of the birth postponement. If sufficiently long cohort data series have accumulated after the benchmark cohort, we can use this approach to predict on a step-by-step basis the postponement ratio for each cohort and for each age (up to age 40, depending on the national schedule of deviations), using the following equation:

$$pPR_c(x) = \alpha \cdot PR_c(x-1) + \beta + \varepsilon \tag{12}$$

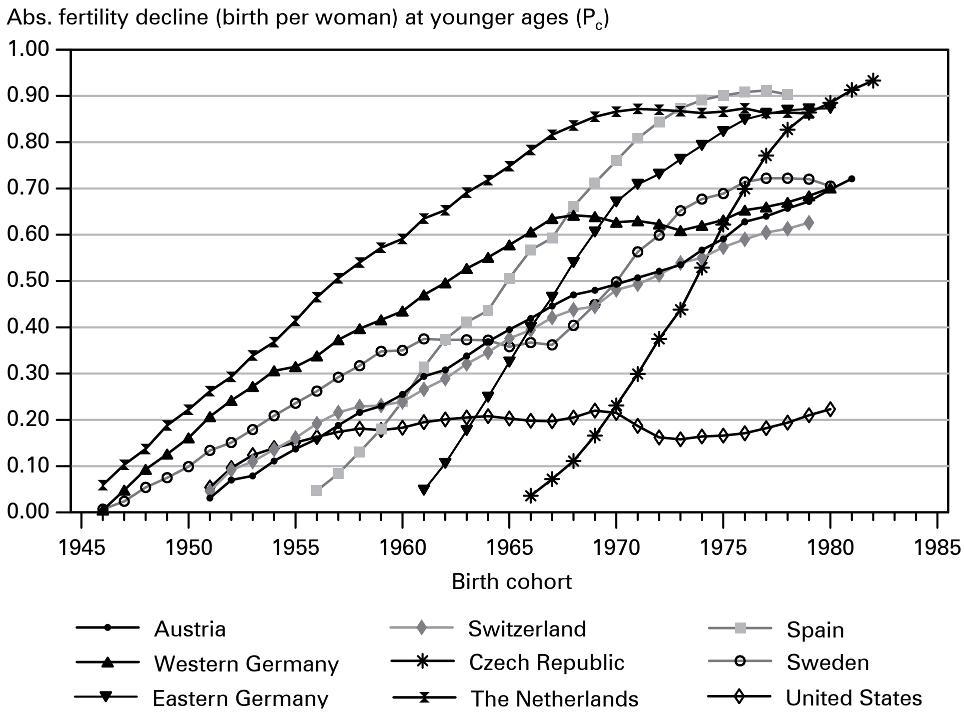
This approach thus ignores the theoretically useful distinction between the postponement and recuperation phases of the ongoing cohort change. At the same time, this theoretical disadvantage is outweighed by a higher stability of the projection.

5 Diversity in the trajectories of postponement and recuperation

Building on the previous sections, we apply our methodological tools to analyse cohort *postponement* and *recuperation* in three predominantly German-speaking countries of Europe, Austria, Germany and Switzerland, which experienced low fertility rates for several decades (see *Sobotka* 2011, in CPoS 36,2-3). We compare them with four countries representing broader European regions (the Czech Republic for post-communist Central Europe, the Netherlands for Western Europe, Spain for Southern Europe and Sweden for Northern Europe) as well as with the United States. Owing to a lack of detailed order-specific cohort fertility data for Germany, and partly also Switzerland, and to save space, we focus particularly on the results for all birth orders combined.

First we compare cohort trajectories of fertility decline at younger ages from the onset of the postponement transition, as measured by the size of cumulated fertility decline P_c at the trough age m. Figure 4 shows particularly rapid transitions in the Czech Republic and Spain, as well as in Eastern Germany (former GDR). In contrast, birth postponement progressed in a more gradual and also regular fashion in Austria and Switzerland, whereas in Western Germany and Sweden it stalled for about five cohorts before picking up again, rapidly in Sweden and gradually in Western

Fig. 4: Absolute fertility decline at younger ages from the onset of fertility postponement (P_c)

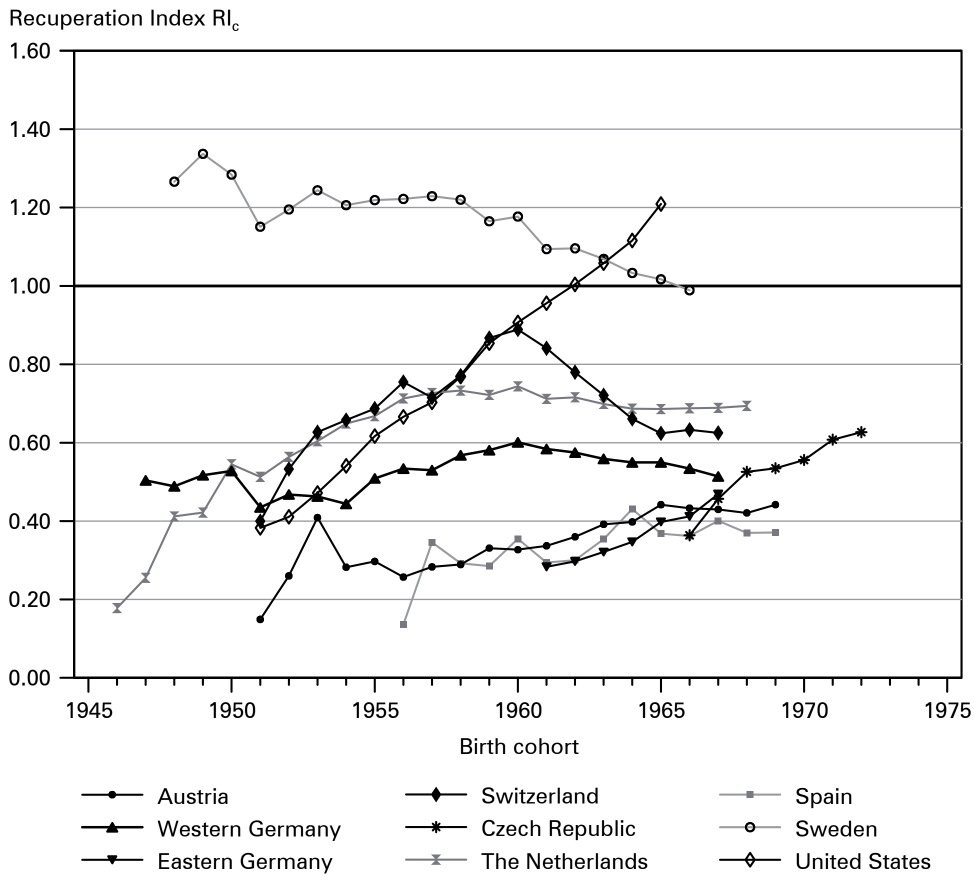


Source: see section 2.

Germany. The pattern is very different in the United States, where this indicator suggests that the concept of the "postponement transition" does not conform to the observed fertility trend: The fall in fertility at younger ages was relatively minor and mostly confined to the 1950s cohorts, with a reversal occurring among the late 1960s cohorts.

