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STUDY PAPER 153
JULY 2020

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Study Paper No. 153

Published by:

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July 2020

Not just later, but fewer: Novel trends in cohort fertility in the Nordic countries

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Acknowledgements

The authors would like to acknowledge Guðjón Hauksson for providing data from Iceland. The contribution of Lars Dommermuth was funded by the Norwegian Research Council (project no. 287634). The contribution of Peter Fallesen was funded by FORTE – Swedish Research Council for Health, Working Life, and Welfare (grant no. 2016-07099) and the ROCKWOOL Foundation (grant no. 1190). The views and opinions expressed in the text belong solely to the authors, and do not necessarily reflect the positions of their employers or of any other agency or organization.

Abstract

With their historically similar patterns of high and stable cohort fertility and high levels of gender equality, the Nordic countries of Sweden, Finland, Norway, Denmark, and Iceland are seen as forerunners in demographic behavior. Furthermore, Nordic fertility trends have strongly influenced fertility theories. However, the period fertility decline that started around 2010 in many countries with relatively high fertility is particularly pronounced in the Nordic countries. This raises the question of whether Nordic cohort fertility will also decline and deviate from its historically stable pattern. Using harmonized data across the Nordic countries, we comprehensively describe this period decline, and analyse to what extent it is attributable to tempo or to quantum effects. Two key results stand out. First, the decline is mostly attributable to first births, but can be observed across all ages from 15 to the mid-thirties. Large-scale fertility declines at ages above 30 have not been previously documented in these countries. Second, tempo explains only part of the decline. Forecasts indicate that the average Nordic cohort fertility will decline from two children for the 1970 cohort to around 1.8 children for the late 1980s cohorts. Finland diverges from the other countries in terms of its lower expected cohort fertility, below 1.6, and Denmark and Sweden diverge from Finland, Iceland, and Norway in terms of their slower cohort fertility decline. These findings suggest that the Nordic model of high and stable fertility may need to be updated, and call into question the broader theories linking fertility and gender equality.

Keywords**:** Nordic fertility regime, period fertility, cohort fertility, fertility timing, forecasting

Introduction

Compared to other high-income countries, the Nordic countries of Iceland, Norway, Sweden, Denmark, and Finland have relatively high fertility levels, high female labor market participation rates, and generous and family-friendly social policies. The Nordic high fertility regime is often attributed to the long tradition of public policies that promote work-family reconciliation and gender equality in these countries (Andersson 2004; Neyer et al. 2006; Andersson et al. 2009). Understanding fertility in the Nordic countries can contribute to our understanding of fertility trends in countries beyond the region, as the Nordic countries are often seen as forerunners in fertility behavior, and a number of recent fertility theories are based on the empirical associations between gender equality and fertility observed in the Nordic countries (Duvander et al. 2019). It has, for example, been argued that at later phases in the demographic transition, improvements in gender equity may prevent fertility from falling to very low levels (Esping-Andersen 2009; McDonald 2000, 2013). Furthermore, some theories have stated specifically that increases in fertility are conditional on men becoming more involved in family life in order to ease the double burden of balancing work and family that women tend to carry (Esping-Andersen and Billari 2015; Goldscheider, Bernhardt, and Lappegård 2015; Anderson and Kohler 2015).

However, the Nordic countries have experienced a sustained decline in their period fertility rates since 2010 (Hellstrand, Nisén, and Myrskylä 2019; Comolli et al. 2019). While the decrease in period fertility that started in the Nordic region in 2010 was also observed in other countries that tend to have relatively high fertility, such as France, Ireland, the United Kingdom, and the U.S., the trends in the Nordics stand out (Human Fertility Database 2019). In 2018, the TFR reached 1.41 in Finland and 1.56 in Norway, which were the lowest levels across the Nordic countries, and were lower than the 2017 European average TFR of 1.58 (Figure 1). Additionally, there are no signs that in Finland, the decreasing trend is coming to an end (Official Statistics of Finland (OSF) 2019). These declines in period fertility call into question the claim that the Nordic countries have a common high fertility regime; and, more broadly, these trends seem to challenge the idea that gender equality is positively associated with fertility.

