CHILDLESS SOCIETIES? TRENDS AND PROJECTIONS OF CHILDLESSNESS IN EUROPE AND THE UNITED STATES[1]

Tomáš Sobotka, Draft July 2005

ABSTRACT

Using period and cohort fertility data for 17 European countries and the United States, this paper analyses and projects trends in final childlessness among women born between 1940 and 1975. Two basic scenarios of lifetime childlessness are presented for women born after 1955. The first, upper bound scenario, assumes that the most recent age-specific first birth probabilities will remain constant. The second, lower bound scenario, employs Kohler and Ortega's (2002a) adjustment for tempo and variance effects to modify the period first birth probabilities employed in the first scenario. Since both of these methods are markedly less affected by the fertility postponement than the more commonly used incidence rates of first birth order, they should project final childlessness with a considerably higher accuracy. This hypothesis is strongly supported by a retrospective projection computed for five countries that had experienced postponement of childbearing already by the late 1970s. The presented scenarios reveal that lifetime childlessness will increase gradually in almost all industrialised countries, although the timing and the magnitude of this change varies across countries. The scenarios for the United States indicate a slight decline in final childlessness, deviating from the projected trend in other countries. In the high-childlessness regions—especially West Germany and England and Wales—final childlessness among women born after 1970 is likely to come close to 25%, and will almost certainly remain below 30%, while the more common childlessness levels will range between 15 and 22%.

1 INTRODUCTION

Considering the social, economic and cultural trends of the last 35 years, most odds are in favour of rapidly increasing childlessness. Modern contraception has shifted control over reproduction and childbearing decisions almost entirely to women. At the same time, their educational and career opportunities have virtually equalled those of men. The feminist movement—at least its earlier stage—helped to fuel women's labour participation and

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detachment from traditional family roles. The movement was interpreted as "urging women to define autonomy and self-actualisation as the major goals of their life" and "to avoid total economic dependence on a man by becoming or remaining employed" (Chafetz 1995). Increased individual aspirations and a new image of a dual-earner family as a benchmark serving to evaluate one's living standard have further strengthened career orientation in women's lives. Partnerships have become more fragile, with more young people remaining single or cohabiting and marriages being eroded by rising divorce rates (e.g. Kuijsten 1996). Furthermore, the decision to become a parent has been increasingly seen as a matter of personal choice. Coupled with the growing demands of the labour market in terms of qualification requirements, competitiveness, and flexibility, high levels of childlessness may be viewed as the inevitable consequence of recent societal transformations as well as the competitive character of liberal market societies. A single individual 'unhindered' by any commitments is the winner in the race: Beck (1992: 116) proposed that "the ultimate market society is a childless society."

Very low levels of period first birth incidence rates[2] combined with a rapidly increasing proportion of women remaining childless in their late 20s and early 30s indeed appear to indicate that lifetime childlessness might be expected to increase sharply in the majority of industrialised countries. In Spain, the Netherlands and Italy, more than half of women born in 1968 were still childless when they reached age 30, a spectacular increase as compared with 21% (Italy) to 26% (the Netherlands) of women born in 1950 remaining childless at that age. Yet the expectations that final childlessness may reach dramatically high levels, formulated in some earlier contributions addressing this issue, have not materialised. In fact, most projections produced in the past provided too high estimates of lifetime childlessness.

At the heart of the problem of projecting final childlessness among women who are still in reproductive age is the process of postponement of childbearing among young women and 'catching up' at later ages. While under the conditions of stable fertility timing various indicators of period fertility provide roughly comparable values, fertility postponement distorts these indicators and results not only in a steep decline in the total fertility rates, largely driven by the *tempo-effects*, but also in a substantial variability of different period fertility measures (Sobotka 2004). Ryder (1980: 16) observed that "the fundamental flaw in research based on period mode is simply that changes in cohort tempo are manifested as changes in period quantum." This finding may equally be formulated in a purely period manner: changes in the period *tempo* (timing) of fertility are disrupting the measurement of period fertility *quantum* (Bongaarts and Feeney 1998). Particularly the use of the total fertility rates specified by birth order may lead to highly distorted interpretations of the childlessness

[2] The term 'incidence rates,' (also called 'reduced rates,' and 'rates of second kind') denotes age- and order-specific fertility rates, which do not account for exposure, i.e. are related to the whole population of women in a given age irrespective of their parity status.

trends, suggesting much higher levels of childlessness than those calculated for real birth cohorts (Ryder 1990; Bongaarts 2002).

Should the attempts to estimate future levels of ultimate childlessness be abandoned? Working with the U.S. data, Chen and Morgan (1991: 523) and Morgan and Chen (1992: 489) have argued that the use of the period 'life table method' (here also referred to as a 'fertility table'[3]) to estimate the future cohort fertility among women still in childbearing age seems to provide a reasonable estimate of childlessness. Cruijsen and van de Giessen (1988: 212), inspecting data for the Netherlands, concluded that although the fertility table estimates are also distorted by the strong delays or 'catching up' of first births, they provide a "much better indication of the actual level of childlessness than the traditionally used total first birth rates". A similar argument has been put forward by Merlo and Rowland (2000), who used a fertility table of first births in 1996 to project lifetime childlessness among Australian women. More recently, Kohler and Ortega (2002a) proposed a fertility adjustment method, which reflects the level, tempo and postponement pattern of fertility in a given calendar year. As contrasted with the period fertility adjustment proposed by Bongaarts and Feeney in 1998, which uses incidence rates and does not reflect real exposure, this method works with age- and parity-specific exposure indicators of fertility (occurrence-exposure rates) and therefore is compatible with the fertility table framework. Kohler and Ortega (2002b) illustrated its use for the scenarios of cohort fertility in three European countries experiencing long-lasting postponement of childbearing: Sweden, the Netherlands and Spain.

Using detailed data on period and cohort fertility, this paper presents two scenarios of final childlessness in 17 European countries and the United States. These scenarios are based the most recent data on cohort parity distribution among women combined with the recent set of non-adjusted and adjusted period age-specific first birth probabilities. Childlessness among women currently of childbearing age is likely to remain within the range of these two scenarios, which are therefore considered as lower and upper bound scenarios. The low-childlessness scenario assumes that starting with the reference year women will experience a first birth pattern corresponding to the most recent adjusted period first birth probabilities. This is a first birth recuperation scenario, coined by Kohler and Ortega (2002a and 2002b) as a 'postponement stops' scenario. Van Imhoff (2001) proposed that this is the most likely projection of cohort fertility out of the three scenarios discussed by Kohler and Ortega (2002a). The high-childlessness scenario assumes that analysed birth cohorts of women will continue their childbearing according to the schedule of the most recent period first birth probabilities, implying that there would be no 'catching-up' effects in the future. The hypothesis that these two scenarios constitute the realistic range of lifetime childlessness

[3] The term '(period) fertility table' denotes an age-parity life table depicting period fertility schedule of age and parity-specific birth probabilities.

among women aged 25 and older in the base year of the projection[4] is tested empirically: for five countries where the fertility postponement started already in the 1970s, retrospective projections of childlessness with the base year 1981 were computed for women born in 1935 to 1960 and compared with the actual childlessness recorded in the most recent data.

Besides the methodological discussion and evaluation of the childlessness projections, this contribution focuses on recent trends in final childlessness, both among women who have already completed their childbearing (birth cohorts 1940-1955) and women who are still in their childbearing years (birth cohorts 1960-1975). Birth cohort 1940 provides a useful frame of reference as these women belong to the baby-boom generation giving birth to their first child in the first half of the 1960s and having particularly low levels of childlessness (Rowland 1998). With the exception of France, West Germany and Italy, for which recent data were not available, women born in 1975 were aged 24 to 28 years at the starting point of the projection, which varies between 1st January 2000 and 2004.

Such a cross-country analysis still remains hampered by the limited availability of comparable data. As a result, very few analytic contributions address the issue of childlessness from a comparative perspective (more recent contributions are Prioux 1993; Rowland 1998; and Frejka et al. 2001).[5] The apparent lack of data and small number of publications on childlessness are striking, particularly in the light of an increasing importance of first births for the overall fertility level within the context of the small family system[6].

This paper first briefly discusses the changing nature of childlessness and reviews different methods of childlessness projections. After specifying data sources and methods employed to compute first birth indicators and the scenarios of final childlessness, two projections are presented. The first one is a retrospective projection of final childlessness in five countries, which serves as a test whether the proposed projection scenarios provide reliable estimates of lifetime childlessness. The second one is based on the most recent period and cohort data on first births. The last section discusses the findings and their broader implications on the backdrop of continuing strong motivations for parenthood.

[4] Among women aged 25+, final childlessness may be projected with a higher accuracy, since many of them have already entered motherhood and most of the childless women who will eventually give birth to a child will do so in the following 5-10 years. Unless a profound change in first birth intensity among older women takes place, the most recent exposure-based period fertility indicators provide a realistic basis for childlessness projections. Projecting final childlessness among younger women is, however, more difficult: such a projection relies almost entirely on the most recent period fertility indicators, which are assumed to hold constant for more than two decades into the future. This greatly increases not only the share of projected fertility, but also the risk of erroneous projection.

[5] Some parts of comparative fertility analysis in Bosveld (1996) and Frejka and Sardon (2004) discuss trends in cohort childlessness as well. The project of T. Frejka, G. Calot and J.-P. Sardon has resulted in the most comprehensive collection of data on childlessness in industrialized countries to date.

[6] Among the countries analysed in this paper, first births constitute 40% (Norway) to 53% (Spain) of the total number of live-born children.

2 THE CHANGING CHARACTER OF CHILDLESSNESS

In much of the Western world the issue of childlessness received considerable attention in the media and became a topic of scientific research during the 1970s. The Netherlands may serve as a typical example of this trend: the first popular articles on voluntary childlessness appeared in 1973 and the interest in this phenomenon grew steadily soon thereafter (Niphuis-Nell 1983). It is no coincidence that the emergence of the public and scientific debate on childlessness paralleled the onset of dynamic changes in fertility, family patterns, and living arrangements, and a concomitant value shift towards individualisation and personal self-fulfilment, later coined as the second demographic transition. Indeed, social legitimisation of voluntary childlessness and rising levels of final childlessness are associated with this transition (van de Kaa 1987). Although the distinction between voluntary and involuntary childlessness always remains somewhat fuzzy (Rowland 1998, McAllister and Clarke 2000), the increasing voluntary childlessness, in particular among women living in a couple, is often recognised as a major factor behind increasing levels of lifetime childlessness. The baby-boom era of the 1950s and 1960s was one of the "generalisation of the right to have children," when the deliberate decision not to become a parent was practically unthinkable (Toulemon 1996: 24). Having children was seen as an inevitable consequence of marriage; women who wished to remain childless were stigmatised as selfish (Kiernan 1989). The following decades were marked by an increasing recognition of the "right not to have children" and the gradual disappearance of the centrality of motherhood in women's lives. This shift was enabled by radical changes in the position of women in advanced societies coupled with the availability of modern contraception. Rather than a commonly expected goal, the decision to have a child has become more a matter of preference, an outcome of a careful weighting of the pros and cons of parenthood, and a 'derivative' of a personal quest for self-realisation (van de Kaa 2004). In contrast to 'Western' societies, the social acceptance of childlessness as a matter of choice and personal lifestyle has been spreading only recently in the post-communist countries of Central and Eastern Europe.

Childlessness has become increasingly linked to the postponement of childbearing, characteristic for fertility trends in industrialised countries during the last three decades (see Sobotka 2004). Delaying parenthood has been increasingly embraced as a strategy which enables women (and, to a lesser degree, their partners) to pursue higher education, to establish themselves in the labour market, to accumulate material resources, to enjoy various leisure and consumer activities incompatible with the family life, to form partnerships unhindered by everyday child-rearing tasks, and to deal with unstable life conditions and adverse circumstances. Postponed childbearing is, however, also associated with increased indecision and ambivalence toward having children (Rowland 1998, Smallwood and Jefferies 2003) and the 'postponers,' initially deferring childbearing until they reach some intermediate goal, may gradually become adapted to their child-free situation and loose interest in having a child

(Veevers 1980; Rindfuss, Morgan, and Swicegood 1988). Increased infertility among women past age 35 (Menken 1985) is another factor that may contribute to the increasing levels of final childlessness (Beets et al. 2001). Such a relationship is documented for many countries between the delay of parenthood and the overall level of fertility (Kohler, Billari, and Ortega 2002). As a result of the long-standing shift toward later timing of first births, more and more women remain childless well into their 30s, and the level of final childlessness becomes less predictable even for women in the later stage of reproductive life. The ambivalence towards childbearing is partly fuelled by the perceived and real difficulties, especially for women, to coordinate two conflicting and strongly interdependent 'careers' of work and fertility (see Willekens 1991). Furthermore, parenthood has also become increasingly identified with 'total commitment,' a disruption which many childless people consider threatening to their independence and material security, as it brings unpredictability to their lifestyle (McAllister and Clarke 2000).

The debate on childlessness initially focused on voluntary childlessness among married women and couples. In the 1970s, unmarried women were still supposed to be largely a select group, where pregnancy was typically unwanted and childlessness was an expected feature of their unmarried status. The novelty to study was the occurrence of fertility postponement and voluntary childlessness among married couples. As Veevers (1980: 2) put it, at the start of the 1970s voluntary childlessness among married couples "has begun to emerge as an alternative to conventional marriage." However, the growth of cohabitation and childbearing among solo mothers has rendered the previous focus on married women superfluous. With many European countries registering more than 40% of births outside marriage[7], studies on childlessness now typically focus on the total population of women. Accordingly, this article looks at the trends and levels of childlessness among all women, irrespective of their marital status.

3 CHILDLESSNESS PROJECTIONS: PAST AND PRESENT

Various projections of childlessness have been produced since the early 1980s. American demographers published a number of methodological and analytical contributions, usually projecting childlessness among white and non-white women in the United States separately (e.g. Bloom 1982; Bloom and Pebley 1982; Bloom and Trussell 1984; Evans 1986; Ryder 1990; Chen and Morgan 1991; Morgan and Chen 1992). Morgan and Chen (1992: 478) distinguish between three types of projection methods used to forecast childlessness; these methods "reflect fundamental controversies about the factors which affect fertility and, in

[7] According to Council of Europe (2003), births by unmarried women accounted for more than 40% of all births in 2002 in Slovenia (40.2%), the United Kingdom (40.6%), Bulgaria (42.8%), Latvia (43.1%), France (44.3%), Denmark (44.6%), Norway (50.3%), Sweden (56.0%), Estonia (56.3%) and Iceland (62.3%). As first births occur outside marriage more often than higher-order births, in most of these countries more than half of all first births were extra-marital.

some cases, social change more generally." The first type is based on fertility intentions among women in childbearing age. This strategy does not lead to accurate predictions of childlessness as only few young women expect to remain childless and childbearing intentions change over the life course (Rindfuss, Morgan, and Swicegood 1988; Ryder 1990; Toulemon 1996; Quesnel-Vallée and Morgan 2003, Berrington 2004). The second type relies on cohort methods, modelling cohort experience based on cohort behaviour to date and additional assumptions. Examples of this approach include Bloom (1982), fitting the Coale-McNeil marriage model to first birth cohort data in the United States, and Martinelle (1993), projecting first birth rates and childlessness in Sweden based on a regression model of incomplete cohort fertility, which distinguishes between women with lower and higher education.