To find out what portion of the presumably postponed births has eventually been "made up" at later ages, Figure 5 plots the recuperation index RI_c for all birth orders for the cohorts born until the late 1960s. It depicts vast differences between countries, with Sweden constituting an example of a complete recuperation with the RI exceeding unity, the Netherlands registering a strong recuperation at around 70 %, while Spain, Eastern Germany and Austria lag behind with fewer than one-

Fig. 5: Recuperation Index, RI_c (total birth orders), cohorts born through the late 1960s



Note: Observed and projected recuperation index for the Czech Republic is computed at age 38.

Source: see section 2.

half of the early fertility decline being compensated at higher ages (only around 37 % in Spain). Whatever minor postponement there had been in the United States, it was subsequently "overcompensated" at higher ages, with the recuperation index surpassing 1 for the cohorts born after 1962. Most other countries experienced stagnation or a minor rise in the recuperation index among the late 1960s cohorts. The examples of Sweden and the more recent cohorts in the United States show that the shift to a later timing of childbearing, and the concomitant fall in fertility at younger reproductive ages, does not necessarily have a lasting negative effect on completed fertility.

Table 1 summarises key indicators of the *postponement transition* in the countries analysed. There is little variation in fertility levels among the benchmark cohort, ranging from values around 1.8 in Austria, Germany and Switzerland up to values close to 2 in the Netherlands and the United States. The postponement indicator, P_c, shows massive declines in early fertility in all the analysed countries except the United States, with the cohort of 1978 having fewer births by 0.6-0.9 when reaching the trough age than the benchmark cohort. Some of the early fertility decline remained permanent in all the countries, except in the United States, with the ultimate decline (measured at age 40) being largest in Spain (-0.4), Austria and Germany (both East and West, around -0.3).

As expected, huge birth order differences exist with respect to the share of "recuperated" fertility: In the cohort of 1968, analysed in Table 1, the recuperation surpasses 70 % for first births among the countries with available data except Switzerland. For second births, it reaches low values in Spain and moderate levels around 65 % in Austria, the Czech Republic, the Netherlands and Switzerland. The

Tab. 1: Selected indicators of the postponement and recuperation process

Country	Benchmark cohort	Cumul. fert., F_b (age 40)	Observed P_c Kohorten 1968 und 1978		Observed RI_c, cohort 1968 or most recent				Final decline FD
			C1968	C1978	BO1	BO2	BO3+	Total	(C1968)
Austria	1950	1.84	-0.47	-0.65	0.76	0.64	0.02	0.41	-0.28
Germany	1945	1.78	-0.64	-0.72	-	-	-	0.48	-0.33
Germany, Eastern	1960	1.78	-0.54	-0.87	-	-	-	0.49	-0.33
Germany, Western	1945	1.76	-0.64	-0.67	-	-	-	0.48	-0.28
Switzerland	1950	1.77	-0.44	-0.61	0.68	0.64	0.25	0.57	-0.19
Czech Republic	1965	1.90	-0.11	-0.83	0.77	0.64	0.41	0.63	-0.15
The Netherlands	1945	1.98	-0.84	-0.86	0.83	0.68	0.46	0.69	-0.23
Spain	1955	1.87	-0.66	-0.90	0.75	0.48	0.00	0.39	-0.40
Sweden	1945 (1955)[1]	1.95	-0.41	-0.72	0.94[1]	0.88[1]	0.08[1]	0.92	-0.03
United States	1950	1.99	-0.18	-0.18	1.10	1.08	3.29	1.30	0.05

Notes: [1] For Sweden, order-specific results are computed using the 1955 cohort as a benchmark, since the complete set of age and order-specific fertility rates is not available for the older cohorts.

Swiss data estimated and kindly provided by M. Burkimsher. The recuperation indexes RI_c in Sweden are shown for the 1967 cohort and in the United States for the 1968 cohort, as more recent data are not available. For the Czech Republic, we show RI_c for the cohort of 1972, at age 38.

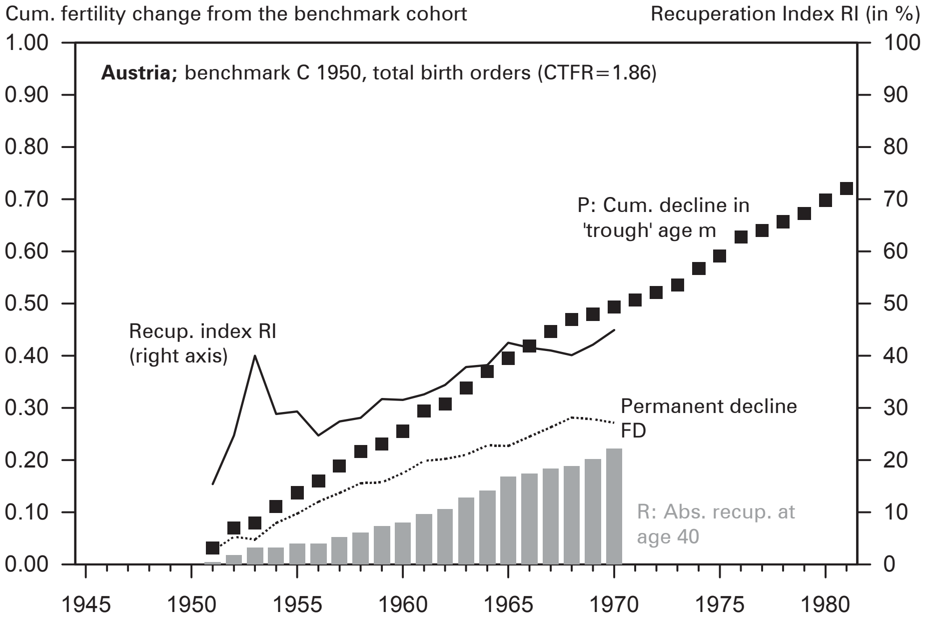
Source: see section 2.

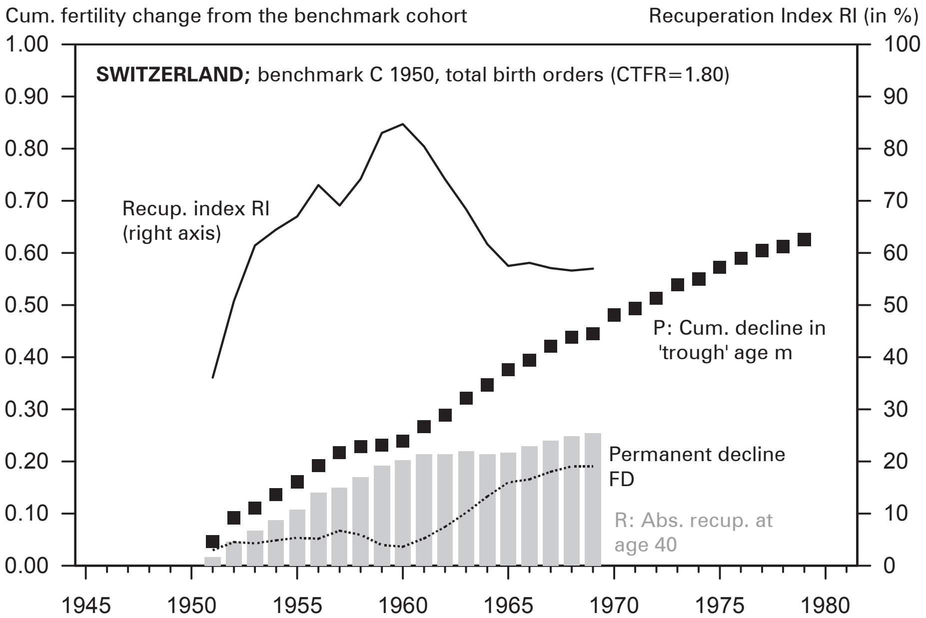
largest differences exist in the extent of recuperation in higher order births, where no measurable recovery of cohort fertility took place in Austria or Spain, there was a very modest one in Switzerland and a large "overcompensation", with an *RI* index surpassing 2, occurred in the US cohort of 1965.