However, whether the strong decline in period fertility in the Nordic countries will affect the total number of children women who are currently of childbearing age will ultimately have is not yet known. Period-based measures are sensitive to the timing of childbearing (Bongaarts and Feeney 1998), and tend to underestimate the completed fertility of cohorts when women are postponing childbearing (Myrskylä, Goldstein, and Cheng 2013). Most of the previously observed variation in period fertility in the Nordic countries has been attributed to tempo effects, as the completed cohort fertility level has been nearly constant and close to replacement level for the cohorts born since the 1940s (Andersson et al. 2009; Jalovaara et al. 2019). A key example of a tempo effect is the "roller-coaster fertility" that Sweden experienced in the 1990s (Hoem 2005), when the TFR fell from its peak level of 2.14 in 1990 to an all-time low of 1.51 in 1999. However, this short-term trend had no implications for cohort fertility. Existing cohort fertility forecasts for the Nordic and other high-income countries are becoming outdated, as they do not cover the most recent fertility decline (Myrskylä, Goldstein, and Cheng 2013; Schmertmann et al. 2014). For Finland, the findings of Hellstrand, Nisén, and Myrskylä (2019) suggest that the decline in period fertility will also be reflected in cohort fertility, as the cohorts born in the late 1980s are projected to have completed fertility that could fall below the 1.7 level. A comparable analysis – or an analysis that attempts to distinguish the tempo from the quantum contributions to the recent decline in fertility – has not yet been conducted for the other Nordic countries. Therefore, the question of whether the recent decline in period fertility in the Nordic countries merely reflects fertility postponement, or whether the cohort fertility levels in these countries are undergoing long-term changes, has yet to be answered.

A cohort fertility decline in the Nordic countries would indicate that the concept of a common Nordic regime characterized by high and stable cohort fertility, which is based on current fertility levels, needs to be revisited. Furthermore, while the Nordic countries are often considered prime examples of countries with macro-level associations between high gender equality levels and fertility increases (Myrskylä, Billari, and Kohler 2011; Myrskylä, Goldstein, and Cheng 2012), the finding that cohort fertility is decreasing in the Nordic countries would call this assumption into question as well. Micro-level findings within the Nordic countries have already pointed out that the relationship between gender equality and fertility is often ambiguous. These results have, for example, suggested that the greater involvement of fathers in family life increases the risk of having a second birth, but not necessarily of having a third birth (Brodmann, Esping-Andersen, and Güell 2007; Duvander, Lappegård, and Andersson 2010; Miettinen, Lainiala, and Rotkirch 2015; Duvander et al. 2019).

In this study, we analyze recent fertility changes in the five Nordic countries with the latest available data. Using demographic decompositions, tempo adjustments, and innovative cohort forecasting methods, we document the contributions of age and parity to the decline in the TFR in 2010-2018, estimate the magnitude of the decrease in period fertility without tempo distortions, and forecast completed fertility for women aged 30 and older in the five countries. Our main objective is to investigate whether the period fertility decline that started in 2010 in the Nordic countries reflects a decline in fertility quantum, and, if so, how the magnitude of this decline differs across these countries. Among the key strengths of our study are that we compare five countries that are simultaneously undergoing a fertility transition; that we use harmonized, high-quality, up-to-date data for each of the countries in our sample; and that we apply several different methods that independently examine the recent period fertility decline from different angles, and under different assumptions.

[FIGURE 1 ABOUT HERE]

The common Nordic fertility regime

The childbearing trends and family policies in the Nordic countries have many shared characteristics, and have historically conformed to the established idea of a common Nordic fertility regime (Andersson et al. 2009). This term refers to the idea that the Nordic region has relatively high and stable fertility, which is underpinned by high levels of support for working mothers. It is generally agreed that the Nordic countries provide a favorable setting for combining work and family life, which has resulted in high labor force participation rates for women and high rates of enrollment in child care. Thus, these countries are often considered vanguards of family demographic developments in the Western world.