The most common is the third approach, combining the actual cohort fertility distribution with the recent or projected period indicators of first births. The two main projection scenarios analysed in this chapter, as well as a comparative third scenario, are based on this approach. Within this approach, several types of projections may be further distinguished. The first distinction can be drawn between projections utilising recent or projected sets of period age-specific first birth incidence rates and those employing period indicators based on exposure, namely age-specific first birth probabilities or occurrence-exposure rates, to finish incomplete cohort experience. Although the indicators based on incidence rates, in particular the summary measure of the total fertility rate of first birth order, are frequently distorted and may reach absurd levels (Ryder 1990), they are still used to estimate the 'remaining' portion of cohort fertility, especially among women approaching the end of their reproductive span (e.g. Frejka et al. 2001). Additionally, the second distinction can be made between projections utilising unmodified period first birth indicators to estimate the future course of cohort fertility and those which further modify these period indicators, employing an extrapolation of recent fertility trends (e.g. Ryder 1990), or an adjustment of recent fertility indicators. Each projection scenario employed here falls into a different sub-category: both the first and the second scenario work with exposure-based sets of the most recent period age-specific first birth probabilities, unaltered in the former case and adjusted for tempo and variance changes in the latter case. The additional comparative scenario is based on unaltered period age-specific incidence rates.

Despite a gradual advancement of techniques and methods of projecting first birth rates and childlessness, there are very few national and international estimates of future childlessness that could pass state-of-the-art scrutiny. Period and cohort fertility models often continue to focus on the total quantum of fertility, disregarding the paramount importance of parity-specific approach; a recent example is the cohort fertility projection model proposed by Li and Wu (2003). Among the official statistical bodies, Statistics Netherlands is perhaps the only institution regularly updating parity and age-specific estimates of cohort fertility rates. The most recent data encompass birth cohorts of women born from 1935 to 2020 (CBS 2003).

Qualified projections of childlessness are also frequently published by French researchers (Toulemon 1996; Toulemon and Mazuy 2001).

4 DATA AND METHODS

4.1 Data sources

Data used for computing first birth indicators and projection scenarios originate from a large number of diverse sources: vital statistics records, census results, expert estimates based on vital statistics, large-scale family surveys, and population registers. Especially the estimation of parity distribution of women by age has frequently required a combination of different data sources, such as population census records and parity-specific data on fertility rates in the years following the census.

Table 1 gives a concise overview of the data sources. A more detailed description of the data is provided in the Appendix. The primary data gathered included (1) the distribution of women's population by age on January 1 in the three years preceding the starting year of the projection, (2) the statistics on the distribution of live-born children of birth order 1 specified by age of mother (biological birth order), and (3) the data used for estimating the parity distribution of women by age, namely the proportion of women remaining childless, on January 1 of the starting year of the projection and the three preceding years.

Statistics on the age distribution of women mostly come from EUROSTAT (2003 and 2004); these data are not listed in the table. The second column of Table 1 indicates the starting year of the projection for each country analysed. In the case of countries for which both the most recent and retrospective 'evaluative' projections were formulated, two different base years (the most recent and 1981) are indicated separately. The next column specifies the sources of data on the distribution of first births by age of the mother. In England and Wales, France, and Germany these data are collected for birth order within current marriage only; therefore expert estimates of the 'true parity' distribution of first births or first birth rates had to be used.[8] The table further specifies whether first birth data depicted the completed age of mother (AP: age-period format), or were organised by the year of birth of the mother (age reached during the calendar year, cohort age; PC: period-cohort format). The last column lists all the data sources used for reconstructing the cohort distribution of childless women by age

[8] See Kreyenfeld (2002) and Birg, Filip, and Flöthmann (1990) for West Germany, Rallu (1986) and Toulemon and Mazuy (2001) for France, and Smallwood (2002b) and ONS (2002) for England and Wales. French official statistics on biological birth order of newly born children has been published since 1998. However, a comparison with the survey data revealed a large over-reporting of births of first birth order, attributable to the continuing erroneous registration of birth order within current marriage by many local administrations (Prioux 2003: 530). Consequently, this article uses only the data based on the 1999 INSEE Study of Family History for the period until 1997 (see Toulemon and Mazuy 2001).

TABLE 1: Data sources used for the computation of period and cohort fertility indicators and childlessness projections

Country	Starting year projection	Most recent first births data	Data format	Estimates of the most recent cohort parity distribution by age
Western Europe				
Austria	2004	SA 2004, EUROSTAT 2003 (VS)	PC	SA 2005; EUROSTAT 2003, 2004 (C + VS)
England and Wales	2002	Smallwood 2002 (EST)	AP	Smallwood 2002; ONS 2002 (EST)
	1981 (R)	Smallwood 2002 (EST)	AP	Smallwood 2002 (EST)
France	1998	Toulemon and Mazuy 2001 (S)	PC	Toulemon and Mazuy 2001; EUROSTAT 2003 (S + EST + VS)
	1981 (R)	Rallu 1986; Toulemon and Mazuy 2001 (S) 1)	PC	EUROSTAT 2003; Toulemon and Mazuy 2001 (EST)
West Germany	1996	Kreyenfeld 2002 (EST)	AP	Birg, Filip, and Flöthmann 1990; Kreyenfeld 2002 (EST)
The Netherlands	2004	CBS 2004 (VS)	PC	CBS 2004; CBS 2003 (VS)
	1981 (R)	CBS 2003b (VS)	PC	CBS 2003, 2004
Southern Europe				
Italy	1998	EUROSTAT 2003 (VS)	PC	ISTAT 1996; EUROSTAT 2003 (EST + VS)
Spain	2001	EUROSTAT 2003 (VS)	PC	EUROSTAT 2003 (EST + VS)
Northern Europe				
Denmark	2002	EUROSTAT 2004 (VS)	PC	EUROSTAT 2003, 2004 (EST + VS)
Finland	2003	EUROSTAT 2004 (VS)	PC	SF 2001; Vikat 2002; EUROSTAT 2004 (EST + VS)
Norway	2002	EUROSTAT 2003 (VS)	PC	SN 2003; EUROSTAT 2003 (VS + REG)
Sweden	2003	EUROSTAT 2004 (VS)	PC	EUROSTAT 2004 (EST + VS)
	1981 (R)	EUROSTAT 2003 (VS)		EUROSTAT 2003 (EST + VS)
Central and Eastern Europe				
Czech Republic	2004	CSU 2004 (VS)	PC/AP	FSU 1963-86; POPIN CR 2002; CSU 2000, 2004; EUROSTAT 2003 (VS)
Estonia	2002	EUROSTAT 2003 (VS)	AP	ESA 2003; EUROSTAT 2003 (C + VS)
Hungary	2003	EUROSTAT 2004 (VS)	AP	EUROSTAT 2004 (VS)
Poland	2003	EUROSTAT 2004 (VS)	AP	Bolesławski 1993; GUS 1991-96; EUROSTAT 2004 (C + EST + VS)
Romania	2001	EUROSTAT 2003 (VS)	AP	CNPS 1994b; CNPS 1993-1997; EUROSTAT 2003 (C + VS)
Slovak Republic	2002	EUROSTAT 2003; POPIN SR 2003 (VS)	AP	FSU 1982b; FSU 1971a-1990a; POPIN SR 2003 (C+ VS)
United States	2000	CDC 2000b; 2001 (VS)	PC	CDC 2001 (VS)
	1981 (R)	Feeney 1998; OPR 2003 (VS+EST)	PC	OPR 2003; Hauser 1976 (VS+EST)

NOTES: 1) Rallu's (1986) article served as a source of age-specific first birth incidence rates in 1980; data specified in Toulemon and Mazuy (2001) were used for estimating age-specific first birth probabilities among childless women in 1980.
AP - age-period data (current age of mother); PC – period-cohort data (age reached during the calendar year, cohort age); R – retrospective projection
C – Census data; EST – expert estimates; REG – official population register; S – large-scale population or family survey; VS – vital statistics data

and specifies different types of data used. The single most important data source was the EUROSTAT (2003 and 2004) New Cronos database. Two different indicators from this database were used for reconstructing the cohort parity distribution of women: (1) the estimates of cohort fertility by age and parity for birth cohorts 1930-1963, calculated for various countries for the period until 1989 (France) to 1997 (e.g. Finland) and (2) the time series of vital statistics data on first births by age of mother and on the age distribution of women. For many countries, these data cover a relatively short period after 1990.

Given the diversity of data sources, there is always a risk of inconsistency between them. Nevertheless, the careful inspection of data, the relative smoothness of the presented estimates, and occasional comparison with other sources revealed that such inconsistency did not alter the overall trends in childlessness. The accuracy of the presented data is relatively high and the absolute differences in final childlessness resulting from combining different data sources remained smaller than 2%.[9]

4.2 Computing period and cohort fertility rates

The primary data specified above enabled computation of the following fertility indicators:

(1) Period age-specific incidence rates of birth order one $f_1(a)$

(2) Period age-specific first birth probabilities $q_1(a)$

(3) Adjusted period age-specific first birth probabilities $q'_1(a)$

(4) Age-specific proportion of women remaining childless on January 1 ($w_0(a)$)

(1) Period age-specific first birth incidence rates were calculated for the year preceding the starting year of the projection. When order-specific incidence rates were used for a reconstruction of cohort parity distribution, considerably longer series were calculated. For each single age group of women (*a*), the number of first births (denoted as B_1) was divided by the total mid-year population of women in that age group: $f_1(a) = B_1(a) / P_F(a, T\text{=}July\ 1)$. The mid-year population of women aged *a* ($P_F(a)$) was obtained as an average of the total women's population aged $x=a-1$ at the beginning of the year and population aged $x=a$ at the end of the year (*a* is age reached during the calendar year and *x* is age in completed years). Data sources are specified in the Appendix. Data initially available in the age-period format were used for calculating first birth incidence rates by completed age *x* and then redistributed, assuming a uniform distribution of birth rates in each age group into the two birth cohorts concerned: $f_1(a) =(f_1(x-1) + f_1(x)) / 2$.

[9] The largest differences in estimated levels of cohort childlessness, which resulted in visible breaks in the cohort data series, were recorded between the birth cohorts 1955 and 1956 in France (see country-specific graphs in Figure 4 for cohort trends and Appendix for data sources).

First birth rates in France were reconstructed on the basis of age-specific first birth probabilities derived from the 1999 Study of the Family Survey[10] (see Toulemon and Mazuy 2001); the data on first birth rates in the United States in 1980 and 1998 were taken from Feeney (1998) and the Vital Statistics yearbook (CDC 2000b, Table AP1-34).

(2) Period age-specific first birth probabilities were computed directly from the data on first births and age-parity structure of the female population:

$$q_1(a) = B_1(a) / P_{F,i=0}(a,T{=}January\ 1) = B_1(a) / [P_F(a, T{=}Jan.\ 1) \cdot w_0(a,T{=}Jan.\ 1)] \quad (1)$$

where i denotes birth order and w_0 represents estimated proportion of childless women by age. This equation expresses the probability that a childless woman aged a on January 1 will give birth during the year t. As contrasted with the calculation of incidence rates, the denominator includes only childless women at the beginning of the year t. Such a specification of exposure does not take into account possible effects of migration and mortality on the number of childless women during the year. First birth probabilities were calculated for at least three years preceding the projection, which is the shortest period necessary to calculate the Kohler-Ortega adjustment.

For countries where the initial data pertained to the distribution of births B by completed age x, the distribution of births by cohort age a was estimated assuming a uniform distribution of births in each age group into the two birth cohorts concerned.[11] Data on period first birth probabilities in France were obtained directly from the estimates based on the 1999 Study of the Family Survey (see Toulemon and Mazuy 2001); data for the United States for 1980-1982 were estimated on the basis of first birth incidence rates and the proportion of women childless (data obtained from OPR 2003) and the U.S. data for 1997-1999 were taken from the official vital statistics yearbooks (CDC 2000a; 2000b; and 2001, Table 1-37).

(3) Adjusted period age-specific first birth probabilities were derived using Kohler and Ortega's (2002a) method. This method estimates age- and parity-specific fertility indicators which are free of the three distortions present in the TFR, namely distortions caused by (1) changes in the parity distribution of women, (2) changes in fertility timing, and (3) changes in the variance of fertility schedule. This method provides relatively stable and reliable estimates of fertility quantum of first birth order. For each parity and single age group, the Kohler-

[10] Age- specific first birth probabilities served first for reconstructing cohort first birth incidence rates and parity distribution by age. These results were combined with cohort fertility data in EUROSTAT (2003) New Cronos database, pertaining to the birth cohorts 1930-1963 for the period until 1989. Cohort fertility data were then converted to the period first birth incidence rates by age.

[11] This assumption may lead to some distortions when there are large differences in the total cohort size of the two consecutive birth cohorts of women aged x (age in completed years) in the year t. However, in the fertility table indicator of the lifetime probability of ever giving birth to a first child, these potential fluctuations are likely to cancel each other out.

Ortega adjustment enables a derivation of adjusted age-parity birth probability $q'_i(a) = q_i(a) / (1-r_i(a,t))$, where $q_i(a)$ is the observed probability that a woman aged a, who has i-1 children at the beginning of the year t will give birth to another child during that year. A complete description may be consulted in the original contribution (Kohler and Ortega 2002a).
The adjustment used here differs somewhat from the original Kohler and Ortega's (KO) application. First, I work with age-parity birth probabilities as contrasted with the occurrence-exposure rates (birth intensities) utilised by KO. Second, the observed set of age-parity probabilities was not smoothed before the adjustment and I did not apply an iterative procedure aiming to provide a correction for variance effects[12]. Finally, in order to reduce irregularities in the adjusted fertility index, the age range of birth probabilities to be used for inferring all the parameters necessary for the adjustment has been restricted to ages 20 to 40 for birth order 1 and 22 to 40 for birth order 2, 25 to 40 for birth order 3, and 26 to 40 for birth orders 4+.

(4) The age-specific proportion of women remaining childless ($w_0(a)$) on 1st January of the base year of the projection and all the years for which the period first birth probabilities were calculated, was derived in several ways (see also Appendix):

a) from the cohort fertility data in the EUROSTAT (2003 and 2004) database by truncating these data at the time point when the observed data end and the estimated data begin[13] or at any date of interest before that point;
b) by using the time series of period data on first birth incidence rates to reconstruct the age-specific cohort parity distribution;
c) using qualified estimates and calculations of other researchers;
d) combining the data specified above;
e) combining the population census data with the indicators specified above.

