Better later than never? The increase in late childbearing in Europe, Japan and the United States

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1 INTRODUCTION

In the last decades men and women in advanced societies were spending an ever longer part of their young adult years in education and were delaying their entry into labour market, union formation and parenthood (e.g., Corijn and Klijzing 2001, Beujot 2004). These delayed life course transitions might be partly seen as a logical consequence of the overall extension of life expectancy and thus of the age-related changes in people's life course plans and options, leading to a 'rescaling of the life course' (Lee and Goldstein 2003). While the timing of many transitions, such as home leaving, or entry into union or marriage can be further stretched without any obvious limits – except those set by mortality and survival – menopause and the preceding onset of sterility still impose a relatively rigid biological limit to childbearing for women. According to various estimates, a majority of women are definitely sterile by age 45 (Leridon 2005). Rapid advances in assisted reproduction might enable many post-menopausal women in their 50s to achieve pregnancy with donated fertilised eggs, but the contribution of births resulting from these procedures to overall fertility remains minimal. At the same time, childbearing early in life has become increasingly perceived as incompatible with educational participation, early career advancement, and preferred lifestyle of young adults (e.g. Kohler, Billari, and Ortega 2002, Sobotka 2004, Rindfuss, Morgan and Swicegood 1988). For instance, Joshi (2002) reported that lifetime earnings loss associated with motherhood for women in the United Kingdom declined with age at first birth for women having first birth in their 20s. Thus, a plethora of social trends, lifestyle factors as well as economic considerations provide incentives for many women to perpetually delay childbearing towards the age deadline imposed by their 'biological clock'.

Starting in the 1970s in north-western Europe, United States, and Japan, the trend towards delayed parenthood has become universal and the most characteristic feature of fertility in advanced societies, spreading across a wide range of socioeconomic contexts (Kohler, Billari, and Ortega 2002). In 2005, women is Spain, a country with the highest mean age at first birth in Europe, had their first child at age 29.3 on average, up from 24.8 in the late 1970s and it seems only a matter of time before women in many European societies will bear most of their first children after the age of 30. This is already the case for the university educated women in a number of countries (see Lappegård and Rønsen 2005 for Norway, Ravanera and Rajulton 2004 for Canada and Beets et al. 2001: 41 for the Netherlands, Spain, and Italy). As a result of this general trend towards later parenthood, advanced societies have also experienced a reversal in the longstanding trend in childbearing among women aged 40 and older. Until the 1980s the joint influence of declining average family size, improvements in contraceptive technologies and relatively early family formation had made late childbearing relatively rare: Prioux (2005: 2S10) noted that late fertility "seemed destined to disappear." However, instead of disappearing, late fertility has been increasing in the last two decades in many countries – this shift is

documented in a recent article by Billari et al. (2007). Whereas the overall shift to later childbearing has been studied extensively (see e.g., Beets et al. 2001, Frejka and Calot 2001, Bongaarts 2002, Kohler, Billari, and Ortega 2002, Sobotka 2004, Ní Bhrolcháin and Toulemon 2005), childbearing at late reproductive ages remains little explored by demographers. The study of Billari et al. (2007) and the contributions of Prioux (2005) and Toulemon (2005) constitute major exceptions. In contrast, early childbearing and teenage pregnancies enjoy considerable attention among researchers studying fertility and family dynamics, particularly in the United States.

The importance of exploring trends and cross-country differences in late childbearing is underscored by an increasing number of studies and expanding popular literature that see late motherhood as a health and social issue which deserves specific attention or even policy intervention. This is also the case for involuntary 'non-motherhood' due to infertility among a growing number of women who postponed childbearing towards late reproductive years. The inability to have at least one child has considerably more serious implications for individual well-being than the inability to have a second or a third child; McQuillan et al. (2003) report that infertility is associated with substantial long-term distress only for women who are not mothers. Delayed parenthood leads to an increasing demand for infertility treatment, which is frequently linked with considerable emotional stress, and at advanced reproductive ages also with high financial costs (Katz, Nachtigal, and Showstack 2004) and low success rates (e.g., CDC 2006). The access to assisted reproduction (ART) at late reproductive ages is often a subject of ethical debates as well as legislative regulations and many countries do not subsidise ART for women aged 40 and above.

Medical researchers frequently emphasise health consequences of late pregnancies, such as high frequency of miscarriages, birth deformations and negative health effects both for mothers and their children (e.g., ESHRE 2005, Bewley 2005, Heffner 2004, Lansac 1995, de la Rochebrochard and Thonneau 2002, Stein and Susser 2000). Several recent studies indicate that late paternal age (specifically, age 40+) is also linked with increased risk of miscarriage and foetal death, especially when coupled with high maternal age (Kühnert and Nieschlag 2004, Andersen et al. 2002, de la Rochebrochard and Thonneau 2002). In a more general perspective, late parenthood may imply not only increasing need for careful monitoring of women during their pregnancy, but also more demand for specialised childcare and child-related services, as older mothers tend to have higher human capital (education, labour market experience) and income at the time of giving birth than younger mothers

This paper builds upon a recent study of Billari et al (2007), which provides a general overview of trends in late childbearing in six European societies and the United States as well as a more detailed analysis of long-term changes in late (at age 40+) and very late (at age 45+) motherhood in Sweden. Our study considerably expands this analysis, it maps trends, patterns and cross-country differences in births and fertility rates among women aged 40 and older in 25 European countries, Japan, and the United States. We look to what extent has late motherhood shifted from being typical of women with many children who continue their reproduction even at advanced maternal ages to women who are childless or have only one child and postponed motherhood towards late reproductive ages. For a smaller subset of countries we use exposure-based fertility rates to analyse differences in trends in late childbearing between women at different parities and decompose the overall trends in late fertility rates into the effect of changing childbearing intensities and the effect of changes in the parity composition of women aged 40-44. In line with Billari et al. (2007) we use terms 'late childbearing,' 'late fertility,' 'late births,' and 'advanced childbearing ages' when we refer to childbearing at ages 40 and above and 'very late childbearing' or 'very late fertility' when we refer to childbearing at ages 45 and above.

Our focus on childbearing among women aged 40 and older is motivated not only by the well-documented rapid increase in sterility and various negative health consequences linked to late motherhood. In advanced societies age 40 also frequently constitutes a normative deadline to childbearing among women, after which motherhood becomes considered undesirable and 'too late.' The perceived average age deadline for completing parenthood among the respondents of a random survey conducted in the Chicago metropolitan area was 39.1 years for women and five years later (44.2 years) for men (Settersten and Hägestad 1996, Figure 3). Similarly, Eurobarometer survey of

2006 found that in the member countries and associated countries of the European Union the average perceived age after which a women should no longer have children was 41 years; for men this age threshold was 5 years higher (46 years) (Testa 2006, Table 13; data refer to the respondents aged 25-64). A slight decline of this perceived age limit with age (Figure 27 in Testa 2006) suggests that younger respondents may more frequently view childbearing after age 40 as generally acceptable. These data on parenthood age norms illustrate that reproduction, its timing and sequencing with other life transitions remains firmly grounded in socio-cultural context (Sauvain-Dugerdil 2006).

Besides analysing general trends in late childbearing, we aim to address a number of specific issues, most of which have not been studied in the existing contributions on late childbearing:

- Is the recent increase in births and fertility rates at very late reproductive ages typical of all advanced societies?
- Is there a similar trend in the frequency of the 'very late' (age 45+) and 'extreme late' (age 50+) childbearing?
- How significant are contemporary levels of late fertility from a historical perspective?
- Is the order-specific distribution of late births shifting rapidly towards first and second births?
- Does the frequency of late childbearing differ by parity? Are women who are still childless when reaching the age of 40 more likely to have a child than women who have one or two children at that age?
- Is the overall increase in the frequency of late childbearing linked to the 'real' increase in childbearing intensities among women at different parities or rather to the changes in the parity distribution of women aged above 40 towards parities with higher intensities of late childbearing?
- Is the increase in fertility rates among women aged 40+ closely linked to the 'catching-up' process among the cohorts of women who increasingly delayed childbearing at younger ages?

In addition, we will discuss whether there is an evidence of an increasing concentration of childbearing into a relatively narrow interval during a late stage of reproductive span. Making an analogy with mortality trends, Kohler, Billari, and Ortega (2002) hypothesized that such a shift – a 'rectangularisation' of fertility schedule – might eventually occur. This idea is partly at odds with the arguments that many important life transitions have become increasingly *de-institutionalised* and *de-standardised* (Lesthaeghe 1995; Settersten 2003), a development which also implies an increasing variability and 'chaos' in the timing and sequencing various transitions (see also Bourdelais and Gourdon 2005). Finally, we also aim to stimulate discussion on various social, cultural, and technological changes that contribute to the observed trend reversal in the frequency of late childbearing. We focus especially on the role of the educational differences in late fertility and the rising importance of assisted reproductive technologies (ART). Despite the persisting biological limits and cultural age deadlines to late childbearing, we expect that the increase in fertility rates at high reproductive will continue during the next decades.

