Was slowing postponement really the engine for TFR rises in European countries?

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Across Europe, total fertility rates (TFRs) had been falling ever since the end of the baby-boom. In some countries, particularly in eastern and southern Europe, they even reached 'lowest-low' levels, with TFRs less than 1.3 children per woman during the latter part of the 1990s. Although some policy-makers worried that this reflected a rejection of motherhood and needed treating with pro-natalist measures, more astute demographers saw that the underlying cause of these low values was mainly attributable to year-on-year postponement (Kohler, Billari and Ortega, 2002). As the mean age in first birth (and higher birth orders) was rising each year, this longitudinal 'stretching' of births over time was causing the TFR, a period measure, to be significantly lower than the mean number of children actually borne by women, ie. the cohort fertility rate. They foresaw that, at some stage in the future, postponement would slow and eventually stop, leading to an automatic increase in the TFR (Bongaarts and Feeney, 1998). At that stage period fertility measures, such as the TFR, would once again approach the underlying cohort fertility rate, when no further postponement was taking place.

It was only a mild surprise to some, therefore, when TFRs did indeed start rising around the turn of the new millennium. Some people saw this as women choosing to have more children, or at least not remaining childless, and policy-makers were especially encouraged that their policies were 'working'. Meanwhile, demographers saw that the increases 'must' be caused by a slowing in the rate of postponement (Goldstein, Sobotka and Jasilioniene 2009; Bongaarts and Sobotka, 2012). This paper investigates these alternative explanations in more depth and finds that the reality is more nuanced, with neither of the competing arguments being sufficient in themselves. However, it succeeds in pinpointing the primary cause of the recent rises in TFRs.

Research question: decomposing the potential causes of the rise in TFRs

TFRs can rise because of several reasons, or a combination of these factors:

1. A rise in the first birth rate (equivalent to a decline in childlessness)
2. A rise in the 2nd birth rate (more women going on to have a second child)
3. A rise in larger families of three or more children
4. Changes in timing: a decline in postponement (of 1st or 2nd births)

The aim of this study is to investigate which of these has predominated in the European countries in the past decade.

Data overview and definition of terms

To examine the different potential factors contributing to TFR rises, high quality birth registration data is required, decomposed by age of mother and biological birth order of each birth, together with equally high quality mid-year estimates of the female population by age. Fortunately the recently launched Human Fertility Database (HFD) gathers these data together, as supplied by national statistical offices, and these are easily accessible online (http://www.humanfertility.org). This analysis uses solely the data in the HFD. Data for 14 European countries were analysed; those in the HFD which included birth order data.

The following abbreviations are used in this paper:
FR1: fertility rate for first order births; this is also the complement of the rate of childlessness.
FRx: fertility rate of births of biological order x
MAB1: mean age of mother at first birth
MABx: mean age of mother at birth x
FR1* is FR1 with the Bongaarts-Feeney correction (also known as adjTFR), ie. FR1/(1-r), where r is the 3 year moving average of the year-on-year change in MAB1
The rise (or fall) from change in timing of 1st births is the excess change in FR1 over FR1*
Postponement is defined as an increase in MABx over time.
When postponement rates in MAB1 are increasing (eg. in Stage 1 described below), then FR1* will exceed FR1, so we deduce that increases in FR1 are due to 'real' rises in 1st birth rates. However, this may be an artefact associated with a change in fertility schedules (Goldstein, Sobotka & Jasilioniene, 2009, Appendix 6, p. 56)
ASFRx: Age-specific fertility rate of birth order x

Recent rises in TFRs

Figure 1 shows the recent rises in TFRs of thirteen countries, five in western Europe and eight in eastern Europe.

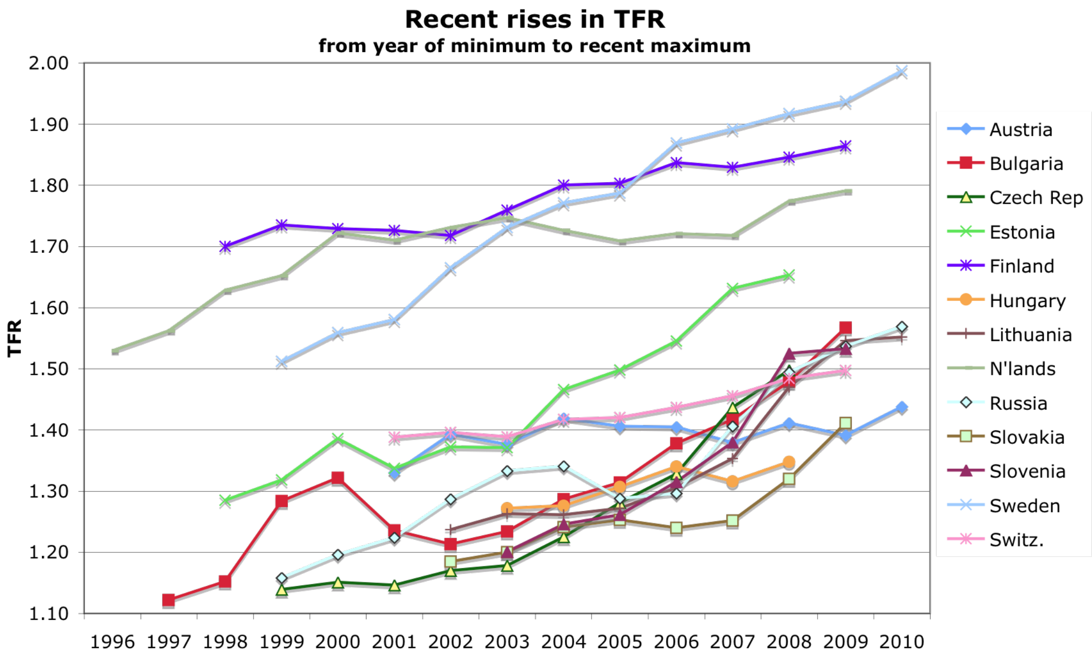


Figure 1: Recent trends in TFRs for 13 European countries

The start year for the data lines plotted was the year in which the TFR reached its recent minimum. Of the countries studied, one had a minimum in 1996, one in 1997, two in 1998, three in 1999, two in 2001, two in 2002 and two in 2003.