The last option was the most problematic one, since the census data differ from the data calculated on the basis of period fertility rates, as the former are affected by migration and mortality taking place before the census, whereas the latter do not take these processes into account. Moreover, for a small proportion of women, the parity distribution often remains unknown in the census data. These women were assumed to have the same parity distribution

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[12] The adjusted parity-specific tempo change $r_i(a,t)$ is computed following Kohler and Philipov (2001: 8, Eq. 11): $r_i(a) = \gamma_i + \delta_i (a - \bar{a}_i)$, where γ_i is the annual change in the mean age of the fertility schedule (here represented by birth probabilities) at parity *i*, δ is the annual increase in the standard deviation of the schedule, and $\bar{a}$ is the mean age of the schedule.

[13] The EUROSTAT (2003) database of cohort fertility data contains observed or estimated data on birth rates by age and parity for the birth cohorts 1930 (1935) – 1963, with the most recent observed data referring to a period between 1989 (France) and 1997 (e.g. Finland). Fertility rates after that year are usually projected assuming that the most recent age and order-specific incidence rates have remained constant. This part of the database was not used in any estimates presented in this paper.

as women whose parity distribution is known. In addition, the census usually takes place during the year. To combine the census indicators with the period fertility data, the vital statistics data for the census year had to be adjusted in order to estimate correctly a portion of fertility taking place between the day of the census and the end of the year. Two assumptions have been made in this respect: (1) fertility rates are distributed uniformly over the year concerned (disregarding possible seasonality effects) and (2) the dates of birth among women within each birth cohort are distributed evenly over the calendar year.

4.3 Computing projection scenarios

The scenarios of childlessness were produced by combining the most recent data on the proportion of women remaining childless with the most recent set of adjusted and unadjusted period first-birth probabilities. The retrospective projections with a base year of 1981 further contain a third scenario, based on the most recent set of period first birth incidence rates. This scenario was included for an illustration of the strong tempo-distortions in incidence rates, producing vastly exaggerated estimates of final childlessness during the periods marked by the postponement of childbearing. For comparative purposes, this unrealistic scenario is also depicted in the country-specific graphs of the recent childlessness projection in Figure 4.

The most recent data on cohort childlessness pertain to 1st January of the starting year of the projection (see Table 1 above). From this year on, women who are still in their reproductive period are assumed to experience the fertility schedule of the specified scenarios until the end of their reproductive span, defined here at age 50. Competing events, namely migration and mortality, are disregarded. All scenarios of lifetime childlessness may be calculated within the framework of a fertility table. Data for Spain, which represents an example of a country with very intensive fertility postponement are shown in Table 2 to illustrate these calculations. The most recent data on age distribution of childlessness among Spanish women were estimated for 1st January 2001. This is therefore set as the base year of the projection. The table shows the observed proportion of childless women in selected birth cohorts born between 1960 and 1975. The indicator that enables projecting childlessness at age 50 (a_1) is the age-specific lifetime probability of having a first child among women still childless at age a_0. This indicator, denoted as U_{01} is calculated as follows:

$$U_{01}(a_0, a_1 = 50) = 1 - S_0(a_0, a_1 = 50) = 1 - \prod_{a=a_0}^{a_1 - 1}(1 - q_1(a)) \quad (2)$$

where $S_0(a_0, a_1=50)$ is the 'survival' probability that a women childless at age a_0 will remain childless until the end of her reproductive period, and $q_1(a)$ is age-specific first-birth probability among childless women aged a (Equation 1 above). Among Spanish women aged 30 (age in completed years), the lifetime first birth probability is still considerably high. According to the schedule of the most recent (2000) first birth probabilities, almost two thirds (64.5%) of women still remaining childless would eventually have a child; the adjusted probabilities put this proportion even somewhat higher, at 69.0%. When the initial age a_1 is set at the onset of reproductive life, the indicator U_{01} then equals the summary index of first-parity fertility $PATFR_1$, a fertility table equivalent of the total fertility rate of first birth order. The projected proportion of women remaining permanently childless ($\omega_0(a_1=50)$) is computed straightforwardly as

$$\omega_0(a_1 = 50) = w_0(a_0, T = Jan.1) - w_0(a_0, T = Jan.1)U_{01}(a_0, a_1 = 50) \quad (3)$$

where $w_0(a_0)$ represents the actual proportion of childless women at age a_0 (age reached during year t) at the beginning of the projection period (1st January of the year t). In Spain, 53.2% of women born in 1970 were still childless on January 1, 2001. The estimate of their final childlessness, using the Kohler-Ortega adjusted value of U_{01} (0.690 in column 3) is then calculated as 0.532 – 0.532 * 0.690 = 0.165, that is 16.5% of women born in 1970 are projected to remain permanently childless. The comparative scenario based on first-birth incidence rates is calculated in a different way. The proportion of all women (irrespective of their current parity) ever giving birth to a first child between age a_0 and the end of their reproductive age is calculated as the sum of the period age-specific first birth incidence rates $f_1(a)$ between ages a_0 and $a_1=50$. The projected final childlessness is then

$$\omega_0(a_1 = 50) = w_0(a_0) - \sum_{a_0}^{a_1 - 1} f_1(a). \quad (4)$$

Returning again to the example of Spain, projected final childlessness among women born in 1970 is then computed as 0.532 – 0.266 (the sum of age-specific fertility rates between ages 31 and 50 in column (4)) = 0.266. This is a markedly higher value than the estimates derived from adjusted and non-adjusted birth probabilities.

TABLE 2: Calculation of childlessness scenarios in Spain, selected birth cohorts (base year 2001)

Birth cohort	Age (1st Jan. 2001): Completed years (x)	Age (1st Jan. 2001): Reached in 2001 (a)	Proportion childless $w_0(a)$, 1st Jan. 2001 (1)	Proportion childless ever having first child ($U_{01}(a_0, a_1=50)$): Probabilities (2)	Adj. probabilities (3)	Incidence rates * (4)	Incidence rates (5)=(4)/(1)
1975	25	26	0.860	0.752	0.789	0.508	0.591
1970	30	31	0.532	0.645	0.690	0.266	0.500
1965	35	36	0.209	0.345	0.375	0.062	0.295
1960	40	41	0.111	0.066	0.075	0.007	0.065
				Projected proportion ultimately childless			
				Probabilities (6)=(1)-(1)·(2)	**Adj. probabilities** (7)=(1)-(1)·(3)	**Incidence rates** (8)=(1)-(4)	
1975	25	26		0.213	0.181	0.352	
1970	30	31		0.189	0.165	0.266	
1965	35	36		0.137	0.131	0.147	
1960	40	41		0.104	0.103	0.104	

NOTES: * This value refers to the total proportion of all women who will ever have first child after age a_0

5 CHILDLESSNESS PROJECTIONS

5.1 Retrospective projection with the base year 1981

By the start of the 1980s many industrialised countries were already experiencing a substantial shift in the timing of parenthood towards later ages. Falling fertility rates were additionally affected by this postponement of first births. With the very low first birth rates, rapidly increasing proportions of childless women at younger ages and a growing social acceptance of voluntary childlessness, there were many reasons to argue that final childlessness would reach record-high levels. Bloom and Pebley projected in 1982 that close to 30% of women in Austria, England and Wales, West Germany, and the United States would eventually remain childless. Such high childlessness was projected for women born in the first half of the 1950s, whose first birth history was known at approximately age 25.

More recent data reveal that despite a gradual increase in final childlessness, most projections tended to overestimate its future levels.[14] Would the methods proposed in this chapter perform better? If the projection problem lies in using inadequate period data, for instance, period fertility rates that are seriously distorted by the postponement of childbearing, then period fertility table methods should retrospectively provide a better estimate of final childlessness. However, if the low reliability of the past projections is mostly related to the factors affecting period fertility rates after the base year of the projection, such as changing socio-economic conditions, then any improved specification of the most recent fertility rates would not yield a reasonable estimate of the eventual childlessness level.

The retrospective projection with the baseline year of 1981 was prepared for five countries, where the delay of childbearing was well in progress already by the late-1970s: England and Wales, France, the Netherlands, Sweden, and the United States. Figure 1 presents three scenarios of final childlessness for birth cohorts 1935 (1940 in Sweden) through 1962 based on the assumption that the 1980 values of age-specific first birth probabilities (S1), adjusted first birth probabilities (S2), and first birth incidence rates (S3) are held constant for women still of childbearing age in 1981. These scenarios were compared with the most recent data for women above age 40, which is the age when their final childlessness can be determined with a very high accuracy.[15] An additional benchmark for evaluating the childlessness scenarios is provided by the 'naïve' scenario, assuming that the level of final childlessness among the

[14] In the United States, several projections of childlessness used the same set of fertility data specified through 1979 (e.g. Bloom 1982; Bloom and Trussel 1984; Evans 1986; and Morgan and Chen 1992). Most of them overestimated the level of final childlessness. For the youngest birth cohort projected, 1955, only Evan's lower bound (19.3%) and Morgan and Chen's fertility table estimate (21.3%) came close to the recently recorded values of lifetime childlessness among white women, put at 18.8% (CDC 2001).

[15] In all countries considered, less than 1.5% of first birth rates take place at ages 41-49. Thus, the portion of fertility in this age group can be estimated with a very high reliability and different estimation methods produce identical results.

FIGURE 1: Retrospective projections of final childlessness in England and Wales, France, the Netherlands, Sweden, and the United States among women born in 1935-1962 (base year 1981)

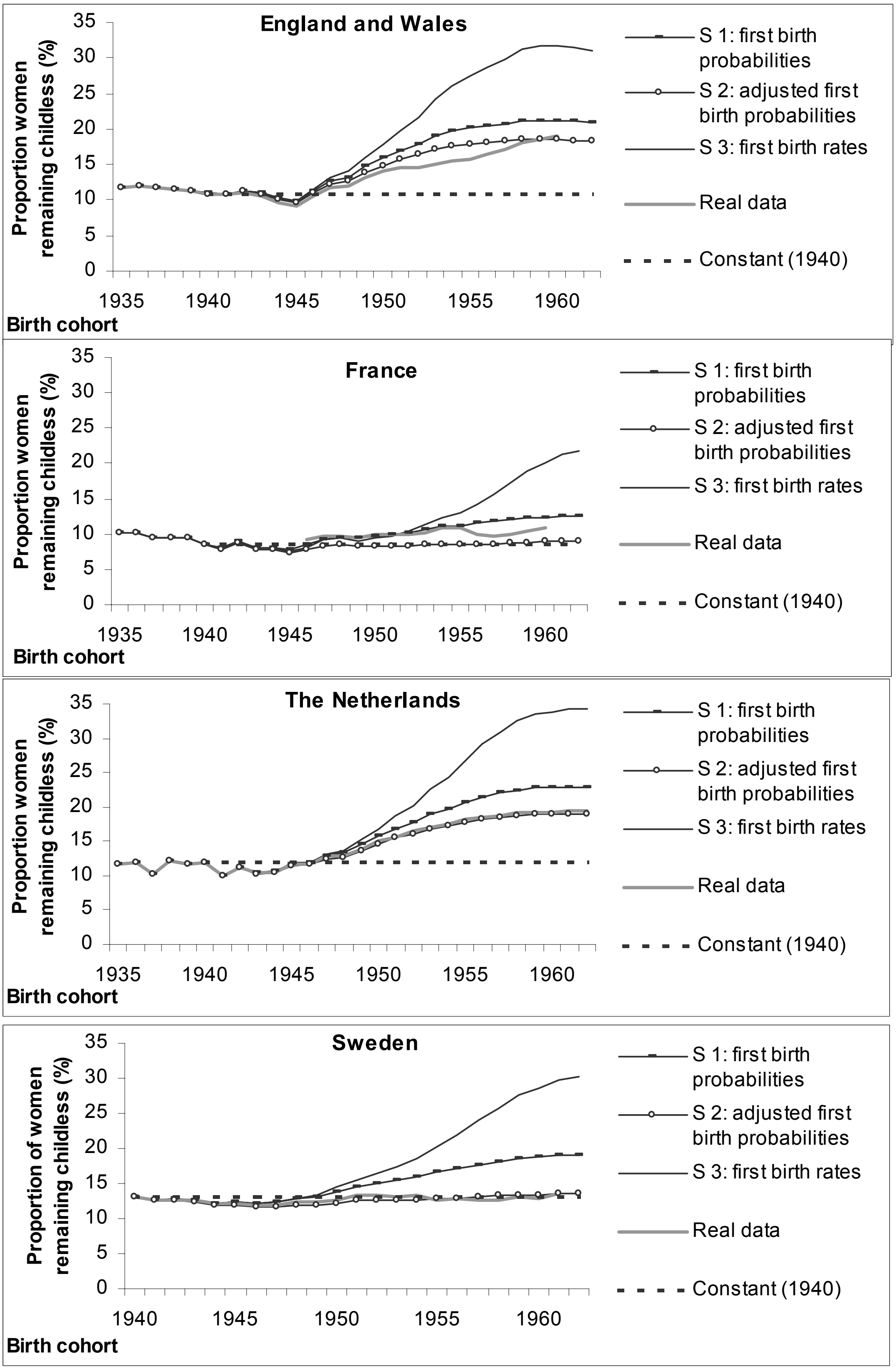
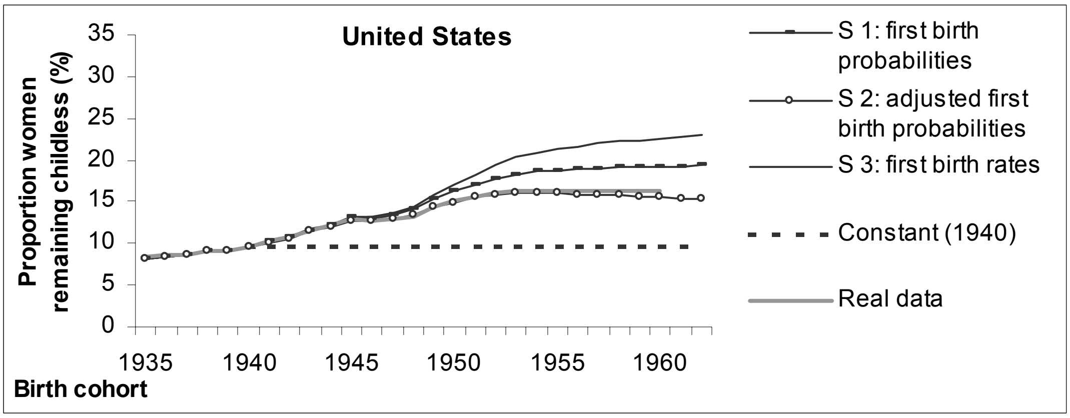


FIGURE 1 (continued): Retrospective projections of final childlessness in England and Wales, France, the Netherlands, Sweden, and the United States (base year 1981)



SOURCES: see Table 1 and Appendix.