While most developed countries have experienced a decline in cohort fertility starting with the 1940s birth cohorts, in the Nordic countries, cohort fertility has stabilized around the replacement level among the cohorts born in the 1940s or later (Frejka 2017; Zeman et al. 2018). Consequently, the long-term implications of very low fertility that many European countries have been facing (Morgan 2003) have not previously been pressing policy concerns in the Nordic region. In the Nordic countries, cohort fertility fell to some extent for the 1940s cohorts, then recovered somewhat for the 1950s cohorts, and then underwent a weak downward trend in most countries, except in Denmark, where the trend was positive (Zeman et al. 2018; Jalovaara et al. 2019). The main driver of the weak downward trend starting with the 1960s cohorts has been the decreasing progression to third and higher order births, rather than increasing childlessness (Zeman et al. 2018). Cohort fertility for women born in the early 1970s is 1.9 in Finland, 2.0 in Denmark and Sweden, 2.1 in Norway, and 2.3 in Iceland (Human Fertility Database 2019). When we compare all high-income countries, we see that countries characterized by strong religious and traditional values, like the U.S. and Northern Ireland, also have cohort fertility above the replacement level; which implies that fertility tends to be higher in both more traditional and more egalitarian countries. In contrast, cohort fertility has dropped below the 1.5 level in some Southern European and East Asian countries for the cohorts born in the 1970s (Frejka 2017). These two groups of countries also represent two distinct fertility regimes as measured by their period fertility trends (Rindfuss, Choe, and Brauner-Otto 2016). The first group have had fairly stable period fertility close to the replacement level in recent decades (Anderson and Kohler 2015), while the second group have seen their TFRs fall to lowest-low levels of below 1.3 (Kohler, Billari, and Ortega 2002; Goldstein, Sobotka, and Jasilioniene 2009).

When we look at parity distributions in the Nordic countries, we see that childlessness levels are around the European average (Sobotka 2017a), and that the two-child norm is strong (Frejka 2008; Duvander et al. 2019). In all of the Nordic countries, ultimate childlessness rose slightly starting with the 1950s cohorts, but plateaued for the 1960-1970s cohorts at a level ranging from 12% in Norway to 15% in Sweden (Andersson 2009; Jalovaara et al. 2019). Childbearing behavior is somewhat more polarized in Finland than it is in other Nordic countries. In Finland, ultimate childlessness is above 20% for the most recent cohorts born in the early 1970s, which is among the highest rates globally (Kreyenfeld and Konietzka 2017). However, Finland makes up for its high childlessness rate through the large proportion of its population with multiple children. For example, about 10% of all recent births in Finland were of the fourth or a higher birth order, which is the highest share of parity four or higher births across all EU member states, and is twice as high as the share of such births in the rest of the Nordic countries (Eurostat 2019a). Iceland also stands out as having a high proportion of third births. In that country, the share of recent births of the third birth order is close to 20%, compared to around 15% in the rest of the Nordic countries (Eurostat 2019a). However, the rate of progression to higher-order births is slightly lower in the Nordic countries than it is in the top-ranking Western European and English-speaking non-European countries (Zeman et al. 2018).

In developed countries, fertility postponement has been one of the main demographic trends in recent decades (Mills et al. 2011; Sobotka 2017b; Nathan and Pardo 2019). One of the most striking demographic developments in the Nordic countries has been the strong fertility recuperation at older ages, which has counterbalanced postponement (Andersson et al. 2009; Lesthaeghe 2010). While the widespread postponement of fertility observed in most developed countries has been linked to rising educational enrolment and career-building (Ní Bhrolcháin and Beaujouan 2012), fertility recuperation has been characterized as a consequence of welfare provisions that support dual-earner families with young children (Kravdal and Rindfuss 2008; Lesthaeghe 2010). Indeed, the Nordic countries are known to have the highest levels of gender equality in the world, and to promote work-family reconciliation among couples by offering some of the world’s most generous family-friendly policies (Neyer et al. 2006; Rindfuss, Choe, and Brauner-Otto 2016). Building on the findings of McDonald (2000, 2013), recent theories predict a return to higher fertility once gender equity in the family catches up with gender equity in other aspects of society, like in the educational system and in the labor market (Esping-Andersen and Billari 2015; Goldscheider, Bernhardt, and Lappegård 2015; Anderson and Kohler 2015). Macro-level findings imply that up to now, the gender revolution has hindered strong declines in cohort fertility, but has not increased it (Frejka, Goldscheider, and Lappegård 2018).