2 DATA AND METHODS

To be drafted

3 TRENDS AND CROSS-COUNTRY DIFFERENCS IN LATE AND VERY LATE CHILDBEARING

3.1 The reversal in the frequency of late childbearing

The studies of Billari et al. (2007) and Prioux (2005) found that the frequency of late childbearing was increasing since the late 1980s in many western and northern European countries and the United States. This increase has been reflected in each of the following three indicators of childbearing among women aged 40 and above: the total number of births, the age-specific fertility rates, and the proportion of the total fertility rate (TFR) realised at that age. Table 1, featuring data for 25 European countries, Japan, and the United States generally supports these findings and shows that by 2005 the rise in the frequency of late childbearing and thus the reversal of the previous long-lasting decline has

been universal in advanced societies. Despite wide cross-country differences, childbearing at ages 40+ has recently become more common in all of Europe, even in the post-communist countries of Central and Eastern Europe where fertility postponement typically started only after 1990 and was initiated by the cohorts of women that will reach the age of 40 around 2010. In 2005 the proportion of births to women aged 40 and older varied between 0.8 percent in Bulgaria to 4.2 percent in Italy. In most western, northern, and southern European countries it was between 2.5 and 4 percent, increasing from 1 – 1.5 percent in 1985. Also in Japan and the United States the increase the proportion of births to women aged 40+ between 1985 and 2005 was substantial: from 0.8 to 2.7 percent in the U.S. and from 0.6 to 1.7 percent in Japan. In many countries, including the U.S., late fertility is currently at the highest levels since the late 1960s or the early 1970s; in Japan the level of late fertility rates in 2004 was highest since 1960.

<Table 1 about here>

Late fertility, measured by the sum of age-specific fertility rates above age 40 has also increased in all the countries shown in Table 1, although less markedly than the absolute proportion of late births. The rates of late childbearing still remain very low in central-eastern, eastern and south-eastern Europe and in Japan, with cumulative fertility of 11 to 26 births per thousand women aged 40+ in 2005 (2004). In most western, northern, and southern European countries and in the U.S., the cumulative fertility rates reached 40 to 55 births per thousand women aged 40-49 in 2005 and it was highest in Ireland (85 births per thousand women), where late childbearing has never become as rare as in other advanced societies.

The changes in late fertility from 1960 through 2005 in the main regions of Europe, Russia, Japan, and the United States are plotted in Figure 1. Since the mid-1990s all regions except central-Eastern Europe and Russia experienced similar upward trend in late fertility. However, late fertility rates still remains below the levels reached in the early 1960s. Only in Japan, where late fertility rates declined especially fast after the World War II, cumulative late fertility rate in 2004 (25 per thousand) reached almost the same level as in 1960 (27 per thousand, see Figure 1). In most of western Europe, northern Europe, and in the United States the trough in late fertility rates was reached in the late 1970 or the 1980s and in most of southern Europe and the post-communist countries of Europe during the 1990s (Figure 1 and Table 1). Since then late fertility rates have increased by a factor of two or more in the former group of countries (Table 1; in Denmark, the increase reached even the factor of 3.5) where, so far, the relative pace of increase in late fertility does not show any signs of slowing-down. In the early 2000s, late fertility rates have been rising by almost 5 percent annually in the EU-25, 4 percent in the U.S, 2 percent in the post-communist countries of Central-Eastern Europe and 1 percent in Russia (Figure 2). As a result of the declining TFR in most of the analysed countries during the 1980s and 1990s, the share of late fertility on the TFR has been increasing faster than the sum of age-specific fertility rates for women aged 40+. In the EU-25, the fraction of the TFR attributable to fertility at age 40 and above rose from 1.6 percent in the late 1980s to 2.7 percent in 2005 (unweighted average for the EU-25), i.e. the highest level since 1972 (Figure 3). Much of this trend can be explained by the overall postponement of childbearing, especially of first births (see also Section 6 below). It is worth noting that after 1990 late fertility rates in most European countries (and their share on the TFR) have been rising more steeply than the fertility rates at ages 30-39. Cross-country heterogeneity in late childbearing in the EU-25, as measured by standard deviation and the coefficient of variation, declined through the 1980s and the 1990s. In the early 2000s, standard deviation was rising gradually, whereas the coefficient of variation remained stable (Figure 3).

<Figure 1 about here>
<Figure 2 about here>
<Figure 3 about here>

3.2 Late childbearing seen from a historical perspective

The preceding section has shown that by 2005 fertility rates among women aged 40 and above were at the highest levels for the last 2-3 decades. However, historical time series show that contemporary levels of late fertility are far below those recorded until the 19th and the early 20th century, i.e., until the era when conscious birth control spread rapidly, limiting especially childbearing at high reproductive ages. Historically high rates of late childbearing have been documented by Billari et al. (2007) for Sweden. Our comparative analysis draws from various national and international data, of which the most prominent was published by Festy in 1979 (full list of data sources is listed below Figure 4). All the countries for which we dispose with historical data reaching back to the late 19th or the early 20th Century experienced a steep fall in late childbearing during the first decades of the 20th century and, in most cases, already in the last decades of the 19th century (Figure 4).

Sweden, for which we have the longest time series, appears to be a typical case of such development: Following an increase in the 1850s and a sudden decline around 1868, late childbearing follows a steadily declining trend from the mid-1870s onwards. Consequently, the number of births per thousand women aged 40-44 fell from 125 in 1875 to 20 in 1940, below 10 in 1966 and below 4 in 1976. It then bounced back above 10 in 2004, but this level still constitutes less than one-tenth of late fertility reached in the 1870s, when the cumulative fertility rates after age 40 surpassed 0.6. Two countries shown in Figure 4 display a peculiar development in late fertility. France stands out for the comparatively low levels of late childbearing already in the 1890s, when the number of births per thousand women aged 40-44 fell below 40, while in several other countries shown in Figure 4 it was two to four times higher. This finding is consistent with the well-documented early start of he French demographic transition (Chesnais 1992, Festy 1979) and illustrates how widespread was fertility limitation in France by the late 19th century (e.g., Binion 2002). In contrast, the estimates of late fertility in Russia, based on Vishnevsky et al. (2006) show a persistence of very high and practically unregulated late fertility until the second decade of the 20th century. In 1910-14 fertility rate of Russian women at ages 40-44 was still close to 150 per thousand, corresponding to the cumulated rate of late childbearing above 0.7. In comparison, today's rates of late childbearing in Russia are below 3 per thousand women aged 40-44, which is around 2 percent of their early 20th century levels. This very high level and long persistence of late fertility in Russia can be explained by the late adoption of birth control in most parts of Russia and the late start of demographic transition there (Vishnevsky et al. 2006, Coale et al. 1979). At the same time, high rates of non-marriage ('celibacy'), typically linked to permanent childlessness in many parts of Europe, were lowering late childbearing rates even in populations where marital fertility remained almost unlimited until the end of women's reproductive span.

<Figure 4 about here>

High rates of late childbearing persisting well into the 20th century implied that late fertility constituted a sizeable fraction of the overall total fertility. In Sweden and Finland, for which the data shown in Figure 4 reach back to the mid-19th century, women aged 40 and older contributed 11 to 14 percent to the overall TFR until the early 20th century. In Russia, the fraction of the TFR realised after the age of 40 declined below 10 percent only in the late 1940s (estimates based on Vishnevsky et al. 2006, T. 12.3, not shown in Figure 4) and in Ireland this proportion was still 8 percent in the early 1960s. Thus, differently from today, late childbearing in the past was a common experience that made a sizable contribution to overall fertility as measured in terms of the TFR or the number of births. Although on the rise, contemporary late fertility rates constitute only a small percentage, typically less than one-tenth of their levels a century ago. These long-term time series suggest that despite the recent intensive fertility postponement, women in advanced reproductive ages still realise only a small part of their reproductive potential.

3.3 Very late and extreme late childbearing

Much of the lively media coverage of late childbearing focuses on the cases of extreme late childbearing and the advances in assisted reproduction that enable pregnancies and childbearing in women that are past their menopause. For instance, *New Scientist* (20 October 2006) featured a collection of articles on the 'Reproduction revolution,' which included an article titled 'Methuselah moms' (Nowak 2006). Particular media attention is attracted by the new records in extreme late childbearing ages. The last two records were set in 2005 and 2007. In 2005 a retired and divorced university teacher from Romania, Andrea Iliescu, gave birth to a daughter at age 66, following a number of previously unsuccessful attempts to have a child. The most recent record has been reached in January 2007, when a single woman from Spain named Carmela Bousada gave birth to healthy twins one week before her 67th birthday (and 18 years after reaching menopause), following an assisted reproduction treatment before which she misreported her age in order to be admitted.

Despite the rising record-late childbearing ages, giving birth at ages 45+ remains relatively rare and data for individual countries often show wide annual fluctuations. Figure 5 looks at the fraction of cumulative late fertility that took place among women aged 45 and older. The line showing an average for 18 countries represents best the overall trend – a gradual decline from almost 9 percent in 1960 to 4 percent in the mid-1990s followed by a stabilisation thereafter. Thus, until the mid-1990s, fertility rates at very advanced childbearing ages increased more slowly (if at all) than the fertility rates at ages 40-44. More recently, however, several countries, including Spain and the United States, registered an increasing fraction of late births attributable to women at ages 45+.