1940 birth cohort which was almost completely determined by 1980, would persist among the younger birth cohorts as well.

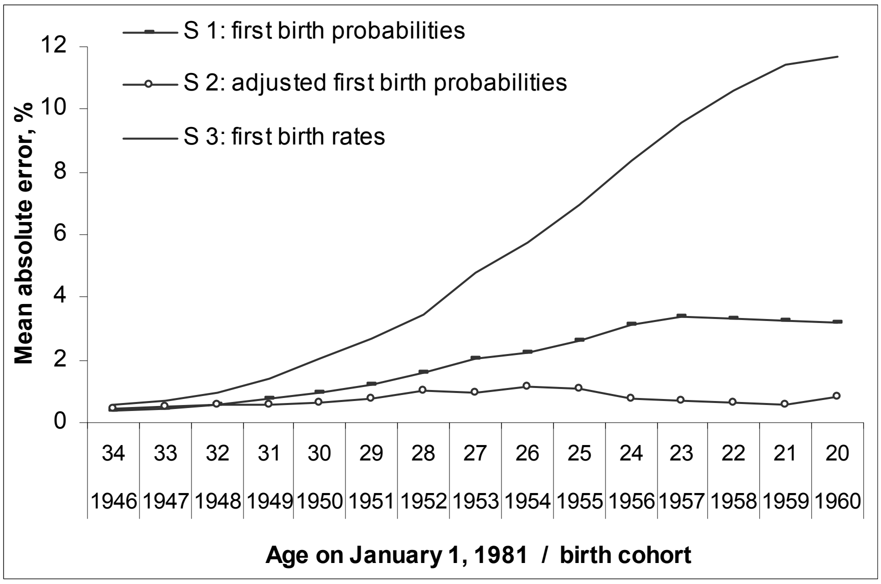
The figure clearly shows that the scenario using the most recent period age-specific incidence rates consistently provided estimates of final childlessness which were too high. For women born in 1960, projected final childlessness was above 20% in all five countries and above 30% in England and Wales (31.7%) and the Netherlands (33.7%). In reality, their final childlessness stood below 20% in all cases, with France retaining a low level of 10.8% and the Netherlands (19.2%) and England and Wales (19.0%) having a high childlessness rates. The poor performance of the period incidence rates in projecting childlessness is not only due to their distortion by the postponement of childbearing, but also due to the fact that they are related to all women in a given age and do not reflect the real exposure. Even if any 'catching-up effects' were absent and first birth probabilities therefore remained constant among women at later ages, incidence rates would increase simply because of increasing numbers of childless women at these ages.

In most cases final childlessness remained within the range set by the two scenarios based on adjusted and non-adjusted period first-birth probabilities. While this was anticipated, the very close correspondence of the proportion of childless women with the scenario based on adjusted first birth probabilities, especially in the Netherlands, Sweden, and the United States, comes as a surprise. First of all, it indicates that despite the continuing trend toward later childbearing, the underlying childbearing intensity among childless women did not change much in the period after 1980. It appears that the future degree of fertility recuperation among women in their thirties—and there were some 'catching-up effects' in all countries concerned—was largely predictable and determined by 1980. This finding may be surprising also because it challenges common wisdom among demographers that further postponement usually leads to a lower fertility level.

In England and Wales, final childlessness among women born before 1960 was even below the level suggested by the scenario based on adjusted first birth probabilities. In France, a comparison of the projection estimates and the most recent childlessness data is somewhat hindered by the fact that two different data sets served as a basis of the retrospective projection (the cohort fertility data in the EUROSTAT (2003) database) and the most recent evidence (data based on the 1999 survey published in Toulemon and Mazuy (2001)). Thus, the proximity of the final childlessness data to the projection scenario based on the period first birth probabilities may be an effect of using a different data set. However, in this case final childlessness also remains within the range set by the two scenarios based on adjusted and non-adjusted first-birth probabilities. A notable feature is the relatively stable and low level of childlessness in France and Sweden, which does not increase much among the cohorts experiencing a substantial delay of first births. Particularly in Sweden, a very simplistic scenario assuming that the level of final childlessness among women born in 1940 would remain constant in the younger generations provided a very good estimate of lifetime childlessness among women born until 1961.

To summarise the overall performance of different scenarios in the retrospective projection, Figure 2 plots the mean values of absolute error in each scenario for the birth cohorts 1946-1960. These are arithmetic averages of differences between the projected and observed values of final childlessness in the five countries analysed, shown for women aged 20-34 on January 1, 1981. In the case of the first scenario (based on the period first birth probabilities) and the third scenario (based on the period first birth incidence rates), the error term is equal to the average level of overestimation of the proportion of women remaining childless. The scenario based on incidence rates had a considerably larger error term among women below age 32, accelerating further among women below age 28 and reaching more than 10% among the youngest age group 20-22. In relative terms, this means an overestimation of final childlessness by the factor of 1.7. The mean error in the scenario 1 and 2 diverges among women below age 30, but this difference is small. Among women below age 25, the first scenario overestimated final childlessness on average by slightly more than 3%; still a considerably good result given that the projection period encompassed most of their reproductive age. As already noted, the very good performance of Scenario 2, based on adjusted first birth probabilities, is rather surprising: the mean absolute difference remained lower than 1.1%, and the relative difference was always lower than 10%. Although it might appear that the selection of a particular method does not considerably alter the results for women above age 30, caution has to be exercised. As a result of the continuing shifts of childbearing toward later ages, more recent scenarios may also diverge for women in the early to the mid-30s in the base year of the projection.

FIGURE 2. Mean absolute error in the retrospective projection scenarios (in %) with base year 1981 in the five analysed countries; birth cohorts 1946-1960

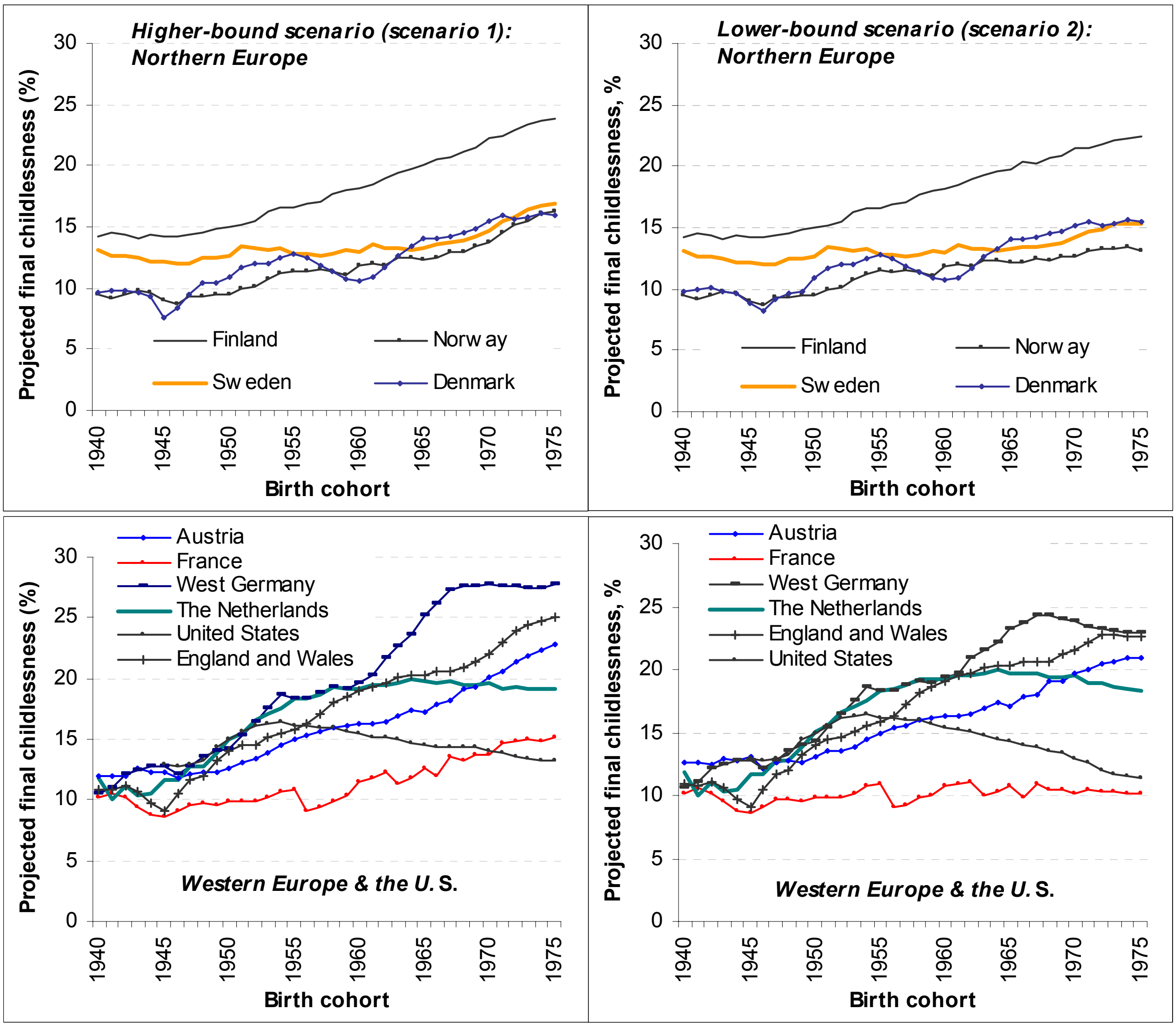


5.2 Projection scenarios based on the most recent first birth data

This section examines projected childlessness trends in all 18 countries. Figure 3 shows the observed and projected levels of final childlessness among women born in 1940-1975 for the upper-bound scenario (Scenario 1 based on the most recent first birth probabilities) and the lower-bound scenario (Scenario 2 based on the most recent adjusted first birth probabilities). To make the regional and the country-specific trends more transparent, four groups of countries are plotted in separate graphs featuring trends in different regions: Northern Europe, Western Europe and the United States, Southern Europe, and the post-communist societies of Central and Eastern Europe. Although the figure does not depict the comparative scenario based on first birth incidence rates, it is shown for illustrative purposes in Figure 4 in the Appendix, which portrays childlessness scenarios for each country considered. A comprehensive overview of recorded and projected levels of final childlessness among selected birth cohorts is further given in Table 3; the complete results of the lower-bound scenario for women born in 1945-1975 (1978 for countries with the base year of the projection in 2003-04) are provided in Table 4 (Appendix).

The proportion of women remaining childless is expected to increase in almost all countries; the two scenarios differ mostly in the predicted magnitude of this increase. The scenarios for the United States constitute the most important exception to the projected trend of increasing childlessness; both scenarios predict slightly declining final childlessness among women born after 1958. The projection envisions a particularly pronounced increase in childlessness in Central and Eastern Europe, where childlessness has been quite uncommon until recently. The projected increase in childlessness is also rapid in the upper-bound

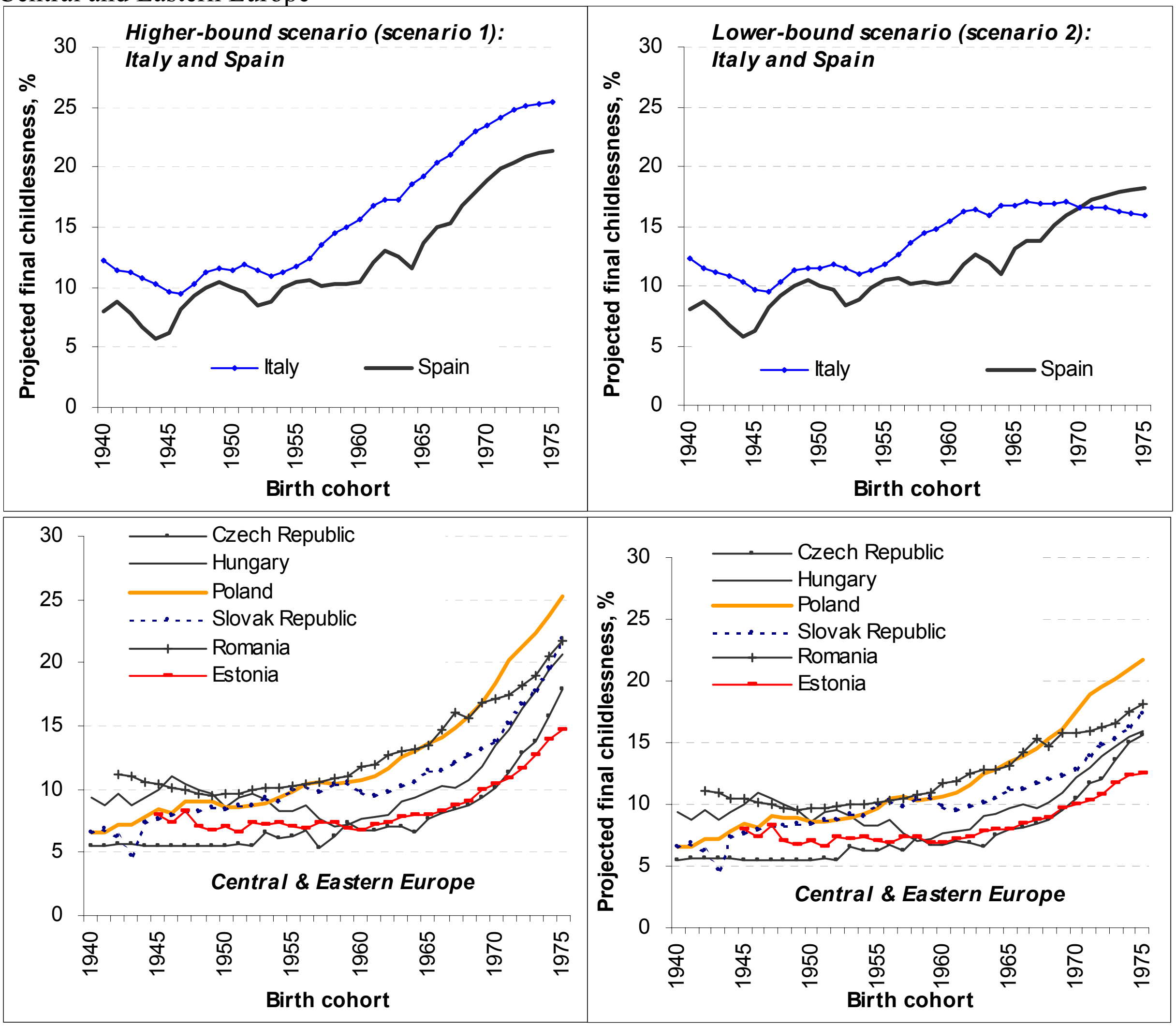
FIGURE 3a: Projected final childlessness among women born in 1940-1975: Northern Europe, Western Europe, and the United States



scenario for younger cohorts in Italy and Spain. Despite similarity in the predicted trends, there are sharply increasing differences between countries in the projected levels of childlessness among women born after 1955. In almost all countries women born in the 1940s have a relatively low and stable level of final childlessness, between 9% and 15% in Western Europe, Northern Europe, Italy and the United States, and between 5% and 10% in Spain and in Central and Eastern Europe.

