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in Denmark and Norway**

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RESEARCH NOTE: COMPARING IDEAL FAMILY SIZE WITH OBSERVED AND FORECASTED COMPLETED COHORT FERTILITY IN DENMARK AND NORWAY*

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Abstract

We examine whether cohort ideals for children exhibit similar trends as those produced by cohort fertility forecasts in Denmark and Norway – two Nordic countries on diverging fertility trajectories. We use recent data from the Generation and Gender Survey to obtain measures of stated ideal family sizes and compare these stated ideals to those suggested by forecasts. In both Denmark and Norway, women express higher ideal family sizes than the number of children they can expect to have. For Denmark, the difference between stated ideal and expected number of children is stable over forecasts for more recent birth cohorts, whereas for Norway there is an increasing gap across recent birth cohorts between women's ideal number of children and their expected cohort fertility driven by forecasted decline in cohort fertility. Norway either must see a fertility schedule for cohorts still in the childbearing age drastically different to any schedule ever recorded previously or should expect an increasing deficit in childbearing quantum relative to ideals.

Keywords: fertility, forecasting, Generation and Gender Survey, ideals, Nordic countries

Introduction

The 2010s saw declining total fertility rates in both Denmark and Norway following two decades of relative stability (Comolli et al. 2021; Hellstrand et al. 2021). Recent research suggests that unlike previous period declines, the ongoing period decline is not only due to a tempo effect but also due to a quantum effect resulting in declining cohort fertility, with some indications of Norway facing a much steeper decline than Denmark (Hellstrand et al. 2021). Historically, the Nordic countries have had similar fertility regimes (Andersson 2004; Andersson et al. 2009; Jalovaara et al. 2019). Yet, whether these recent declines in fertility are driven by changes in preferences or changes in opportunity for having children have only just begun to be addressed (see Hellstrand et al. 2022; Savelieva et al. 2021 for evidence from Finland).

In this research note, we use the recent wave of the Generation and Gender Survey from Denmark (Simonsen et al. 2021) and Norway (Dommermuth and Lappegård 2021) to compare women's stated ideal number of children with observed and forecasted completed fertility across cohorts. We update findings on fertility forecasts from Hellstrand et al. (2021) with three more years, and find even stronger support for that the Norwegian cohort fertility declines can expect to continue, whereas the Danish decline appears to stabilize well above the threshold between low and very low cohort fertility (Zeman et al. 2018). In both Denmark and Norway, women on average express higher ideal family sizes than the number of children they on average can expect to have. For Denmark, the difference between stated ideal and expected number of children is stable over birth cohorts at around 0.50 child. In Norway, there is an increasing gap across birth cohorts between women's ideals and their expected cohort fertility from around 0.37 to 0.64. The research note contributes new, important information on the relationship between ideals and expected cohort fertility that plays out during the ongoing fracturing of the common Nordic fertility regime. Further, we demonstrate that Norway must either see a drastically different fertility schedule for cohorts in

the childbearing age than ever recorded previously or should expect an increasing deficit in childbearing relative to women's ideals.

Background

The common Nordic fertility regime, which combines relatively high fertility rates with high female labor force participation, has in the literature been explained by the high levels of gender equality and family friendly policies that are part of the foundation of the Nordic Social Democratic style welfare regime (e.g., Duvander et al. 2019; Esping-Andersen and Billari 2015). Yet, recent fertility declines (Comolli et al. 2021) and diverging cohort fertility trends (Hellstrand et al. 2021) point to a fragmentation of the common Nordic regime, with Denmark and Sweden moving along one path and Iceland, Norway and Finland moving along another, lower-fertility path. Thus, Denmark and Norway represent, respectively, the weaker and the stronger fertility decline case in the Nordics. Recent studies from Finland point to a co-occurrence of decline in actual fertility and fertility ideals, but so far this phenomenon has not been examined using comparative data sources across multiple countries. Studying Denmark and Norway allows for such a comparison.

Figure 1 compares the total fertility rate (TFR) between Denmark and Norway from 1970-2021. Only from 2016 onwards does Norway have a lower TFR than Denmark, and it represents the first clear divergence in trends between the two countries in this period. Insofar that the divergence represents a quantum and not solely a tempo gap between the two countries (as argued in Hellstrand et al. 2021; see also top panel of Figure 2 below), it raises the question of what drives the emerging gap between Denmark and Norway—differences in family size ideals or difference in opportunities (in the broadest understanding of the word) for obtaining ideal family size?