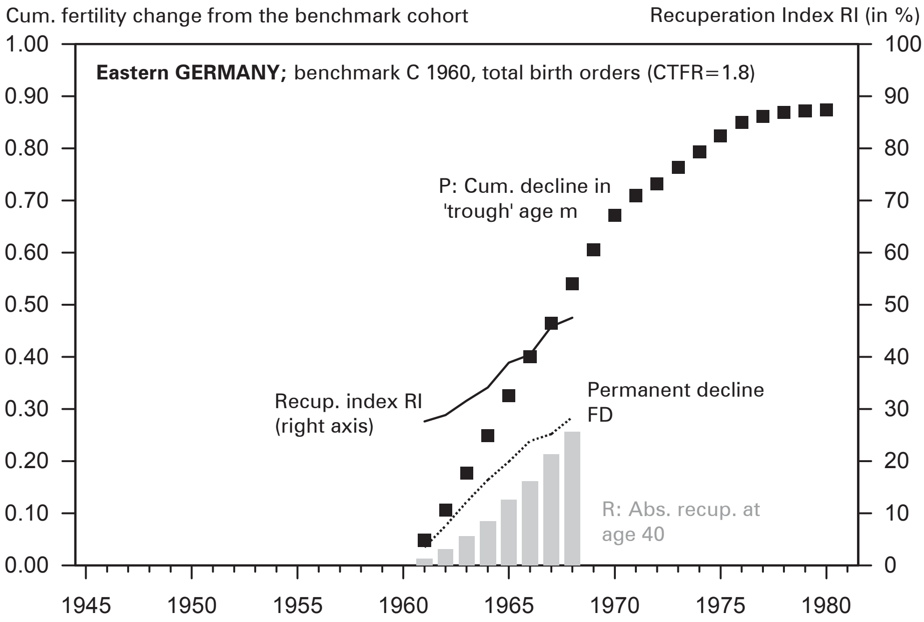
While there are many similarities in the postponement transition between Austria, Germany and Switzerland, subtle differences are revealed in detailed graphs charting its progression in these three countries (Fig. 6). The exceptionally rapid pace of the postponement transition in Eastern Germany stands out. In the course of fifteen cohorts, 1960-1975, Eastern German women reduced their fertility at younger ages by a larger magnitude – over 0.8 in absolute terms – than their counterparts in Austria, Western Germany and Switzerland over more than thirty cohorts. In addition, fertility decline at younger ages has ceased in the mid-1970s cohorts in Eastern Germany, suggesting that the postponement transition has paused there, while it still continues in Austria, Switzerland, and, at a low intensity, in Western Germany. Also the trajectories of the *Recuperation Index* show some differences: The *RI* increased in the mid-1960s cohorts in two regions, gradually in Austria, and more rapidly in Eastern Germany (but from a very low initial base) and it has generally stagnated or slightly declined in Western Germany and Switzerland. Despite these differences, these regions fall within a broadly similar range of the *RI* around 50 % in the late 1960s cohorts.

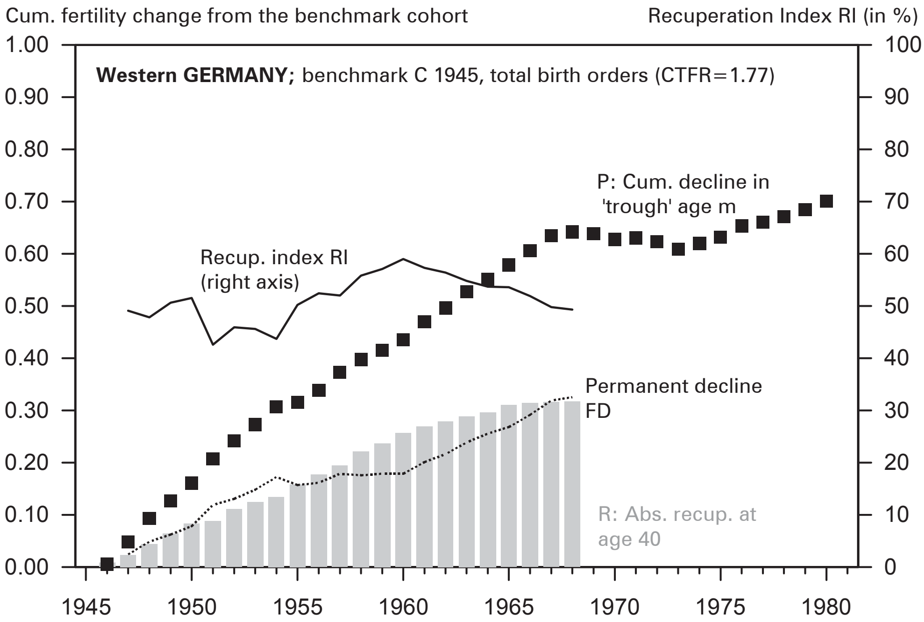
Differences in completed fertility across countries during the *postponement transition* may be related to the differences in three key components of the recuperation process: (1) fertility level among the benchmark cohort ($CTFR_b$), (2) absolute fertility decline at younger ages (P_c), and (3) relative fertility recuperation, as captured by the RI_c index. A simple decomposition may explain the difference between the cumulated fertility rate at age 40 in Sweden, which has had a pattern of an almost complete recuperation and retains stable fertility close to two births per woman, and the cumulated fertility at that age in the other countries analysed. Swedish cumulated fertility amounted to 1.95 in the 1967 cohort. The decomposition, described in detail in Appendix 2 in our expanded study (*Sobotka et al*. 2011), leads to one clear-cut conclusion: in the six regions analysed, each of the three components – a lower fertility in the benchmark cohort, a steeper decline in trough and a less vigorous recuperation – played a role in explaining lower fertility in the 1967 cohort when compared with Sweden (Fig. 7). The only exception was the higher level of benchmark cohort fertility in the Netherlands. This portrait of absolute differences can be complemented with a picture of the relative distribution of the overall difference between Sweden and other countries analysed (see Fig. 20 in *Sobotka et al*. 2011). Two factors clearly dominate in the predominantly German-speaking countries: The lower initial fertility level in the benchmark cohort, and a low degree of recuperation of the presumably "postponed" fertility, are responsible for a large share (86 %-93 %, except in Western Germany) of the differences in completed fertility observed between Sweden, on one side, and Austria, Germany and Switzerland on the other. Only in Western Germany did the large magnitude of fertility decline at younger ages have an additional strong influence on this difference in completed fertility.