<Figure 5 about here>

Due to advances in assisted reproduction and the spread of ART services, we expect that the incidence extreme late childbearing, i.e., childbearing among women aged 50 and above has increased recently. In many countries, data on births at extreme high childbearing ages are not published in the official vital statistics[1]. In addition, these records may be reported with error and, in smaller countries, the number of reported births at age 50+ is so low that it may be difficult to analyse long-term trends. Table 2 summarises recent data for six countries (Austria, England and Wales, France, Spain, Sweden, and the United States) with available data. Besides showing the expected fluctuations, these data support our argument. The number of live births to women aged 50+ per 100,000 total live births increased in all six countries between 2000 and 2005 (2004). Also the proportion of 'late' live births (at ages 40+) realised by women at ages 50+ has markedly increased in three out of six analysed countries (in Austria, Spain, and the United States), indicating that the number of births to women at the latest-late childbearing ages is often increasing more rapidly than the overall number of births to women aged 40 and above. Especially in the United States this trend is clearly established: Between 1997 and 2004 the total number of live births to mothers aged 50+ increased from 144 to 374 (i.e., by a factor of 2.6) and the ratio of births at age 50+ to the births at age 40+ almost doubled from 1.8 to 3.4 per thousand (see Figure 6).

<Table 2 about here>
<Figure 6 about here>

4 CHANGING BIRTH ORDER DISTRIBUTION OF LATE CHILDBEARING

In the past late childbearing was usually linked with larger family size. The long-term trend towards small family size, initiated with the (first) demographic transition, implied a fall in fertility rates among women with two or more children and consequently also a drastic decline in fertility at high childbearing ages, documented in the preceding section.

[1] For instance in the United States births to women aged 50+ are distinguished in the official reports on birth statistics only since 1997 (Martin et al. 2005).

Order-specific distribution of births to women aged 40 and above shows huge and persistent cross-country differentiation coupled with a common trend of an increasing share of first and second births and a rapidly diminishing importance of higher-order births. In 2005 the share of first and second late births varied between 26 percent in Poland and 70 percent in Spain. The Netherlands shows a typical trajectory over time, with less than one fifth of late births attributed to first and second births in 1970, rising to 58 percent in 2005 (see Figure 7 and table AP-1 in the Appendix). This shift has been most marked in Southern Europe, where women postponed their first births most intensively during the 1990s; in Spain 70 percent of late births in 2005 were first and second births. In contrast, first and second births still make up much smaller share of late births in Central and Eastern Europe, where the postponement of parenthood affected generations that have not reached the age of 40 yet. Late childbearing in these countries still typically remains linked with a larger family size. The persistent importance of larger family size for late childbearing is most visible in Romania, where 43 percent of late births are births of fifth or higher birth order; also in Poland and Slovakia this proportion remains high, around 30 percent. However, as families with five or more children have become relatively rare in all parts of Europe, the fraction of late births attributable to birth order 5 and higher has been falling everywhere. In the Netherlands, for instance, this share fell from 48 percent in 1970 to 12 percent in 2005 (Figure 7).

<Figure 7 about here>

Table AP-1 in the Appendix further shows that second births remain more frequent among women at late reproductive ages than the first births (Romania is a notable exception). The birth order distribution of late births in the United States in 2004 is also characteristic of many western and northern European countries: 22 percent are first births, 28 percent are second births, and 50 percent are third births. Thus, late childbearing appears to be more common among women who already have their first child (with most of them entering parenthood in their mid or late thirties) and decide to have a second one at advanced reproductive ages (see also the next section). At the same time, the share of first children is also rising rapidly in most countries. The fraction of first-order TFR that takes place at ages above 40 shows a huge increase in most parts of Europe and in the United States during the last two decades. In many advanced societies the portion of first birth occurring at ages 40+ has probably reached historically highest levels (Figure 8). In the United States only 0.2 percent of first birth rates occurred after the age of 40 in 1980, but this proportion rose sharply to 1.4 percent in 2004, well above the levels registered during the first half of the 20th century (historical data on order-specific fertility rates starting in 1917 were estimated by Heuser 1982). In two countries characterised by relatively late first-birth timing, Ireland and Spain, 2 percent of the first-order TFR occurred after the age of 40 in 2005, up from 1 percent in 1996.

<Figure 8 about here>

5 PARITY-SPECIFIC ANALYSIS OF LATE CHILDBEARING

Our analysis presented in the previous sections has shown that fertility rates among women at advanced childbearing ages are rising across all advanced societies. In addition, we have shown that an increasing fraction of late births occur to women who are childless or have only one child. These findings do not indicate, however, whether the observed rise in the frequency of late childbearing was mostly driven by an increase in childbearing intensity among women of different parities or whether it was mostly induced by the shifting parity composition of women at advanced reproductive ages towards parities with higher intensity of late childbearing. In this section we first inspect trends in parity-specific intensity of childbearing after age 40 and then provide a decomposition of changes in late fertility.

5.1 Trends in childbearing intensity after the age 40

We analyse changes in late childbearing intensity with an indicator of period probability of ever having a(nother) child specified by the parity status of women at age 40. This measure is computed from fertility tables based on parity-specific probabilities of childbearing by single years of age and summarizes well the trends in childbearing intensity across all late childbearing ages. For simplicity, we compute this indicator per 100 women and refer to it as "late childbearing intensity". Figure 9 displays changes in this indicator for women at parities 0, 1, and 2 at age 40 in 8 European countries and the United States. In all countries except Romania, there is a continuous trend towards higher intensity of late childbearing for childless women and for women with one child after 1990. In contrast, there is only a slight increase, if any, in the propensity to have a third child after age 40: in all the analysed countries except the United States fewer than 3 births occur after age 40 per 100 women having two children. Women in Spain show the highest frequency of having their first child after the age of 40 (11.4 per 100 childless women in 2005, up from 5.7 in 1996), whereas women in Sweden have the highest second birth intensity after that age (10.0 per 100 women with one child in 2005, a four-fold increase from 1975). The cross-country differences in late childbearing intensity have increased over time. For instance, in 2003 second birth intensity after age 40 in 2003 ranged from 0.8 per 100 women in Romania to 8.9 in Finland and 9.3 in Sweden.

<Figure 9 about here>

Sweden constitutes an example of a country with a continuous increase in late childbearing intensities among women with fewer than 2 children and a rapidly rising parity differentiation in late childbearing. This differentiation is clearly visible when the late childbearing intensities are plotted for the cohorts that have progressively delayed childbearing; starting with the 1947 cohort, each successive cohort plotted in Figure 10 has entered parenthood at a higher age than the preceding one. The higher is the age at first birth, on average, the more differentiated are late childbearing intensities by parity at age 40 (Figure 10). Especially the steep rise in second-birth intensities suggests that many women try to achieve a two-child family even at advanced reproductive ages. In contrast, women with two children at age 40 have much lower likelihood of having another child before reaching age 44, when a large majority of late fertility takes place.

<Figure 10 about here>

Figure 11 suggests there is an emerging differentiation between countries in the propensity to have a first and a second child at high reproductive ages. Especially in societies with 'higher' fertility level—judged by the European standards of low fertility—the orientation towards a two-child family is also manifested by the higher probabilities of having a second child at late childbearing ages. Thus, in Finland, the Netherlands, and Sweden, as well as in the United States women aged 40 who have one child also have a higher probability of ever having another one than the women who remained childless at that age. In contrast, especially in southern European countries and to a smaller extent also in central-eastern Europe, women who remained childless at age 40 have a higher likelihood of ever having a child than those who already have a child. This late 'catching up' effect among childless women is most pronounced in Spain and Italy.

<Figure 11 about here>

5.2 Decomposition of changes in late childbearing rates

We decompose changes in period fertility rates at ages 40-44[2] and their order-specific components in Austria, the Netherlands, Spain, and Sweden between 1995 (1996 in Spain) and 2005 (see Section 2 for a brief description of the decomposition used). We have selected these countries on the basis of data availability and a substantial increase in late fertility after 1995. The decomposition enables us to

[2] Because only a small portion of late births occurs at ages 45+, our analysis focuses on changes in fertility of women aged 40-44 only.

distinguish the effect of changes in childbearing intensities ('childbearing intensities effect') and the effect of changes in the parity distribution of the female population aged 40-44 ('parity distribution effect') and to analyse the distribution of these two effects by birth order. In addition, by combining this analysis with the absolute changes in the number of women aged 40-44 we are able to decompose the overall changes in the total number of late births.

Table 3 illustrates numerous results of our decomposition, taking the Netherlands as an example. The upper half of the table features indicators that serve as an input of the decomposition; all of these indicators are specified for women aged 40-44: Parity distribution of women, occurrence-exposure childbearing rates (intensities) per thousand women of a given parity (OER), and the order-specific 'incidence rates' of childbearing per thousand women (IR, rates of the second kind, i.e., childbearing rates that use in their denominator all women of a given age irrespective of their parity status). The IR can be simply derived by multiplying the OER rates by the proportion of women in a given parity. They are additive, that is, the sum of order-specific incidence rates gives the overall fertility rate for all women of a given age. It is worth noting that the parity distribution of women of late reproductive age in the Netherlands have changed relatively little between 1995 and 2005 and the childbearing intensities have increased for women of all parity categories, including those already having two or more children. As a result, also the IRs increased for all birth orders. Surprisingly, the largest relative increase in the OER rates took place among women with two children. The lower half of the table shows results of the decomposition, first in absolute terms (contribution to the absolute change in IRs), and then in relative terms (relative distribution of the overall change attributable to the two effects by parity (birth order)). The first column, which shows the change in the IRs attributable to the OERs change indicates how much would incidence rates change in the absence of parity composition changes, whereas the second column ("change due to parity composition) shows to what extent the IRs changed in each parity category due to the increasing or declining proportion of women in that category. In the Netherlands, change in parity-specific childbearing intensities contributed 91 percent to the overall change in late fertility rates, whereas the (small) shifts in the parity distribution of women had only a minor, though positive, impact.