An analysis for Portugal is not included in this report, as its trajectory has been opposite to the other countries. Portugal saw a recent maximum TFR in 2000, and it has been falling since then, with falls in fertility rates of all birth orders. As with most other countries, the standard deviation of MAB1 and MAB2 has been increasing, but the intensity of childbearing (as defined by the peak value of ASFR1 and ASFR2) has been declining. Mean age at 1st and 2nd birth continues to rise, although they are already high (28 and 31.5 respectively), so it is possible that the deflationary tempo effects will start to decline before long.

Larger families or not?

The total fertility rate is the sum of the birth order specific fertility rates, and we examined the trends in FR1, FR2 and FR3+ to discover which had contributed most to the increases in TFR. Figure 2 shows which birth order rates have contributed most to the TFR increases.

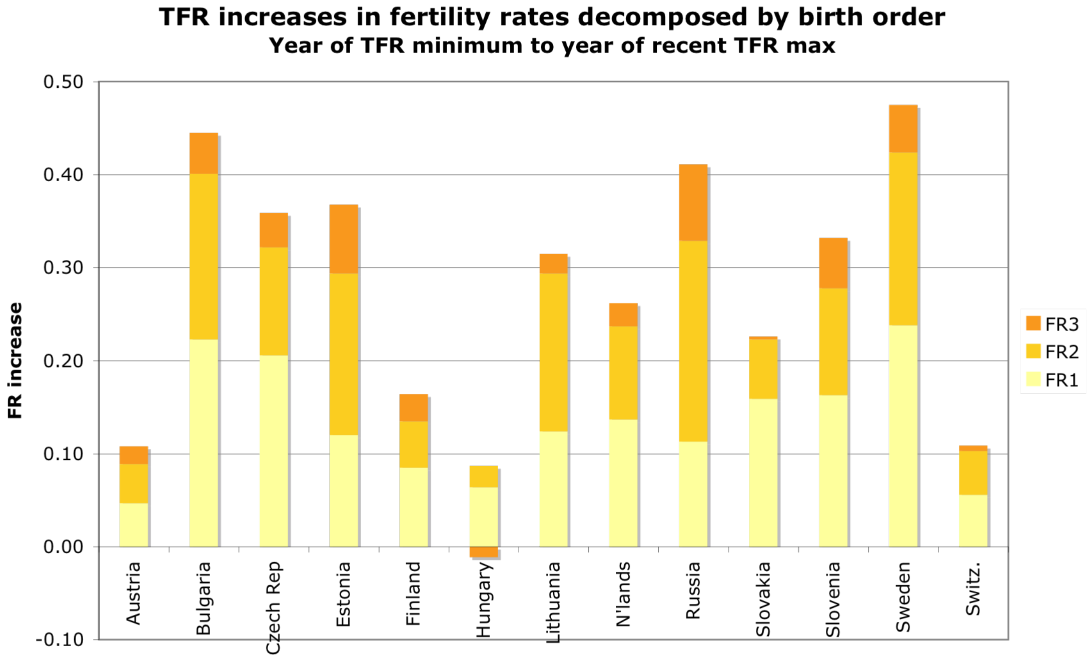


Figure 2: Decomposition of rises in TFR by birth order

We can see from Figure 2 that although larger families (increases in FR3+) contributed a little to the overall increase in TFR, the main increases stemmed from rises in FR1 and FR2.

Figure 3 confirms the essential stability in the FR3+ rates in most countries – even though those rates vary widely from country to country across Europe. The greatest increases in higher order births have occurred in Russia, Estonia, Slovenia and Sweden, but even in these countries the rise is of the order of only 0.05 in higher order births per woman.

Concluding that the rises in TFRs have not mainly stemmed from an increase in larger families, we concentrate the rest of this report on looking mainly at the FR1 and FR2 trends. In fact the FR2 trends seem to follow those of the FR1 but delayed by a few years; therefore, our focus is particularly on the FR1 trends.