Policy goals and fertility in the Nordic countries

As it is generally assumed that the family policies of the Nordic countries have helped to create a favorable setting for relatively high fertility (Brewster and Rindfuss 2000; Adserà 2004), we provide a brief overview of the Nordic policy goals and their implementation. The Nordic countries are known for their comprehensive and universal welfare state model, including their comparatively generous family policies. High labor market participation among both men and women is an underlying precondition for maintaining this model. Moreover, social and gender equality is an explicit policy goal of the social democratic Nordic welfare states (Esping-Andersen 1990). These countries promote a dual earner-dual caregiver model in which men and women are expected to participate equally in both paid work and childrearing (Ellingsæter and Leira 2006; Gornick and Meyers 2009). However, while the Nordic countries are the most gender-equal countries globally (World Bank 2012), their policy goals of promoting gender equality are not fully achieved in practice. High overall female employment rates in the Nordic countries are accompanied by occupational segregation and high rates of part-time work among women. Compared to their male counterparts, Nordic women are more likely to work in the public sector, and are less likely to hold high positions (Mandel and Semyonov 2006). It is also relatively common for Nordic women to work part-time in order to accommodate their caregiving responsibilities (Wennemo Lanninger and Sundström 2014). The percentage of total employment that is part-time work is slightly above the 2018 EU average of 31% in Norway, Denmark, Iceland, and Sweden; although this share is much lower in Finland (Eurostat 2019b). Additionally, Nordic men perform less unpaid work than their female counterparts, even though they share domestic responsibilities more equally than men in most other countries (Hook 2006; Prince Cooke and Baxter 2010).

The Nordic countries' family policies are in line with general policy goals designed to promote gender equality, rather than to promote childbearing per se (Rønsen 2004). The family policies in these countries include both child-related cash transfers (cash benefits) and public support for services for families (benefits in kind), such as child care and early education. Among all OECD countries, the Nordic countries devote the largest share of their total social expenditure as a percentage of GDP to benefits in kind (OECD 2019). The aim of the family policies in the Nordic countries is to (a) support parents in combining work and family life, (b) ensure that men and women share paid and unpaid work more equally, and (c) provide care solutions that reflect the best interests of the child (Rostgaard 2014). Thus, family policies in the Nordic countries are not directed explicitly at families, but rather at each parent individually. For instance, a non-transferable, earmarked part of paid parental leave that compensates for loss of income after having a child is reserved for each parent; and access to affordable day care for young children is guaranteed, regardless of the parents' labor market status. When a large part of the non-transferable, earmarked paid parental leave is reserved for the father, the actual uptake of paid leave by fathers tends to be higher as well. The only exception to this pattern has been observed in Finland, where the uptake of parental leave by fathers is as low as it is in Denmark, even though Denmark has a smaller quota for fathers.

To sum up, the Nordic countries have been leading internationally in implementing policies that aim to support work-family balance among parents (Thevenon 2011), including policies that provide extensive paid parental leave schemes after the birth of a child, and broad access to child care services for young children. Furthermore, studies have consistently highlighted the positive impact of policies supporting work-family reconciliation and fathers' participation in domestic work on fertility in developed countries (Thévenon and Gauthier 2011; Luci-Greulich and Thevenon 2013). However, the substantial decline in period fertility that has recently been observed in the Nordic countries despite their exemplary family and social policies calls into question whether these countries can still be seen as role models. Thus, more insight into the consequences of this fertility decline is needed.

Data and methods

Data

We base our analyses on a combination of aggregated data obtained directly from national statistical agencies, and data from the Human Fertility Database (HFD), a source of high-quality fertility data that is based on a collaboration between the Max Planck Institute for Demographic Research and the Vienna Institute of Demography (Human Fertility Database 2019). From the HFD, we use several types of age- and birth order-specific fertility rates. First, we use incidence rates that relate births of women in a certain age group/cohort to all women in that age group/cohort, regardless of parity. Second, we use two types of conditional rates: births of order i related to women of parity i-1, and births of order i related to all women who have not yet reached parity i. The age of the mother was recorded as the age at the time of the birth for the period-based rates, and as the age at the end of the year for the cohort-based rates. Data for the Nordic countries from the most recent years[1] are not yet available in the HFD, but were supplied to the authors by the respective national statistical agencies. Based on these data, fertility rates were calculated to match the format in the HFD[2]. Thus, we have complete time-series of rates from 1970[3] to 2018 for Finland, Iceland, Norway, and Sweden; and up to 2017 for Denmark. The 2018 incidence rates by the age (but not by the birth year) of the mother were also obtained for Denmark using Statistics Denmark's database.