[Figure 1 about here.]

Method and data

Data

To disentangle to what extent the growing gap in (expected) cohort fertility emerging between Denmark and Norway reflects growing differences in family size ideals between the two countries we compare two distinct sources of data. First, to obtain measures of ideals for completed cohort fertility, we use the Danish and Norwegian samples of round 2 of the Generation and Gender Survey. The samples were collected November-December 2020 in Norway (Dommermuth and Lappegård 2021) and March-June 2021 in Denmark (Simonsen et al. 2021), and included questions concerning ideal family size. To capture fertility ideals, we rely on two questions: 1) “For you personally, what would be the ideal number of children you would like to have or would have liked to have had?”; and 2) “Generally speaking, what do you think is the ideal number of children for a family?” Together, we take this to capture, respectively, respondents’ personal fertility ideals (or preferences absent any barriers) and view on general fertility ideals. We use responses from 2869 women in Norway and 4055 women in Denmark, limit the analytical sample to cohorts born 1971-2002, and apply age-specific weights. To obtain information on realized and expected completed cohort fertility, we combine updated fertility data from the national statistical agencies in Denmark and Norway with data from the Human Fertility Database (Human Fertility Database 2022). We obtain age-specific incidence rates that relate births of women at specific cohorts to all other women in that cohort. For full details on data, we refer to Hellstrand et al. (2021).

Method

To model personal and perceived general ideals for completed cohort fertility across cohorts, we use locally estimated scatterplot smoothing (LOESS), a semiparametric technique for carrying out locally weighted regression (Cleveland 1979). LOESS allows a more flexible modelling of the association between cohort and fertility ideals because it relies on fitting weighted least square

regressions to localized subsets of the data. We estimate LOESS curves with a bandwidth of 1 and a second-degree polynomial, and report 95 % confidence intervals. Results are robust to changes in bandwidth of 50 % increase (decrease). To examine differences between ideals and realized/expected cohort fertility, we obtain point estimates for each cohort.

To estimate the ultimate number of children born to women in cohorts still within reproductive age, we rely on forecasting. We only forecast for cohorts we already observe up to at least age 30 in order to observe as least as many periods that we aim to forecast. We report results from four forecasting techniques: 5-year extrapolation, freeze rate, Bayesian, and non-parametric forecasts. The five-year extrapolation method of Myrskylä et al. (2013) extrapolate recent age-specific trends in fertility five years into the future, and then freezes the rate there. The technique performs well when higher age fertility evolves in a continuous manner without interruptions. The freeze rate method of Ryder (1986) assumes that each subsequent cohort will experience the same age specific fertility rates as those observed for the last period in the data (which in our case is 2021). Bayesian forecasting of fertility (Schmertmann et al. 2014) draws on a priori patterns over age and time informed by historical data in the Human Fertility Database and weighted based on historical plausibility (i.e., how common that scenario has been) under model-based assumptions for trends and age schedules. The Bayesian approach allows for probabilistic forecasts informed by history but does so under strong modelling assumptions. Last, the nonparametric approach by Hellstrand et al. (2020) relaxes parametric assumptions by applying past recuperation paths observed from historical data to women with incomplete age schedules, allowing older age fertility in this group to increase following the main patterns in historical data.

Results

We first present results on the development in (expected) completed cohort fertility together with personal and general fertility ideals. For forecasts, we assume that women's reproductive age end at 44 and only forecast expected cohort fertility rates (CFR) for women who were at least 30 in 2021. The results represent a three-year update of results for Denmark and Norway from Hellstrand et al. (2021). The completed fertility forecasts are presented in the first panel of Figure 2. For Norway, all methods predict a continuous decrease in completed fertility quantum to an extent where even the upper limit of the 95% confidence interval of the least drastic decrease (the nonparametric method) still predicts a continuous decrease. Further, all forecasts except the nonparametric have their median predictions at or below the threshold for very low cohort fertility at 1.75 for the latest born cohort, which would represent an approximately 12-15% decrease in CFR within a 15-year period. For Denmark, forecasts also predict a decrease followed by a stabilization at a new lower level, with some possibility for recuperation. Median of all forecasts have the latest born cohort's CFR sitting above the lowest-low rate, although the 95% confidence interval of the nonparametric method does include 1.75. For Denmark, the nonparametric and five-year extrapolation methods predict the smallest decline, whereas the freeze-rate and Bayesian forecasts predict the largest decline.