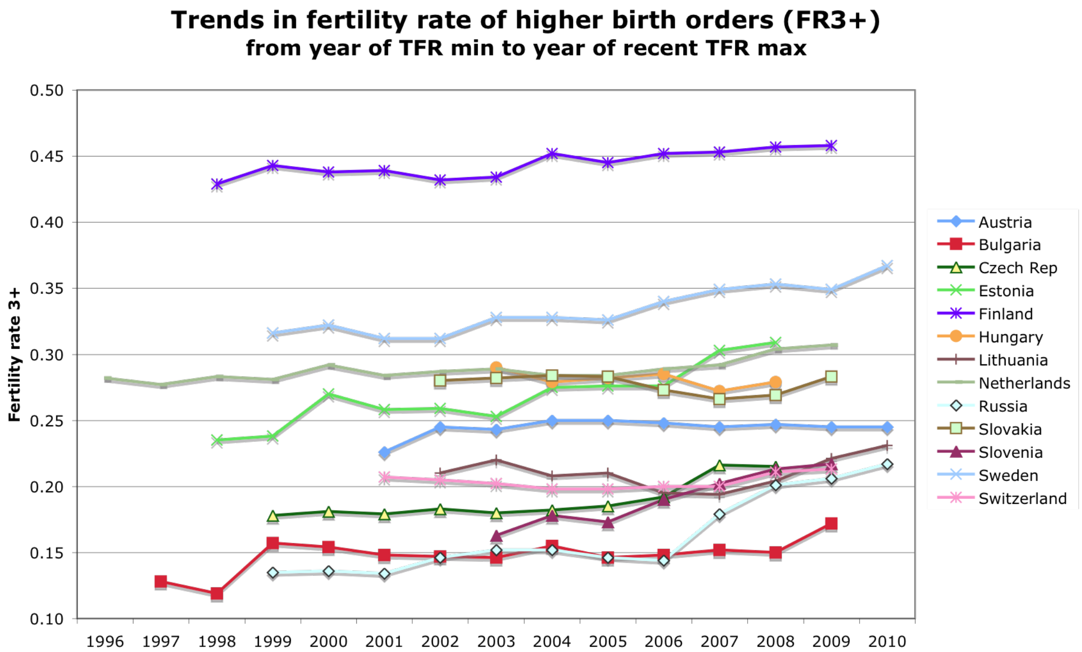


Figure 3: Trends in FR3+

Changing trends in postponement rates

We assumed from the literature that when we examined the trends in year-on-year changes in MAB1 in the years after the TFR started to rise, then these would show a decline, ie. postponement rates were declining. However, when we looked at the what actually occurred in the period after the year of minimum TFR, we discovered the trends as plotted in Figures 2.

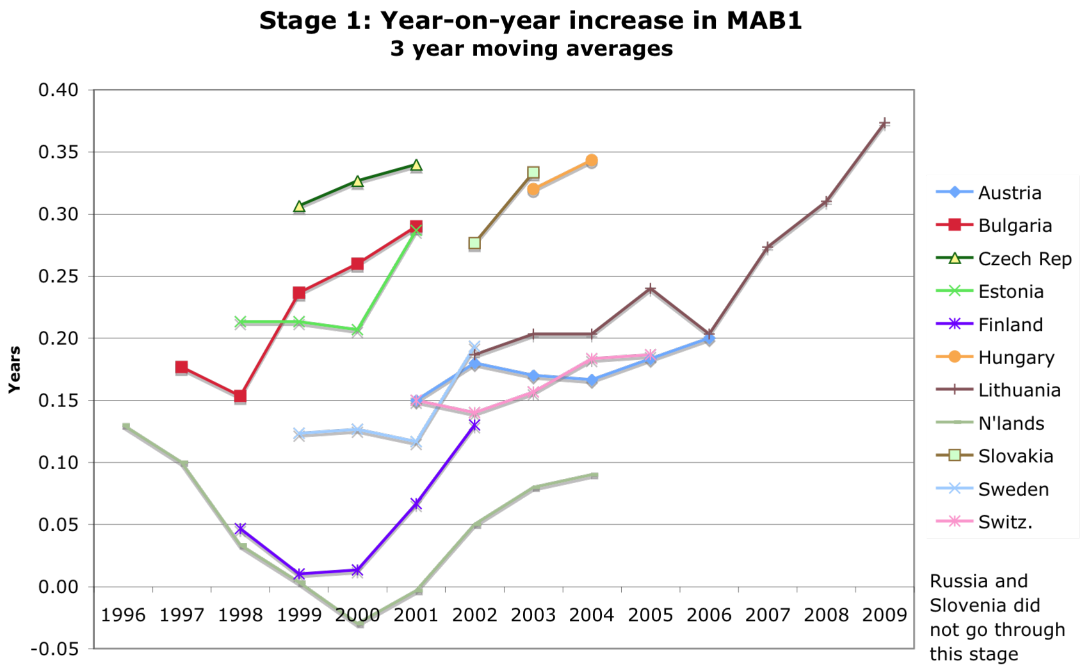


Figure 2: Stage 1: increasing postponement rates for 1st births

This shows than in 11 of the countries studied postponement rates actually increased in the years immediately after the year of minimum TFR (for several countries after a lag of a few years). Therefore, we defined this period of increasing postponement as Stage 1. The trends for year-on-year postponement for MAB2 were less well defined (not plotted here).

Stage 1 was then followed by several years of declining postponement rates of MAB1, as plotted on Figure 3, and we defined this as Stage 2 (again the trends in MAB2 postponement were less well defined).