Fig. 6: Graphical summary of the postponement and recuperation process: total birth orders in Austria, Germany and Switzerland since the onset of fertility postponement



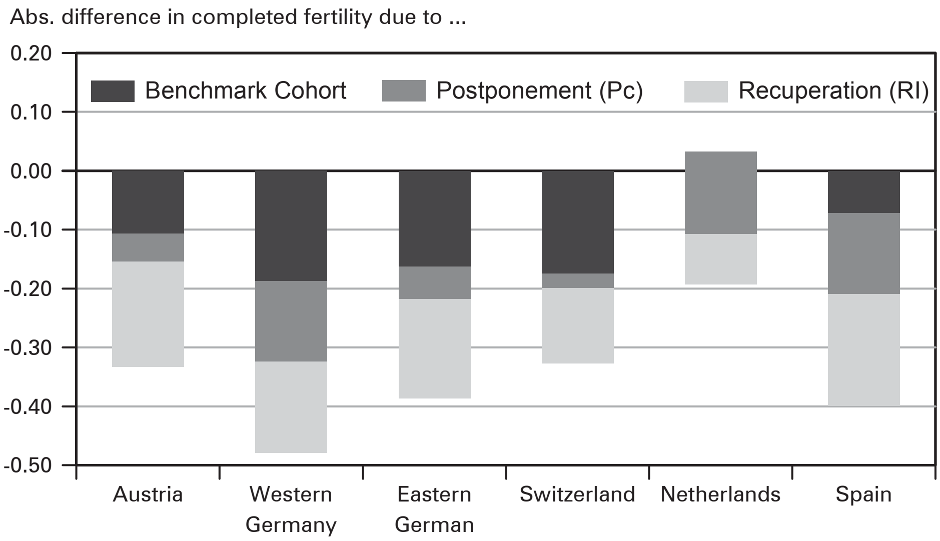






Source: see section 2.

Fig. 7: Absolute contribution of three components of the *postponement transition* to the differences in cumulated cohort fertility at age 40 between Sweden and selected countries of Europe. Women born in 1967



Source: see section 2.

6 Projection scenarios for five countries

Using data and models introduced above, we formulate projection scenarios of completed fertility in five countries with a different history of the cohort postponement process: Austria, the Czech Republic, the Netherlands, Spain and Switzerland. We compute two distinct sets of projections: one based on the *basic benchmark* approach, using key parameters of the postponement process with projected values of the *Recuperation Index* (see section 4.1), and another that relies on the relational model of fertility, summarised in section 4.2. We compute these projections for age 40, rather than for ages 45 or 50, in order to obtain time series of projection parameters for somewhat younger cohorts. At the same time, we recognize a rising importance of late fertility after age 40 for the completed fertility rate (*Billari et al.* 2007), and are aware that a small portion of the *recuperation* is being shifted beyond age 40, and is thus not captured by our *Recuperation Indexes* and projection scenarios. Therefore, in some of our analyses we also perform a separate trend projection of cohort fertility rates by birth order at ages 40+. The projected completed fertility is then computed, combining the projection scenarios for age 40 with a separate fertility projection for ages 40+. For instance, projections of completed fertility based on extrapolating the *Recuperation Index* are computed as follows:

$$pCTFR_c^i = CTFR_b^i(40) + P_c^i.(1 - pRI_c^i(40)) + pF_c^i(40+) \tag{13}$$

where *p* stands for projected indicators and $pF^i(40+)$ represents projected fertility rates at order *i* at ages 40 and above. We compute two baseline scenarios: The first simply keeps the most recent observed *Recuperation Index* constant and the second extrapolates the *RI* trends observed among the cohorts recently reaching age 40, using linear extrapolation. Depending on individual country trajectories and analysts' needs, other extrapolation methods can be used as well. For each of these two baseline scenarios, we obtain two sub-scenarios of the completed *CTFR*, the first based on a direct computation for total birth orders and the second – which we prefer – based on adding order-specific projection results.

Table 2 provides a first glimpse of the projection results, concentrating on the 1980 cohort that was approaching age 30 at the start of the projection (2009 or 2010). The two approaches derived from order-specific *Recuperation Indexes* give identical results for Austria, the Netherlands and Switzerland. They differ somewhat in the case of Spain, which has a low projected completed fertility rate of 1.45 and 1.41, respectively. For the Czech Republic, the difference is considerable. Similar scenarios can be computed without using order-specific data (see *Sobotka et al.* 2011), but we expect that the parity-specific analysis is likely to improve projection accuracy and reliability. We compare these results with a simple projection scenario combining cohort fertility rates observed up to 2008 or 2009 with constant age-specific fertility rates in that year. This scenario does not allow any additional recuperation during the projection period, and thus is likely to underestimate completed fertility. For two countries, Austria and the Czech Republic, it shows considerably lower values than the scenarios based on the postponement-recuperation framework.

We also show projections of childlessness based on the *stable RI* and the *trend RI* scenarios (Fig. 8). These two scenarios differ considerably for the Czech Republic, the Netherlands as well as Spain: In the Netherlands, the trend scenario leads to a steady fall in childlessness, whereas in Spain it indicates its rapid increase to

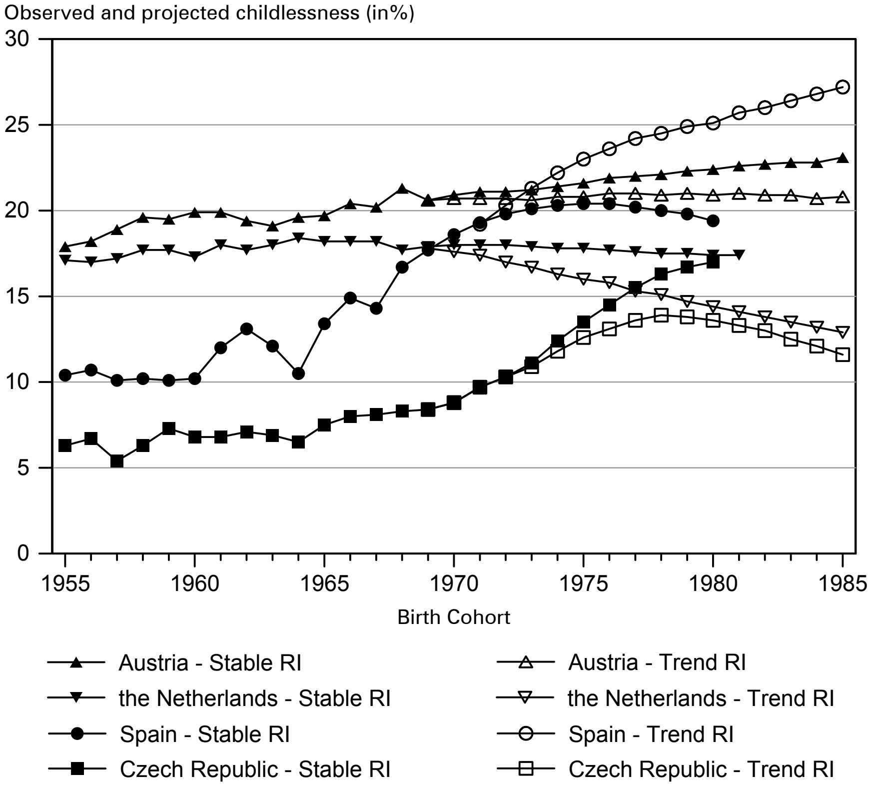
Tab. 2: Projected completed fertility rates among women born in 1980 based on different scenarios

	Derived from order-specific scenarios		Keeping the 2008 age-specific fertility constant
	Stable *RI*	Trend *RI*	
Austria	1.60	1.61	1.48
Czech Republic	1.68	1.82	1.56
the Netherlands	1.77	1.77	1.76
Spain	1.45	1.41	1.39
Switzerland	1.56	1.55	1.52

Note: in each scenario, the observed cohort fertility rates by age until 2008-2009 are combined with the projected values thereafter.

