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Fertility Forecasting in the German-speaking World: Recent Experience and Opportunities for Improvement

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Abstract: In this article, the official fertility projections of the statistical agencies in Germany, Austria, and Switzerland are examined. We refer to the literature on this topic and the history of fertility projections in all three countries. We conclude that the basis of fertility projections is the persistence of the present. We then investigate the most recent projections in more detail – with special regard for their consistency of timing and level changes of fertility. This shows that in the low fertility context, such as in the three countries under consideration, where fertility postponement is expected to stop sometime in upcoming decades, the medium assumptions of constancy contain an implicit decline in the forecasted level of fertility. Both tempo and cohort perspectives on projected fertility reveal this conclusion. Consequently, we suggest that agencies should deal explicitly with the prospect of postponement and their effect on fertility levels. The Bongaarts-Feeney framework or similar ones could be used. We also provide examples of three consistent variants (low, medium, and high) in the case of Germany, and show that such a forecast can in some cases outperform the usual constant level forecast in a low-fertility context.

Keywords: Fertility · Projections · Forecasts · Tempo · Statistical agencies

1 Introduction

Declining fertility is considered to be a key driver of the aging and shrinking of a population. Consequently, a key component of future composition and size of populations is their future fertility. The object of our analysis is not fertility as such, but rather forecasts of fertility. Our interest is in the official forecasts of Germany, Switzerland, and Austria since the last baby boom.[1] Since *Sobotka* (2011 in CPoS

[1] The title of this paper refers to the "German-speaking World", but when we consider Switzerland we refer to the whole country.

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36,2-3) pointed out that the fertility patterns of these three countries are very similar, it seems appropriate to discuss their projection strategies together.

We first provide an overview of the existing literature on this topic and the forecasts that were made for the countries under consideration during the last four decades which allow us to make some generalisations about forecasting practice. Second, we look at the range of rationales that are used to justify different forecasts, and updates of past forecasts. These range from an appeal to Easterlin's theory of relative cohort size, to the conclusion that there is no adequate theory. Third, we look at the issue of fertility postponement in the forecasts in greater detail, showing that forecasting agencies have yet to adopt a consistent practice for dealing with "tempo" effects and the divergence between cohort and period fertility. Finally, we offer some observations comparing and contrasting the approaches used to date, and making some recommendations which we hope will give future forecasts a firmer scientific basis. Our suggestions may not necessarily improve forecasting accuracy, but we hope that they will make it easier to understand why forecasts go wrong, if they do. Forecasters are aiming to combine the application of the best known demographic methods with analyses of demographic structural developments. The advancement in demographic methods, including fertility analysis and projections, is a continuing process. In addition, increasingly in-depth analyses of demographic, social, economic, political, cultural and historical conditions shaping fertility behaviour are taken into account when defining assumptions about future fertility trends. Since it is difficult to assess how the use of such variables in forecasts have preformed, we are focusing in this article on the demographic methods and logic used in the projections.

2 General preliminary remarks

The terms "forecast" and "projections" can in theory refer to quite different kinds of exercises. Whereas projections refer to hypothetical scenarios under defined assumptions, forecast try to foresee the future as precise as possible. In practice, however, as *Keyfitz* (1982) has noted, the scenarios used by statistical agencies (particularly when there is a middle case) are chosen because they appear to agencies to be the most reasonable and most likely for the future. We therefore follow *Keyfitz's* practice of using the two terms "forecast" and "projection" interchangeably, although the statistical agencies themselves often restrict themselves to the "projection" label.

In addition to this comment, it is also worth prefacing the actual experience of forecasting fertility in the German-speaking world with some general comments and reflections from the literature on fertility forecasting. As early as 1950, *Dorn* had enumerated points not given enough consideration in fertility projection (*Dorn* 1950). He noted that the fertility of a single year or a short period does not provide sufficient information to assess future trends. The use of very recent trends will in many cases give them undue weight, especially in a long-term projection. Another relevant issue is that a long-lasting trend, such as falling birth rates, need not neces-

sarily be a continuing trend. A very critical view of population forecasting in general was taken by *Hajnal* (1955). He argues that "much of the elaborate technique of forecasters is expended in vain; crude methods could have archived equally good results" (*Hajnal* 1955: 310). Instead of improving techniques to extrapolate age-specific fertility rates, demographers should include other factors affecting fertility in the analysis. As examples of factors for which data could be found, he mentions impending changes in sex-ratios, imbalances in marriage markets, and fluctuations in distribution of birth by parity.

A detailed overview of techniques to project fertility was given by *De Beer* (1992). He concludes that use of age-specific fertility rates is essential, since changes in age structure of potential mothers within coming decades is projectable with a high degree of certainty. Besides changes in the fertility of certain age-groups, the number of women in these age-groups is the main driver of changes in the number of total births, and cannot be excluded from the analysis. *De Beer* (1992) also discusses the use of methods based on period or cohort observations. Period observations can be distorted by the changes in the timing of fertility and thus do not always lead to plausible levels of family size for successive birth cohorts. A cohort approach uses this figure (completed fertility of real cohorts) as a central variable, but first, requires a long data series, and second, disregards information on cohorts still reproductively active, particularly for women at the beginning of their childbearing years. Hence, *De Beer* advises the use of period observations for short term forecasts, and cohort considerations for medium and long term forecasts. For other extensive reviews of population projection methods involving fertility projection, see *Booth* (2006) and *Wilson* and *Rees* (2005). For a review of fertility projection strategies in particular, see *Sorvillo* (1999). It can be summarised, that the prevalent practice by forecasters in post-demographic-transition populations in North America, Europe, and Asia has been to assume that there is no trend toward either higher or lower fertility. Rather, forecasts tend to take the current level of fertility and extrapolate it into the future. The basis of fertility forecasting is the persistence of the present.

The contrast of fertility studies with mortality is striking at first glance. In mortality forecasts, the question is not whether mortality will improve but rather how quickly this will happen. But with mortality, societies and individuals clearly have a common aim, and are marshalling common resources toward healthier and longer life. With fertility, there is no such common aim. It may be that people want fewer, or more, children in the future. It may be that conditions are more conducive, or less, to having children in the future. Governments, despite, answering the United Nations' population policy statements (*United Nations* 2007: 12) pursue policies which are not aimed solely at raising their birth rates, but rather have many competing goals, including economic growth, reducing economic inequality, enhancing gender equality, improving the environment, protecting the aged, improving education, and more – all of which have potential bearing on future fertility decisions. There is so much uncertainty surrounding future fertility rates that one cannot with confidence even state the direction of the trend.

Demographers failed to predict the baby boom, and also failed to predict the baby bust. No one saw the onset of postponement and the dramatic effect it would

have on period fertility. Although some predicted that postponement would slow someday, no one knew when. The Swiss, in a particularly self-critical statement, say that based on known factors, the recent increase in fertility should have been better predicted (*Bundesamt für Statistik Schweiz* 2010: 32).[2] Forecasting is always an uncertain task, however, and there will always be the potential for making a wrong prediction. We think the question that should be asked is "are we incorporating the full informative potential of contemporary demography theory and analysis?" In the absence of a set of fertility determinants that everybody can agree on, the answer is probably yes. *Keyfitz* (1982) argued in this context that theory-guided assumptions cannot be used for projections at all, even if valid theories exist. The reason is that they are conditional on and affected by other relations. Hence, it is not possible to forecast explanatory variables. Even if these forecasts are available, they are usually of too short a term for use within population projections.

The forecasts we consider are one-size-fits-all forecasts, aimed at a wide variety of users. The same forecasts are used to influence educational policy decision in the next decade and pension policy decisions going forward half a century or more. While short-term forecasts obviously need to be updated on a frequent basis, it is remarkable that long-term forecasts are also frequently updated. As we will see, forecasts made five years apart can have quite different views of the same future some 20 years hence. Our focus here is on the "middle" or "main" forecasts, as opposed to the high and low variants.

Alternative approaches to fertility forecasting include "stochastic" forecasts in which a time series model is developed, which then provides not only a central forecast, but also a range of uncertainty, and set of probabilistically consistent future paths for fertility to follow (e.g. *Lee/Tuljapurkar* 1994).