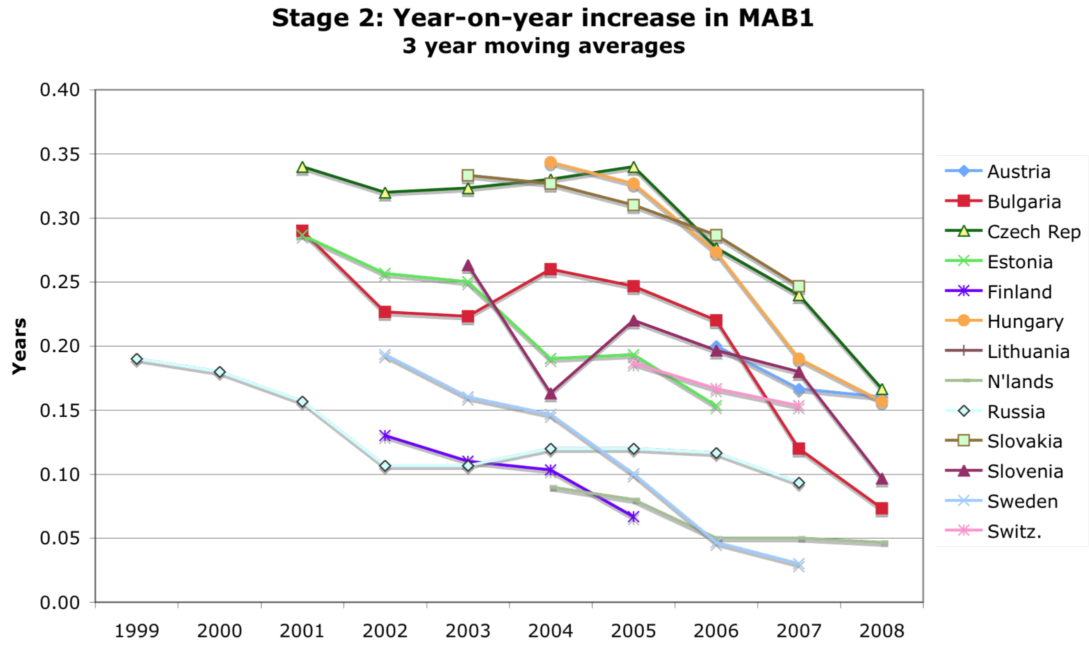


Figure 3: Stage 2: declining postponement rates for 1st births

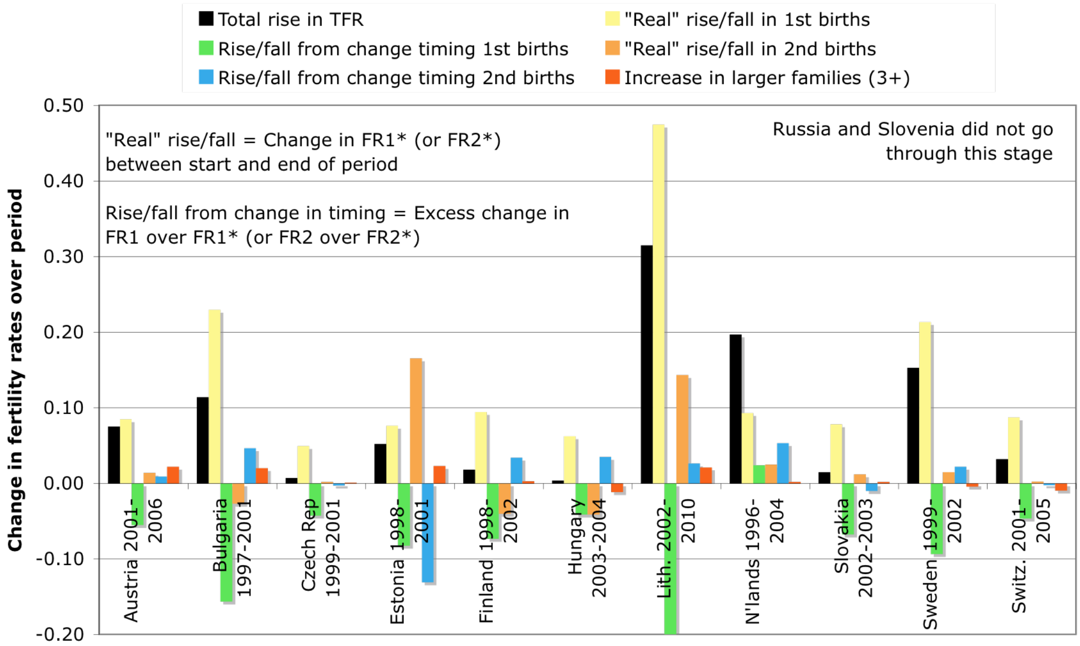
After Stage 2, seven countries again entered a period of slightly rising postponement rates, which we term Stage 3 (data in the HFD is currently only available up until 2009 or 2010). The onset of the recession in 2008 has been seen to herald a period of increasing postponement once again (Bongaarts and Sobotka, 2012). There is, therefore, still the potential for these countries to see another rise in their TFRs when postponement finally ceases (when MAB1 hits its upper limit) or even reverses. This is likely to happen sooner in the western European countries than in eastern Europe, where childbearing still happens at relatively young ages. MAB1 may be reaching a maximum in Sweden, the Netherlands and Switzerland (with MAB1 close to or exceeding 29), whereas there is considerable scope for ongoing postponement in Russia (MAB1 24.6) and Bulgaria (25.1).