Source: see section 2.

Fig. 8: Observed and projected childlessness (in %) among women born during the years 1955-1985. Stable and trend scenarios



Source: see section 2.

the levels above 25 % in the early 1980s cohorts. Such differences nicely illustrate considerable uncertainty in childlessness projections among the women who had not yet reached the "recuperation" stage at the start of the projection period.

Such projections can be further complemented with purely hypothetical "no recuperation" and "full recuperation" scenarios. These can be seen as exercises in sensitivity analysis, demonstrating the importance of the recuperation process for the projected completed fertility, but also showing how narrow or wide the spread of the projected scenarios is within the hypothetical limits given by the "full recuperation" vs. "no recuperation". For instance, in Austria and in the Czech Republic a complete absence of fertility *recovery* at ages after the *trough* would eventually push completed fertility close to 1 in the mid-1980s cohorts, as contrasted to 1.9 in the "full recuperation" scenario and to the actually projected values of 1.6 in Austria and around 1.7-1.8 in the Czech Republic (see Figure A4 in the Appendix to *Sobotka et al.* 2011).

The projections based on the relational model give similar insights and broadly comparable trends of the future cohort fertility as the scenarios based on the Recuperation Indexes. In Figure 9, we compare three order-specific scenarios of completed fertility, two based on projecting the Recuperation Index (*Trend RI* and *Stable RI* scenarios) and the other based on projecting the postponement ratios PR_c in the relational model (see section 4.2 above). Hypothetical simplistic scenarios combining the most recent cumulated cohort fertility by age and birth order with the most recent set of age-specific fertility rates, which are subsequently kept constant, are also depicted. For Austria and Switzerland the figure also provides a comparison with the official projections (Fig. 9b and 9c), specifically, with the completed cohort fertility implied by the projection scenarios of period fertility rates by age, published by Statistics Austria and the Swiss Federal Statistical Office (see *Goldstein et al.* 2011, in CPoS 36,2-3 for an overview and a critical assessment).

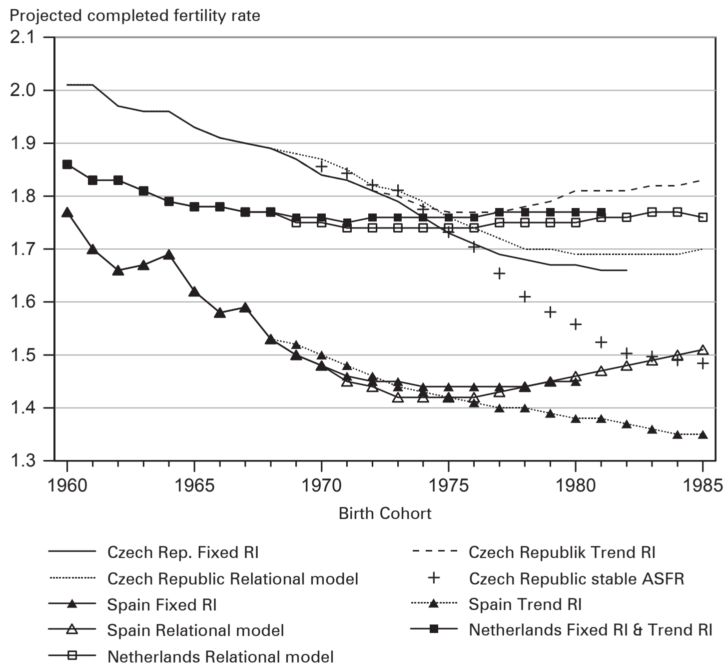
The projection indicates considerable heterogeneity in cohort fertility in the five countries analysed. For Austria and the Netherlands, stabilization is projected for women born after 1980, at a higher level in the Netherlands (just below 1.8 children per woman) than in Austria (around 1.6). The main factor behind their different projected fertility is the lower "starting" *CTFR* level of the *benchmark cohort* in Austria, combined with a complete absence of *recuperation* at third and higher-order births. In Austria, these projections are close to (relational model) or moderately above (projections based on the *RI*) the main scenario of the recent official fertility projection, suggesting that the continuous fall implied by its low scenario is very unlikely to materialise.

For Switzerland, the three projection scenarios shown envision a gradual decline in fertility towards a similar level of 1.55 in the 1980 cohort. These scenarios also come remarkably close to the official medium scenario among the youngest cohorts analysed. The results are less stable and less reliable for the Czech Republic and Spain due to a later start of the postponement process and dynamic changes in fertility since the late 1990s. Therefore, the scenarios of completed fertility illustrate considerable uncertainty with regard to the completed fertility among the early 1980s cohorts, with Spain falling into a low-fertility range of 1.35-1.51 (or 1.57 if the scenarios for all birth orders combined were considered (not included in Figure 9a)) and the Czech Republic depicting a wide, but relatively high range of 1.6-1.8 (or 1.9 if the scenarios for total birth orders were included). The results for the Czech Republic contrast strongly with a hypothetical (and unlikely) scenario assuming no further changes in fertility after 2009, which implies a rapid fall in completed fertility below 1.5 in the mid-1980s cohorts.

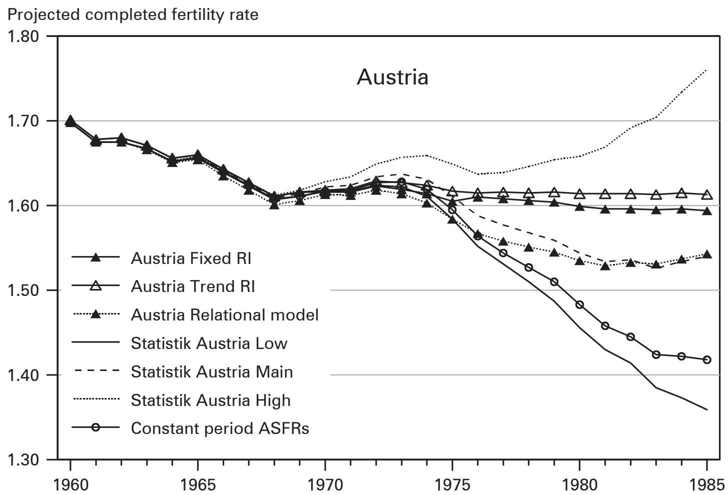
It is important to emphasise limitations of our projection approaches. The projections are sensitive to the specification of the *trend scenario*, which strongly depends on the type of extrapolation selected and the reference period on which the extrapolation is based. Moreover, parity-specific projections are sensitive to the quality of birth statistics by birth order. We recommend that the analysts perform sensitivity analysis when using this approach, modelling different possible trends in the *recuperation index* at each birth order analysed.