[Figure 2 about here.]

The bottom panel reports stated personal and perceived general family size ideals from the Danish and Norwegian GGS samples as fitted LOESS curves. In both Denmark and Norway, we see a divergence between personal and general ideals occurring for younger but not for older cohorts. In general, younger cohorts report lower personal ideal family sizes relative to perceived general ideals for number of children. For both Denmark and Norway, there are some indications of a slight decline in personal ideal number of children occurring from cohorts born in the early 1970s to cohorts born in the 1980s (Norway) and 1990s (Denmark). Personal ideals are at roughly

identical levels across the two countries. Unlike personal ideals, perceived general ideal family sizes are not declining. For Denmark, we observe a shallow U-shape, whereas the general ideal number of children is increasing across cohorts in Norway.

Figure 3 reports the differences between observed/forecasted cohort fertility and the two measures of family size ideals. We treat the forecasted parameter estimates as true values, and thus only use standard errors obtained from the LOESS curves. Whereas both the nonparametric and the Bayesian forecasts has their own error-interval, their median prediction tracks so closely to the freeze rate and 5-year extrapolation that we disregard the forecast error interval. Instead, we reproduce the figure at upper and lower bound of predictions in Figure A1 in Supplementary Materials. For Denmark, women express on average a personal ideal family size that is 0.5 children higher than they had/can expect to have across cohorts, with little indications of change. We find similar results when considering perceived general ideal family size. For Norway, we see an increasing gap between personal ideal family size and realized/expected number of children ever had. Where those born in 1971 have 0.45 fewer children than ideally preferred, that difference decreases to 0.37 for the 1977 cohort and then continuously increases to between 0.58 to 0.64 for the youngest (1991) cohort. When considering the difference between perceived general ideal family size and realized/expected completed cohort fertility the increasing gap becomes even stronger. For the 1971 cohort the gap was 0.41, whereas for the 1991 cohort the gap grows to between 0.77 and 0.83. Thus, whereas the gap between ideal family sizes and realized/expected cohort fertility remains constant in Denmark, the gap appears to be growing in Norway so women increasingly are having fewer children that they ideally would prefer.

[Figure 3 about here.]

Table 1 reports the share of women aged 45-49, who for predominant part has finished their fertility schedule, who report having had fewer, the correct amount, or more children than their personal ideal. We include both adopted and biological children, but not stepchildren. For Denmark, 48% of women had less children than their ideal, but only 3% had more than their ideal. For Norway, 39% had less than their ideal, and 3 had more. This tracks well with the differences between personal ideals and CFR reported in Figure 3 and thus speaks to the surveys' suitability for the above analysis.

[Table 1 about here.]

Discussion and Conclusion

In this research note we compared completed and forecasted completed cohort fertility for Danish and Norwegian women born 1971-1991 with personal and perceived societal ideals for number of children. Our updated cohort fertility forecasts predicted that cohort fertility decline will continue in Norway to a level of very low cohort fertility, whereas Danish cohort fertility will stabilize at a level below previous cohort fertility but above very low cohort fertility. For both countries, we found that fertility ideals were higher than realized/expected cohort fertility. The Danish gap was stable across cohorts, whereas it was increasing in Norway, indicating that Norwegian women's completed cohort fertility was on route to fall increasingly short of their intended number of children.

The present study is not without limitations. First, fertility preferences expressed as personal or general ideal family sizes generally decline with age (Savelieva et al. 2021), but we use cross-sectional data to obtain measures of such ideals or preferences. Thus, younger cohorts may overstate ultimate ideals. With increasing age, especially the personal ideal family sizes may be aligned and downsized towards achieved parity. However, using questions on ideals instead of

plans or preferences may encourage respondents to provide an ideal family size less knotted to age. Further, when comparing to forecasts, we only include women 30+ years of age, which likely will have more stable ideals than younger women. Second, although the surveys used appear well-balanced regarding number of children compared to the background population, it does contain an overrepresentation of women with longer educations (Dommermuth and Lappegård 2021; Simonsen et al. 2021). If ideal preferences for children differ across education, this may affect the level of the ideals. Yet, since cohort fertility is not vastly different across educational groups for Nordic cohorts who recently finished the childbearing career (Jalovaara et al. 2019), this should not call our main conclusion into question.