Decomposing 'quantum' and 'tempo' effects on TFR rises

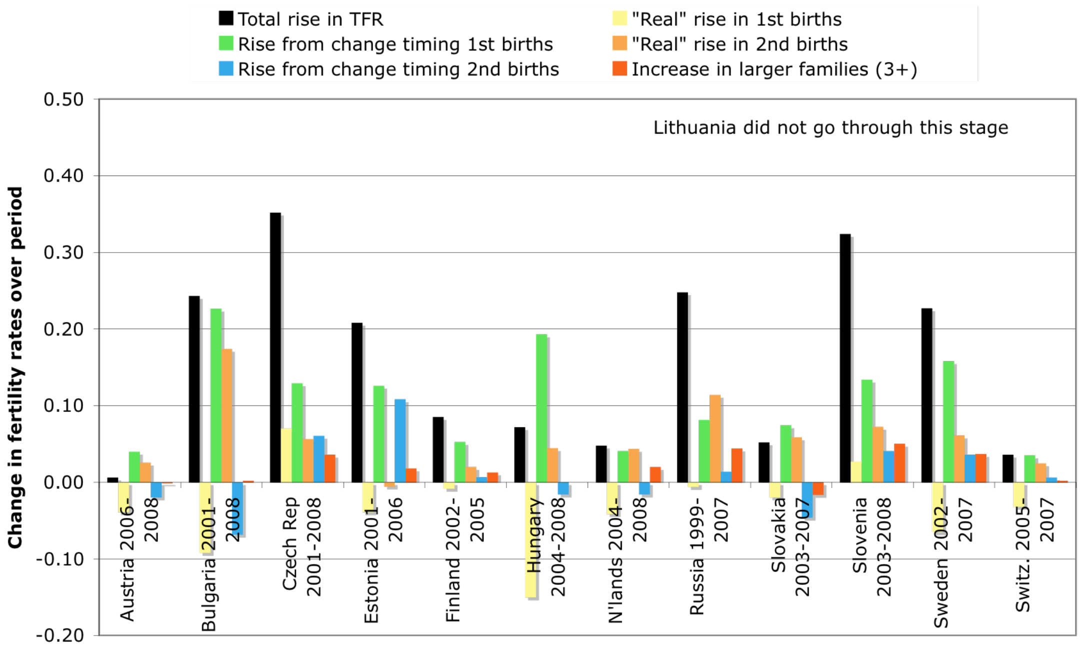
Having determined the trends in MABx, we could then decompose the quantum (changes in 'real' rates, FR1, FR2 and FR3+) and tempo effects (changes stemming from changes in postponement rates) on the TFR. These are defined for each of the three stages, as defined in the previous section.

The choice of key dates can affect the conclusions of any analysis of this sort. These were the criteria for defining the different key years:
Year 1: minimum TFR
Year 2: year of maximum year-on-year increase in MAB1
Year 3: subsequent year of minimum year-on-year increase in MAB1
Year 4: year when TFR reached recent maximum (with available data)
Stage 1 was between Years 1 and 2; Stage 2 between Years 2 and 3; Stage 3 between Years 3 and 4.

Figure 4 shows the results of the decomposition for each stages 1 and 2.



Stage 1: TFR rise from 'quantum', mostly first births



Stage 2: rise in TFR mainly from tempo changes & rises in 2nd+ births

Figure 4: Decomposition of rise of TFR into effects from tempo and quantum

Increasing intensity or broadening of age range of childbearing?

Increases in fertility rates are caused by a greater area under the fertility curve, where age-specific fertility rates are plotted against mother's age at giving birth. Two mechanisms can increase the area under the curve: the peak can become higher and/or the width of the curve can widen. In other words, the intensity of childbearing (by birth order) can increase, or women can have their children over a broader age range. For brevity, the following discussion focuses on first birth rates; the same analysis has been carried out for second order births; these essentially follow the same trends as first order births though generally a few years later.

Let us consider the effect on the fertility curve of changing rates of postponement. When postponement is ongoing but the postponement rate is stable (ie. change in MAB1 year-to-year is steady) then the peak is moving rightwards, as women are having their first child at later and later ages. In this case, from a period perspective, the area under the curve remains stable. However, when any postponement is occurring, the width of the cohort fertility curve is wider than the period fertility curve, while the peak of the curve (fertility rate at modal age of childbearing) is identical. Figure 4 shows a practical example of this with the data for Switzerland. When the Bongaarts-Feeney correction is made, then it is equivalent to adding extra births to the width of the curve.

We might expect, therefore, using the (unadjusted) age-specific rates, that the fertility curve would tend to be narrowing in periods of increasing postponement, but widening in periods of declining postponement – as this is when the period rates are approaching the cohort rates.