The Czech Republic stands out as a country with a particularly low proportion of childless women, reaching 5-6% among those born in 1940-1952. The trend toward increasing levels of lifetime childlessness can be traced back to the generations of women born in the late 1940s in Western Europe, Denmark, Finland and the United States (the mid-1940s in England and Wales), the mid-1950s in Italy and Norway, the early 1960s in Spain and the late 1960s in Central and Eastern Europe and Sweden. In most cases, increase in childlessness progressed in tandem with the postponement of childbearing, but in some

FIGURE 3b: Projected final childlessness among women born in 1940-1975: Southern Europe, Central and Eastern Europe



countries, such as France, Norway and Sweden, parenthood has been increasingly delayed among women born after the mid-1950s without affecting much their final childlessness.

Since not only the inflection point of an increase in final childlessness differs between countries, but also the magnitude of this increase, it is difficult to generalise the trends depicted in Figure 3 and Table 3 further than outlining the high vs. low childlessness level and slow vs. rapid change dichotomy. Several countries reach considerably high levels of childlessness among the youngest birth cohorts observed. According to the upper- bound scenario 23% to 28% women from Austria, England and Wales, Finland, West Germany Italy, and Poland born in 1975 will remain childless. In the lower-bound scenario final childlessness in all these countries except Italy converges at the level of 21-23%. This list of the high-childlessness countries is hardly surprising. Despite some differences in childlessness estimates, West Germany is well known for its high proportion of women

TABLE 3: Recorded and projected final childlessness among women born in 1940-1975

Country / region	Projection scenario	Recorded childlessness				Projected childlessness			
		1940	1945	1950	1955	1960	1965	1970	1975
Western Europe									
Austria	Upper-bound scenario (S1)	11.9	12.4	12.6	15.0	16.3	17.3	20.1	22.9
	Lower-bound scenario (S2)					16.3	17.1	19.7	20.9
England and Wales	Upper-bound scenario (S1)	10.8	9.1	14.0	15.8	19.0	20.2	22.0	25.0
	Lower-bound scenario (S2)					19.1	20.3	21.5	22.6
France	Upper-bound scenario (S1)	10.1	8.6	9.8	10.9	11.4	12.6	13.8	15.2
	Lower-bound scenario (S2)					10.8	10.7	10.2	10.2
West Germany	Upper-bound scenario (S1)	10.6	12.7	14.2	18.3	19.7	25.2	27.7	27.7
	Lower-bound scenario (S2)					19.3	23.3	23.8	23.0
The Netherlands	Upper-bound scenario (S1)	11.9	11.7	15.0	18.4	19.2	19.7	19.6	19.2
	Lower-bound scenario (S2)					19.2	19.7	19.5	18.4
Northern Europe									
Denmark	Upper-bound scenario (S1)	9.7	7.6	10.9	12.8	10.7	14.0	15.5	16.0
	Lower-bound scenario (S2)					10.7	14.0	15.2	15.4
Finland	Upper-bound scenario (S1)	14.3	14.2	15.6	16.5	18.1	20.0	22.2	23.9
	Lower-bound scenario (S2)					18.2	19.8	21.6	22.4
Norway	Upper-bound scenario (S1)	9.4	9.0	9.5	11.4	11.9	12.3	13.8	16.2
	Lower-bound scenario (S2)					11.8	12.1	12.6	13.2
Sweden	Upper-bound scenario (S1)	13.1	12.2	12.6	12.8	12.9	13.3	14.7	16.9
	Lower-bound scenario (S2)					13.0	13.3	14.2	15.4
Southern Europe									
Italy	Upper-bound scenario (S1)	12.3	9.7	11.4	11.8	15.6	19.3	23.4	25.5
	Lower-bound scenario (S2)					16.4	16.8	16.6	15.9
Spain	Upper-bound scenario (S1)	8.1	6.2	10.0	10.4	10.4	13.7	18.9	21.3
	Lower-bound scenario (S2)					10.3	13.1	16.5	18.2
Central and Eastern Europe									
Czech Republic	Upper-bound scenario (S1)	5.5	5.5	5.5	6.3	6.8	7.6	10.1	17.9
	Lower-bound scenario (S2)					6.8	8.0	10.6	15.7
Estonia	Upper-bound scenario (S1)	..	8.0	7.1	7.1	6.8	7.9	10.4	14.7
	Lower-bound scenario (S2)					6.8	8.0	10.0	12.5
Hungary	Upper-bound scenario (S1)	9.3	10.0	8.6	8.3	7.6	9.9	13.4	20.6
	Lower-bound scenario (S2)					7.4	9.7	12.2	16.0
Poland	Upper-bound scenario (S1)	6.6	8.4	8.6	9.8	10.7	13.6	18.4	25.3
	Lower-bound scenario (S2)					10.7	13.4	17.5	21.8
Romania	Upper-bound scenario (S1)	..	10.5	9.7	10.2	11.8	13.5	17.2	21.8
	Lower-bound scenario (S2)					11.7	13.2	15.8	18.2
Slovak Republic	Upper-bound scenario (S1)	6.5	7.6	8.5	10.0	9.8	11.4	13.8	22.0
	Lower-bound scenario (S2)					9.8	11.2	12.9	17.4
United States	Upper-bound scenario (S1)	9.6	13.0	15.0	16.1	15.4	14.6	14.1	13.3
	Lower-bound scenario (S2)					15.4	14.2	13.0	11.3

remaining childless (see Dorbritz and Schwarz 1996; Kreyenfeld 2002); West German women born after 1960 probably have the highest level of childlessness in Europe. In Austria, childlessness was traditionally high and relatively accepted; during the 20th century it has become an increasingly urban phenomenon, with women in Vienna having a particularly high childlessness levels[16] (SA 2005). England and Wales experienced a continuing trend of

[16] According to the 2001 Population Census (SA 2005), 25.3% of women in Vienna aged 40-44 remained childless as compared with the Austrian average of 16.1% and 12.1% in municipalities with less then 20

rapidly increasing childlessness among women born after 1945, and Finland had a comparatively high level of lifetime childlessness (around 15%) already among women born in the 1940s. The lower- and the higher-bound scenarios provide a fairly broad range of childlessness in Italy, estimated for women born in 1975 at 16 and 26%, respectively. The projected sharp increase in childlessness in Poland may appear surprising. A marked decline in first birth rates coupled with the postponement of childbearing is a relatively recent phenomenon in Poland, and therefore the projected levels of final childlessness, put at 22% (lower-bound) and 25% (higher-bound) for women born in 1975 may be too high—a consequence of a temporary shift in first birth patterns.

A broad and diverse group of countries occupying the middle position in projected childlessness among women born in the first half of the 1970s can be further divided into two categories. The first one, with a relatively higher level of projected childlessness among women born in 1975, namely 19-22% in the upper bound scenario and 16-18% in the lower-bound scenario, includes the Netherlands together with Hungary, Romania, Slovakia, and Spain. While in the Netherlands childlessness is projected to peak at 19.9% already among women born in 1964 and stabilise or slightly decline thereafter, in all other countries the projection implies a rapid increase in childlessness among women born between 1965 and 1975. The second group, composed of the three Nordic countries with very similar trends (Denmark, Norway, and Sweden) and the Czech Republic, will probably reach somewhat lower childlessness levels, namely 16-18% in the upper bound and 13-16% in the lower bound scenario for women born in 1975. Women in Estonia, France and the United States are projected to reach a lower level of lifetime childlessness than other countries. The expected childlessness among women born in 1975 is 13-15% for the upper-bound scenario and 10-13% for the lower-bound scenario. In Estonia and France (for the higher-bound scenario) this level still constitutes a gradual increase in final childlessness among the younger birth cohorts. The example of France indicates that the pervasive delay of parenthood may not necessarily lead to a considerable increase in childlessness. Although the lower-bound scenario appears too low, possibly a result of relying on survey data, the relatively low level of projected final childlessness in France is consistent with the detailed analyses of Toulemon (1996) and Toulemon and Mazuy (2001). The projected decline of childlessness in the United States clearly deviates from the trends in other countries. Even considering the upper-bound scenario as the most likely one, the question remains whether the foreseen gradual decline in the proportion of women who remain permanently childless—from 16% among women born in 1955 to 13% among those born in 1975—will materialise. This issue is further addressed in Section 6.2, which discusses explanations for the envisioned cross-country differences.

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thousand inhabitants. Among women aged 35-39, the actual level of childlessness was 30.6% in Vienna as contrasted with 19.1% in Austria and 14.1% in smaller municipalities.

5.3 How realistic are the presented scenarios?

The unreliability of projections based on period incidence rates has been clearly illustrated in the retrospective scenarios of childlessness with base year 1981: combined with the cohort fertility reached until that year, they produced vastly exaggerated projections of lifetime childlessness in all five countries considered. In line with some earlier studies, considerably more realistic projections of childlessness were derived by employing the most recent exposure-based indicators of first birth intensity combined with the cohort parity distribution up to date. Especially the lower bound scenario ('recuperation scenario') provided a strikingly good projection of final childlessness in England and Wales, France, the Netherlands, Sweden, and the United States among women of childbearing age in 1981. This finding indicates that in the case of first births continuing postponement of childbearing after the base year of the projection (1981) has not led to the additional unanticipated increase in final childlessness. A possible interpretation is that in Western Europe, Northern Europe and the United States the 'underlying' decline in first birth probabilities (net of the distortions caused by tempo-effects), linked with the subsequent gradual increase in final childlessness, had already taken place in the 1970s. Since the early 1980s the intensity of first births remained rather stable, affected mostly by the continuing shifts in first birth timing. Such a possibility requires, however, a more rigorous exploration.

Will the scenario based on adjusted age-parity birth probabilities perform equally well in the future? In most countries continuing fertility postponement is likely to be linked with a slight increase in childlessness. Such a hypothesis is also supported by the findings on the process of becoming childless: childlessness is typically an outcome of sequential postponement and prolonged indecision about parenthood. Planned, initially and consistently intended childlessness remains very low (Quesnel-Vallée and Morgan 2003). Thus, an increasing proportion of women remaining childless past age 30 may, for a variety of reasons, remain childless until the end of their childbearing age. Final childlessness would then exceed the lower-bound scenario and move closer to the upper-bound scenario, assuming no further recuperation of first birth probabilities.

The two scenarios outlined here should not be, however, interpreted rigidly. Rather, they should be viewed as indicative of the most likely levels and trends of childlessness among women born up to the mid-1970s. A great deal of uncertainty remains with respect to the extend of 'catching up' among women in Central and Eastern Europe, where the gradual increase in first birth intensity among women past age 30 is a recent phenomenon. While the increase of childlessness above the level set by the upper-bound scenario is unlikely, an accelerated recuperation, implying less pronounced increase in childlessness than suggested by the lower-bound scenario, cannot be ruled out. The scenarios are also less certain in the Netherlands, where first birth postponement has slowed down and all the scenarios, including the simplistic complementary scenario based on incidence rates, suggest almost identical childlessness levels among women born after 1965. There, the future shifts in period fertility may cause unforeseen changes in childlessness levels.

Finally, the levels of childlessness in many countries analysed will be affected by immigration. Typically, migrant women are less often childless than the native women and as a result, final childlessness among all women tends to be lower when analysed ex-post from the census data that include recent immigrants than when reconstructed from the series of period fertility rates based on vital statistics registration. Most analyses used in this study have relied on the second type of data and the census results may thus ultimately indicate lower childlessness levels. In Austria, for instance, this difference reached 2 to 4 percent among women born until 1971.[17]

6 DISCUSSION AND CONCLUSIONS

6.1 The continuing motivation for parenthood

The presented results indicate that final childlessness will increase gradually in almost all industrialised countries, although the timing and the magnitude of this change are subject to considerable variance. The United States appears to be the most important exception to the general trend of increasing childlessness. Viewed from a perspective of some earlier projections, the expected trend in most societies is not dramatic: lifetime childlessness in the high-childlessness regions like England and Wales or West Germany is likely to come close to 25%, and almost certainly to remain below 30%, while the more typical childlessness levels will range between 15 and 22%. However high these numbers may appear, they are not without precedence. Historical estimates of childlessness reveal that a large proportion of women born in the second half of the 19th and the first quarter of the 20th century remained childless. Among women born at the beginning of the 20th century, lifetime childlessness reached 19% among white women and 25% among non-white women in the U.S., 25% in France, 26% in Germany and the Netherlands, 30% in Australia, and 32% in Austria.[18] These levels of childlessness, achieved through a combination of a high proportion of women never marrying and high childlessness within marriage, are partly attributable to negative economic conditions during the economic crisis of the 1930s (Rindfuss, Morgan, and Swicegood 1988).

Viewed from a longer-term perspective, the level of childlessness in developed countries follows a U-shape pattern, hypothesised by Poston and Trent (1982) in the case of

[17] The estimated final childlessness for women born in 1966 in the lower-bound scenario is 17.8% when the 2001 Census is taken as a point of departure as in the case of this study and 21.4% when the time series of vital statistics data are cumulated.

[18] Data relate to birth cohorts 1903 in the U.S. (Evans, 1986), 1900 in France (Toulemon 1996), 1901-1905 in Germany (Dorbritz and Schwarz 1996), 1901-1910 in the Netherlands (Liefbroer and Dykstra 2000), 1901-1906 in Australia (Merlo and Rowland 2000), and 1901-1905 in Austria (OSZ 1989).

marital childlessness. Among women born in the 20th century, low childlessness levels associated with the generations born in the 1940s and having children in the 1960s and early 1970s appear to be more unusual than the more recent increase in lifetime childlessness. Considering that women and men have a broad range of means to prevent or terminate unwanted pregnancies and voluntary childlessness has become accepted as a matter of personal choice, the projected increase in childlessness appears to be relatively modest.

The question, rather, may therefore be why so many women and men still intend to have children and why do most of them realise these intentions later in life? Although childbearing has became more a result of the careful weighing of personal preferences and the pros and cons of parenthood, the continuing strong motivation to have children deserves more attention. Schoen et al. (1997: 339) have argued that "creating a social capital" is a "crucial factor that motivates childbearing in low-fertility societies." Social capital may be viewed as a "resource" which enables individuals to advance their purposes. Bernardi's (2003) qualitative research carried out in Northern Italy has aptly illustrated the continuing importance of social influence in a low fertility context on enforcing the "parental imperative," operating through social interaction with peers and relatives. Foster (2000: 211) has proposed the hypothesis that humans have an inherited biological predisposition toward nurturing behaviour, which "is sufficiently strong to ensure that the majority of women will (…) want to bear at least one child, despite the substantial costs of so doing." Other arguments, some of them discussed by Coleman (1999) and Morgan and King (2001) include such diverse parenthood motivations as 'uncertainty reduction'—a sort of 'escapist' solution to uncertainty early in life (Friedman, Hechter, and Kanazawa 1994)—or a broadly defined value of children for their parents (Hoffman and Hoffman 1973).