3 The recent official forecasts in the German-speaking countries.

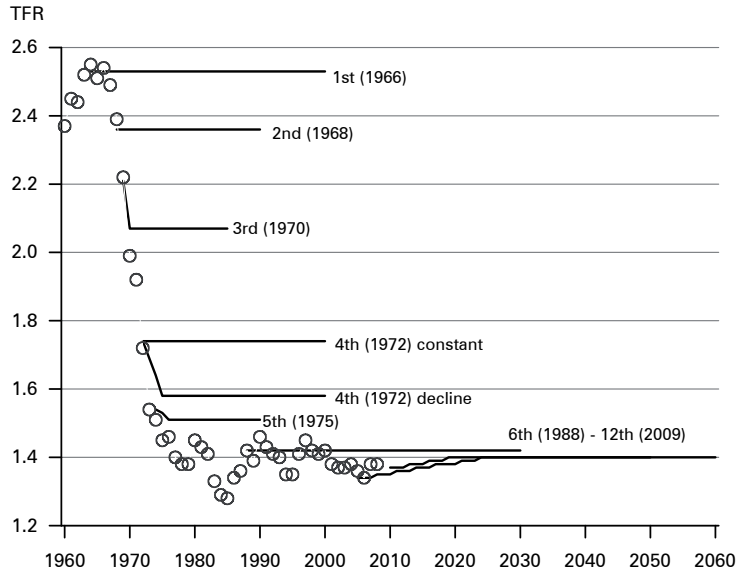
We now consider the official forecasts since about 1960 in Germany, Austria, and Switzerland. For Germany, we consider only the West German experience before unification. For purposes of comparison we also consider the most recent versions of other forecasts for these countries, produced at the European level by Eurostat and at the international level by the United Nations. However, the focus of this paper lies on the official national forecasts, because they give us the greatest insight into how the agencies react to national-level changes in their fertility rate.

Figure 1 shows the total fertility rate observed in the German-speaking countries along with the forecasts of this rate made at different points in time. We show only

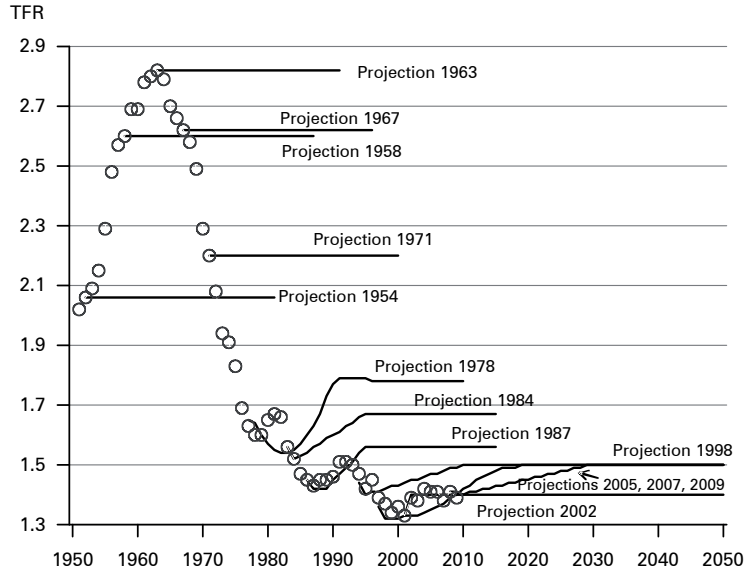
[2] „Auf der Grundlage der zwar gewünschten, aber aufgeschobenen Geburten der in den 1970er-Jahren geborenen Frauen war die letztere Zunahme eigentlich vorhersehbar" (*Bundesamt für Statistik Schweiz* 2010: 32).

Fig. 1: Observed (circles) vs. projected (solid line) TFRs for German speaking countries with the respective base years of the projections

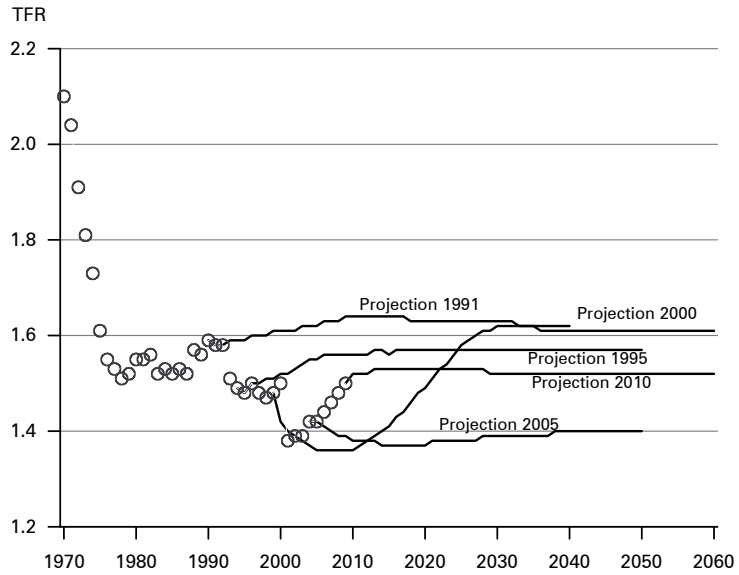
Germany



Austria



Switzerland



Sources: Publications by statistical agencies, Human fertility database

the central forecast, both for graphical clarity and for consistency, since high and low alternatives were not always given.[3]

The method used for the German forecasts is transparent. From 1966 to 2009, future fertility has been forecast to be a level continuation of the fertility observed at the year of the forecast. Thus the forecast for the year 2000 goes from 2.50 in 1966 to 1.4 in 1988, not because of any new theories of the determinants of fertility behaviour, nor because of changing forecasting methods, nor from new insights of statistical analysis, but simply because the level of fertility at the time of the forecast fell from about 2.5 to about 1.4 children per women.

In Austria and Switzerland, the forecasts have been more complex and varied. Until 1977, Austria followed the same approach as Germany, extrapolating the level of TFR observed in the forecast year. However, since 1977, the Austrians have predicted a non-monotonic path of future fertility consisting of an initial dip in fertility, followed by a subsequent rise. As we will see in the rest of the paper, this strikingly non-monotonic forecast is a result of the Austrian method of assuming constancy – not in the period TFR, but in the cohort TFR under changing tempo. The Austrian method failed in its first attempt in 1978, predicting a rapid rebound of fertility within a dozen years. However, the 1987 forecasts were very accurate for their first years of their forecast, before failing to see another dip in fertility after 1995. The 1998

[3] Our figures are inspired by *Lee* (1976) and his graph showing that the US forecasters behaved similarly.

forecast captured, to some extent, the rise in the 2000 to 2005 period. Whereas the 2002 projection predicted a stable TFR level of 1.4, current forecasts are predicting a rebound of about 0.1 children to a level of 1.5 children over the long term.

Switzerland has also been predicting an increase of fertility since 1990. The forecasts in 1991, 1995, and 2000 all predicted a rebound, but the forecast of 2005 predicted a decline. The most recent forecast in 2010 predicts no change at all.

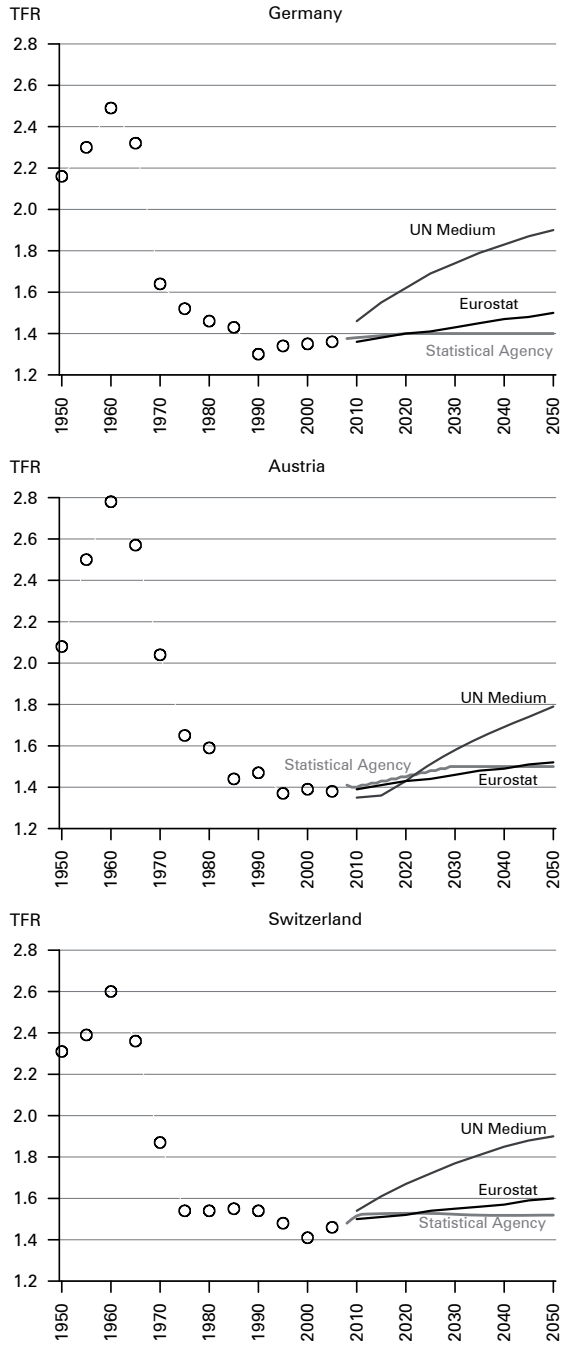
On one level, the three countries share almost identical fertility histories and also similar forecasts. The current long term TFR in Austria and Switzerland is set at 1.50, in Germany it is 1.40. On the other hand, the approach to forecasting is quite different. Austria and Switzerland have tried to include the likely recovery of fertility, but Germany has decidedly not done so.