<Table 3 about here>

We compare main results of the decomposition analysis for all the four countries in Table 4. The increase in late fertility rates between 1995 and 2005 was pronounced in each country (between 50 percent in Sweden and 82 percent in Spain). A large fraction of this increase in the Netherlands and Spain and all of this increase in Austria and Sweden can be explained by the changes in late childbearing intensities among women of different parity categories. In Sweden, changes in the parity distribution of women aged 40+ even had a slight negative influence on late fertility rates (-3 percent). Only in Spain, where late fertility increased most rapidly, did parity distribution changes contribute to this trend to a significant extent, specifically, by 22 percent. The rise in childbearing intensity among women with one child had the largest impact on the overall increase in fertility rates in Austria, the Netherlands, and Sweden, whereas in Spain the rise in late childbearing intensities among childless women contributed most to this trend. Finally, in all the four countries, the total number of women aged 40-44 increased as well, most markedly in Spain and Austria. Consequently, the absolute number of births to women above the age of 40 rose more rapidly than late fertility rates did.

<Table 4 about here>

6 Birth cohort effect? The link between delayed childbearing and increasing late fertility

To be drafted

SUMMARY and CONCLUSIONS

To be expanded and finalised

By the early 2000s, a reversal in late childbearing has occurred across all advanced societies. It started earlier and so far, it is taking place with higher intensity, in the regions where the postponement of first births had been initiated already in the 1970s and 1980s, i.e., in western, northern, and southern Europe, Japan and the United States. More recently, fertility rates have been increasing also at the 'very late' and 'extreme late' childbearing ages. Although rare and marginal, fertility rates and total numbers of births to women aged 50+ recently appear to increase faster than the overall late births and late fertility rates. This trend, most pronounced in the United States, is closely linked to advances in assisted reproduction.

Our analysis has shown that the observed increase in late childbearing can be largely seen as a cohort-driven process: cohorts of women that have progressively delayed childbearing are also 'responsible' for the observed increase in late fertility. In addition, the decomposition of trends for four countries where this process is well advanced show that the increase in late fertility has been driven by the 'genuine' increase in late childbearing intensity among women of different parities. The contribution of the shifting the parity distribution of women aged 40+ towards parities with higher intensity of late childbearing appears to be of a relatively minor importance for the overall increase in late fertility. Because the majority of advanced countries experienced declining period total fertility rates during the last decades, the fraction of births to women aged 40 and above has been increasing even faster than the late fertility rates. Moreover, late childbearing is gradually shifting from being characteristic of women with large family size who continue to have children until they become infertile to being more typical of women who have postponed childbearing to late reproductive ages and, by reaching the age of 40, have no or only one child. This shift is also well manifested by the increasing parity differentiation in late childbearing intensities: the probabilities of having a first or a second child after the age of 40 are rising steadily in many countries, whereas the probability of having a third child increases slowly—if at all—and remains very markedly lower. However, cross-country differences in late childbearing intensities remain surprisingly wide, even when analysed separately for different parities.

Viewed from a long-term perspective, late fertility remains far below the levels reached before the first demographic transition. Typically, late fertility rates in advanced societies are one-tenth or less of their levels a century ago. First birth rates constitute an exception: the fraction of first births to women aged 40+ is rising fast and, in many countries including the United States, it has probably reached historically highest levels. Much higher late fertility rates achieved in the past suggest that late fertility rates might increase markedly even in the absence of assisted reproduction. Several other factors suggest that late fertility is likely to increase further in the coming decades and, as a result, the share of late births may eventually come close to one-tenth of all births. In the majority of European countries as well as in Japan, the United States and other advanced societies first births are still being delayed towards later ages, although with lower intensity than in the past. Given relatively low desired family size among younger cohorts in advanced societies, there is still a scope for further substantial delays of childbearing (Goldstein 2006). This implies that at least until around 2020 an increasingly higher proportion of women reaching age 40 will have fewer than two children and many of them will desire having a(nother) child after that age. In addition, further advances in assisted reproduction will probably bring improved chances of successful conception and delivery among women of late reproductive ages using IVF or ICSI treatment. It is too early to tell whether the advances in the 'new modes' of reproduction linked to deliberate fertility postponement, such as cryopreservation, may have any appreciable effect on late fertility in the future. However, the widely publicised stories on the 'reproduction revolution' may have an independent effect of stimulating further fertility postponement as many women might become convinced that having children at very reproductive ages has become a matter of choice (Guardian, Grant 2006).

The likely further increase in late fertility and the growing importance of assisted reproduction in this trend will have a number of social, health, and ethical repercussions. The norms on the commonly accepted age deadlines to entering parenthood may shift to higher ages. Higher late fertility rates may negatively affect aggregate trends in foetal malformations, child mortality and health, as well as maternal health. There are not many studies studying whether the possible negative health consequences of late childbearing are more serious for women who are childless than for those who are mothers (see e.g. xxx). Many of the aggregate outcomes of late childbearing will depend on the availability and accessibility of prenatal screening and selective abortion. It is also likely that the use of and the access to assisted reproduction at later childbearing ages will be further regulated. Despite some envisioned negative health consequences of rising late fertility rates, late childbearing could also have a positive impact on society. A large majority of late births are strongly desired, they take place in a stable family environment and late parents are endowed with above-average levels of human capital and income.

ACKNOWLEDGENMENTS

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To be completed

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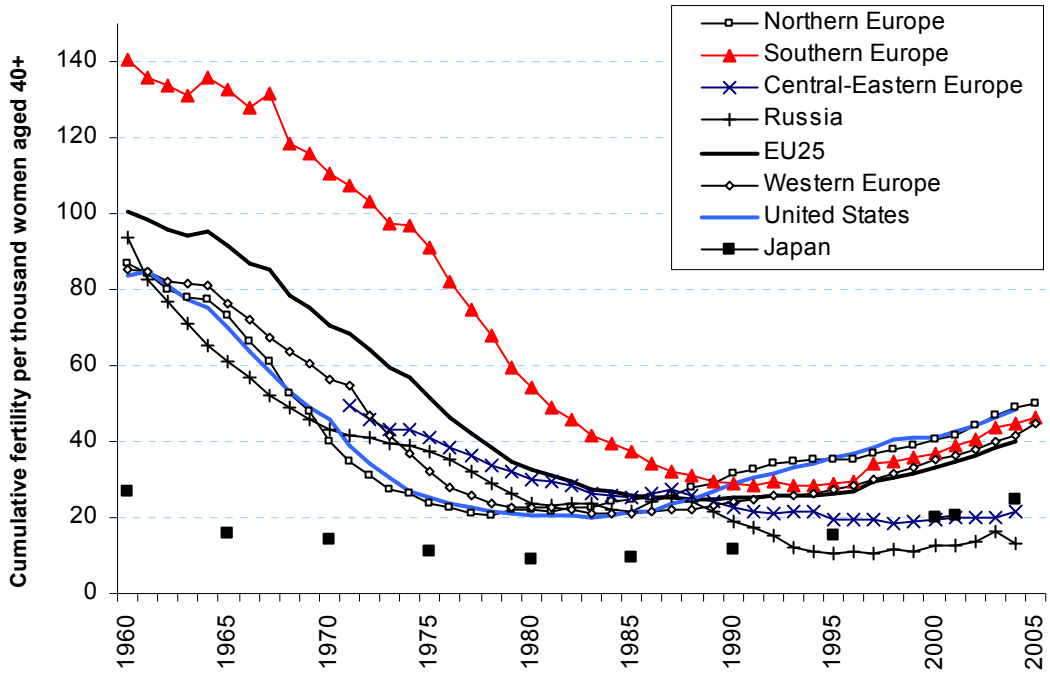
FIGURES AND TABLES

TABLE 1: Major trends in childbearing among women aged 40 and older in 25 European countries, Japan, and the United States

	Births to women aged 40+ in 2005, %	Births to women aged 40+ in 1985, %	Cumulative fertility rate per 1000 women aged 40+ (2005)	Year when lowest fertility at age 40+ reached	Lowest cumulative fertility rate per 1000 women aged 40+	Index fertility 40+ 2005/ year when minimum reached	2005 level last reached in
Western Europe							
Austria	2.87	1.13	32.0	1988	18.4	1.7	1978
France	3.21	0.99	54.7	1983	23.5	2.3	1972
Germany	3.24	0.93	31.7	1984	13.4	2.4	1973
Ireland	4.14	3.32	85.2	1996	61.5	1.4	1989
Netherlands	2.68	0.90	38.6	1983	17.5	2.2	1972
Switzerland	3.66	1.09	42.2	1985	17.1	2.5	1972
England and Wales	3.44	1.14	53.1	1977	21.7	2.4	1968
Northern Europe							
Denmark	2.66	1.16	41.7	1982	11.8	3.5	1967
Finland	3.66	1.33	56.8	1976	31.1	1.8	1969
Norway	2.58	1.03	43.5	1983 (1987)	19.0	2.3	1972
Sweden	3.37	1.71	54.1	1978	18.7	2.9	1967
Southern Europe							
Greece	2.90	1.54	33.1*	1990	20.5	1.6	1981
Italy	4.17	1.58	48.8	1986	25.3	1.9	1977
Portugal	2.85	2.70	35.9*	1994 (1996)	27.4	1.3	1988
Spain	3.54	2.58	48.8	1995	25.9	1.9	1985
Central-Eastern Europe							
Czech Republic	1.25	0.41	18.5	1989	8.0	2.3	1966
Hungary	1.57	0.73	25.0	1984	12.4	2.0	1967
Latvia	2.04		26.0*	1996	18.0	1.4	1988
Lithuania	1.99	1.69	22.0*	1994	17.1	1.3	1993
Poland	1.77	1.58 (1990)	26.0	2000	25.0	1.0	(2001)
Slovak Republic	1.33	0.48	18.8	1988	13.0	1.4	1982
Slovenia	1.89	0.85	22.3	1994	11.6	1.9	1983
South-Eastern Europe							
Bulgaria	0.80		11.0*	1998	7.6	1.4	1993
Romania	1.06	0.97	19.2	1998	15.1	1.3	1992
Eastern Europe							
Russia	1.11*[1)]	0.97[1)]	13.0*	1997	10.6	1.2	1992
Non-European countries							
Japan (2004)	1.74	0.59	24.6	1986	9.0	2.7	1960
USA (2004)	2.67	0.77	48.2	1981	20.5	2.3	1969