Methods

We describe trends in fertility rates by five-year age groups in all Nordic countries using incidence rates. We use the stepwise replacement method (Andreev, Shkolnikov, and Begun 2002; Andreev and Shkolnikov 2012) and conditional fertility rates (births of order i related to women of parity i-1) to decompose the difference in the TFR computed from conditional age- and parity-specific fertility rates ($TFRp$) in 2010 and 2018. As the $TFRp$ adjusts for both the age and the parity composition of the female population, it might differ slightly from the conventional TFR. However, the $TFRp$ allows us to decompose the recent period fertility development into additive age and parity contributions.

Changes in the timing of childbearing are known to have an impact on TFR. We apply the tempo- and parity-adjusted TFR (Bongaarts and Sobotka 2012), denoted as BS, to measure the distorting impact of changes in fertility timing on the TFR. The BS is an improvement over the simple tempo-adjusted TFR (Bongaarts and Feeney 1998), denoted as BF, because the BS controls for the female parity distribution, and removes the additional distorting parity composition effect that influences the conventional TFR (Bongaarts and Sobotka 2012). Furthermore, the BS exhibits smaller year-to-year fluctuations, and is a closer approximation of completed cohort fertility (Bongaarts and Sobotka 2012). However, estimating the BS requires more data. While the BF can be calculated using incidence rates only, the BS needs information on the female population by parity, and is calculated using conditional rates on births of order i related to all women who have not yet reached

[1] Data from 2015-2018 for Norway, from 2016-2018 for Finland and Iceland, from 2017 for Denmark, and from 2018 for Sweden.

[2] Due to rules about identifiable data for Denmark and Norway, cells with less than three observations were set to zero, and cells with between three and four observations were set to five in the tables that were used to calculate the fertility rates. Only live births to individuals registered as living in Denmark when giving birth were included. Parities include previous out-of-country births for both expats and migrants, provided that these children were residing in Denmark on December 31 of any year from 1985 onward.

[3] For Iceland, we have rates that relate births of order i to women of parity i-1 since 2009.

parity. We therefore apply the BF when we lack data on the female parity distribution, as we do for Iceland before 2009.

In addition, we apply existing parametric and model-based approaches (Myrskylä, Goldstein, and Cheng 2013; Schmertmann et al. 2014) and a new nonparametric approach (Hellstrand, Nisén, and Myrskylä 2019) to estimate the cohort fertility rates (CFR) for women currently aged 30 and older. For cohort fertility estimation, we use the age-specific incidence rates that relate births to women in a certain cohort to all women in that cohort. The forecasts estimate the total number of children women will ultimately have, even though they are still of reproductive age. Using the simple freeze rate method, which freezes the latest observed age-specific fertility rates into the future, we estimate what the cohort fertility would be if the age-specific rates would not change over the coming years. The five-year extrapolation method (Myrskylä, Goldstein, and Cheng 2013) extrapolates the trend from the past five years into the future, and then freezes the rates. The extrapolation of trends performs well when older age fertility is developing continuously without interruption during a period of time. If the trends are changing, the freeze rate method may be preferable. Using age-specific fertility rates from the HFD countries before 1960 as prior data, the Bayesian forecasting method (Schmertmann et al. 2014) produces a probabilistic forecast that includes estimates of uncertainty, and extrapolates trends in fertility rates over both time and age. The five-year extrapolation method, the Bayesian method, and the freeze rate method are among the best-performing cohort fertility forecasting methods that exist (Bohk-Ewald, Li, and Myrskylä 2018); and all are applied in this study.

The Bayesian forecasting method has strong model-based assumptions regarding trends and age schedules. Thus, developments in age-specific fertility rates that would lead to cohort schedules with shapes not seen in historical data are considered unlikely, and are therefore rated as having a low probability within this method. To address this problem, a nonparametric method that lacks such conservative assumptions was developed (Hellstrand, Nisén, and Myrskylä 2019). This nonparametric approach overcomes the shortage of strict modeling assumptions, and the resulting narrow confidence intervals among existing parametric methods. The nonparametric method estimates how cohort fertility will develop if the past recuperation paths observed in fertility histories are applied to women with uncompleted age schedules, regardless of what the complete age schedules or time-series in fertility rates eventually look like. For a cohort with observed age-specific fertility rates up to age x, we calculate the universe of fertility changes for ages above x that have been observed in the past, then add these changes to the most recent year's fertility rates. For the fertility histories, we use data from all HFD countries since 1975. During this period, the general pattern was characterized by decreases in younger age fertility and increases in older age fertility. Consequently, the median forecast of the nonparametric approach estimates the completed cohort fertility if older age fertility starts to increase like the main pattern in the historical data.