Since projections on the European level, by Eurostat, and on the international level, by the UN, show considerable differences from the official forecasts by statistical agencies, we will consider their approaches to project fertility in the following. The UN projections are cohort-component projections, produced in 5-year intervals for 5-year age-groups. The publication of revisions for the projections follows a biennial cycle. Within the most recent publication (the 2010 revision) a great change in regard to the fertility forecasting strategy was conducted. The preceding revisions used a very simple linear model to forecast the TFR for below-replacement fertility countries. TFR-levels were assumed to change linearly at a quinquennial rate of 0.05 to approach a level of 1.85 children per woman, which was assumed to remain constant after it was reached. This procedure delivers fertility forecasts that are not country-specific, which had been one of the initial reasons for the 2010 revision. Here the authors of the UN switched to a Bayesian projection model – more precisely, a first order autoregressive time series model with its mean fixed at a TFR of 2.1 as approximate replacement level. In the case of Germany, Austria and Switzerland, the model parameters depend on estimates from observed data, which is supposed to make the trajectory country-specific, back to the replacement level. In both fertility forecasting strategies, a low and a high fertility scenario were derived in the same manner: half a child was either subtracted or added to the target value.

The UN demographers directly address the influence of tempo-effects on their projections: "*Bongaarts* and *Feeney* (1998) have pointed out that current below-replacement period TFRs may be lower than the cohort TFRs for the currently fertile cohorts, reflecting a tempo rather than a quantum effect. Our AR(1) model for the low fertility Phase 3 predicts a recovery from below-replacement period TFR, as does the Bongaarts-Feeney work, and so it may to some extent capture this phenomenon." (*Raftery et al.* 2009: 16). However, the projections were with regard to separate projections on tempo and quantum effects not made compatible.

Figure 2 displays the latest TFR projections for the three countries under consideration by Eurostat, as well. The underlying assumption of the Eurostat projections for all demographic indicators is a Europe-wide convergence in the very long run (*Eurostat* 2011b). For Germany and Switzerland, the outcome of fertility assumptions leads to projections that are higher than the medium scenarios of projections

Fig. 2: Projected TFRs of the most recent population projections from the UN, Eurostat and the statistical agencies in comparison



Sources: *United Nations Population Division* 2011, Eurostat 2011a

by statistical agencies, but considerably lower than the ones by the UN. For Austria, the Eurostat TFR projection is very similar to the one by the statistical agency.[4]

4 The rationale for forecasts

In this section, we recount the history of official forecasts in the three countries, following the history of the stated rationale for forecasting assumptions as they evolved over time. In so doing we exclude official forecasts that have been made on the sub-national level. In all three countries, forecasts exist at the level of federal states (or cantons) and are coordinated with the one on the national level, but with varying assumptions for the demographic parameters (*Statistik Austria* 2008: 8, *Statistisches Bundesamt* 2009: 9, *Bundesamt für Statistik Schweiz* 2011: 1).[5]

4.1 Germany

In Germany the tradition of projections goes back to 1952. Since 1966 the Federal Statistical Office has conducted coordinated population projections by harmonising demographic trends of the federal states and national territory. Currently the 12th and latest coordinated population projection is from 2009. The 1st (1966-2000) and the 2nd (1968-1990) coordinated population projection postulated only a single variant in fertility development, assuming constant birth rates over the entire forecast horizon. The forecasters did not anticipate the sharp decline in fertility since 1966. Although the forecasters have noticed that fertility rates were strongly overestimated in both previous projections, they didn't formulate any alternative scenarios to assess to what extent fertility levels might decline. The 3rd projection (1970-1985) is based on the 1969 age specific fertility rates, with a proportional adjustment for the expected fertility decline in 1970. From 1970 onward, a constant fertility trend was assumed. The forecasters acknowledged that they had little basis on which to predict the future, since the variations in fertility furnish no conclusion for the long term fertility trend. Consequently they explicitly acknowledged that they must assume constancy to get a picture of likely future trends. Conducting projections in short time intervals is therefore very important in order to account for changing fertility developments (*Kampl/Rückert* 1971: 668).

The 4th coordinated population projection (1972-1985) added an assumption of fertility decline by 9 % in 1975 in addition to the constant variant (*Bretz* 1986: 257). The forecasters argued that the scenario of fertility decline reflects the dramatic reduction in fertility in several European countries related to a change in age-specific fertility patterns caused by considerable changes in family planning[6].

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4 A more detailed description of the methodology of Eurostat's projections is forthcoming and was not available for us at the time of publication (see *Eurostat* 2011).

5 For a further analysis of sub-national fertility trends see *Basten et al.* 2011 in CPoS 36,2-3.

6 „In den Veränderungen der altersspezifischen Fruchtbarkeitsziffern spiegeln sich – sehr allgemein formuliert – Auswirkungen der Familienplanung wider." (*Linke/Rückert* 1973: 83)

The authors narrowed the forecast horizon from a period of 35 years in the 1st to less than 15 years in the 4th coordinated population projection.[7]

Similar arguments underlie the fertility assumption of the 5th coordinated population projection (1975-1990). The forecasters acknowledged that there was little information about the determinants of individual fertility decisions regarding number of children or spacing of childbearing. Some examples of possible deterrents to childbearing included widespread use of contraceptives, changing attitudes toward gender roles, and the rising proportion of women in the labour force. An economics-based approach to explaining fertility-related behaviour suggests that potential parents might react to increasing costs of childrearing by having fewer children. Upon these considerations, the forecasters concluded that an increase of fertility was rather unlikely. However, they predicted that the decline would stop around 1977.[8]

The 6th coordinated population projection (1988-2030) was the last one conducted for West Germany alone. Only one scenario – a constant fertility level – has been postulated.

In the 7th coordinated population projection (1990-2030), which was the first one after reunification, assumptions were separately made for both parts of the country, assuming convergence in 1995 (*Sommer* 1992: 217). In the subsequent projections there was a focus on the speed of the convergence between the two parts of Germany. Complete convergence in 2010 in the 8th coordinated population projection (1993-2040) or alternatively in 2005 in the 9th coordinated population projection (1999-2050) and again 2010 in the 10th coordinated population projection (2003-2050) were functional estimates, as fertility levels did converge between East and West Germany in 2007.[9] Nevertheless, all these projections have been made without regard for any alternative assumptions for the TFR. The forecasters assume that the fertility rate will stay at 1.4 which is rather low, particularly over a period of half a century.

It was not until the 11th coordinated population projection (2006-2050), however, that fertility assumptions were made for a low, medium and high variant. The main assumption, "approximate stability", supposes continuation of current age-specific birth trends until 2025. The total fertility rate remains at its present level of nearly 1.4 children per woman and the average age at birth rises by about 1.6 years. The second variant, "slight increase", assumes an increase in birth rates to 1.6 children per woman until 2025 with a rise in the average age at giving birth of about one year. Afterwards birth rates remain constant from 2026 to 2050. The low variant, "slight decrease", assumes that birth rates will gradually decrease to 1.2 children per woman until 2050, and that woman's average age at giving birth further rises by about

7 We could not find any explanation for the forecast horizon reduction from the 1st to the 2nd projection, and even further reduction in the 3rd and 4th projection.

8 „Die gemachten Annahmen unterstellen ein Ausklingen des Geburtenrückgangs bis 1977." (*Linke/Höhn* 1975: 795)

9 *Sommer* 1994: 497; *Statistisches Bundesamt* 2000: 9; *Statistisches Bundesamt* 2003: 10.

two years (*Statistisches Bundesamt* 2006: 8-11). The long-run values for the TFR of the latest 12th coordinated population projection (2009-2060) coincide with the ones assumed in the previous 11th coordinated population projection. In addition, the authors of the forecast state that their assumptions are based on a detailed analyses of cohort fertility (*Pötzsch* 2010). The outcome of a constant level of the period TFR of 1.4 for the medium forecast is explicitly linked with a decline in cohort TFR from 1.66 to 1.4. The argumentation here is that the increase in age-specific fertility rates above age 30 can presumably not compensate the decrease of age-specific fertility rates below age 30. In addition to that the authors refer to an potential increase of childlessness. (*Statistisches Bundesamt* 2009; *Pötzsch* 2010).

4.2 Austria

Austria produces population projections regularly, going back to 1953. Updates of the population projections are provided annually by Statistics Austria and are based on the most recent population data available. Every three to four years, a new projection generation is set up based on revisions of the assumptions on fertility, mortality and migration. Since 1987, external experts are included in the assumption-finding process (*Hanika* 1988: 4). Early forecasts were published already in 1953, 1959, 1964, 1967 and 1974 (*Findl* 1979: 273). In these early projections no change in the TFR was assumed nor was migration taken into account (*Parizek* 2006: 32). Therefore we concentrate our analysis on projections launched from 1977 onwards as these projections did account for changes in fertility.