This study set out to investigate whether recent divergence in expected cohort fertility across the Nordic countries may be due to diverging ideal family sizes. We found instead that ideals appear similar across Norway and Denmark with only small declines in personal fertility ideals. This means, insofar that present forecasts are correct, that the divergence between Denmark and Norway are driven by differences in opportunity. Such differences may result from differences in the possibility of finding a partner, differences in access to medically assisted reproduction technologies, or postponing for so long that tempo effects turn into quantum effects. Whatever the drivers, Norwegian women are on track to miss ideal fertility goals to a larger and larger extent across cohorts, whereas for Danish women we do not see a similar development. Thus, Norway might be facing an increasing unmet demand for children.

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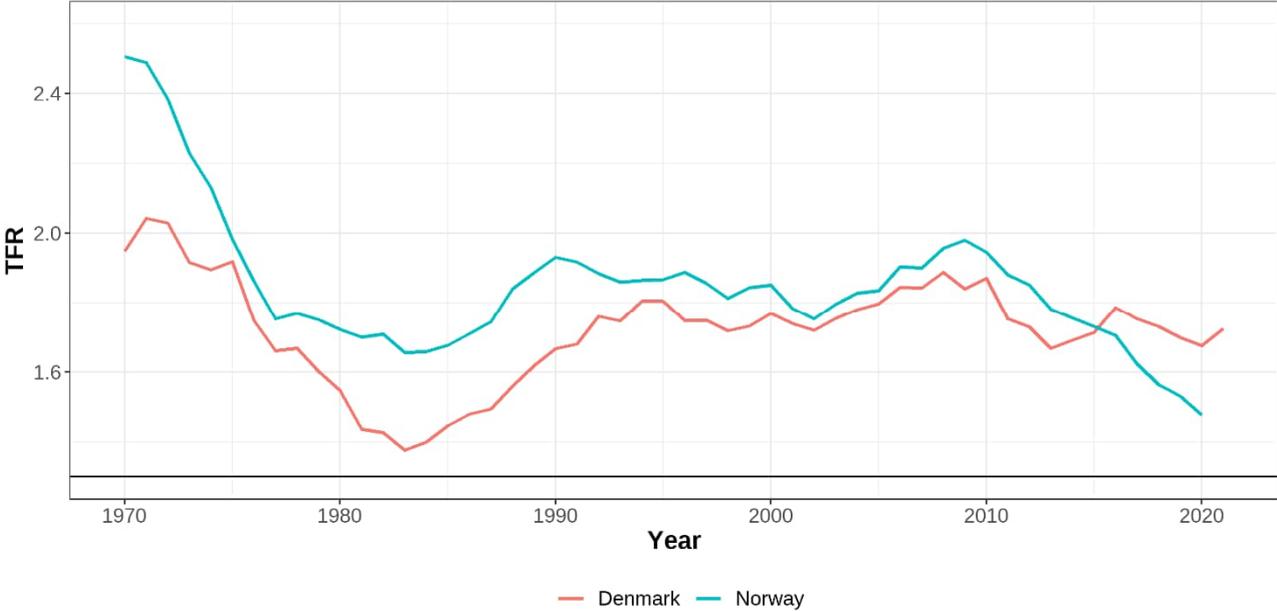
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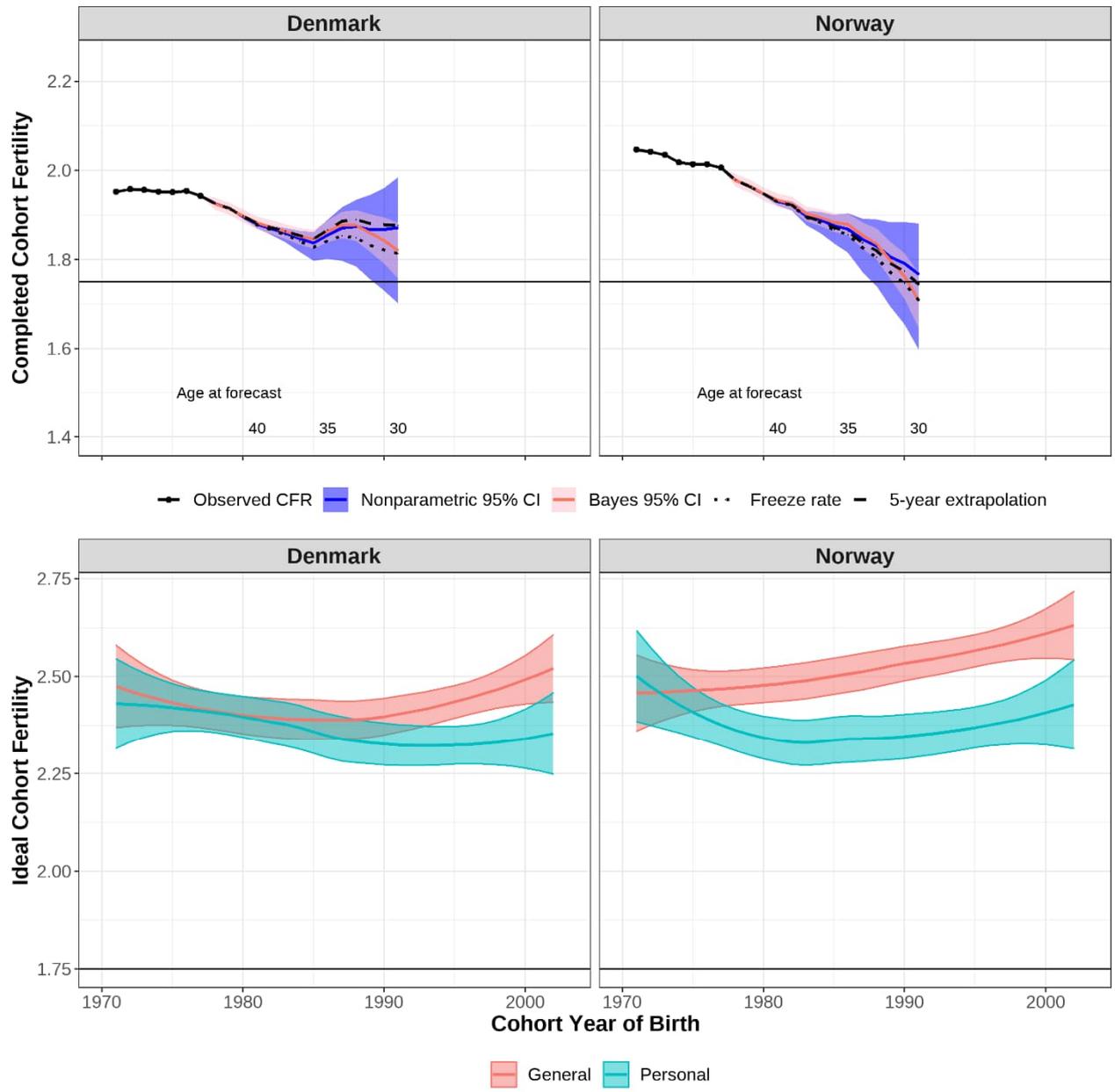
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Figure 1: TFR for Norway and Denmark, 1970-2021