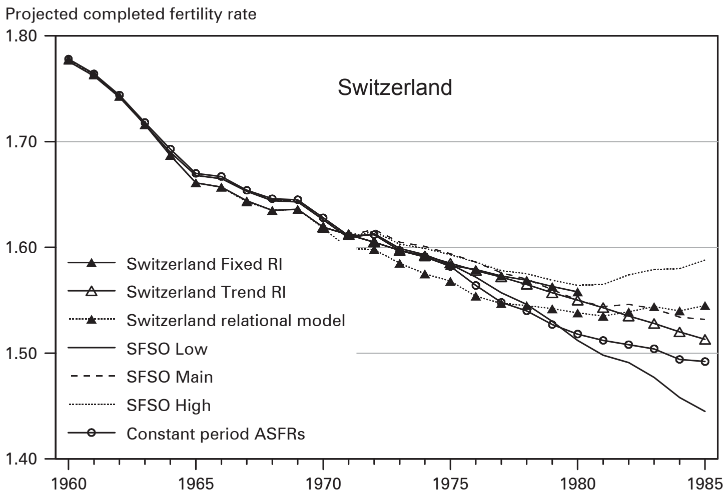
Fig. 9: Completed cohort fertility rate, projected by different methods for the cohorts born through 1985

a. Czech Republic, the Netherlands, and Spain



b and c. Austria and Switzerland: Also shown are cohort fertility scenarios implied by the recent official projections and the scenario based on the "constant rates" scenario





Note: Official scenarios are computed from the official period fertility projections transformed into cohort fertility rates (see *Goldstein et al.* 2011, in CPoS 36,2-3).

Source: own design based on sources listed in Section 2; SFSO fertility projection based on *Goldstein et al.* (2011)

7 Conclusions

Our study has revisited the analysis of cohort fertility *postponement* and *recuperation*, focusing on a range of European countries, as well as on the United States. Whereas period fertility rates became considerably distorted by this shift in the timing of childbearing, and thus also less useful for a range of analytical and projection purposes, the cohort approach allows for a much neater, tidier view of the recent fertility transformations. These transformations may be partly or largely driven by period factors, such as economic ups and downs or sudden changes in the labour market and government policies. Nevertheless, our analytical tools would remain useful for descriptive, analytical and projection purposes, even if the observed fertility transformations were mostly driven by such period influences.

We have discussed a range of extensions, elaborations and improvements in the methods used to date, focusing both on analysing the actual progression of the *postponement* and *recuperation* process and projecting completed fertility among the cohorts of women of reproductive age. Whenever data allow, dissecting the overall trends in fertility into order-specific components clearly provides an added value to the analysis, and greater reliability to the projections. The *postponement transition* can be illustrated by several key order-specific indicators that capture its progression, specifically, the fertility level of the benchmark cohort, the size of younger-age fertility decline, and the degree of "recuperation" at older ages, measured by the recuperation index (RI_c). These three indicators can also serve as the main inputs of completed cohort fertility projections. Alternatively, a full set of age-and order-specific cohort fertility rates can be projected using the relational model of cohort fertility, first proposed by *Lesthaeghe* (2001) and further elaborated here.

Our illustrations and cross-country analyses, focusing on Austria, Germany and Switzerland, as well as four European countries representing broader regions (Czech Republic, the Netherlands, Spain and Sweden), and the United States, contribute a number of important observations:

- The initial fertility level in the "reference cohort" matters. Some of the recent cohort fertility differences between countries can be traced back to the initial differences before the onset of the *postponement transition*. Countries which currently have low fertility levels, including Austria, Germany and Switzerland, in most cases already had rather low fertility at the onset of the first birth postponement.
- The recuperation process is paramount for understanding the differences in fertility observed. Typically, countries with low cohort fertility in the order of 1.4-1.6 births per woman in the late 1960s cohorts, including Germany and Spain, show much weaker recuperation than the countries with comparatively higher completed fertility rates around 1.8-2.0, such as the Netherlands and Sweden.
- Fertility recuperation differs widely by birth order. All the countries analysed show a strong recuperation in first birth rates, whereas the recuperation index in the third and higher-order births varies between null in Spain and Austria through 0.4-0.5 in the Czech Republic and the Netherlands to an "over-compensation" (above 1) in the United States (see also below).
- Fertility *postponement*, as measured by the cumulated absolute fertility decline at younger ages, P_c, has come to an end, at least temporarily, in many developed countries starting in the early- to mid-1970s cohorts. This also holds for three countries in our analyses the Netherlands, Spain, and Sweden, as well as for Eastern Germany.
- Projection scenarios of completed fertility suggest relatively stable fertility levels in the countries that have progressed furthest in the postponement process, while for the countries where childbearing postponement started relatively late, the scenarios often diverge, capturing considerable uncertainty in the unfolding *recuperation*. Among the countries analysed, the scenarios studied indicate a broad stabilisation in the completed fertility among the women born after 1975 in the Netherlands (close to 1.8), Austria (at 1.6), and among women born after 1980 in Switzerland (at 1.55), while a rather broad range of fertility levels was projected for the Czech Republic and Spain, with the former potentially retaining a higher fertility of up to 1.9 and the latter experiencing a fall in completed fertility to 1.35 in the lowest scenario presented.
- Projections elaborated here often show considerably higher completed fertility than the simplistic method that keeps the most recent age-specific fertility rates constant. Accounting for the likely future recuperation thus helps the projection-makers to avoid scenarios with unrealistically rapid fertility declines and unlikely low completed fertility rates.

- As the projected fertility and childlessness levels differ considerably across countries, the cross-country differences in low fertility observed are here to stay. The completed fertility of the early 1980s cohorts in individual countries is likely to range between the threshold of lowest-low cohort fertility of 1.3 births per woman and the replacement fertility levels of 2.1 births per woman.
- Among the countries analysed, the United States clearly stand out for their persistently high fertility among teenage women and young adults, and therefore a limited extent of birth *postponement* combined with an "overcompensation" of the postponed fertility during the *recuperation* stage. This unique pattern brings a slight increase in completed fertility among the cohorts experiencing fertility *postponement*, resulting in the completed fertility of around 2.1 in the late 1960s cohorts. High fertility rates among the Hispanic population and some religious groups (Mormons, Evangelical Protestants) have repeatedly been noted as the main reason for the relatively high and early fertility pattern in the U.S. (*Cherlin* 2010; *Westoff/Marshall* 2010).
- Adding education into the analysis explains a considerable part of the *postponement* process. Rising educational attainment among women has strongly contributed to declining first birth rates at younger ages in the post-1950 cohorts in five out of the nine countries studied in the supplementary online Appendix.