In the projection for the period 1978-2010, a set of three variants was introduced. The main hypothesis corresponds to a mean scenario assuming a slight increase of the TFR from 1.65 to 1.78. The forecasters argue that clear assumptions based on the continuation of observable historical trends are very difficult, as periods of fertility decline and fertility increase have been alternating over the last 50 years. Therefore, the recent decline was assumed to be only temporary, and it was argued that an increase of fertility is likely in the near future.[10] The high variant makes an optimistic prediction of reaching replacement-level fertility eventually. Due to this underlying concept that fertility is subject to fluctuations, the forecasters take the possibility of another "baby-boom" into account.[11] The authors refer to the "Easterlin-Hypothesis" to explain that a less competitive environment of the smaller cohorts, e.g. labour market conditions, might have positive effects on fertility behaviour. In ac-

[10] „Um nicht in den Fehler zu verfallen, kurz- und mittelfristige Entwicklungen langfristig fortzuschreiben, wird daher der gegenwärtige Rückgang der Fruchtbarkeit als zeitliche begrenzt anzusehen sein, und es wird in absehbarer Zeit sogar wieder mit einem gewissen Anstieg der Fruchtbarkeit zu rechnen sein." (*Findl* 1979: 279)

[11] „Es kann nicht nur keineswegs ausgeschlossen werden, dass sich in Zukunft abermals ein "baby-boom" ereignet, sondern das Konzept der Fruchtbarkeitsschwankungen legt dies sogar nahe". (*Findl* 1979: 279)

cordance with the concept of fluctuation, it is also likely that no remarkable increase in fertility will occur. In that case, the low variant will result in a decline of the total fertility rate to 1.5.[12]

In the subsequent projection generation for the period 1984-2015, fertility assumptions were adjusted to lower levels in general, but at the same time the range between the high and low variants was extended in the long term view. In this projection a fourth variant was established, assuming constant fertility rates over the entire forecast horizon. The revision of the fertility assumptions incorporate recent developments, referring to a distinct decline in fertility rates by 6 % in 1983, which reversed the upswing that had started in 1979 (*Findl* 1984: 659-660).

A new projection generation was launched again in 1987. This was the first time that experts were consulted in order to give a representative picture of likely future trends (*Hanika* 1988: 4). Due to increasing mean age of childbearing, the forecasters considered tempo aspects, assuming that delayed births would be recouped later in life. The explanatory factors that account for the process of postponement are related to the positive trend of young women spending more time in education, in tandem with an increasing female labour force participation.[13] Evidence on the desired number of children from the 1986 microcensus was incorporated to support the main assumption of a slight increase of TFR from 1.45 to 1.56 in 1995 if postponed but actually desired children will be realised.[14]

In a revision in 1990 and for subsequent years, the set of alternative fertility variants have been abandoned. Because fertility rates have been relatively stable on a low level over the last years, fertility rates were projected to remain stable on a level of 1.56 in the long run (*Hanika* 1990: 635).

Within the new projection generation for the forecast horizon 1995-2050 the main variant postulated that fertility would be stabilizing in the long term at a level of 1.5. The assumption was based on the fertility level of 1994 with a TFR of 1.44 – the slight increase to the stable label up until 2010 was explained with recuperation effects. The forecasters referred here again to tempo aspects by observing that recent period fertility rates clearly underestimated cohort fertility, as women of reproductive age continued with the process of postponement. In the high variant, 0.3 children were added to the TFR projections of the mean scenario in order to examine the influence of higher fertility, such as observed in Norway or Sweden. In the low variant, 0.3 children were subtracted from the TFR projections of the mean

12 „Mit der niedrigen Variante sollte der Tatsache Rechnung getragen werden, dass die Annahme künftiger Fruchtbarkeitsschwankungen erst durch die Erfahrung zweier Zyklen gestützt ist und ein Ausbleiben eines nennenswerten und einigermaßen dauerhaften Aufschwungs durchaus möglich ist." (*Findl* 1979: 279)

13 "Längere Schulbildung der jungen Frauen und damit späterer Eintritt ins Berufsleben sowie andererseits auch ein höheres Heiratsalter bewirken, dass Kinderwünsche häufiger als früher erst in höherem Alter realisiert werden." (*Hanika* 1988: 5)

14 „Gestützt werden diese Vermutungen durch Ergebnisse des Mikrozensus 1986. Die hier von Frauen angegebenen Kinderwünsche würden bei Realisierung ein deutlich höheres Fruchtbarkeitsniveau ergeben als das derzeitige." (*Hanika* 1988: 5)

scenario, which were close to those from the southern European countries such as Italy or Spain (*Hanika* 1996: 330).

In the projection generation for the period 1998-2050, the assumed long term trends have not been changed at all, but the time of approaching the target values is extended to 2020 instead of 2010. The forecasters made similar arguments as those in previous projections in regard to tempo effects distorting the present period fertility (*Hanika* 1998: 697).

Statistics Austria obtains their projection in a deterministic fashion by using the cohort component method, as is usually applied by national agencies. Considerable methodological changes took place with the new projection generation 2000-2050 only in regard to migration assumptions. The projected fertility levels have been taken from the previous projections without any change. However, in the mean variant, reaching a TFR of 1.50 was scheduled earlier to 2015 instead of 2020 (*Hanika* 2000: 977-978).

In the following projection generation for the period 2002-2050 fertility assumptions were once again adjusted to lower levels. The mean variant is kept a constant value of 1.40 over the entire forecast horizon. This rather simplified assumption refers to similar expectations of fertility trends of neighboring countries such as Germany, Italy or Switzerland. The high variant postulated that the TFR would rise to 1.70 by 2015, which is possible if future development resembles that of northern European countries or France. In contrast the low variant assuming a TFR of 1.10 in case Austria would follow the path of lowest-low fertility rates as observed in the southern European countries (*Hanika et al.* 2004: 19).

In the projection from 2005-2050, the main assumption is that recent fertility trends, at a level of 1.40, will continue for a short time, but between 2010 and 2030 the TFR would gradually rise to 1.50. The forecasters note the relevance of timing effects and assume that postponed births will be partly recouped in the future. In such a scenario, the completed fertility of female cohorts would arrive at a level of 1.5 children per woman in a long term.[15] The range of 0.80 between the high (1.90) and low (1.10) variant points to considerable scope of likely future trends, as contemporary fertility rates in Europe vary greatly from country to country (*Hanika* 2005: 975).

A new projection generation was launched in 2009, but again, the fertility assumptions regarding the target values have not been changed. Furthermore, persistent convergence of regional fertility statistics is assumed through postulating that regional fertility differences will narrow from 0.20 in 2008 to 0.17 in 2030 (*Hanika et al*. 2009: 966).

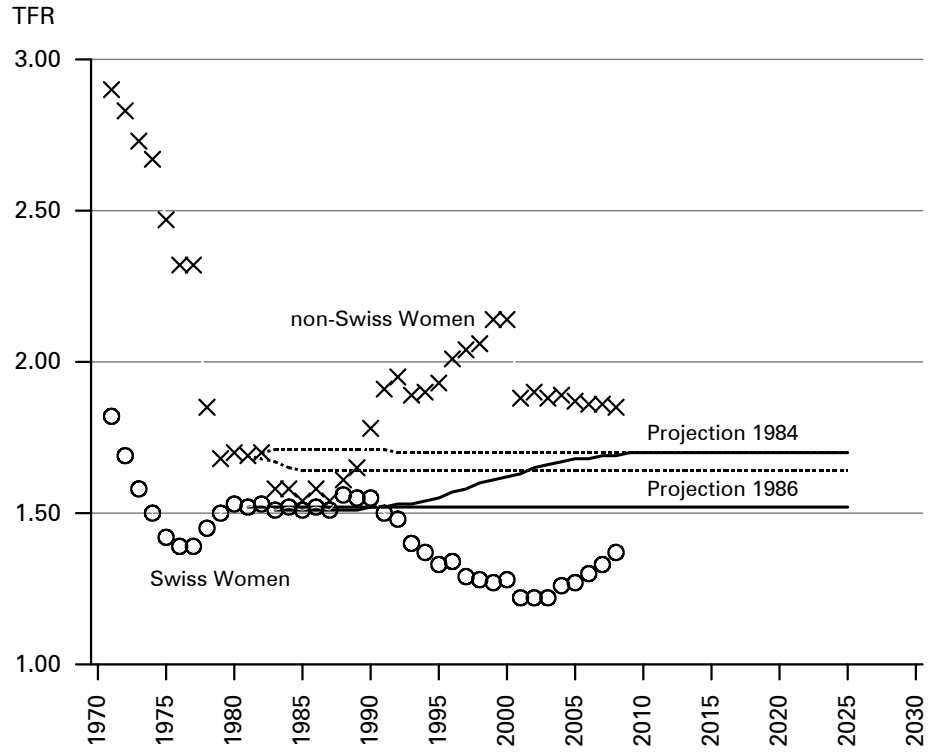
[15] „Unabhängig von allfälligen Timingeffekten bedeutet ein langfristig stabiles Fertilitätsniveau von 1,50 Kindern pro Frau auch eine endgültig erreichte Kohortenfertilität der künftig ins Elternalter kommenden Frauen in derselben Höhe." (*Hanika* 2005: 975)

4.3 Switzerland

The Swiss Federal Statistical Office has been conducting population projections since 1984. The first projection, in 1984, distinguished between Swiss and non-Swiss women and offered three alternative scenarios for fertility in 2025 (assuming a convergence of fertility among nationalities): low (1.4), medium (1.7) and high (2.0). This projection was revised two years later, as the fertility assumptions for Swiss women turned out to be too high. The main variant in 1986 postulated that fertility levels of Swiss women would stay constant at 1.5. Moreover, while in 1984 it was assumed that the fertility levels of Swiss and non-Swiss women would converge in 2005, the 1986 revision assumed that fertility of foreign women would continue to be higher than that of Swiss women. As figure 3 indicates, the gap between the fertility of Swiss and non-Swiss women is still pronounced.