Notes: Line indicates lowest-low fertility at 1.3 (Kohler et al. 2002).
Source: Human Fertility Database.

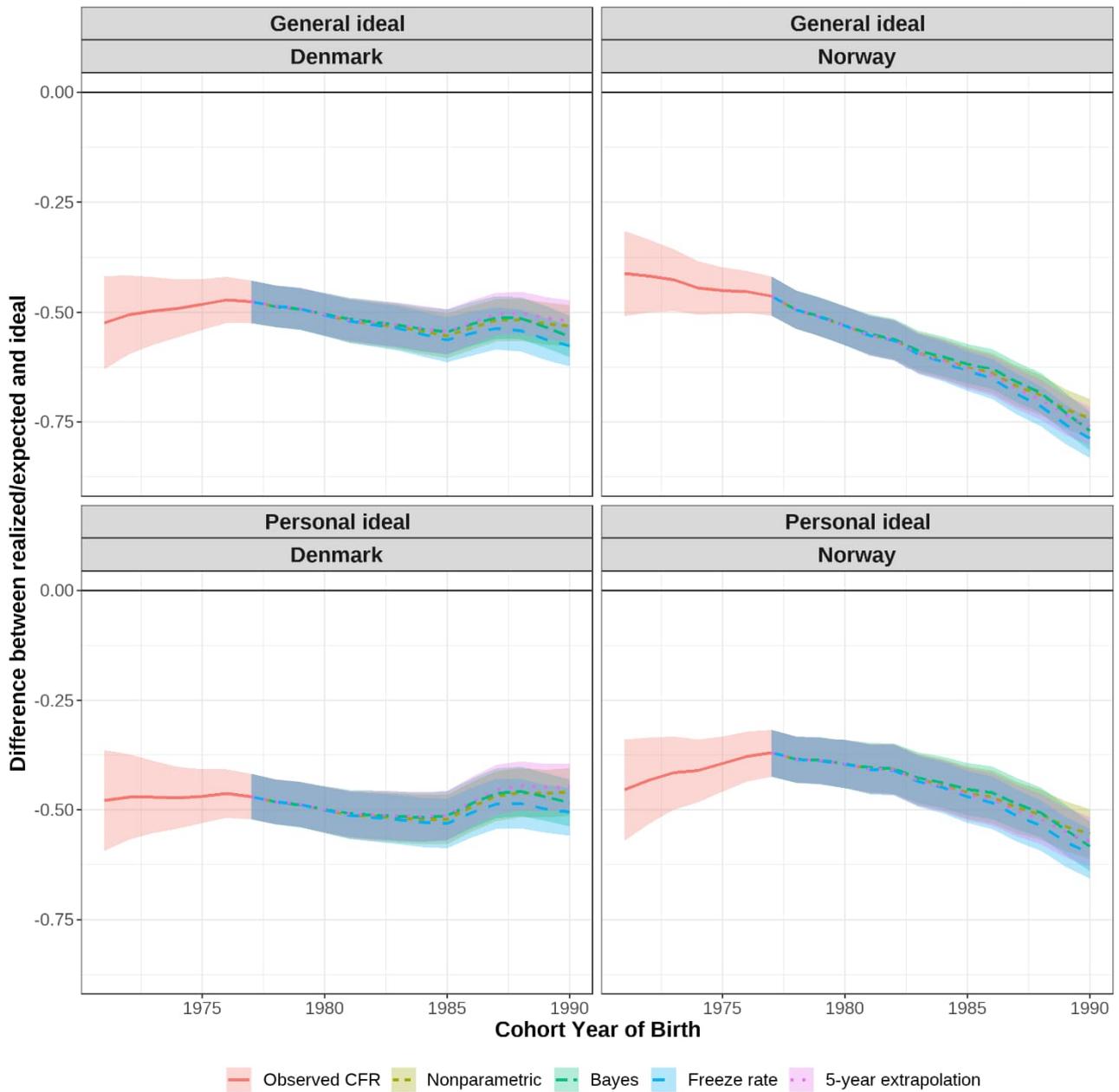
Figure 2: Realized/forecasted cohort fertility and ideal personal and general cohort fertility (LOESS estimates) in Denmark and Norway



Notes: Ideal trends estimated using LOESS with 1-year bandwidth span and second order polynomial in bottom panel. Trends remains stable when span is increased (decreased) with 50%. Full line indicates the threshold between low and very low cohort fertility at 1.75 (Zeman et al. 2018).

Source: Generation and Gender Survey 2020 for Denmark and Norway, Statistics Denmark, Statistics Norway, Human Fertility Database.

Figure 3: Difference between ideal and realized/forecasted fertility in Denmark and Norway



Notes: Standard errors obtained only from LOESS curves. 95% confidence intervals.
 Source: Generation and Gender Survey 2020 for Denmark and Norway, Statistics Denmark, Statistics Norway, Human Fertility Database.