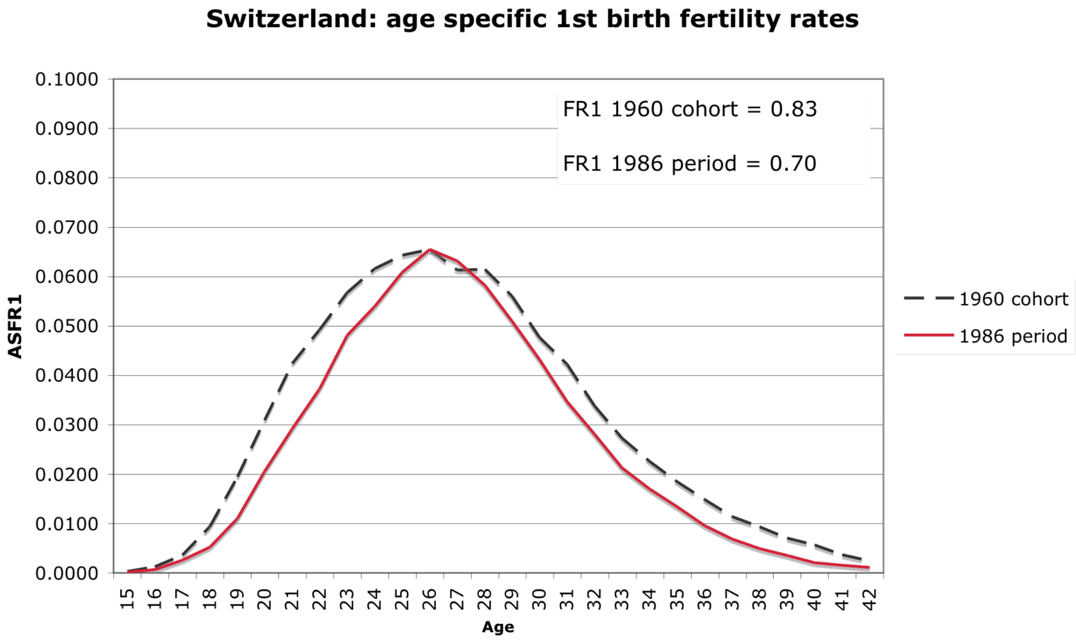


Figure 5: Comparison of cohort and period fertility curves for Switzerland

What do we find when we look at the changing shape of the fertility curves for the different European countries? Figure 6 graphs the increases in the width of the fertility curve seen across all the countries in the years from the TFR minima to the recent TFR maxima. Did these increases only start after the TFR reached its minimum, and so is broadening of the curve one explanation of the increase in fertility rates? The answer is negative. In fact, we discover if we examine the trends for the years preceding the TFR minimum that increasing variability in age at first (and second) births was well underway in the preceding years. Broadening of the fertility curves was an ongoing trend. This was especially notable in the eastern European countries, where childbearing had previously been early and timed in a narrow age band for women in their early 20s or even younger.

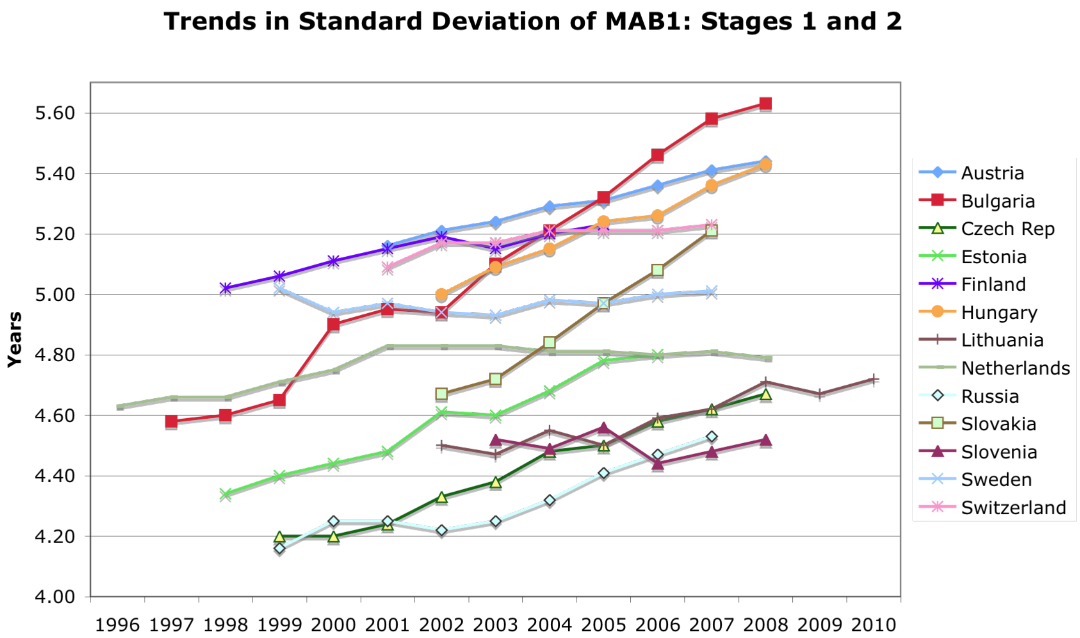


Figure 6: Increases in variability in mean age at first birth

So if the fertility curves had been getting wider, even during the 1990s, then the question becomes: why were fertility rates falling in that period? Figure 7 gives the answer to that question: the curves were becoming flatter, with the peak rates declining. These declines in intensity were especially notable in eastern Europe.