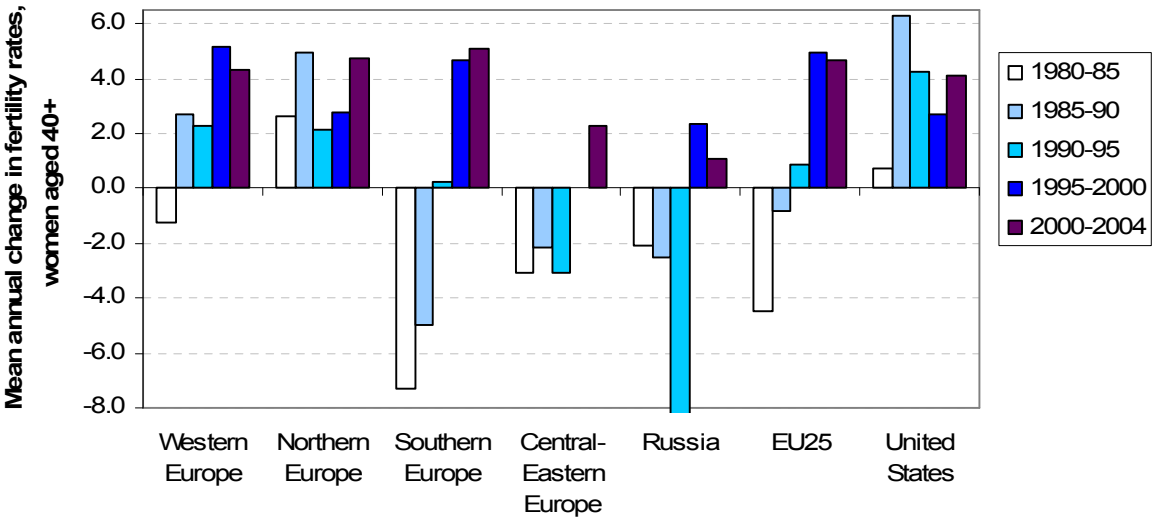
Notes:
Sources:

Figure 1: Cumulative age-specific fertility rates at ages 40+ (per thousand women)



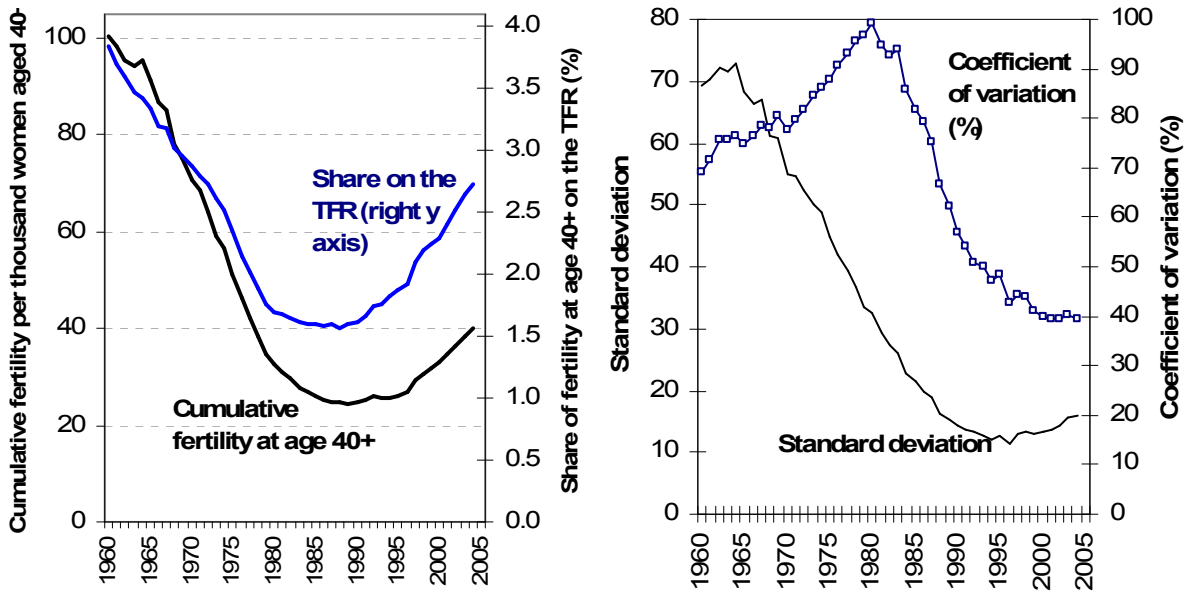
Note: Definition of the regions
Sources:

Figure 2: Mean annual changes in cumulative age-specific fertility rates among women aged 40-49 in different regions of Europe and the Unites States (1980-2004)



Sources: Own computations based on Eurostat (2007), Council of Europe (2006), Schoen (2004) and (NCHS)

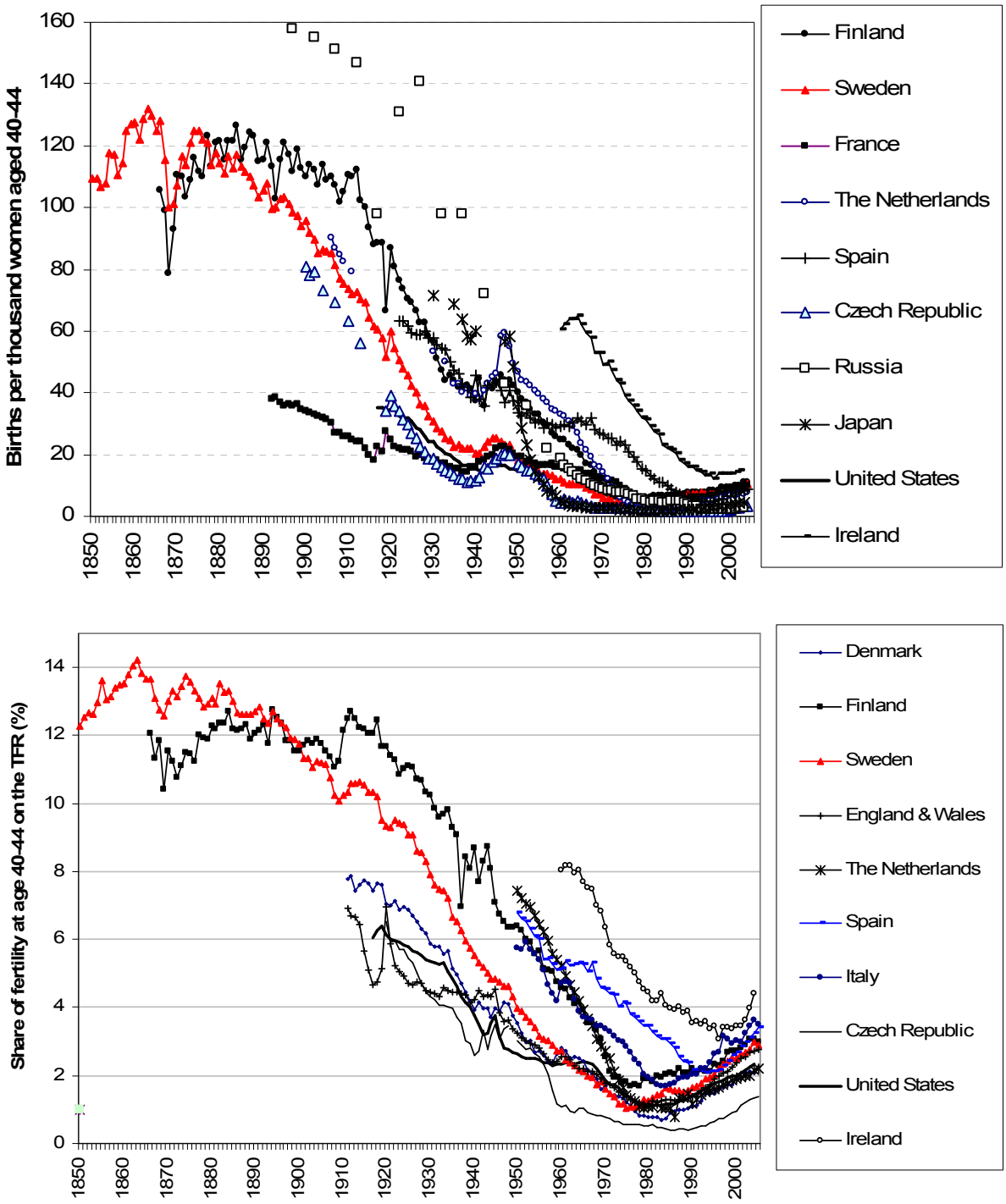
Figure 3: Indicators of fertility rates at ages 40+ and cross-country heterogeneity in fertility rates above age 40 in the countries of the European Union (EU-25) in 1980-2005