Table 1: Comparing ideal number of children with realized number for women aged 45-49

	Denmark	Norway
Had less than ideal	51%	39%
Had same as ideal	46%	58%
Had more than ideal	3%	3%
N	761	328

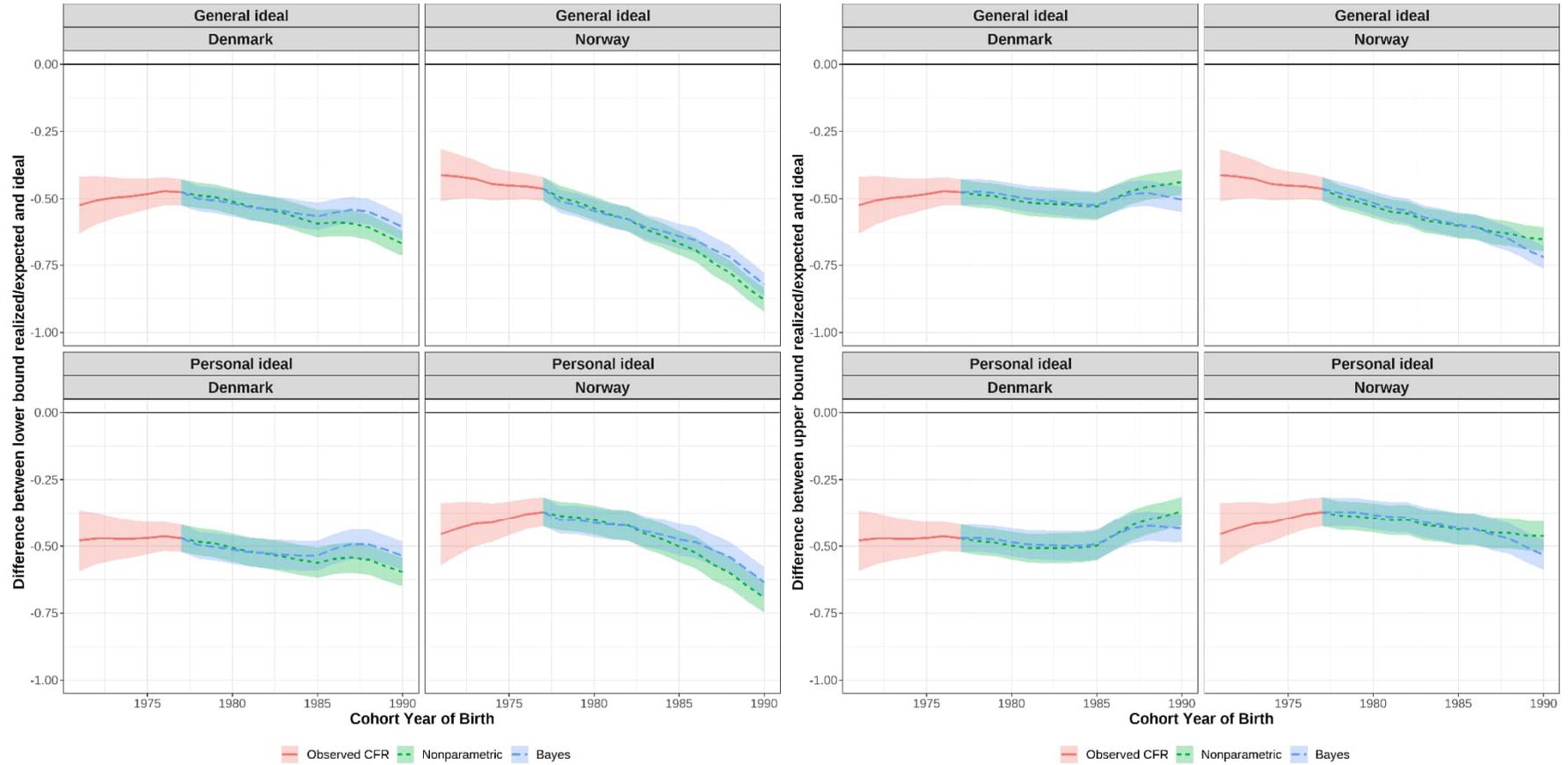
Note: Percentages calculated using weights. Number of children include biological and adopted children.

Source: Generation and Gender Survey.

Figure A1: Difference between ideal and realized/forecasted fertility in Denmark and Norway at lower and upper bound of 95% confidence intervals for nonparametric and Bayesian forecasts

(a) At lower bound

(b) At upper bound



Notes: Standard errors obtained only from LOESS curves. 95% confidence intervals.

Source: Generation and Gender Survey 2020 for Denmark and Norway, Statistics Denmark, Statistics Norway, Human Fertility Database.