6.2 Explaining cross-country contrasts

If we assume a strong childbearing motivation as a given, the question remains how to explain increasing differences in childlessness levels between countries. There appears to be no single explanation, but rather numerous factors operating at the individual and at the societal levels. Institutional influences, such as the structure of childcare institutions (availability and price), and, more importantly, the policies facilitating a flexible combination of work and child-rearing appear to play a strong role. Brewster and Rindfuss (2000) conclude their assessment of the fertility-employment relationship by proposing that the reviewed work "suggests an overriding importance of the state's philosophical orientation toward family policy and families." West Germany, a region which currently has the highest childlessness rates in Europe, also has a long-lasting shortage of day care facilities and an institutional system which is conducive to reproductive polarisation, encouraging women with small children to stay at home and serving as an obstacle for those who wish to combine work and childrearing

(Federkeil 1997; Brewster and Rindfuss 2000; Konietzka and Kreyenfeld 2002).[19] Thus, the conflict between career aspirations and motherhood in Germany is intensified among highly educated women (Huinink and Mayer 1995). The relatively high level of childlessness in England and Wales is also related to the incompatibility of motherhood and upper-level employment, resulting in a large proportion of higher educated women remaining childless (Ekert-Jaffé et al. 2002; Rendall and Smallwood 2003).[20]

Although the limited work-family compatibility may explain higher childlessness in many advanced societies, the changing character of partnerships and union formation also contributes to the rising childlessness levels, especially in the more traditional settings. Overall, younger men and women in almost all European countries are increasingly reluctant to enter long-lasting commitments and marriage in particular. Partnerships have become less bound by societal norms and expectations, including the pressure for marrying and entering parenthood. Couples frequently view their partnerships as 'reflexive projects' (see Giddens 1992) which serve their quest for fulfilment and gratification; having children ceases to be a self-understandable goal. Thus, not only the proportion of men and women living single or without a steady partner has shot up at all ages below 35, but the existing unions have become less stable. The decision for parenthood is often reached after a 'negotiation' between partners; conflicting preferences usually imply that a couple decides not to have a(nother) child (Voas 2003). This development may have more serious impact is societies where social norms support traditional model of family formation marked by marriage, subsequent childbearing and mothers' detachment from the labour force, which is at odds with career ambitions, preferred lifestyle and consumption patterns among younger generations. The centrality of marriage and a limited prevalence of cohabitation and non-marital childbearing typical of Southern Europe have been increasingly associated with very low fertility level (Billari and Kohler 2004).

The rapid increase of childlessness in the upper bound scenarios for Italy and Spain suggests that the prevailing cultural norms may also constitute an obstacle to parenthood. Italy is an interesting case in this respect, a country where the existing theoretical arguments are sending conflicting signals as to the expected extent of future childlessness. Italy is characterised by a deep-rooted familistic culture (Reher 1998), which attaches a high value to parenthood. However, in addition to negative socio-economic factors, such as a high unemployment rate among young people, familism may also serve as an explanation of the

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[19] Tax system, health care, and pension system are most beneficial for married couples with very unequal income, in particular when a woman remains at home as a housewife (Konietzka and Kreyenfeld 2002). At the same time they discriminate against unmarried couples, which do not qualify for tax relief.

[20] Most studies on childlessness show that childlessness remains more common among women with higher education. Lappegård (2002) found that in Norway the childlessness level among women with higher than secondary education also varied considerably according to the field of education: women graduating in aesthetics (artistic professions) and humanities have a particularly high level of childlessness. Whether this reflects their difficulties to combine work with childbearing or a lifestyle preference expressed through the chosen field of study remains unclear.

very late pattern of home leaving and partnership formation, as well as the low compatibility of child-rearing and women's employment (Dalla Zuanna 2001, Micheli 2004). Living in a welfare system that hinders individual autonomy and being increasingly reluctant to marry and enter parenthood, young Italians commonly stay with they parents into their early thirties (Billari and Rosina 2004). The lack of gender equity within the family in combination with the expanding economic opportunities for women outside the family sphere has been hypothesised by McDonald (2002) as a further obstacle to family formation and an explanation of very low fertility in Southern Europe.

The projected rapid increase in childlessness in Central and Eastern Europe has multiple roots. Very low childlessness levels among women born in the 1940s and 1950s are exceptional and were enabled by a combination of traditional family attitudes disapproving childlessness, social and pronatalist policies favouring early family formation, limited opportunities for non-family lifestyles as well as a generally limited choice of modern contraceptives (see Sobotka 2004). The collapse of the communist regimes paved the way to the increased labour market competition and unemployment, scaling down of the previous social policies, prolonged education, rapid spread of modern contraception and, in general, lifestyles that are less compatible with parenthood. Although the plummeting levels of period fertility in this region have been frequently attributed to the broadly defined effects of economic and social uncertainty (e.g. UN 2000), the survey data point out the pivotal role of the changing character of partnerships. Population Policies Acceptance Survey (PPAS), carried out in 2000-2003,[21] indicates that childless men and women who do not intend to become parents or remain uncertain most typically quote the lack of steady partner as a reason. The costs of children and concerns about maintaining one's living standard are quoted frequently as well, whereas relatively few men and women perceive their professional activities as a main reason for the intention to remain childless. Besides being tightly linked to the current partnership status, childbearing intentions are also strongly connected to preferred living arrangements, revealing different lifestyle preferences. Respondents that favour other living arrangements than marriage, including those who prefer to cohabit first and marry later, are considerably less certain about their childbearing intentions.

This finding is particularly helpful for explaining the projected sharp increase in childlessness in Poland, a fairly traditional and dominantly Catholic society. Although the younger generations have embraced to some extent the 'reflexive' model of partnership and wait increasingly longer before entering a stable union, their search for the most suitable partner is hindered by the low societal acceptance of informal living arrangements. The PPAS results provide a picture full of paradoxes. About two-thirds of men and women aged 18-39 (65% and 69%, respectively) and a half of those still remaining childless (50% of men and

[21] In the former Communist countries, the PPAS / DIALOG survey has been conducted in Bulgaria, the Czech Republic, Estonia, Hungary, Lithuania, Poland, Romania, and Slovenia; in addition, the area of East Germany has been sufficiently covered by the German survey (see DIALOG 2005).

52% of women) believe that a woman cannot be fulfilled without having children. Yet a large proportion of those who are actually childless do not intend to have a child or remain undecided. Men are particularly reluctant to parenthood. Among those still childless, 40% are undecided and another 13% do not intend to have a child. Generally strong and traditional family orientation is manifested by an overwhelming personal preference for direct marriage expressed by 63% of men and 71% of women aged 18-39. Very few of these respondents prefer this arrangement without children. However, those who prefer alternative living arrangements often choose a combination without children: in the second most popular category—cohabitation followed by marriage—one firth (21% of men and 19% of women) prefer this option without children. For some, this may be a reflection of their relationship uncertainty, but it also signals the strong perceived disapproval of extramarital childbearing and unmarried cohabitation in general. This provides a clear parallel to the Italian situation. In both countries, the future childlessness may depend to some extent on the ability of these societies to flexibly accommodate different lifestyle orientations among the younger generations, opening thus more pathways to the transition to adulthood and subsequently to parenthood (see also Billari and Rosina 2004).

Western and Northern European countries with relatively low childlessness levels—France, Norway, Sweden, and Denmark—have quite comprehensive system of family support, childcare facilities, and high rates of female employment. In general, a large amount of individual choice in decisions regarding partnership, living arrangements and childbearing, coupled with family-friendly policies typical of the Scandinavian countries appear to have a positive influence on deciding for parenthood. Perhaps these conditions have an enabling effect: by reducing some constraints child rearing imposes upon people's lives, they enable more couples to decide to become parents.[22]

Nevertheless, the example of the United States, with a moderate-to-low childlessness level and a projected slight decline in final childlessness among younger cohorts, indicates that the factors influencing childlessness may be more complex. This projection appears to contradict some commonly accepted arguments. It would challenge the notion that fertility postponement is linked to increased lifetime childlessness. Furthermore, it does not resonate well with the long-lasting trend of increased educational and career opportunities for women, which, coupled with a decline in the normative pressure to follow traditional family-oriented lifestyles, is expected to result in a higher level of childlessness. It is possible that the projected decline in childlessness among U.S. women is an unlikely development, a result of using a projection method relying too strongly on the most recent period trends or using

[22] Rindfuss (1991: 508-509) has argued that the following forces broadening the scope of individual choice may potentially have a pronatalist effect: "1) loosening of the requirement for men to be the financial providers; 2) a looser connection between marriage and childbearing; and 3) a relaxing of the requirement for the biological mother to be with her child during her child's waking hours."

inaccurate fertility data.[23] A satisfactory answer to this problem would require a more detailed analysis. However, some evidence may support the projected decline in childlessness. Younger cohorts of non-white U.S. women have considerably lower childlessness than white women. A compositional effect of the increasing proportion of non-white women in the younger population may subsequently lead to a slight decline in final childlessness. Despite a long-term delay of childbearing, women in the United States are becoming parents at an earlier age than women in most European countries[24], a factor which is probably linked to a lower level of involuntary childlessness. Decline in lifetime childlessness may also be related to an increased role compatibility (perceived or real) between labour participation and child-rearing, for instance through a higher societal acceptance of organised childcare for pre-school children (Rindfuss, Brewster, and Kavee 1996). Finally, the normative pressure to become a parent may remain higher in the United States than in most European countries, and, although societal pronatalism takes more subtle forms than in the past (Rindfuss, Morgan, and Swicegood 1988), it may partly account for the predicted low level of childlessness.

6.3 Childless societies?

The results of this study provide quite an unambiguous answer to the rhetorical question posed by its title. Advanced societies are not becoming childless societies, at least not yet, and not for the foreseeable future. Despite the continuing erosion of the 'parenthood imperative' and gradually rising levels of childlessness, the projected final childlessness among women born until 1975 does not reach the record high levels in most countries. Thus, the ongoing decline of completed cohort fertility to low and very low levels, observed in a number of advanced societies, appears to be driven more by declining family size than by increasing rejection of parenthood. Considering the rise in cross-country differences, as well as the existence of many social groups where childlessness is very common, the seemingly trivial question of why people enter parenthood is at least as puzzling and challenging as the traditional demographic quest to explain fertility differences. Increased data availability and innovative studies, including careful cross-country analyses, may shed more light on this issue in the future.

[23] Officially published tabulated data on the U.S. period and cohort fertility (CDC 2000a, 2000b, and 2001) may not be accurate with respect to birth order and race (Morgan et al. 1999). For instance, the reported proportion of non-white women remaining childless at ages 40-50 in the year 2000 is between 0.7 to 2.3% (see CDC 2001, Table 1-36), staying even below the level of biological infertility.

[24] Mean age at first birth among the U.S. women, derived from the schedule of first birth rates was 24.4 years in 1998 (author's calculations) as compared with the age 26-29 in Western, Northern and Southern Europe and 22-26 in the former communist countries of Central and Eastern Europe (see Chapter 3 in Sobotka 2004).

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FIGURE 4: Childlessness scenarios for individual countries; women born in 1940-1975