Note: Data on cumulative fertility rate and the share of late fertility on the TFR constitute average values that are not weighted by population size

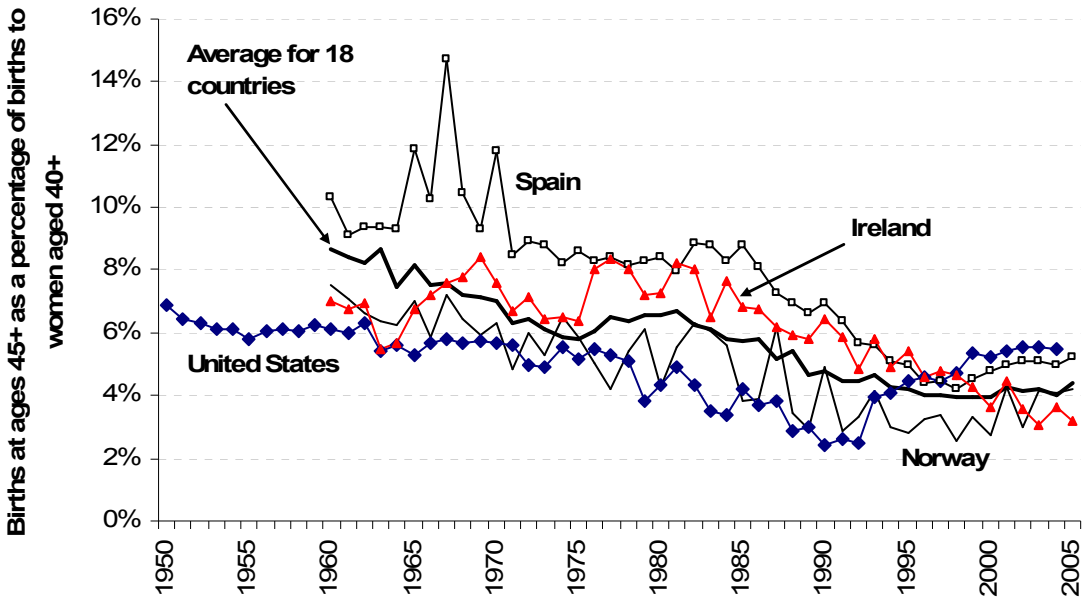
Sources:

Figure 4: Long-term trends in births per thousand women aged 40-44 and the share of fertility at age 40-44 on the TFR in selected countries of Europe, Japan, and the United States (1850-2005)



Sources: Own computations based on Eurostat (2007), Council of Europe (2006), Festy (1979), Heuser (1982), Central Bureau of Statistics (2006), (NCHS 2006) (Japan Dem. Yearbook 2005)
Note: Data for the Czech Republic in 1900-11, Japan in 1924-59, and Russia in 1895-1959 are estimates based on fertility rates at age 40-49, assuming that 10% of fertility rates above age 40 took place at age 45-49 (this is roughly corresponding to historical data for other countries).

Figure 5: Fraction of cumulative fertility of women aged 40+ realised at ages 45+ in selected European countries and the United States, 1950-2005



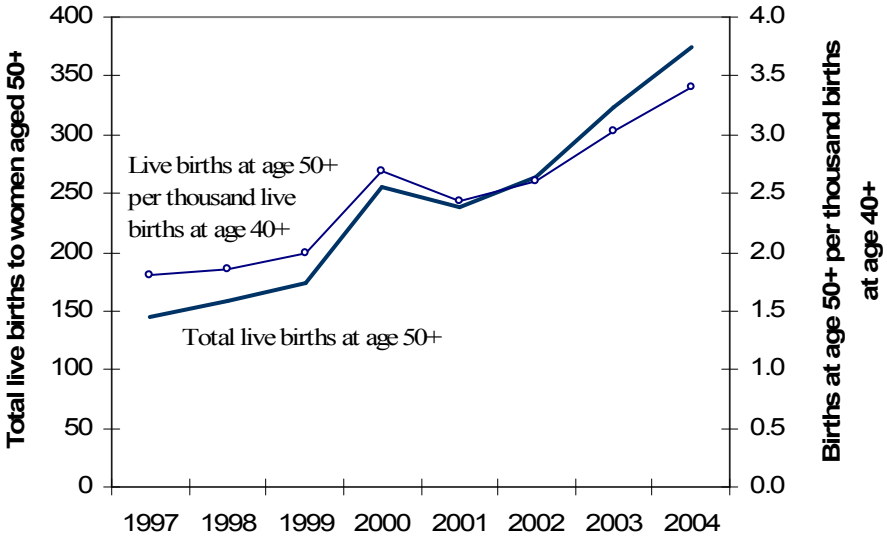
Sources:
Notes: The line showing the average for 18 countries is based on the data for Austria, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, the Netherlands, Norway, Romania, Russia, Slovenia, Spain, Switzerland, Sweden, and the United States.

Table 2: Childbearing at extreme late childbearing ages (50+) among women in Austria, England and Wales, Spain, Sweden, and the United States, 1985-2005

	Live births to women aged 50+ per 100,000 live births				
	1985	**1995**	**2000**	**2004**	**2005**
Austria	0.0	1.1	2.6	7.6	7.7
England and Wales			7.3	7.5	10.4
France	6.0	3.9	4.3	4.8	4.8
Spain		3.3	5.0	9.7	12.4
Sweden	2.0	0.0	4.4	5.0	4.9
United States			6.3	9.1	
	Live births to women aged 50+ per thousand live births at ages 40+				
	1985	**1995**	**2000**	**2004**	**2005**
Austria	0.0	0.9	1.4	3.0	2.9
England and Wales			2.9	2.3	3.0
France	6.0	2.0	1.7	1.6	1.5
Spain		1.8	2.0	2.9	3.5
Sweden	1.2	0.0	1.7	1.5	1.5
United States			2.7	3.4	

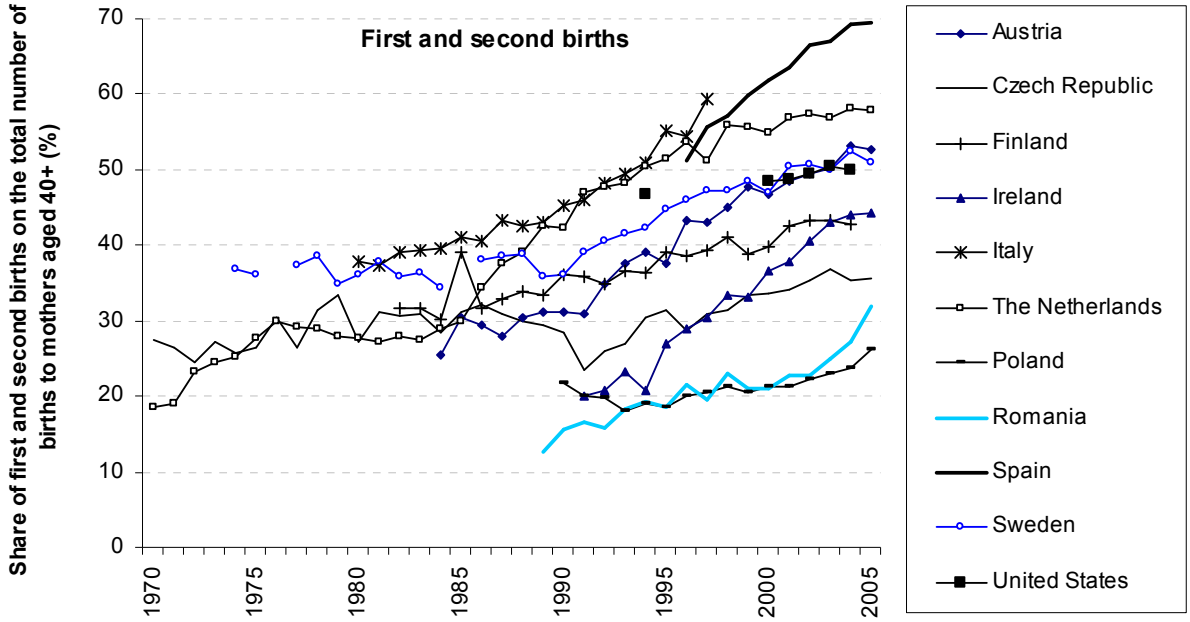
Sources:

Figure 6: Childbearing at extreme late childbearing ages among women in the Unites States, 1997-2004



Sources:

Figure 7: Birth order distribution of live births to women aged 40+ in selected European countries and the Unites States, 1970-2005