Since the 1991 projection, the national forecasts for Switzerland began to distinguish between EU and non EU nationalities within the group of non-Swiss women. An interesting aspect of this is that the projected cohort fertility is explicitly pre-

Fig. 3: Observed vs. projected TFRs for Swiss and non-Swiss women in Switzerland, Projection 1984 and 1986 revision



Source: BFS Schweiz

sented by the forecasters. However, it is not clear how far cohort fertility patterns have been integrated into the forecasts of fertility. The cohort perspective is a result of the fact that the forecasters took tempo issues into account. They argued that the CTFR was decreasing less than the TFR, because births are occurring later in life. Although the forecasters see no return to replacement-level fertility, they argue that an increase of cohort fertility cannot be precluded, as it is still possible under certain societal circumstances, such as work and family reconciliation policies.[16]

For the projections for 1995, 2000, 2005 and 2010, very detailed information (age-specific fertility rates) was provided by the Swiss Federal Statistical Office upon request. The main variant of the 1995 projection projects a slight increase of the TFR to 1.56 in 2005, remaining constant until 2060. Summing up these arguments for the main variant indicates that they are based on the stability of past developments of cohort fertility, the changing role of women in society, the economic changes in the labour and housing market as well as the role of grandparents in assisting child-drearing. The high scenario assumes an increase of the TFR to 1.80 before 2030. It assumes an increase of births of order three and argues that such an increase would indicate a considerable change of social norms, and would require family orientated policies. The scenario based on the low fertility assumption postulates a decline of the TFR to 1.20, arguing that an increase in divorces may negatively affect the time frame of reproduction (*Bundesamt für Statistik Schweiz* 1996: 19).

For Swiss women, the long run values of the 2000 fertility projections in 2030 coincide with the ones assumed in the 1995 projections. Furthermore, they were in accordance with the assumptions by Eurostat for Germany and Austria – countries close in their fertility patterns to Switzerland. Interestingly, the arguments underlying the three scenarios are mainly based on the feasibility of family policies and labour market policies to ease the combination of motherhood and work (*Bundesamt für Statistik Schweiz* 2001: 11-12).

In 2005, the long term projection offers rather low fertility rates, reaching a level of 1.40 in 2050. Unfortunately, we could not find any specific argument that explains this rather pessimistic assumption except the fact that the forecasters refer to recent analysis of fertility patterns. Several hypotheses have been put forward to explain the further trend of fertility, most interestingly these arguments are based on research in the field of fertility.

According to work by *Frejka* and *Sardon* (2005) fertility levels may stabilise at a rather low level in many western European countries. Higher levels of childlessness, according to *Wanner* and *Fei* (2005) may occur in all social groups. Immigration policy favors migrants from low fertility countries, and there is increasing integration of women in the labour force. Family policies are lagging behind, and hence a

[16] "Unter bestimmten kulturellen und sozialen Bedingungen (vermehrte Wertschätzung des Kindes und der Familie, bessere Möglichkeiten zur Verbindung von Berufstätigkeit und Mutterschaft usw.) ist auch in der Schweiz ein erneuter Anstieg der endgültigen Nachkommenschaft der Generationen nicht auszuschließen." (*Bundesamt für Statistik Schweiz* 1992: 16)

low level of fertility between 1.2 and 1.4 is likely. As in the 2000 projections, variants of fertility development are based on different assumptions on how far work-family reconciliation policies will succeed (*Bundesamt für Statistik Schweiz* 2006: 16).

Since the last two projections underestimated fertility rates in the short term, the forecasters have adjusted the fertility projection upwards in 2010, as compared to the 2005 projections. Due to increasing fertility rates, they argue that they have changed their assumptions by considering the recent changes.[17] They explain differences between projected and actual development from the previous projection 2005-2050, by referring to the increasing age at childbearing for women born in the 1970s. These cohorts postponed their intended children which led to the underestimation of fertility levels. The authors admit that these factors were known and that considering them adequately would have led to more accurate predictions (*Bundesamt für Statistik Schweiz* 2010: 32). Interestingly, in the 2010 projections reference to a study by *Schubert et al*. (2009) can be found arguing that financial and labour market uncertainties might induce families to postpone and, in the extreme cases, give up childbearing at all. Moreover, the current increase in period fertility rates is argued to be just a sign of cessation of postponement of childbearing, but not to be related to an increase in cohort fertility. They argue that a further decline in cohort fertility is possible, since the decline of fertility in younger ages is not compensated by the recuperation of births in older ages.[18] Again references are made to the changing role of females in the labour market and the attitude towards this societal change in terms of designing and adapting family policies.

4.4 Discussion

In all three countries, statistical agencies make good efforts to explain the rationale for their forecasting assumptions. To generalise, the current practice is to assume a persistence of current behaviour into the future for the main or "middle" forecast, reserving the use of theories of fertility behaviour for the justification of high and low scenarios.

There is some recognition of the transient effects of changes in fertility timing on observed period fertility levels, and also some recognition of the need to incorporate information on cohort fertility (e.g. *Pötzsch* 2010).

Disaggregated forecasts on the regional level or by immigration status have been performed, but here success has been mixed. In Germany, the convergence between East and West was forecast accurately by the second attempt (as early as 1992 within the 8th coordinated forecast). The efforts in Switzerland to forecast

[17] „So wurden die Fruchtbarkeitsziffern unter Berücksichtigung der in den letzten Jahren festgestellten Entwicklungen geändert." (*Bundesamt für Statistik Schweiz* 2010: 33)

[18] „Die Geburtenrate der über 30-jährigen Frauen steigt zwar an, doch mit diesem Anstieg wird die Abnahme der Geburtenziffer ebendieser Frauen, als sie noch jünger waren, nicht kompensiert. Daraus resultiert für zahlreiche Frauengenerationen ein Rückgang der endgültigen Nachkommenschaft." (*Bundesamt für Statistik Schweiz* 2010: 10)

fertility by immigration status have been less successful: native fertility was overestimated and foreign-born fertility was underestimated.

Agencies make fairly frequent changes in forecasting methods and in the basis for assumptions. What is striking to us is that short term changes in fertility often produce updates not only in the short term forecasts but also in the assumptions about long term levels. The last decade has been a "calm" period in forecast updates. Because period fertility has remained nearly constant, so have forecasts. The open question is, if fertility rises or falls, how will forecasters react?

5 Inconsistent changes in timing and level in forecasting fertility

In this section we follow a three-stage-process. First, we aim to illustrate how tempo distortions could matter within the most recent fertility forecasts of the statistical agencies and what the implications for projected levels of fertility are. Secondly, we provide an illustrative projection for the case of Germany with consistent changes in the level and timing of fertility. Thirdly, we test the accuracy of such a forecast with historical data.

5.1 Inconsistent changes within the most recent forecasts

As we saw in the discussion of assumptions, agencies recognise that the postponement of births to older ages is an important factor in keeping period fertility lower than cohort fertility.[19] In Austria and Switzerland, the temporary nature of such "tempo effects" was explicitly mentioned, and presumably provides part of the rationale for assuming that, even in the middle forecast, period fertility rates will rise in years ahead. In Germany, the latest forecasts assume no increase in fertility for what is considered the medium scenario.

From one perspective, a tempo effect is considered relevant to projection when an increase or decrease of mean age at childbearing (MAC) is expected, which slows or stops during the projection period. In such cases, there will be a response in the conventional TFR, without a change in the quantum of fertility. If for example a sudden stop of the increase in the mean age at childbearing is foreseen, the conventional TFR should immediately adapt to the values of the tempo-adjusted one, if there is no simultaneous decline in the quantum of fertility assumed as well. In this section, we use the period-tempo framework developed by *Bongaarts* and *Feeney* (1998, 2000, 2008) to look at these consistencies of the assumptions in the forecasts in all three German-speaking countries. We find that changes in timing are not reflected in changes in period total fertility rates in a consistent way.