a) Western Europe and the United States

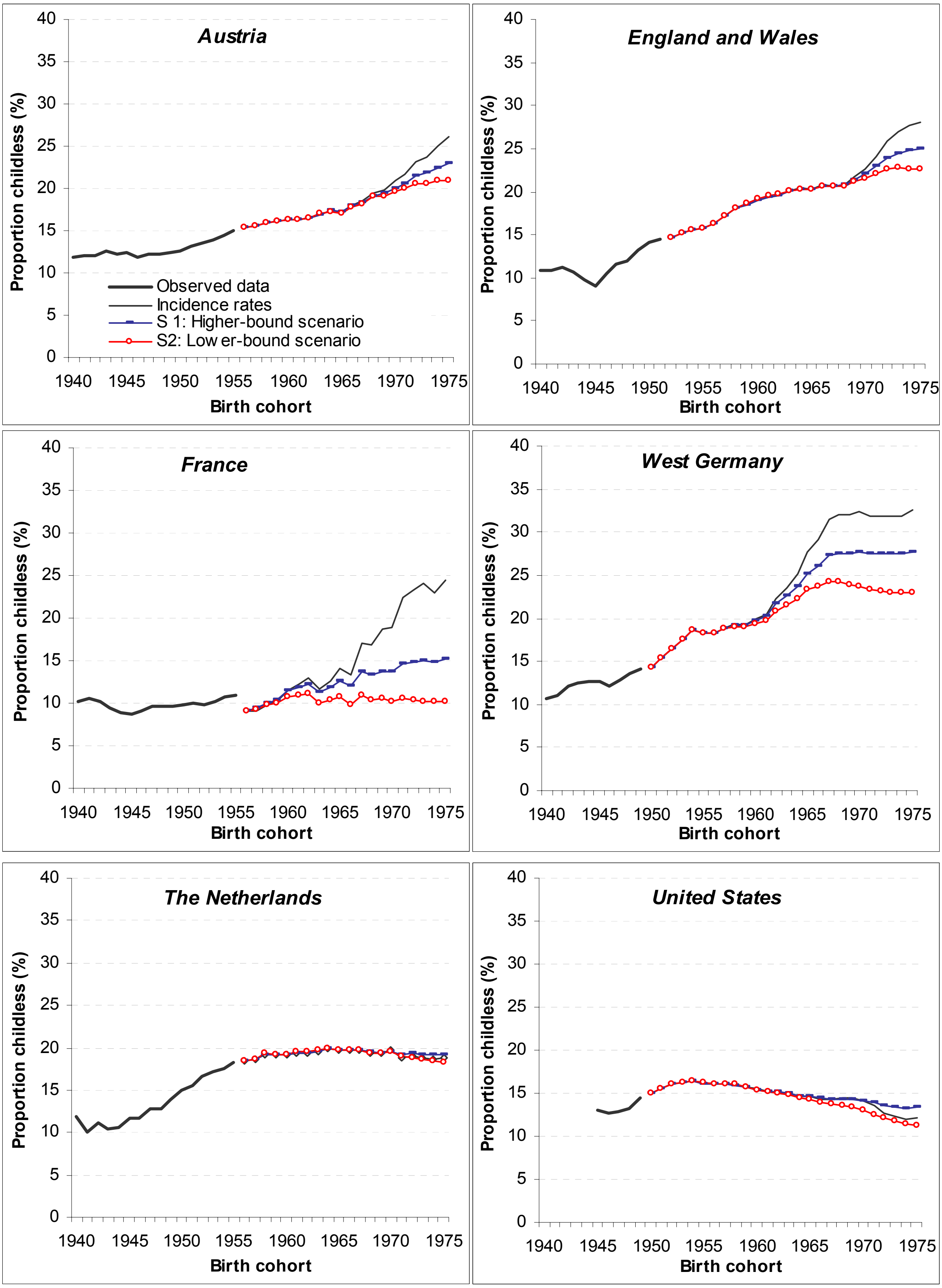
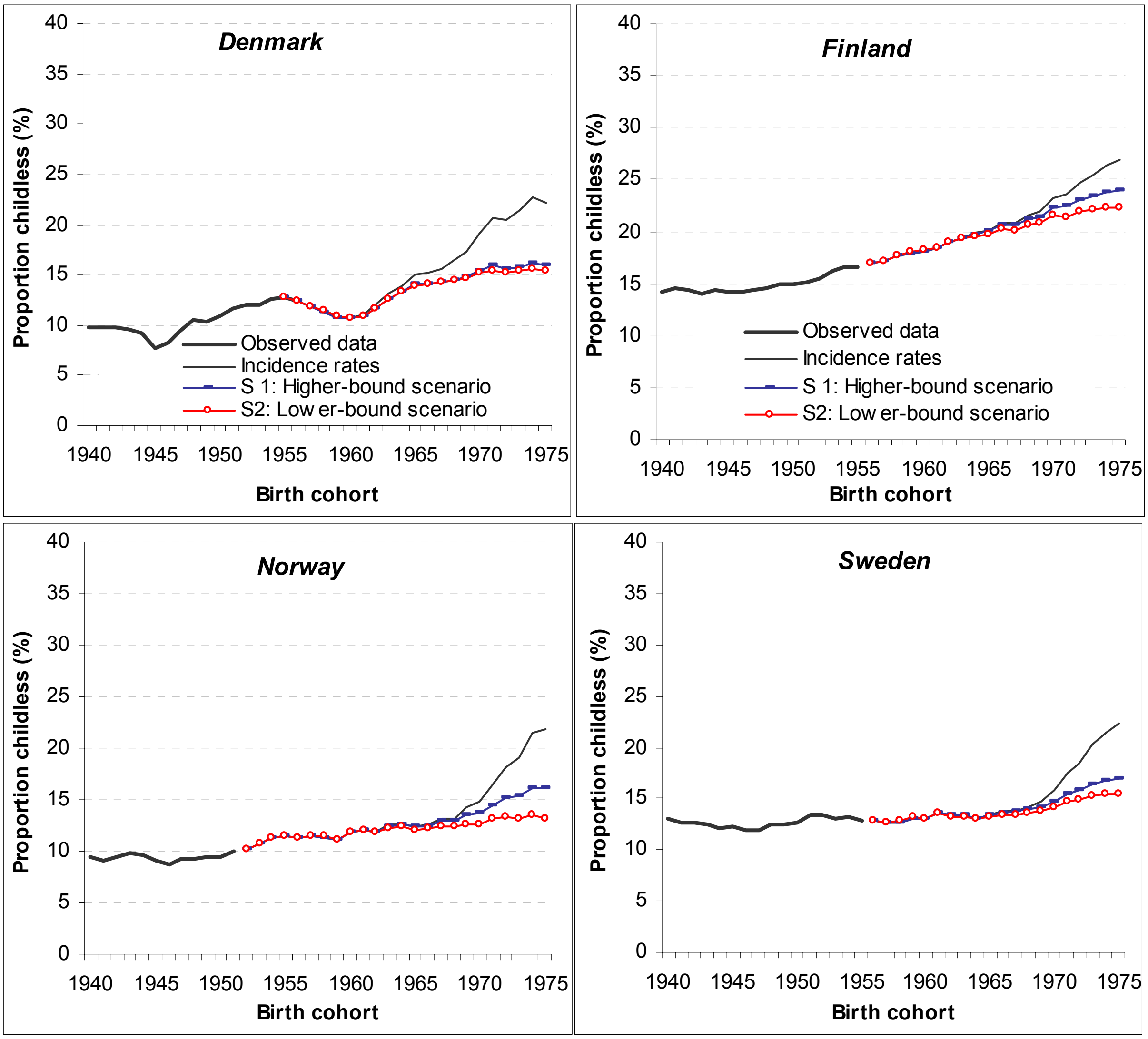


FIGURE 4 (continued): Childlessness scenarios for individual countries; women born in 1940-1975

b) Northern Europe



c) Southern Europe

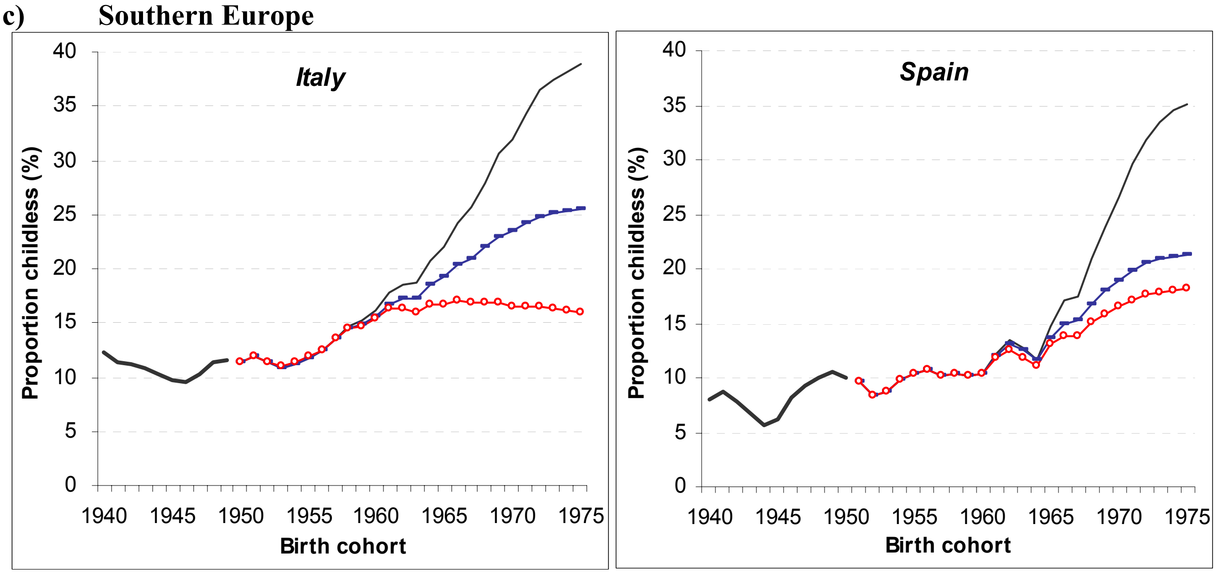


FIGURE 4 (continued): Childlessness scenarios for individual countries; women born in 1940-1975

d) Central and Eastern Europe

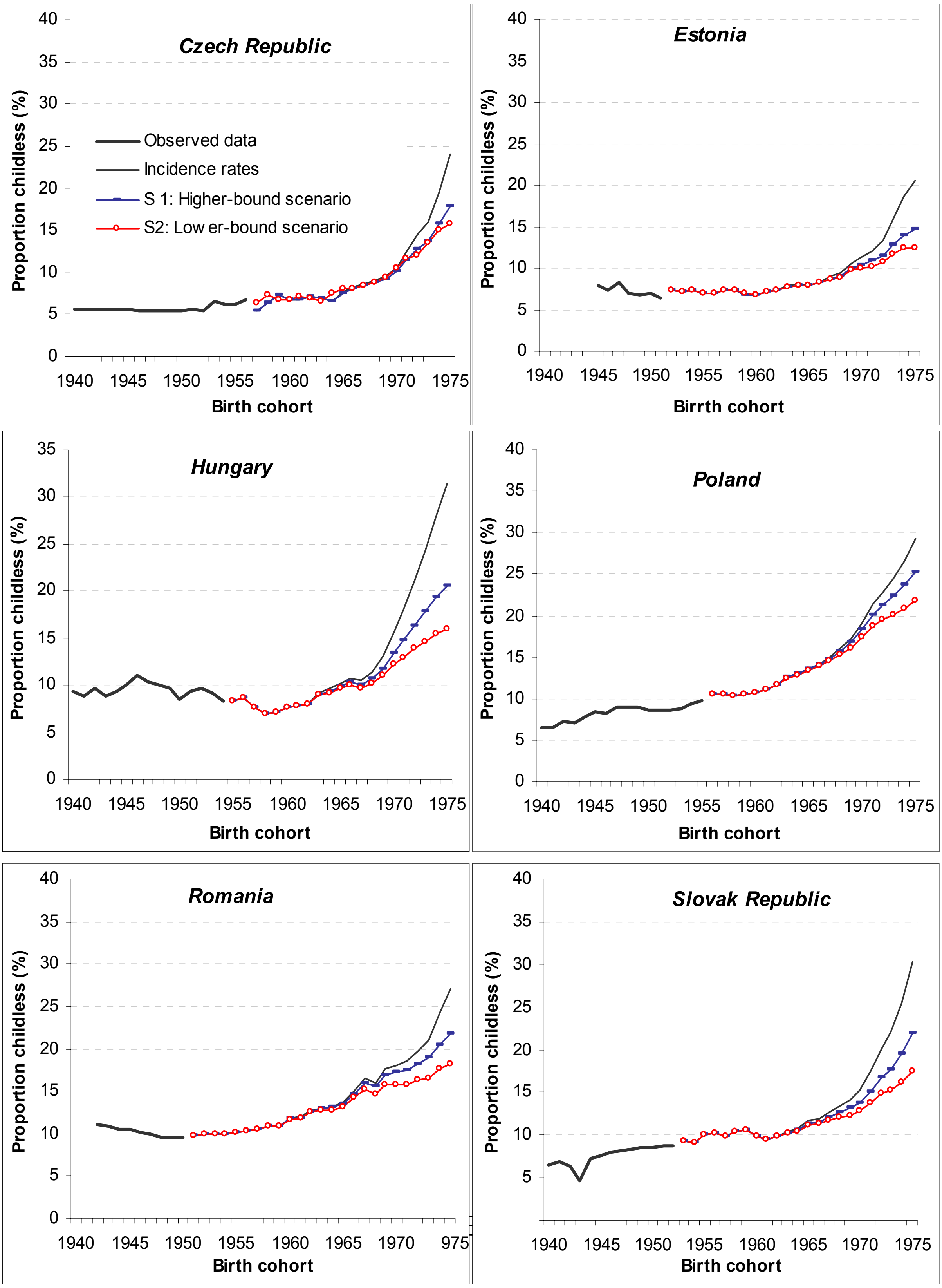


TABLE 4: Recorded and projected final childlessness among women born in 1940-1975; lower-bound scenario based on adjusted first birth probabilities

Projected final childlessness (%)	**Western Europe**					**Northern Europe**				**Southern Europe**	
	Austria	England and Wales	France	West Germany	The Netherlands	Denmark	Finland	Norway	Sweden	Italy	Spain
1945	12.4	9.1	8.6	12.7	11.7	7.6	14.2	9.0	12.2	9.7	6.2
1946	11,8	10,5	9,1	12,2	11,7	8,4	14,2	8,7	12,0	9,5	8,2
1947	12,2	11,6	9,6	12,8	12,8	9,4	14,3	9,3	12,0	10,4	9,2
1948	12,3	12,0	9,7	13,6	12,8	10,4	14,5	9,3	12,5	11,3	10,0
1949	12,4	13,2	9,6	14,0	13,9	10,4	14,9	9,5	12,5	11,5	10,5
1950	12,6	14,0	9,8	14,3	15,0	10,9	14,9	9,5	12,6	11,4	10,0
1951	13.1	14.5	9.9	15.4	15.5	11.6	15.1	10.0	13.4	11.9	9.7
1952	13,5	14,6	9,9	16,5	16,6	12,1	15,5	10,2	13,3	11,4	8,4
1953	13,9	15,2	10,2	17,5	17,1	12,0	16,3	10,7	13,1	11,0	8,8
1954	14,5	15,5	10,8	18,6	17,6	12,5	16,5	11,2	13,2	11,4	9,9
1955	15,0	15,8	10,9	18,3	18,4	12,8	16,5	11,4	12,8	11,9	10,4
1956	15,3	16,4	9,1	18,3	18,4	12,4	16,9	11,3	12,8	12,5	10,7
1957	15,6	17,2	9,2	18,8	18,7	11,9	17,1	11,5	12,6	13,6	10,1
1958	15,9	18,1	9,8	19,1	19,3	11,4	17,7	11,4	12,8	14,4	10,3
1959	16,1	18,6	10,0	18,9	19,2	10,8	18,0	11,1	13,2	14,8	10,2
1960	16,3	19,1	10,8	19,3	19,2	10,7	18,2	11,8	13,0	15,3	10,3
1961	16.3	19.5	11.0	19.7	19.5	10.9	18.4	12.0	13.6	16.3	11.9
1962	16,5	19,6	11,1	20,9	19,5	11,7	19,0	11,9	13,3	16,4	12,6
1963	17,0	20,1	10,0	21,5	19,6	12,6	19,3	12,3	13,3	15,9	11,9
1964	17,3	20,3	10,3	22,2	19,9	13,3	19,6	12,3	13,1	16,7	11,1
1965	17,1	20,3	10,7	23,3	19,7	14,0	19,8	12,1	13,3	16,8	13,1
1966	17,8	20,6	9,9	23,7	19,7	14,0	20,4	12,1	13,5	17,0	13,8
1967	18,1	20,6	10,9	24,3	19,7	14,2	20,2	12,4	13,5	16,8	13,8
1968	19,0	20,6	10,4	24,2	19,4	14,5	20,7	12,3	13,5	16,9	15,1
1969	19,1	21,2	10,5	23,9	19,4	14,6	20,8	12,6	13,8	17,0	15,9
1970	19,7	21,5	10,2	23,8	19,5	15,2	21,5	12,6	14,2	16,6	16,5
1971	19.9	22.1	10.5	23.4	18.9	15.5	21.4	13.1	14.7	16.5	17.1
1972	20,5	22,7	10,4	23,2	18,9	15,1	21,9	13,3	14,9	16,5	17,6
1973	20,6	22,7	10,3	23,0	18,6	15,3	22,1	13,2	15,3	16,3	17,9
1974	20,8	22,7	10,1	22,9	18,4	15,7	22,3	13,4	15,4	16,1	18,1
1975	20,9	22,6	10,2	23,0	18,3	15,4	22,4	13,2	15,4	15,9	18,2
1976	21.4	..	..	..	18.3	15.3	22.5	..	15.5	..	..
1977	21,3	..	..	..	18,0	15,4	22,4	..	15,3	..	..
1978	21,2	..	..	..	17,9	15,2	22,2	..	15,2	..	..