Based on our findings, Austria, Germany and Switzerland share a number of common features in their *postponement transition*: the low cohort fertility level prior to its onset, its relatively even pace over time, but also the low or almost no *recuperation* at higher birth orders. Unlike some countries of Western and Northern Europe, a gradual fertility *postponement* in these three countries, as indicated by declining fertility at younger childbearing ages, gradually continues to date. Eastern Germany, where fertility postponement started late but progressed very rapidly in the cohorts born after 1960, is an important exception to these findings.

The approaches elaborated in this study are not without caveats. First, these methods are suited solely for analysing and projecting cohort fertility changes when a long-lasting process of changing timing pattern of childbearing, be it either postponement or advancement of births, sets in. Second, as ever more births occur at advanced reproductive ages, projections of the completed cohort fertility of women who are currently in the middle of their reproductive span have become more uncertain. Third, projection methods based on the relational approach need further testing, comparisons with the more established methods, and further elaboration.

These limitations and possible extensions notwithstanding, the research presented here has a broad relevance and usefulness. Graphical representations and the indicators of *postponement* and *recuperation* can be employed in a variety of contemporary settings, leading to more rigorous analyses of cohort fertility transformations. These approaches are potentially suitable for studying cohort postponement transitions outside of Europe, for instance, in East Asia (*Frejka et al.* 2010) as well as in less affluent societies, especially in Latin America (*Rosero-Bixby et al.* 2009). Modelling the *postponement transition*, using selected social, economic and cultural variables alongside the key indicators of the postponement process constitutes another promising extension. The factors driving fertility recuperation have not been adequately studied to date, although several, including education level, gender equality, family policy regimes, and an acceptance of fertility outside marriage have been repeatedly suggested as important (*Sánchez-Barricarte/Fernández-Carro* 2007; *Sobotka* 2008; *Lesthaeghe* 2010; *Bratti/Tatsiramos* 2012). Six decades after *Ryder's* (1951) seminal work on the subject, cohort fertility analysis has become ripe with new research potential. It is set to benefit from fresh, critical looks, new methodological developments, and new research directions.

Acknowledgements

We greatly appreciate the assistance of Marion Burkimsher, who has kindly provided us with her extensive collection and estimates of detailed period and cohort fertility data for Switzerland.

This publication was generated in the context of the interdisciplinary working group Future with Children – Fertility and the Development of Society. This group has been jointly established by the Berlin-Brandenburgische Akademie der Wissenschaften and the Nationale Akademie der Wissenschaften Leopoldina and is funded by the Jacobs Foundation.

References

Billari, Francesco C.; Kohler, Hans-Peter 2004: Patterns of low and lowest-low fertility in Europe. In: Population Studies 58,2: 161-176 [doi:10.1080/0032472042000213695].

Billari, Francesco C. et al. 2007: Approaching the limit: long-term trends in late and very late fertility. In: Population and Development Review 33,1: 149-170 [doi: 10.1111/j.1728-4457.2007.00162.x].

Bongaarts, John; Feeney, Griffith 1998: On the quantum and tempo of fertility. In: Population and Development Review 24,2: 271-291 [doi:10.2307/2807974].

Bongaarts, John; Sobotka, Tomáš 2012: Demographic explanations for the recent rise in European fertility. In: Population and Development Review 38,1: 83-120 [doi: 10.1111/j.1728-4457.2012.00473.x].

Bosveld, Willy 1996: The ageing of fertility in Europe. A comparative demographic-analytic study. Doctoral dissertation. PDOD Publications. Amsterdam: Thesis Publishers.

Bratti, Massimiliano; Tatsiramos, Konstantinos 2012: The effect of delaying motherhood on second childbirth in Europe. In: Journal of Population Economics 25,1: 291-321 [doi:10.1007/s00148-010-0341-9].

Caltabiano, Marcantonio 2008: Has the fertility decline come to an end in the different regions of Italy? New insights from a cohort approach. In: Population-E 63,1: 157-172 [doi:10.3917/pope.801.0157].

Caltabiano, Marcantonio; Castiglioni, Maria; Rosina, Alessandro 2009: Lowest-low fertility: signs of a recovery in Italy? In: Demographic Research 21,23: 681-718 [doi:10.4054/DemRes.2009.21.23].

Cherlin, Andrew J. 2010: Demographic trends in the United States: a review of research in the 2000s. In: Journal of Marriage and Family 72: 403-419 [doi:10.1111/j.1741-3737.2010.00710.x].

Devolder, Daniel; Ortiz, Elsa 2010: Human Fertility Database Documentation: Spain. Forthcoming at [www.humanfertility.org].

Eurostat 2003: New Cronos database. Theme 3: Population and social conditions. Data for Spain URL: http://epp.eurostat.ec.europa.eu, 15.5.2003.

Eurostat 2010: Population and Social Conditions. URL: http://epp.eurostat.ec.europa.eu, 15.3.2010.

Frejka, Tomas 2011: The Role of Contemporary Childbearing Postponement and Recuperation in Shaping Period Fertility Trends. In: Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft 36,4 (forthcoming).

Frejka, Tomas; Calot, Gérard 2001: Cohort reproductive patterns in low fertility countries. In: Population and Development Review 27,1: 103-132 [doi:10.1111/j.1728-4457.2001.00103.x].

Frejka, Tomas; Sardon, Jean-Paul 2004: Childbearing trends and prospects in low-fertility countries: A cohort analysis. In: European Studies of Population 13. Kluwer Academic Publishers.

Frejka, Tomas; Sardon, Jean-Paul 2007: Cohort birth order, parity progression ratio and parity distribution trends in developed countries. In: Demographic Research 16,11: 315-374 [doi:10.4054/DemRes.2007.16.11].

Frejka, Tomas; Jones, Gawin; Sardon, Jean-Paul 2010: East Asian childbearing patterns and policy developments. In: Population and Development Review 36,3: 579-606 [doi:10.1111/j.1728-4457.2010.00347.x].

Goldstein, Joshua; Sobotka, Tomáš; Jasilioniene, Aiva 2009: The end of lowest-low fertility? In: Population and Development Review 35,4: 663-700 [doi:10.1111/j.1728-4457.2009.00304.x].

Goldstein, Joshua R.; Rößger, Felix; Jaschinski, Ina; Prskawetz, Alexia 2011: Fertility Forecasting in the German-speaking World: Recent Experience and Opportunities for Improvement. In: Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft 36,2-3 [doi: 10.4232/10.CPoS-2011-09en].

Kohler Hans-Peter; Billari, Francesco C.; Ortega, José Antonio 2002: The emergence of lowest-low fertility in Europe during the 1990s. In: Population and Development Review 28,4: 641-680 [doi:10.1111/j.1728-4457.2002.00641.x].

Kreyenfeld, Michaela et al. 2010: The German birth order register – order-specific data generated from perinatal statistics and statistics on out-of-hospital births 2001-2008. In: MPIDR Working Paper WP 2010-010. Rostock: Max Planck Institute for Demographic Research.

Kreyenfeld, Michaela; Zeman, Kryštof; Burkimsher, Marion; Jaschinski, Ina 2011: Fertility data for German-speaking countries. What is the potential? Where are the pitfalls? In: Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft 36,2-3 [doi: 10.4232/10.CPoS-2011-06en].