The Bongaarts-Feeny framework posits an underlying period intensity of fertility TFR*(t) in the absence of timing changes. Just as the total fertility rate summarises

[19] For or a deeper analysis of postponement and recuperation in cohort fertility for the three German speaking countries see *Sobotka et al.* 2011 in CPoS 36,2-3.

the birth rates of the population in the absence of age-structure effects, the tempo-adjusted total fertility rate tells us the TFR in the absence of tempo-effects. The formula used to calculate the tempo-adjusted fertility rate is

$$TFR^*(t) = TFR(t)/ (1 - r(t)), \quad (1)$$

where r(t) is the rate of change in the mean age of childbearing. The measure can be applied on a parity specific basis, but for purpose of the all-parity forecasts considered here, all parities are considered together.

Apart from Boongaarts-Feeny (1998), there are also other approaches (e.g. *Ryder* 1980; *Kohler*/*Ortega* 2002; *Goldstein*/*Cassidy* 2010), that try to correct for tempo distortions. That is one reason why trained demographers might be alarmed to see the Bongaarts-Feeney method, which has been subject to substantial controversy (e.g. *Imhoff*/*Keilman* 2000; *Kim*/*Schoen* 2000; *Schoen* 2004; *Keilman* 2006), recommended for use for official forecasts. Objections to the method, such as the assumption that the age-pattern of fertility retains its shape even as it moves to older or younger ages, may be relevant to the analysis of empirical fertility change, but are, we believe, less applicable to forecasts.[20] We are dealing with just such stylised scenarios and so the difference between tempo-adjustment approaches, and even the distinction between tempo-adjusted period fertility and cohort fertility is small, and the terms and approaches can be used more or less interchangeably.

Usually age-specific fertility rates, and hence the TFR as their sum, are forecasted in a way that prospective changes in timing and quantum of fertility are not checked with regard to their consistence. The usage of an approach for tempo-adjustment like the one by *Bongaarts* and *Feeney* would, in contrast, allow to forecast both aspects consistently.

As we have seen, the forecasting agencies aim is to use the assumption that current fertility behaviour, measured by the TFR, will persist into the future. A reasonable way to do this is to assume that TFR* will stay about the same. In this case, the forecaster would need to forecast r(t) in order to obtain an estimate of TFR. Because the agencies forecast age-specific fertility, they are implicitly forecasting the future timing of births. One can calculate the pace of postponement implied by the forecasted age-specific rates, and see what they imply about the underlying intensity of births, measured by the TFR*.

Figure 4 shows the results of such an exercise for all three countries. The mean age of childbearing predicted from the main forecast is labeled MAC and can be read from the right hand axis. The TFR (observed and forecast) is shown as a solid line. The tempo-adjusted TFR* is shown with dots as empty circles. The alternative forecast implied by constant TFR* is shown in the grey line.

[20] *Zeng* and *Land* (2001) have shown that the TFR corrected with the Bongaarts-Feeny approach does not differ significantly from an adjustment that allows for a constant annual change of the fertility schedule.

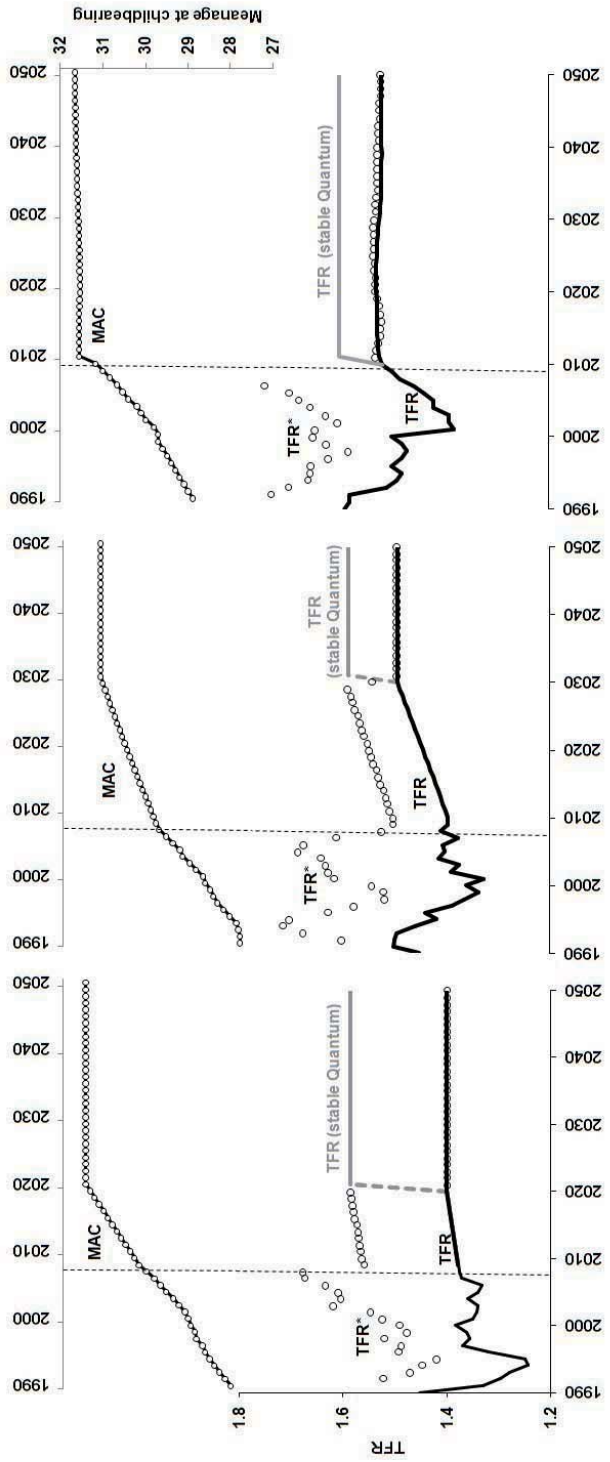


Fig. 4: Mean age at childbearing, TFR and tempo-adjusted TFR from 1990 onwards, including the latest forecasts

Source: Own calculation based on data from the statistical agencies

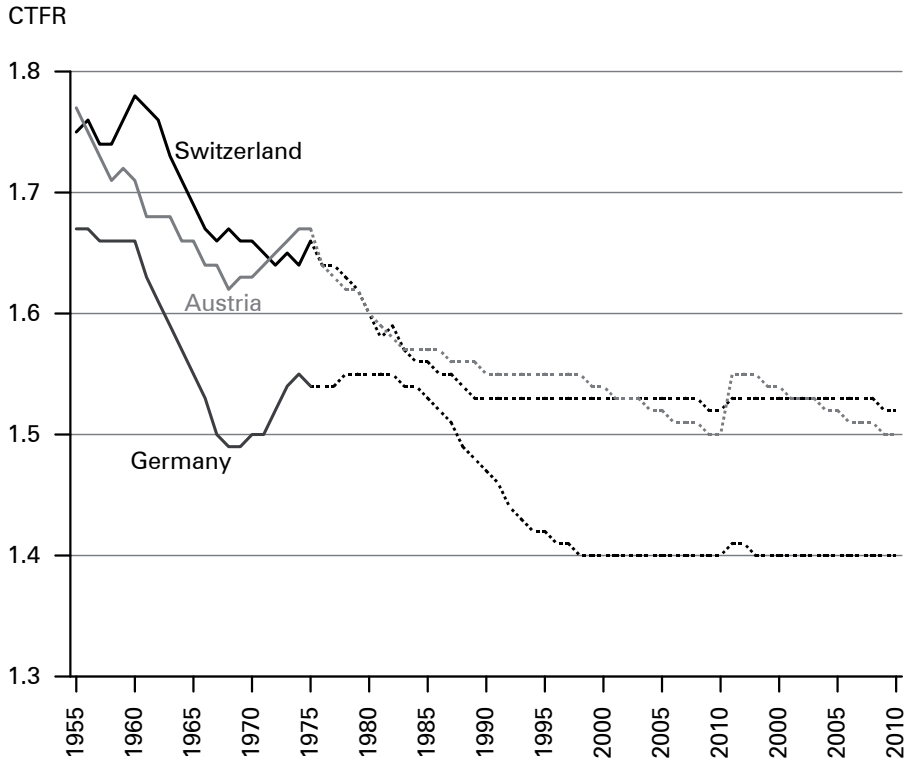
In Germany we can see that the forecast age-specific fertility rates have the mean age of childbearing increasing at about the historic rate until 2020, at which point postponement comes to an end. However, the end of postponement produces no corresponding increase in the period fertility rate, quite contrary to what we would expect in the Bongaarts-Feeney framework, and contrary to what we have seen happen in populations with slowing rates of postponement (*Goldstein et al.* 2009). Accordingly, what the German forecasts implicitly assume is that in the year 2020 there will be a drop in the underlying intensity of childbearing (TFR*) of nearly 0.2 children. A superficial problem with this is that the change happens suddenly, which seems implausible, but a deeper problem is that the assumption is hidden in the forecasts. It can only be disclosed by looking into the (implied) assumptions for the projected cohort fertility. Figure 5 shows that for the cohorts born in 1975 and after, all three medium projections of the statistical agencies imply a downward shift of total cohort fertility by 0.15 children. This contradicts the argumentation by *Sobotka* (2011 in CPoS 36,2-3) and *Sokotka et al.* (2011 in CPoS 36,2-3). It is argued there, that future total fertility rates are likely to remain around 1.6 birth per women. A number of justifications are provided for this conclusion. For Germany also *Goldstein* and *Kreyenfeld* (2011) bring up many arguments for that cohort fertility will rather increase than decrease. In the most recent official population projection for Germany, it is assumed that the level of cohort fertility will only increase up until the cohort 1975, then remain constant for about 10 birth cohorts, before it starts to decline again until it reaches a level of 1.4. Thus, both the cohort and the tempo perspective show us that the implicit assumption behind the medium scenarios is that fertility will decline by a substantial amount.