It is, however, important to note that the forecasted cohort fertility for cohorts at the higher childbearing ages of 35 and above depends very little on the choice of forecasting method. First, fertility rates at ages 35 and older contribute fairly little to the overall cohort fertility; and, second, these rates usually do not change substantially during a short period of time. For younger cohorts at ages 30-35, the forecasted cohort fertility can vary greatly depending on the method used; thus, the uncertainty about the forecasted cohort fertility is larger. Fertility rates at ages 30-35 contribute strongly to completed fertility, and may change substantially over rather short time periods. By using a variety of different methods, we are able to estimate a range of forecasts, and do not rely on the assumptions of a single method only. For a more detailed explanation of the methods, see Appendix 1.

Results

Developments in age-specific fertility in 1990-2018

Over the past three decades, the trends in age-specific fertility rates have been similar across the Nordic countries. These trends are illustrated by five-year age groups in Figure 2. Fertility postponement is reflected in the negative trend up to age 30, and in the overall positive trend at older ages up to 2010. Teen births are becoming extremely rare: in 2018, just 2-5 live births per 1,000 were to women aged 15-19. Even though births to mothers over age 40 are becoming increasingly common, the birth rates for these women are still much lower than they are for women in other age groups: in 2018 across all countries, 11-14 births per 1,000 women were to women aged 40+. Most importantly, since 2010, when the period fertility decline started, all Nordic countries, but Denmark to a lesser extent, have seen a considerable decrease in fertility rates at ages 20-39. We observe a convergence in the fertility rates for the 20-24 age group across the countries due to rapidly decreasing rates for this group in Finland, Iceland, and Norway. For the 25-29 age group, the decrease in the fertility rate has been strongest in Finland, where the rate is currently 81 live births per 1,000 women; in the rest of the Nordic countries, the corresponding rate is between 98 and 109 live births. For the 30-34 age group, we observe considerable variation in the fertility rate between countries. In 2018, the fertility rate for this age group reached 95 live births per 1,000 women in Finland and close to 130 live births per 1,000 women in Denmark. Finland stands out for having low fertility rates in the peak childbearing years of 25-34. Overall, these findings imply that the fertility recuperation pattern typical of the Nordic countries is weakening, and that the prospects for stable cohort fertility in the near future are diminishing.

[FIGURE 2 ABOUT HERE]

Age and parity contributions to the decrease in period fertility in 2010-2018

To analyze the changes in age-specific fertility by parity progression, we decompose the recent period fertility decline into additive age and parity contributions. The decomposition of the decrease in the $TFRp$ between 2010 and 2018 (2017 for Denmark) by age and parity is shown in Figure 3. The decline that is being decomposed differs between the countries: from 0.4-0.5 in Finland and Iceland to 0.1-0.2 in Sweden and Denmark. The dominant pattern in all countries is the decreasing first birth intensity, with the strongest decreases found in Finland and Norway. The contribution of declining first births to the change in the $TFRp$ is largest at ages below 30. However, first birth intensities have also decreased at ages above 30 in all Nordic countries but Iceland. Thus, we notice a new trend toward family formation postponement among Nordic women in their early thirties. Decreasing first birth intensities explain most of the total decrease in period fertility since 2010: i.e., between 57% in Iceland and 92% in Denmark.