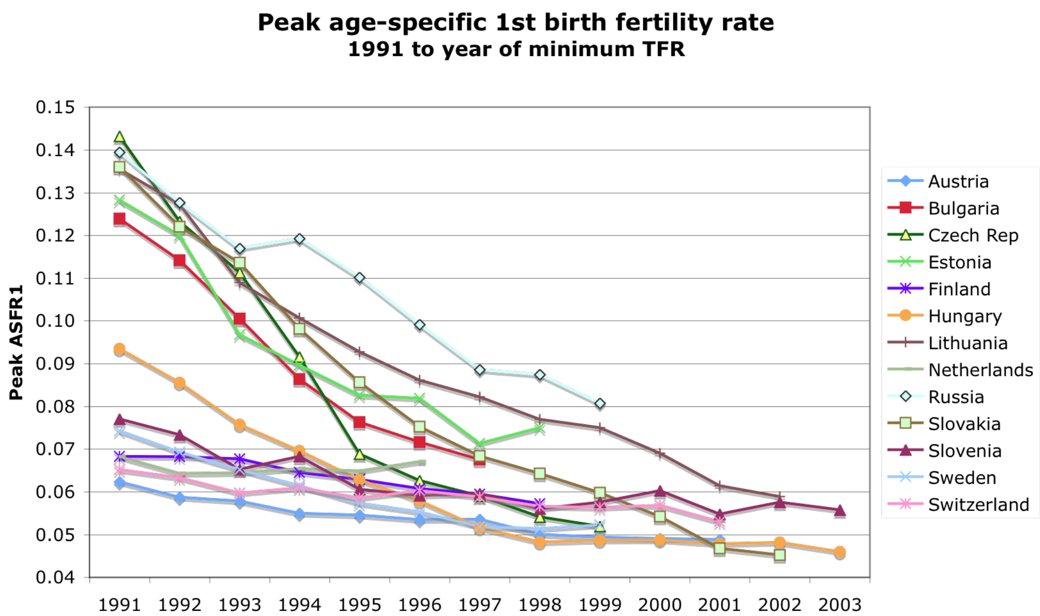


Figure 7: Declines in peak first birth rates during 1990s

What happened to the peak birth rates <u>after</u> the year of minimum TFRs? Figure 8 shows a variety of patterns. Unlike the universal declines in peak rates plotted in Figure 7, in this period some countries saw a rise in peak rates (most notably Sweden, Slovenia, Czech Republic and Lithuania), while many others saw stability, fluctuating levels, or even ongoing declines (Russia and Bulgaria, for example).

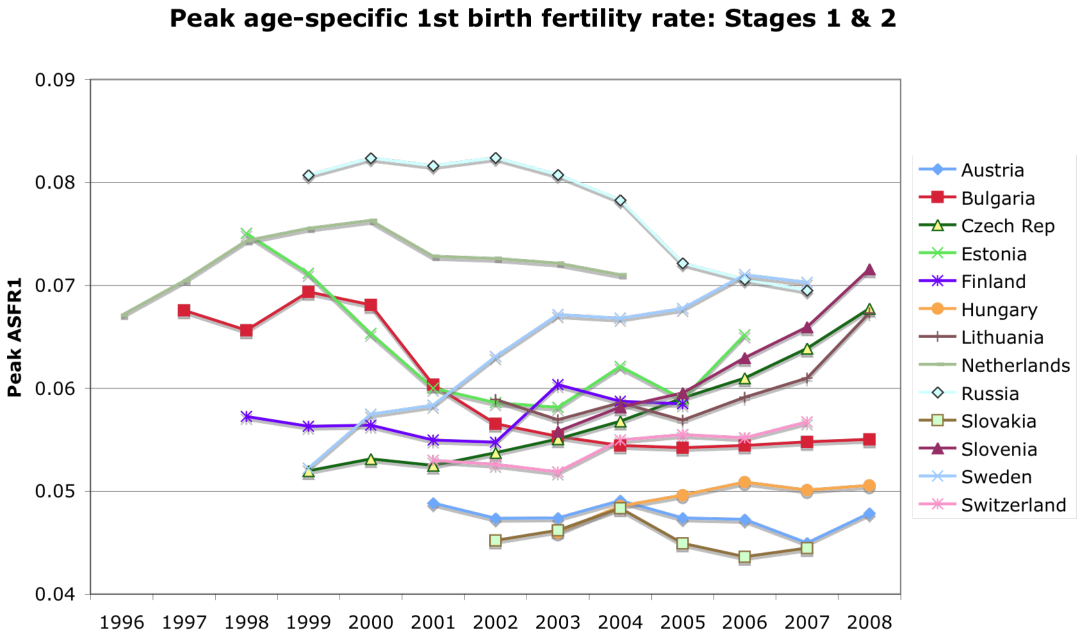
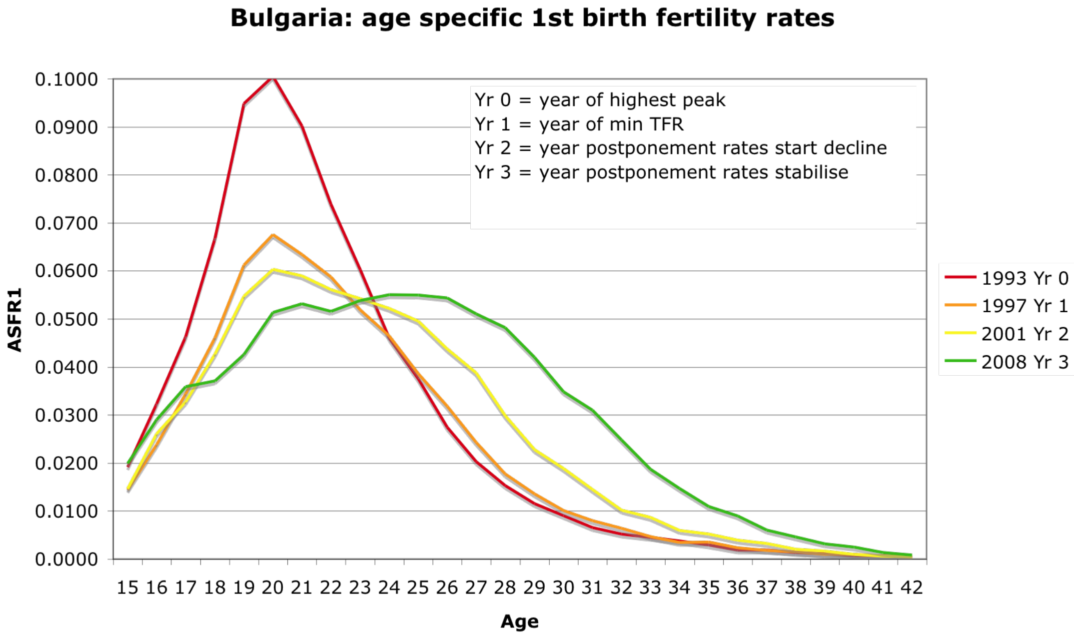


Figure 8: Trends in peak first birth rates in period of rising TFRs
Note: different vertical scale to Figure 7

The explanation for the increase in area under the fertility curve can be summarised as follows: age at first birth had been becoming more variable and so the fertility curve had been widening; this continued throughout the 1990s and 200s. However, during the 1990s, declining intensity (lower peak rates) caused the total area under the curve to shrink. The area under the curve started to rise again as the curves continued to widen and the peak rates either stabilised or, in some cases, started to rise.