Figure 4 also shows what would happen to the observed period TFR under the alternative assumption that TFR* would stay constant, namely, that there would be an increase in period fertility of 0.2 children.

Austria and Switzerland, although they discuss in the rationale for their assumptions tempo effects explicitly, suffer from the same kind of inconsistency. In Austria, the rate of postponement slows slightly at the beginning of the forecast. There is some increase in the period TFR forecasts, but we see this forecast implies a slight drop and then a rise in the TFR*. Then, when postponement comes to an end the TFR* also drops suddenly. The Swiss projection has the same issues, but with its inconsistency immediately at the beginning of the projection period. The recent increase in the mean age at childbearing is projected to end at the beginning of the forecast, so that a response in the period fertility shall be expected, if no decline in period quantum is assumed.

What could be done to make consistent forecasts of mean ages and period fertility levels? A minor change that could be made would be to assume a gradual slowing of the mean age of childbearing. This would at least prevent sudden jumps in the implied TFR*. But a more important change would be to produce forecasts of the TFR that in combination with the changes in fertility timing produce consistency in the tempo-adjusted fertility rate. In our opinion, this would have three advantages. First, and most importantly, it would encourage forecasters to be more explicit about their assumptions. In all three countries, it would become more clear

Fig. 5: Cohort Fertility Rate (CTFR) in Germany, Austria and Switzerland for cohorts born between 1955 and 2010 – observed values and projections according to or implied by the medium variants of the statistical agencies*



* The dotted line indicates that more than about 20 % of the cohorts total fertility was made up by projected rates.

Source: Own calculation based on data from the statistical agencies

that the forecasts are assuming a long-term drop in the tempo-adjusted total fertility rate, which in this context can be thought of as equivalent to assuming a long-term drop in the cohort fertility rate. Second, it would simplify the argumentation for the statistical agencies in case the future diverges from the forecasts. Of course the agencies want to produce accurate forecasts, but prediction is inevitably a difficult task, and will in the majority of cases not be exactly accurate. Explicit and consistent forecasting of timing and level changes will allow agencies to see what went wrong with their forecasts, and to make adjustments when appropriate. Finally, an approach that assumed constancy in TFR* over time would be easier to update. When period fertility changes from one forecast to another, the current practice results in changes in both short and long-term forecasts. Aiming forecasts at TFR* could al-

low agencies, faced with a tempo-driven change in recent period fertility, to change their short-term forecasts without necessarily changing the long-term level.

5.2 Illustrative approach to provide consistent forecasts

In the following we aim to show how agencies could include tempo-effects explicitly in their forecasts. As an illustration, we present a possible application to Germany, shown in Figure 6.

The illustration shows how a combination of assumed changes in mean age and in the underlying quantum of fertility produce the forecast TFR. In all three cases, there is complete convergence when postponement comes to an end. The assumptions we used have been simplified for this application in order to make the method clear. In terms of the timing of fertility, we have in this case assumed that all scenarios see postponement come to an end at the same date of 2030. Furthermore, in all scenarios, postponement continues at its 2008 rate for the first three years of the forecast. This was done so that it was clear that the forecast is not predicting an immediate slow-down of the tempo-effect, but rather one in the "near future." We used linear interpolation to connect the current pace of postponement to a zero pace in 2030. In contrast, the quantum of fertility (TFR*) was assumed to differ across the scenarios. In the main scenario, it is kept constant at the level observed in 2008. In the low scenario it is assumed to fall linearly from 2008 to a level of 1.4 in 2030. And in the high scenario, the quantum is assumed to rise linearly to 1.8 in 2030. These differences of 0.2 children between adjacent scenarios are the same as in the latest forecasts of the Federal Statistical Office, but the levels of long-term fertility are higher in this example than in the actual forecasts. We note that in real applications, agencies might want to add further complexity to the scenarios by assuming variations in postponement as well as quantum across scenarios. The important features of using the tempo-quantum framework in forecasts are that the forecaster has to be very explicit about what the quantum assumptions are. One sees, for example, in the panel on the low scenario, that the forecast TFR is even slightly increasing only because the slow down of the tempo-effect exceeds the impact of the predicted decline in the quantum of fertility after a few years into the forecast horizon. The consistency imposed by the tempo-quantum framework makes such assumptions transparent.

5.3 Testing the accuracy of consistent forecasts

Although the forecasts taking tempo effects into account have some theoretical appeal to demographers, it is of course fair to ask the more practical question of whether they can improve the accuracy of forecasts. Before presenting a historical example, we would emphasise what many others have already said. Fertility's ups and downs have not ever been successfully forecasted, so even the best forecasting method can not be expected to be completely accurate. The decomposition of fertility into tempo and quantum components allows one to see, as in the late 1960s and 1970s, if one was wrong because one could not foresee a quantum decline, or

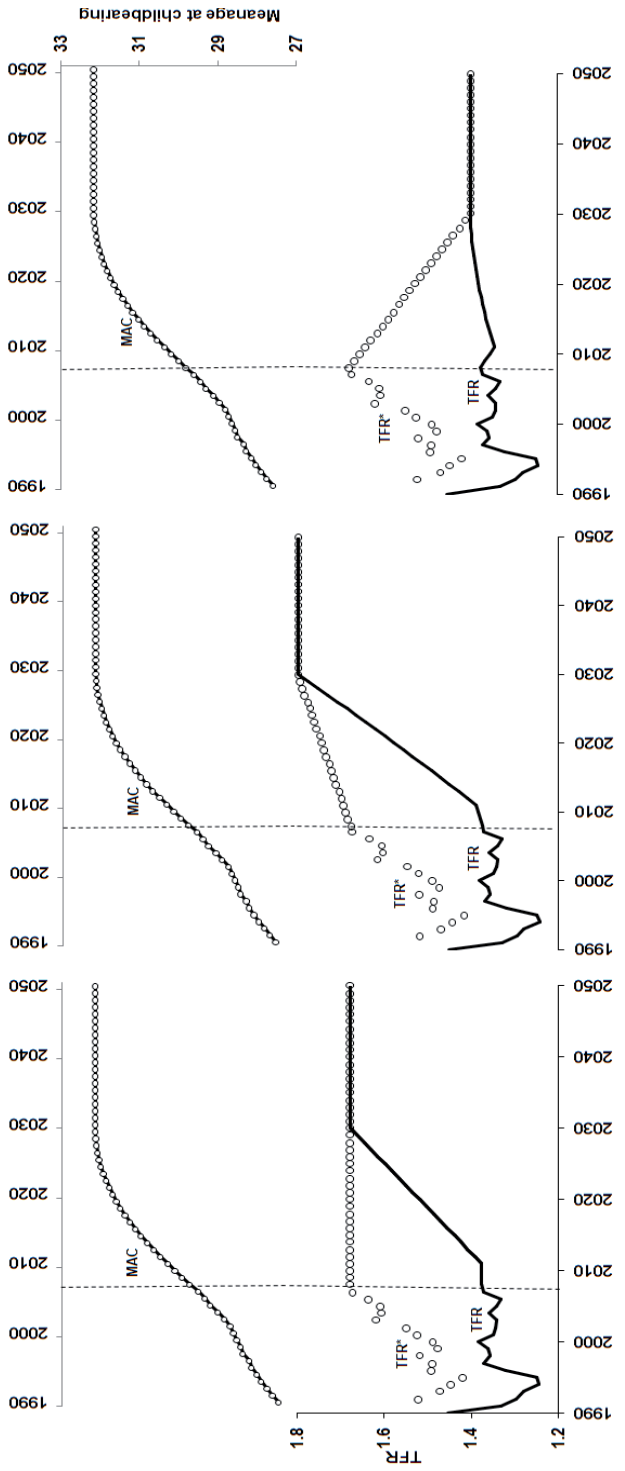


Fig. 6: Mean age at childbearing, TFR and tempo-adjusted TFR for Germany from 1990 onwards with an illustrative forecast for different scenarios