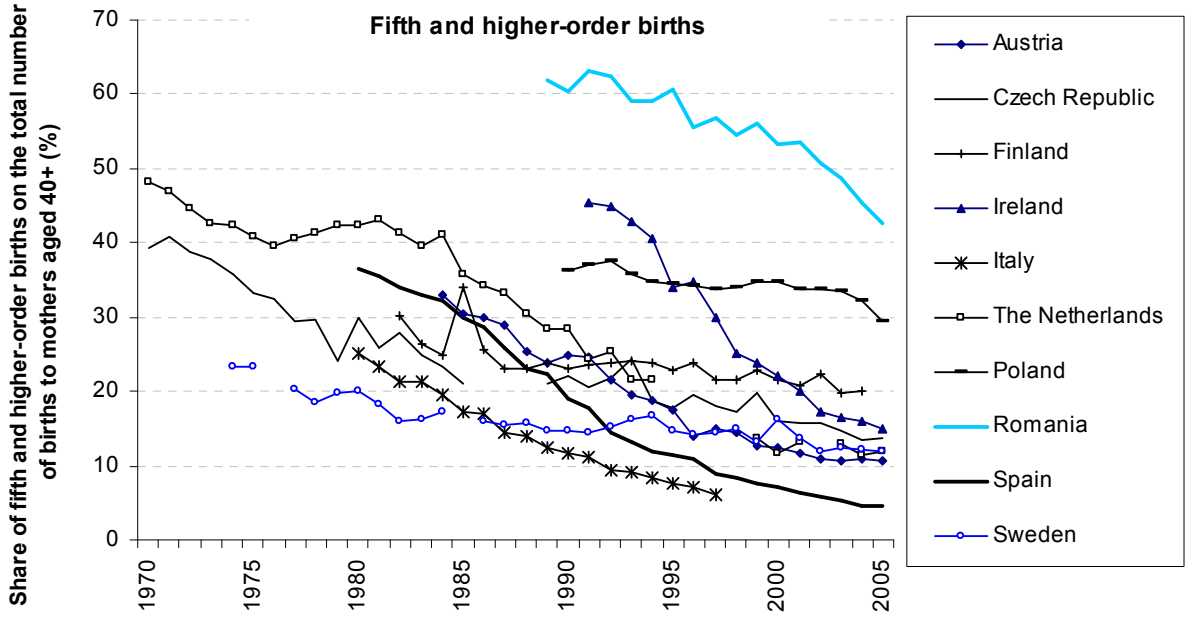
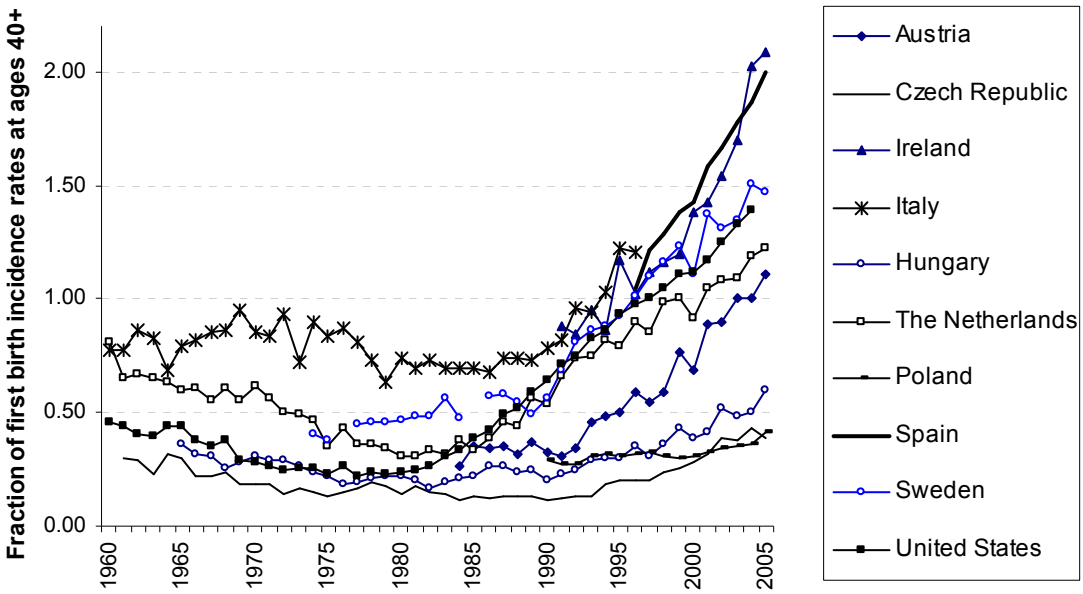


Figure 8: First birth incidence rates (rates of the second kind) at ages 40+ as a proportion of first-order total fertility rate in selected countries, 1960-2005



Sources:

Figure 9: Period probability of having a(nother) child after age 40 by parity status at that age (per 100 women), selected countries, 1980-2005

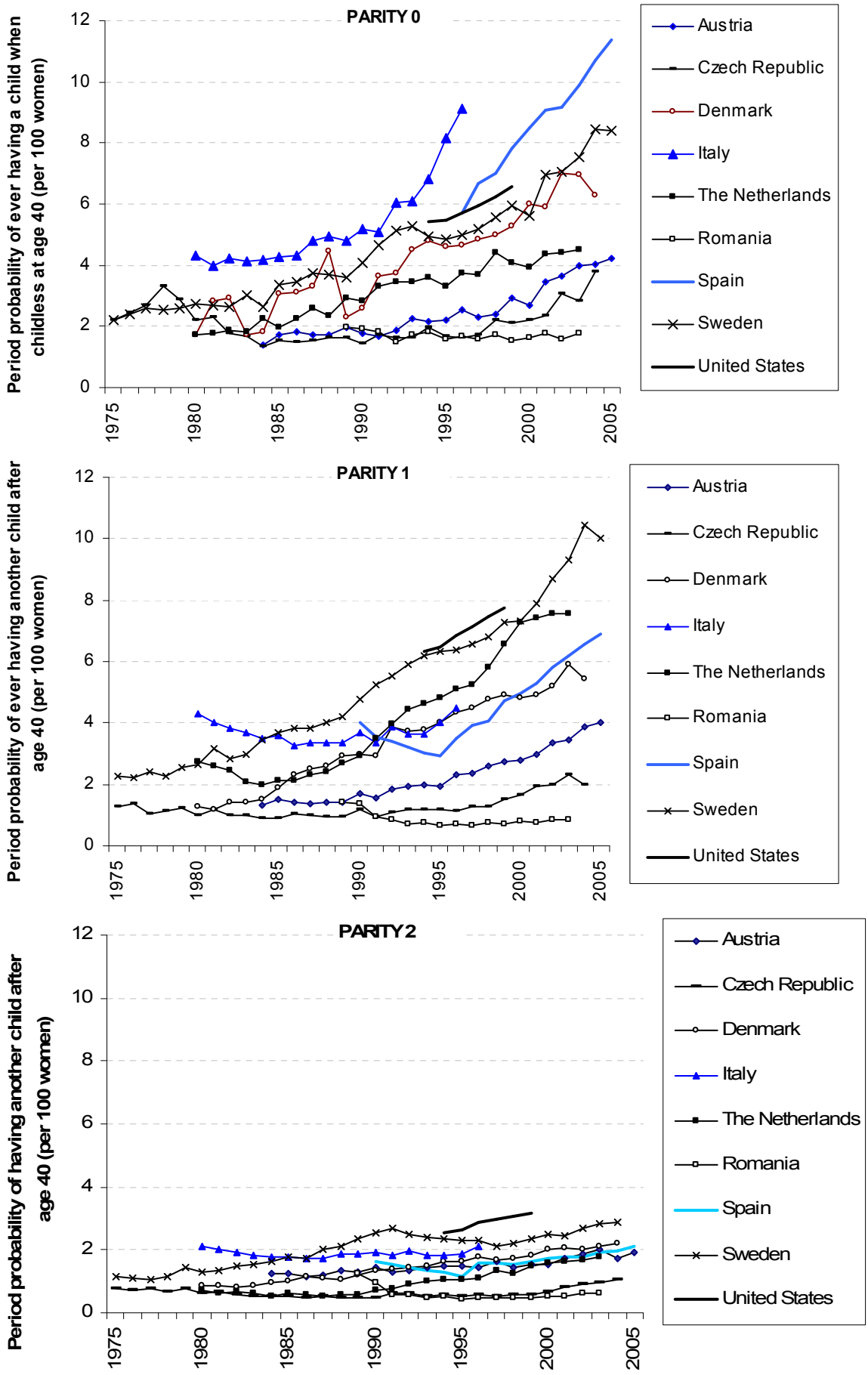


Figure 10: Cohort proportion of women having a(nother) child at age 40-43 by parity status at age 40 in Sweden, women born in 1944-1962