TABLE 4 (cont.): Recorded and projected final childlessness among women born in 1940-1975; lower-bound scenario

Projected final childlessness (%)	**Central & Eastern Europe**						**UNITED STATES**
	Czech Republic	Estonia	Hungary	Poland	Romania	Slovak Republic	
1945	5.5	8.0	10.0	8.4	10.5	7.6	13.0
1946	5,5	7,4	11,0	8,2	10,1	8,0	12,7
1947	5,5	8,3	10,4	9,0	10,0	8,3	12,9
1948	5,5	7,0	10,0	9,0	9,6	8,3	13,3
1949	5,5	6,8	9,6	9,0	9,5	8,5	14,4
1950	5,5	7,1	8,6	8,6	9,7	8,5	15,0
1951	5.6	6.5	9.4	8.6	9.7	8.8	15.6
1952	5,4	7,3	9,6	8,7	9,9	8,7	16,1
1953	6,6	7,2	9,1	8,9	10,0	9,3	16,3
1954	6,2	7,3	8,3	9,3	10,0	9,0	16,4
1955	6,3	7,1	8,3	9,8	10,2	10,0	16,2
1956	6,7	6,9	8,7	10,4	10,4	10,3	16,2
1957	6,3	7,3	7,7	10,6	10,5	9,9	16,1
1958	7,3	7,4	7,0	10,4	10,8	10,4	16,0
1959	6,8	6,9	7,1	10,5	10,9	10,6	15,7
1960	6,8	6,8	7,6	10,7	11,7	9,8	15,4
1961	7.1	7.1	7.8	11.0	11.8	9.5	15.2
1962	6,9	7,3	8,0	11,6	12,5	9,8	15,1
1963	6,5	7,8	9,0	12,5	12,8	10,2	14,8
1964	7,5	7,9	9,2	12,8	12,9	10,5	14,5
1965	8,0	8,0	9,7	13,4	13,2	11,2	14,2
1966	8,1	8,4	10,0	13,9	14,2	11,3	13,9
1967	8,5	8,7	9,6	14,5	15,3	11,7	13,8
1968	8,8	8,9	10,1	15,3	14,7	12,1	13,6
1969	9,5	9,8	11,0	16,1	15,8	12,4	13,4
1970	10,5	10,0	12,2	17,5	15,8	12,9	13,0
1971	11.7	10.3	13.0	18.8	15.9	13.9	12.6
1972	12,1	10,8	13,9	19,5	16,3	14,8	12,1
1973	13,6	11,7	14,6	20,1	16,5	15,3	11,7
1974	15,0	12,4	15,5	20,9	17,6	16,2	11,5
1975	15,7	12,5	16,0	21,8	18,2	17,4	11,3
1976	16.3	..	16.4	22.2	..	..	..
1977	16,6	..	16,7	22,5	..	..	..
1978	16,5	..	16,7	22,7	..	..	..

SPECIFICATION OF DATA AND DATA SOURCES

This section complements Table 1. It aims to give a more detailed overview of the data sources used for a compilation of period and cohort indicators of first birth intensity. If not stated otherwise, the data come from the following sources:

Age distribution of women by single age groups (15-50) on January 1:
EUROSTAT (2003, 2004) New Cronos database.
Period: Differs by country; these data mostly served for a computation of first birth rates and for an estimation of cohort parity distribution (see below). The period then corresponds with the period for which these indicators were calculated.

Data on the distribution of live-born children of first birth order by single age groups of women (used for the computation of first birth rates and first birth probabilities)
EUROSTAT (2003, 2004) New Cronos database.
Period: Differs by country. When used only as an input of the projection scenario, the data pertain to the year preceding the starting year of the projection. When used for computing cohort parity distribution, the period is further specified below.
Data format: Age-period perspective (age in completed years) or period-cohort perspective (age reached during the calendar year; cohort age); see Table 1.

The data below are specified separately for each country. Countries are ordered in correspondence with Table 1. Age-period perspective (age in completed years) is labeled as AP, period-cohort perspective (age reached during the calendar year) as PC. Data originally expressed in an age-period perspective were subsequently organized in the period-cohort perspective (see Section 4.2).

WESTERN EUROPE

AUSTRIA

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups:
Estimated proportion of childless women by age and calendar year until January 1, 2004:
Birth cohorts 1940-1982:
Census data on cohort parity distribution on May 15, 2001 (SA 2005) and the vital statistics data for the period 2001-2003 (PC perspective, EUROSTAT 2003 and SA 2004).
Birth cohorts 1983-1990:
Vital statistics data for the period 1996-2003 (SA 2004)

ENGLAND AND WALES

Age distribution of women by single age groups (15-50):
Official mid-year population estimates for 1945-2001 (see Smallwood 2002)

Distribution of live-born children of first birth order by age of mother:

First births distribution (AP perspective) was estimated by Smallwood (2002) by a combination of vital statistics data on birth order distribution within marriage and survey data from the General Household Surveys in 1986-2000.

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2002:
Birth cohorts 1940-1986:
Age-specific first birth incidence rates based on the data specified above were organized in a period-cohort perspective and served for a reconstruction of cohort parity distribution (see also Smallwood 2002).

FRANCE

Distribution of live-born children of first birth order by age of mother:

First birth incidence rates in 1980 (retrospective projection) estimated by Rallu (1986); first birth rates in 1997 (recent projection) were estimated on the basis of first birth probabilities in 1997.
First birth probabilities: Estimates made by Toulemon and Mazuy (2001) are based on the 1999 INSEE Study of Family History Survey (L'enquête Étude de l'historie familiale; see Cassan, Héran and Toulemon 2000). These data were originally organized by birth cohort, calendar year and age.

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Final childlessness among women born in 1940-1955 based on estimates by Toulemon and Mazuy (2001).
Estimated proportion of childless women by age and calendar year on January 1, 1998:
Birth cohorts 1950-1982:
First births realized in 1960-1989: EUROSTAT (2003); first births realized in 1990-1997: data based on first birth probabilities estimated by Toulemon and Mazuy (2001).

WEST GERMANY

Distribution of live-born children of first birth order by age of mother:

1960-1984 (PC perspective):
First births distribution was estimated by Birg, Filip and Flöthman (1990).
1985-1995 (PC perspective):
First births distribution was estimated by Kreyenfeld (2002) by a combination of vital statistics data on birth order distribution within marriage and survey data from the German Socio-Economic Panel in 1985-1995.

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 1996:
Birth cohorts 1935-1980:
Data estimated on the basis of period first birth incidence rates computed from the data specified above (data sources: Kreyenfeld 2002; Birg, Filip and Flöthman 1990).

THE NETHERLANDS

Distribution of live-born children of first birth order by age of mother:

1950-2003 (period-cohort perspective):
Data obtained from CBS (2004).

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2004:

Birth cohorts 1935-1989:

Data through 2000 based on cohort fertility rates by parity published by CBS (2003), data for 2001-2002 based on vital statistics (CBS, 2004).

SOUTHERN EUROPE

ITALY

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 1998:

Birth cohorts 1935-1982:

Data reconstructed on the basis of period first birth rates, for 1952-1989 taken from ISTAT (1996; first birth rates in age-period perspective), for 1990-1997 calculated from the period first birth data in EUROSTAT (2003).

SPAIN

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2001:

Birth cohorts 1940-1944:

Cohort fertility data in EUROSTAT (2003) database.

Birth cohorts 1945-1986:

First births realized until 1979: Cohort fertility data in EUROSTAT (2003); first births realized in 1980-2000: cohort indicators reconstructed from period first birth incidence rates calculated from EUROSTAT (2003) data.

NORTHERN EUROPE

DENMARK

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2002:

First births realized until 1968: Cohort fertility data in EUROSTAT (2003); first births realized in 1969-2001: cohort indicators based on period first birth rates calculated from EUROSTAT (2004).

FINLAND

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2003:

Birth cohorts 1940-1951:

Cohort fertility data in EUROSTAT (2003) database.

Birth cohorts 1952-1963:

First births realized until 1997: Cohort fertility data in EUROSTAT (2003); first births realized in 1998-2002: cohort indicators based on period first birth rates calculated from EUROSTAT (2003 and 2004).
Birth cohorts 1964-1986:
Cohort indicators reconstructed from period first birth incidence rates; calculated for 1982-1989 from the data provided by SF (2001) and Vikat (2002); and for 1990-2001 from EUROSTAT (2004) data.

NORWAY

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2002:
Birth cohorts 1940-1951:
Cohort fertility data in EUROSTAT (2003) database.
Birth cohorts 1952-1959:
First births realized until 1993: Cohort fertility data in EUROSTAT (2003); first births realized in 1994-2001: cohort indicators based on period first birth rates calculated from EUROSTAT (2003)
Birth cohorts 1960-1975:
Cohort data on first births by age based on the population database of Statistics Norway (SN, 2003); courtesy of T. Lappegård.
Birth cohorts 1976-1986:
Cohort indicators based on period first birth incidence rates in 1991-2001 calculated from EUROSTAT (2003) database.

SWEDEN

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2003:
Birth cohorts 1940-1963:
First births realized until 1988: Cohort fertility data in EUROSTAT (2003); first births realized in 1989-2001: cohort indicators based on period first birth rates calculated from EUROSTAT (2003 and 2004).
Birth cohorts 1964-1986:
Cohort indicators based on period first birth incidence rates in 1977-2001 calculated from EUROSTAT (2003 and 2004) data.

CENTRAL AND EASTERN EUROPE

CZECH REPUBLIC

Age distribution of women by single age groups (15-50):

Data for 1965-1985 are taken from the FSU (1966-1986) yearbooks; data for 1986-1988 from POPIN CR (2002); data for 1989-1999 from CSU (2000); data for 2000-2001 from EUROSTAT (2003); data for 2002-2003 from CSU (2004a).

Distribution of live-born children of first birth order by age of mother:

Data for 1965-1994 are organized in age-period perspective; data from 1995 in period-cohort perspective. Data sources for 1965-2001 identical with the sources on the age distribution (see above); data for 2002 are from EUROSTAT (2004); data for 2003 are from CSU (2004).
Data for 1965-1985 include stillbirths; calculated first birth rates were adjusted for the proportion of stillbirths in the total number of births.

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2004:

Birth cohorts 1940-1965:

Census data on cohort parity distribution on November 1, 1980 (FSU 1982b) and the vital statistics period data for 1980-2002 (AP perspective). Data sources: Data for 1980-1985 are taken from the FSU (1981-1986) yearbooks; data for 1986-1988 from POPIN CR (2002); data for 1989-1999 from CSU (2000); data for 2000-2001 from EUROSTAT (2003); data for 2002 from EUROSTAT (2004); data for 2003 from CSU (2004).

Birth cohorts 1966-1988:

Cohort indicators reconstructed from the period first birth incidence rates in 1980-2003 calculated from the data sources specified above.

ESTONIA

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2002:

Birth cohorts 1945-1986:

Census data on cohort parity distribution on March 31, 2000 (ESA, 2003) combined with the vital statistics on first births in the period 1995-2002 (EUROSTAT, 2003; data originally in age-period perspective).

HUNGARY

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Final childlessness among women born in 1940-1949 based on Prioux (1993, Table 1).

Estimated proportion of childless women by age and calendar year until January 1, 2003:

Birth cohorts 1950-1984:

Cohort indicators reconstructed from the period first birth incidence rates in 1965-2002 calculated from the data in EUROSTAT (2004) database. Data for 2000 are missing in the database; estimation of age-specific incidence rates of birth order one in 2000 was based on the data for 1999 and 2001.

POLAND

Age distribution of women by single age groups (15-50):

Data for 1990-1995 were taken from GUS (1991-1996) yearbooks; data for 1996-2002 are from EUROSTAT (2004) database.

Distribution of live-born children of first birth order by age of mother:

Data for 1990-1995 originate from GUS (1991-1996) yearbooks; data for 1996-2002 are from EUROSTAT (2004) database; data are in age-period perspective.

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups:

Estimated proportion of childless women by age and calendar year until January 1, 2003:

Birth cohorts 1940-1988:

Cohort parity distribution on January 1, 1990 taken from Bolesławski (1993); subsequent cohort fertility in 1990-2002 reconstructed from the period data; for 1990-1995 calculated from the data in GUS (1991-1996) yearbooks and for 1996-2002 from the EUROSTAT (2002) database.

ROMANIA

Distribution of live-born children of first birth order by age of mother:

Data for 1992-1996 originate from CNPS (1993-1997) yearbooks; data for 1997-2001 are from EUROSTAT (2003) database; data are in age-period perspective.

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups:

Estimated proportion of childless women by age and calendar year until January 1, 2002:

- Birth cohorts 1942-1986:

Census data on cohort parity distribution on January 7, 1992 (CNPS, 1994b) combined with the vital statistics on first births in the period 1992-2001. Data for 1992-1996 calculated from CNPS (1993-1997) yearbooks; data for 1997-2001 from EUROSTAT (2003) database.

SLOVAK REPUBLIC

Age distribution of women by single age groups (15-50):

Data for 1970-1979 are from FSU (1971c-1980c), data for 1980-1994 and 2002 are from the POPIN SR (2003) database; data for 1995-2001 from EUROSTAT (2003).

Distribution of live-born children of first birth order by age of mother:

Data for 1970-1989 originate from FSU (1981c-1990c) yearbooks; data for 1990-2002 are from the from the POPIN SR (2003) database; data are in age-period perspective.

Data for 1970-1985 include stillbirths; calculated first birth rates were adjusted for the proportion of stillbirths in the total number of births.

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year until January 1, 2003:

Birth cohorts 1940-1954:

Census data on cohort parity distribution on November 1, 1980 (FSU, 1982b) and the period vital statistics data for 1980-2002 (AP perspective). Data sources: Data for 1980-1989 are taken from FSU (1981c-1990c) yearbooks; data for 1990-2002 from POPIN SR (2003).

Birth cohorts 1955-1987:

Cohort indicators reconstructed from the period first birth incidence rates in 1970-2002. Data sources: Data for 1970-1989 are taken from FSU (1971a-1990a) yearbooks; data for 1990-2002 from POPIN SR (2003).

UNITED STATES

Age distribution of women by single age groups (15-50):

Data on age distribution of the female population were not used for the U.S.

Distribution of live-born children of first birth order by age of mother:

First birth rates in 1980 (retrospective projection) were taken from Feeney (1998); see also OPR (2003). First birth rates in 1998 (recent projection) were taken from CDC (2000b, Table 1-34). First birth probabilities: Data for 1979-1981 were estimated from the period and cohort data provided in OPR (2003), Hauser (1976), and Feeney (1998). Data for 1997-1999 were taken from the vital statistics yearbooks (CDC 2000a, 2000b, 2001, Table 1-37).

Cohort parity distribution: proportion of childless women by calendar year (January 1) and single age groups

Estimated proportion of childless women by age and calendar year on January 1, 1981:
Data taken from OPR (2003) and Hauser (1976).
Estimated proportion of childless women by age and calendar year on January 1, 2001:
Data taken from the CDC yearbook (2001, Table 1-36).
Final childlessness among women born in 1940-1950: Schoen (2003, Table 2).