Source: Own calculation based on data Federal Statistical Office Germany

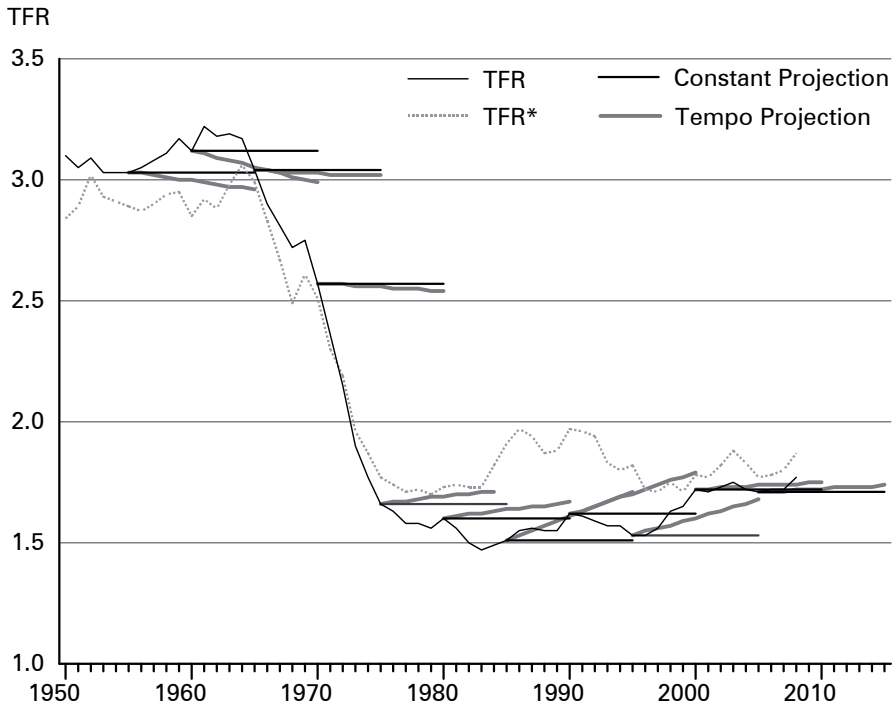
whether one was wrong because in the 1990s one did not accurately predict the continuation of fertility postponement.

In order to illustrate and evaluate a method of forecasting that takes tempo into account, we compared the "constant level" forecasts that constituted the vast majority of fertility forecasts against a "gradual decline of tempo effect" forecast in Figure 7.

We show this for the Netherlands, a country which in some ways is further along the tempo-transition than the German speaking countries, and a country for which parity-specific data are available.

In Figure 7, we show the observed TFR in black and the estimated tempo-adjusted TFR in grey dots. We then show simulated forecasts using the "constant level" and "gradual decline of tempo effect".[21] The first message that applies to both methods is that fertility is easy to forecast when it is remains constant and hard to predict when it changes. However, there is also an important second message, and that is that the tempo-adjusted forecast method tends to point in the right direction. During the Baby Boom the tempo adjusted method tended to forecast that

Fig. 7: Comparison of a "Constant level" and a "gradual decline of tempo-effect" forecast for the TFR in the Netherlands from 1950 to 2015



Source: Own calculation based on data from the Human Fertility Database

[21] The reader should keep in mind that neither of these are the actual official Dutch forecasts.

fertility will eventually decline, and during the low fertility of the 1980s and 1990s, the tempo-adjusted forecast tended to predict an increase. There are years when the tempo adjusted forecast does remarkably better, for example in the mid-1990s, where the TFR ten years later is nearly matched. However, the same increase would have been forecast several years earlier, and as we can see the tempo adjusted forecast overshoots in these earlier periods. Of the 11 forecasts, the tempo-adjusted forecast clearly does better in six cases, the constant level assumption does better in two cases, and the forecasts are essentially the same in three cases. Again, we offer this not as proof of the superiority of incorporating adjusted fertility but rather as an example of the kinds of situations that the tempo-adjusted forecast would have outperformed the constant level forecast. We believe the future in the German speaking countries resembles that of the Netherlands in the 1990s, where postponement slowed down in a low fertility context.

6 Conclusions

In this paper we have looked at the recent practice of fertility forecasting in the German-speaking world. Our analysis of the history of forecasts showed us that Austria, Germany, and Switzerland all follow the same general practice of assuming that recently observed fertility behaviour will continue unchanged. We find this assumption reasonable, since we agree that there are contradictory theories predicting increase and decrease, and that it is difficult to say with any certainty what the future trend will be. Indeed, in the rationale given for forecast assumptions, agencies are quite open about the absence of theory, and also quite open about the arbitrariness of the decision to project current levels of fertility into the future. They emphasise that this kind of forecast does not mean that they have a strong belief in constancy – but rather that in the absence of better alternatives, this simple assumption is best.

Still, we see that agencies have the opportunity to improve their forecasts by considering more carefully how they use the idea of unchanging fertility behaviour.[22] In the past, and to an extent today, the forecasters' implementation of unchanging behaviour is constancy in age-specific fertility rates, or equivalently constant TFR. When current period fertility is lower than cohort fertility because of postponement of births, the assumption of a continuation of current period fertility implicitly assumes either that postponement will continue (indefinitely) or that there will be a drop in the cohort TFR.

We would suggest as an alternative that a reasonable medium assumption would be to assume that cohort fertility is roughly constant in the future and that as postponement comes to an end, period total fertility will rise to converge with cohort fertility levels. With a classical period approach this assumption is hard to

[22] Despite the use of different approaches, the central forecast assumes either a constant level of period TFR or a level very close to it. In the case of Germany this is a result of a detailed analyses of cohort fertility, which is assumed to change (see *Pötzsch* 2010).

implement; with a pure cohort approach it would be possible, but other shortcomings (such as the ones mentioned in the introduction of this paper) have to be considered.[23] What we are suggesting here is a greater use of a formal demographic model to relate periods, cohorts, and timing effects. Use of a tempo-framework such as that developed by Bongaarts and Feeney would make it possible for agencies to produce consistent forecasts, would provide explicit assumptions about the pace and level of fertility, would allow them adequately to incorporate information on the cohorts still bearing children. It would also make it possible to see if changes in both short and long range forecasts are required, or if, in the case where period fertility changes because of tempo effects, only short term forecasts need to be updated. Our three suggestions are: (1) Agencies should continue to make the rationale for their forecasts explicit. This is helpful even if it only means, saying simply that in the absence of theories we have continued the past practice of assuming constant future fertility from the last observed year. (2) Agencies should deal explicitly with the prospects of postponement and their effects on fertility levels. The Bongaarts-Feeney framework or similar ones could be used. The forecasts should be consistent. This may or may not actually change forecasts, but we believe it will give them a firmer rationale. (3) Agencies should be reluctant to change long-term forecasts without seeing changes in cohort fertility.

Another improvement would be the inclusion of parity-specific fertility analyses into the strategies to forecast fertility. This is particularly relevant when fertility changes dramatically such as during a baby boom or baby bust, as such a change usually effects birth parities very differently (see *Sobotka et al.* 2011 in CPoS 36,2-3). It is less relevant when fertility changes incrementally, such as in the low fertility context we experienced in the German-speaking world during the last decades. In addition to that the required data is often difficult to acquire – in our case, only Austria could provide information in a suitable state. Statistical agencies in Germany and Switzerland can provide reliable information on order-specific fertility only recently – thus the time series are not long enough to base reliable projections upon.[24]

Fertility forecasting is remarkably difficult. No country has succeeded in predicting future changes in fertility rates. In Austria, Germany, and Switzerland, great care is taken with fertility forecasts. The statistical agencies update their forecasts frequently and tend to provide clear and sound explanations for their forecast assumptions. Moreover, the constancy of recent fertility makes it appear that agencies have improved their accuracy in recent years. In our view, however, there is still room for improvement. The current level of period fertility has remained constant because the level of cohort fertility has slightly declined and the pace of postponement has remained stable. If in the future, as has happened elsewhere, postponement slows,

[23] The use of both period and cohort approaches by a number of forecasting agencies is reported in the review by *Sorvillo* (1999).

[24] For a more detailed description of the data situation in all three countries see *Kreyenfeld et al.* (2011 in CPoS 36,2-3).

our expectation would be for fertility rates to rise substantially. Current estimates of tempo-adjusted fertility as well as cohort fertility are in the range of 1.5 to 1.7, making it seem to us that long-range level of at least 1.5, and perhaps 1.6 would be reasonable. Introducing the analysis of tempo effects to the rationale for forecasts would provide forecasters with a better basis for deciding on the direction of fertility in the long term as well as giving a rationale for short term changes.

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