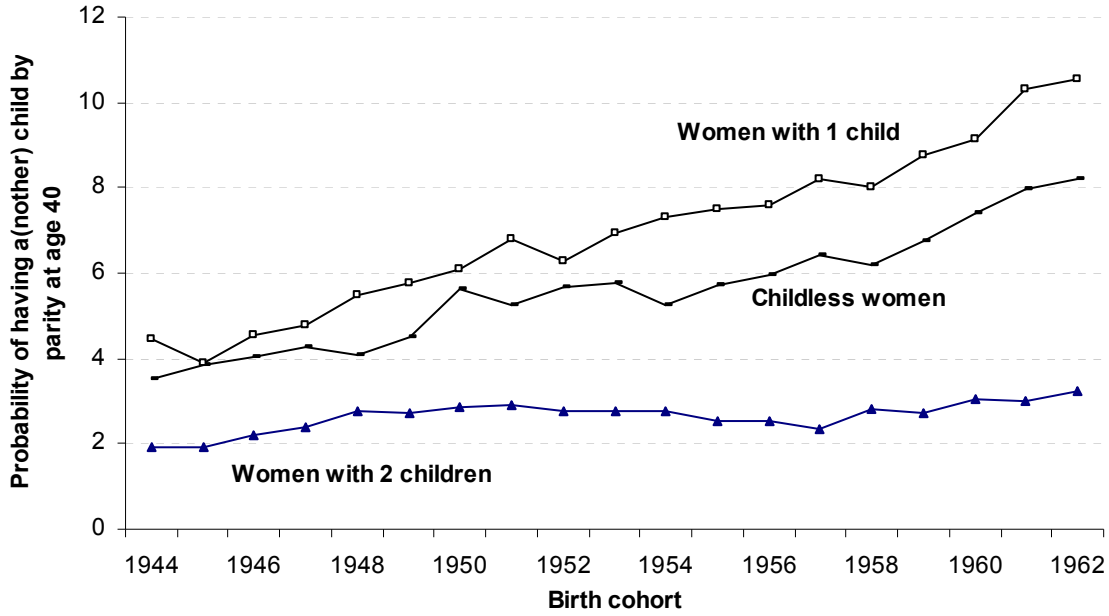
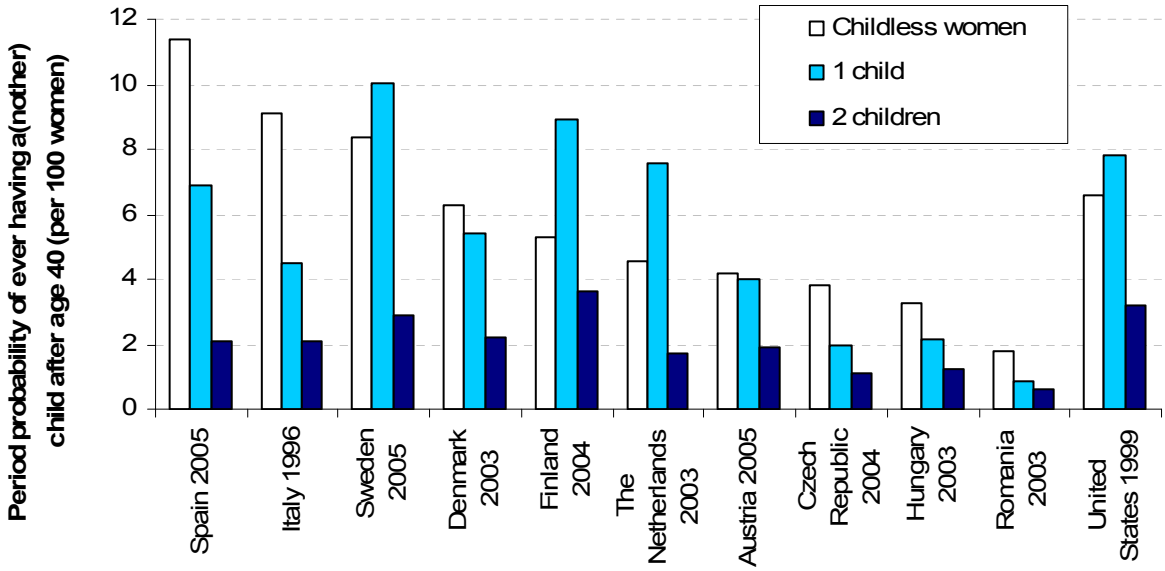


Figure 11: Period probability of having a(nother) child after age 40 by parity status at that age (per 100 women), selected countries



Sources:

Table 3: Decomposition of changes in fertility rate among women aged 40-44 in the Netherlands, 1995-2005

	Parity distribution of women aged 40-44			Occurrence-exposure rates (OER) per thousand women			Incidence rates (IR) per thousand women	
	1995	2005	Index 2005/1995	1995	2005	Index 2005/1995	1995	2005
Parity 0	0.166	0.186	1.12	6.53	10.24	1.57	1.08	1.90
Parity 1	0.153	0.163	1.07	9.57	14.95	1.56	1.47	2.44
Parity 2	0.444	0.420	0.95	1.97	3.49	1.77	0.87	1.46
Parity 3+	0.237	0.231	0.97	6.47	7.43	1.15	1.53	1.72
Total	1	1	1	**4.44**	**7.53**	1	**4.44**	**7.53**
	Decomposition of changes in IR (absolute values)			**Relative distribution of changes in IR (in %)**				
	Due to OER change	**Due to parity compos.**	**Total**	**OER change effect**	**Parity composition effect**	**Total**		
Parity 0	0.61	0.21	0.82	23.8	8.1	32.0		
Parity 1	0.83	0.15	0.98	32.1	5.9	38.0		
Parity 2	0.68	-0.09	0.59	26.3	-3.4	22.9		
Parity 3+	0.23	-0.04	0.18	8.8	-1.6	7.2		
Total	**2.34**	**0.23**	**2.57**	**91.0**	**9.0**	**100.0**		

Table 4: Decomposition of changes in fertility rate among women aged 40-44 in Austria, the Netherlands, Spain and Sweden, 1995-2005 (selected results)

	Austria	The Netherlands	Spain	Sweden
Fertility rate (IR per thousand F, 40-44)				
1995	4.00	4.44	4.34	7.09
2005	6.20	7.53	7.89	10.66
Abs. change, 1995-2005	2.19	3.08	3.55	3.57
Relative change (index 2005/1995)	1.55	1.69	1.82	1.50
Contribution of (in %)				
Change in childbearing intensities	100.3	91.0	78.3	103.2
Parity composition change	-0.3	9.0	21.7	-3.2
Distribution of the OER change by parity (%)				
Parity 0	24.5	26.2	36.3	25.5
Parity 1	43.8	35.3	31.5	39.2
Parity 2	12.6	28.9	11.4	18.5
Parity 3+	19.1	9.7	20.9	16.8
Total	100.0	100.0	100.0	100.0
Index of change in the total number of women aged 40-44	1.34	1.14	1.31	1.06

Note: The decomposition for Spain is based on data for 1996-2005

APPENDIX

Table AP-1: Birth order distribution of live births to women aged 40+ in selected European countries and the Unites States, 1970-2005 (in percent)

First births	**1970**	**1980**	**1990**	**2000**	**2005**	**Abs. change, 1990-2005**
Austria			11.2	18.9	23.3	12.1
Czech Republic	11.1	11.6	11.9	12.4	13.2	1.3
Denmark	9.7	13.1	13.0	19.4	19.7	6.7
Hungary	12.0	13.1	11.4	12.0	14.6	3.2
Ireland			7.9 (1991)	15.1	17.9	10.0
Italy		16.7	18.1	24.5 (1997)		
The Netherlands	6.9	11.4	19.3	22.7	25.3	6.0
Poland			8.0	7.5	9.8	1.8
Romania			6.5	10.7	16.2	9.7
Spain				27.2	30.5	
Slovak Republic	4.6	8.9	13.1	12.1	14.3 (2004)	1.2
Sweden		15.6	13.8	18.9	21.6	7.8
United States				21.1	21.9 (2004)	
Second births						
Austria			20.0	27.8	29.5	9.5
Czech Republic	16.3	15.6	16.6	21.2	22.3	5.7
Denmark	16.8	16.3	24.9	29.4	30.5	5.6
Hungary	14.3	18.2	16.3	18.8	20.1	3.8
Ireland			12.2 (1991)	21.4	26.3	14.1
Italy		21.2	27.2	34.8 (1997)		
The Netherlands	11.2	16.4	23.0	32.3	32.5	9.5
Poland			13.7	11.6	16.3	2.6
Slovak Republic	6.8	11.8	11.5	12.9	14.7 (2004)	3.2
Romania			9.1	10.4	15.7	6.6
Spain				34.6	39.1	
Sweden		20.5	22.3	28.1	29.3	7.0
United States				27.4	28.1 (2004)	
Third and higher-order births						
Austria			68.8	53.3	47.2	-21.6
The Netherlands	81.4	72.2	57.7	45.0	42.2	-15.5
Denmark	73.5	70.6	62.1	51.2	49.8	-12.3
Sweden		63.9	63.8	53.0	49.1	-14.7
Ireland			79.9 (1991)	63.5	55.8	-24.1
Italy		62.2	54.7	40.7 (1997)		
Spain				38.2	30.4	
Czech Republic	72.6	72.8	71.5	66.4	64.5	-7.0
Hungary	73.7	68.7	72.4	69.3	65.3	-7.1
Poland			78.3	78.8	73.9	-4.4
Romania			84.4	78.9	68.1	-16.3
Slovak Republic	88.6	79.3	75.5	75.0	71.0 (2004)	-4.5
United States				51.6	50.0 (2004)	
Fifth and higher-order births						
Austria			24.8	12.3	10.7	-14.1
Czech Republic	39.3	29.9	22.1	16.0	13.6	-8.5
Denmark	30.0	24.5	13.0	11.7	7.9	-5.1
Ireland			45.3 (1991)	22.2	14.9	-30.4
Italy		25.0	11.6	6.2 (1997)		
The Netherlands	48.3	42.4	28.5	11.6	12.0	-16.5
Poland			36.1	34.8	29.5	-6.6
Romania			60.3	53.2	42.6	-17.7
Slovak Republic	62.7	46.1	35.9	35.1	32.1 (2004)	-3.8
Spain				7.0	4.6	
Sweden		20.0	14.6	16.3	11.8	-2.8