Lesthaeghe, Ron 2001: Postponement and recuperation: Recent fertility trends and forecasts in six Western European countries. Paper presented at the IUSSP Seminar "International perspectives on low fertility: Trends, theories and policies", Tokyo, 21-23 March 2001. www.vub.ac.be/SOCO/ron/Posp Recup Fert Tokyo seminar.pdf

Lesthaeghe, Ron 2010: The unfolding story of the Second Demographic Transition. In: Population and Development Review 36,2: 211-251 [doi:10.1111/j.1728-4457.2010.00328.x].

Lesthaeghe, Ron; Surkyn, Johan 1988: Cultural dynamics and economic theories of fertility change. In: Population and Development Review 14,1: 1-45 [doi:10.2307/1972499].

Lesthaeghe, Ron; Willems, Paul 1999: Is low fertility a temporary phenomenon in the European Union? In: Population and Development Review 25,2: 211-228 [doi:10.1111/j.1728-4457.1999.00211.x].

Mayer, Karl Ulrich; Schulze, Eva 2009: Delaying parenthood in East and West Germany. A mixed-methods study of the onset of childbirth and the vocabulary of motives of women of the birth cohort of 1971. In: Working Papers 123. Mannheim: Mannheimer Zentrum für Europäische Sozialforschung.

Neels, Karel 2006: Reproductive strategies in Belgian fertility. NIDI/CBGS Publications 38, Brussels: CBGS.

Neels, Karel 2010: Economic context and fertility outcomes. Exploring educational differentials in postponement and recuperation of first births in Belgium, France, and the Netherlands. Paper presented at the European Population Conference, Vienna, 2 September 2010.

Neels, Karel; De Wachter, David 2010: Postponement and recuperation of Belgian fertility: how are they related to rising female educational attainment? In: Vienna Yearbook of Population Research 8: 77-106 [doi:10.1553/populationyearbook2010s77].

Ní Bhrolcháin, Máire 1992: Period paramount? A critique of the cohort approach to fertility. In: Population and Development Review 18,4: 599-629 [doi:10.2307/1973757].

Ní Bhrolcháin, Máire 2011: Tempo and the TFR. In: Demography 48: 841-861 [doi:10.1007/s13524-011-0033-4].

Ní Bhrolcháin, Máire; Toulemon, Laurent 2005: Does postponement explain the trend to later childbearing in France? In: Vienna Yearbook of Population Research 3: 83-107. [doi:10.1553/populationyearbook2005s83].

Rosero-Bixby, Luis; Castro-Martín, Teresa; Martín-García, Teresa 2009: Is Latin America starting to retreat from early and universal childbearing? In: Demographic Research 20,9: 169-194 [doi:10.4054/DemRes.2009.20.9].

Ryder, Norman 1951: The cohort approach. PhD dissertation, New York: Princeton University Press.

Sánchez-Barricarte, Jesús J.; Fernández-Carro, Remo 2007: Patterns in the delay and recovery of fertility in Europe. In: European Journal of Population 23,2: 145-170 [doi:10.1007/s10680-006-9114-2].

Schoen, Robert 2004: Timing effects and the interpretation of period fertility. In: Demography 41,4: 801-819 [doi:10.1353/dem.2004.0036].

Sobotka, Tomáš 2004: Is lowest-low fertility explained by the postponement of childbearing? In: Population and Development Review 30,2: 195-220 [doi:10.1111/j.1728-4457.2004.010_1.x].

Sobotka, Tomáš 2008: Does persistent low fertility threaten the future of European populations? In: *Surkyn, Johan; Deboosere, Patrick; van Bavel, Jan* (Eds.): Demographic challenges for the 21st Century. A state of art in demography. Brussels: VUBPRESS: 27-89.

Sobotka, Tomáš 2011: Fertility in Austria, Germany and Switzerland: Is there a Common Pattern? In: Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft 36,2-3 [doi: 10.4232/10.CPoS-2011-11en].

Sobotka, Tomáš; Lutz, Wolfgang 2011: Misleading policy messages derived from the period TFR: should we stop using it? In: Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft 35,3: 637-664 [doi: 10.4232/10.CPoS-2010-15en].

Sobotka, Tomáš et al. 2011: Postponement and recuperation in cohort fertility: New analytical and projection methods and their application. In. European Demographic Research Papers 2-2011. Vienna: Vienna Institute of Demography.

Statistics Austria 1989: Volkszählung 1981. Eheschließungs- und Geburtenstatistik. Vienna: Österreichisches Statistisches Zentralamt.

Tu, Edward Jow Ching; Zhang, Xia 2004: Patterns of low fertility in Hong Kong and Taiwan. Unpublished paper. Kowloon: Hong Kong University of Science and Technology, Social Science Division.

Westoff, Charles; Marshall, Emily 2010: Hispanic fertility, religion, and religiousness in the U.S. In: Population Research and Policy Review 29,4: 441-452 [doi:10.1007/s11113-009-9156-3].

A German translation of this reviewed and author's authorised original article by the Federal Institute for Population Research is available under the title "Aufschieben und Nachholen von Geburten aus der Kohortenperspektive: Deutschland, Österreich, und die Schweiz im europäischen Kontext", DOI 10.4232/10.CPoS-2011-10de or URN urn:nbn:de:bib-cpos-2011-10de9, at http://www.comparativepopulationstudies.de.

Date of submission: 11.01.2011 *Date of Acceptance: 05.03.2012*

Dr. Tomáš Sobotka (✉). Dr. Kryštof Zeman. Vienna Institute of Demography, Austrian Academy of Sciences and Wittgenstein Centre for Demography and Global Human Capital. Vienna, Austria. E-Mail: tomas.sobotka@oeaw.ac.at; krystof.zeman@oeaw.ac.at. URL: http://www.oeaw.ac.at

Dr. Ron Lesthaeghe. Em. Prof. Vrije Universiteit Brussel (VUB) and visiting Research Associate, Center for Demographic Studies, Universitat Autonoma of Barcelona (UAB). E-Mail: rlesthaeghe@yahoo.com

Dr. Tomas Frejka. Independent Consultant, Sanibel, Florida, USA. E-Mail: tfrejka@aol.com

Prof. Dr. Karel Neels. Sociology Department, University of Antwerp. Belgium. E-Mail: Karel.Neels@ua.ac.be. URL: http://www.ua.ac.be

Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft

www.comparativepopulationstudies.de

ISSN: 1869-8980 (Print) – 1869-8999 (Internet)

Published by / Herausgegeben von
Prof. Dr. Norbert F. Schneider

Federal Institute for Population Research
D-65180 Wiesbaden / Germany

Managing Editor / Verantwortlicher Redakteur
Frank Swiaczny

Editorial Assistant / Redaktionsassistenz
Katrin Schiefer

Language & Copy Editor (English) / Lektorat & Übersetzungen (englisch)
Amelie Franke

Copy Editor (German) / Lektorat (deutsch)
Dr. Evelyn Grünheid

Layout / Satz
Beatriz Feiler-Fuchs

E-mail: cpos@destatis.de