The two examples shown in Figure 9 demonstrate the difference between Bulgaria and Sweden in how their fertility curves changed during the different stages. Both had almost the same increase in FR1 (see Figure 2); however, the evolution of their FR1 fertility curves is very different. Bulgaria has seen a huge increase in variability in age at first birth, and this has been the driver of the increase in FR1. We can also see how in stage 1 (the period between Year 1 and Year 2) the mean age at first birth increased rapidly, while the modal age did not change, staying at age 20. During stage 2, the mode leaped up by some 6 years, but this continued to broaden the fertility curve even while the peak rate declined slightly.

For Sweden the rise in FR1 since the year of TFR minimum can primarily be attributed to an increase in intensity of childbearing, ie. the peak rates of FR1 at the modal age of first birth. Rates for early childbearing have been quite constant up to the age of 21, and there has been a slight rise in age-specific rates for women in their 20s. However, most of the increase can come from a marked increase in fertility rates of women in their early 30s.



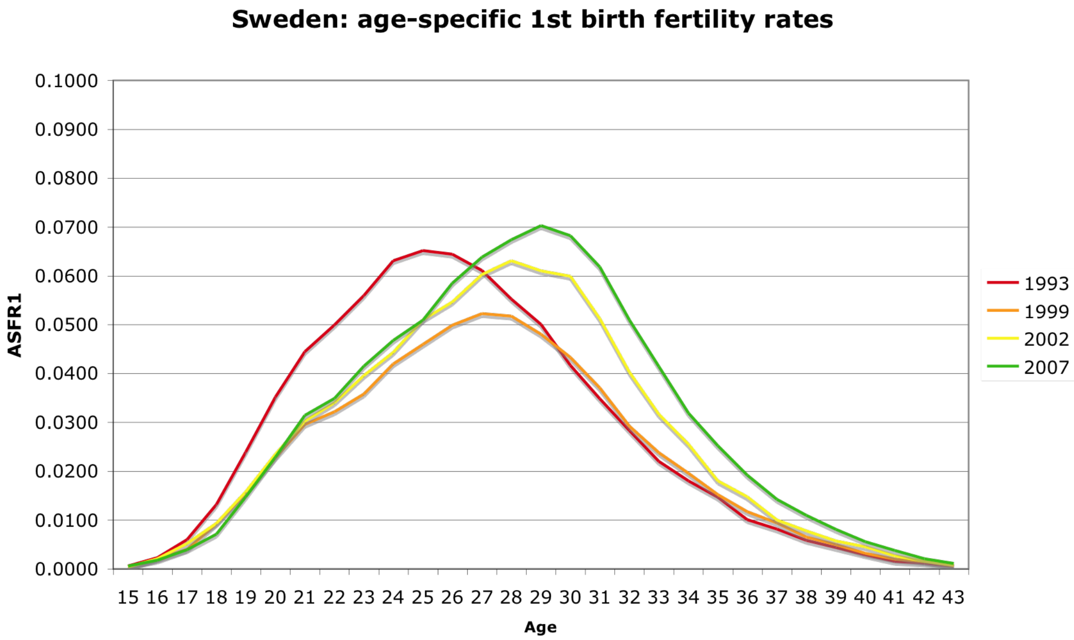


Figure 9: Comparison of the evolution of the fertility curves, Bulgaria and Sweden

Conclusions

What we have found is that the drivers of the rise in TFR are complex and vary over time and between countries. In Stage 1, many countries saw a 'real' rise in 1st (and/or 2nd) birth rates, while postponement of childbearing increased. In Stage 2, declining postponement rates meant that the driver of TFR increases was a tempo effect (of MAB1), plus some increase in 2nd and 3rd+ births. In all countries there has been a broadening of the fertility schedule, especially for first births; increases in eastern Europe have been especially marked. In some countries the intensity of childbearing has risen significantly, with Sweden leading the pack for greatest increase in intensity, as well as highest current TFR. In other countries the intensity has declined and all the rise in TFR has come from broadening of the age range. The increasing variability in age at childbearing has come primarily from a considerable increase in the fertility rates of 'older' women; many more women are having their first child in their late 20s and into their 30s, which is a sea change in the behaviour of women in eastern Europe in particular.

There is considerable scope for examining in more depth the effects on fertility rates of the changing shape of the fertility curves. Simple descriptors such as the mean or modal age of birth may mask real variations between countries and over time. In this study the simple Bongaarts-Feeney correction was made to separate 'quantum' from 'tempo' influences. More sophisticated estimates are available (see Bongaarts and Sobotka, 2012, for example). However, all depend on a measure of change in MABx. Whether using only this parameter to make a correction, when in fact the whole fertility curve is changing in shape, may be questioned.

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