Higher order parities have contributed only slightly to the total fertility decline. Across all countries, the contribution of second births to the total fertility decline is less than 14%. Moreover, the contributions of parity three and parities four and higher are small in all countries except in Iceland, where a quarter of the decline is attributable to third births, and an additional 10% of the decline is attributable to fourth or higher order births. Notably, Iceland has a higher starting level for third order births than the rest of the Nordic countries. However, decreases in higher order births at older ages play an important role in some of the countries: at ages 30+, second and higher order births explain nearly all of the decline in Iceland, and about 50% of the decline in Finland and Norway. When all parities are considered, we see that there have been small increases in older age fertility in Denmark and Iceland (at ages close to 40, second birth intensities have increased somewhat in Denmark, and first and second birth intensities have increased in Iceland), but almost no increases in older age fertility in the rest of the Nordic countries. The rapid decline in fecundity after age 35 and the new trend toward postponement among women in their early thirties weakens the prospects for fertility recuperation in the coming years in the Nordic countries.

[FIGURE 3 ABOUT HERE]

Fertility timing and tempo adjustments

Our main focus is on determining whether the large changes in fertility since 2010 can be explained by timing or by tempo effects. To analyze the impact of changes in fertility timing on period fertility, we use the tempo- and parity-adjustment method, BS[4] (Bongaarts and Sobotka 2012). Figure 4 and Figure *5* show the development in fertility timing and the period TFR, as well as BS-adjusted TFR, in the Nordic countries in 1990-2018. In 2018, the mean age at first birth was around 29.5 in Denmark, Finland, Norway, and Sweden, which was slightly above the 2017 European average of 28.9; while it was only 28.3 in Iceland. All Nordic countries experienced an increase in the mean age at first birth in recent decades, but the speed of the increase varied between countries and time periods. Since 1990, Finland has experienced the slowest total increase in the age at first birth (2.8 years), and Iceland has experienced the fastest increase (4.4 years). For the period after 2010, we observe signs of accelerated fertility postponement mainly in Norway and Finland. Since 2010, the mean age at first birth has risen 1.5 years in Norway, but less than 0.5 years in Sweden. Whereas the development in fertility timing in Finland and Norway had been lagging behind that in Sweden and Denmark, the country differences in the age at first birth have recently decreased substantially.

In the Nordic countries, the BS has been consistently more stable and at higher levels than the conventional TFR: i.e., the BS has been at around two in all countries except for Iceland, where it has been even higher. The BS has, however, decreased since 2010, particularly in Finland, Iceland, and Norway. These findings suggest that the quantum of fertility is decreasing as well, and that the accelerated fertility postponement alone cannot explain the period decline.

[FIGURE 4 ABOUT HERE]

[FIGURE 5 ABOUT HERE]

Cohort fertility

To highlight the patterns in both timing and quantum among women still of childbearing ages in the Nordic countries, we show the observed cohort age-specific fertility rates in Figure 6, and the cumulated cohort fertility rates and the percent childless for selected cohorts in **Fejl! Henvisningskilde ikke fundet.**. The tendency of the age schedules to shift to the right along the x-

[4] For Iceland, we use BF for the years until 2008.

axis – which is observed in all countries, but less so in Sweden – reflects the general pattern of fertility postponement. The reduced peak in the fertility schedules in nearly all countries reflects the decrease in fertility at around age 30 in recent years. In line with the pronounced decreases documented above for Finland, we note that at 100 live births per 1,000 women, the peak in fertility rates for the 1988 cohort is much lower in Finland than it is in the other Nordic countries, where the peak level is between 120 to 140 live births per 1,000 women. These results suggest that catching up on all postponed births at older ages would lead to very odd shapes in completed age schedules for the youngest Finnish cohorts. Although deviations from the "bell-shaped curve" exist – for instance, the bimodal fertility schedule in the U.S. – such exceptions are often attributed to two populations mixing, rather than to a population-level pattern of strong postponement and recuperation (Sullivan 2005).

The country patterns of the cumulated cohort fertility rates and the childlessness levels for the cohorts still of childbearing age are the same as those observed for cohorts who have completed childbearing (Table 1). Finland has the lowest cumulated fertility and the highest level of childlessness, and Iceland has the lowest cumulated fertility and the lowest level of childlessness at all ages above 30. The 1988 cohort who reached age 30 in 2018 have had, on average, 0.86 children in Finland and 1.07 children in Iceland. Of this cohort, over 52% were still childless at age 30 in Finland, compared to just 42% in Iceland.

[FIGURE 6 ABOUT HERE]

[TABLE 1 ABOUT HERE]

What the future brings: A forecast of the cohort fertility

We present the cohort fertility forecasts for Nordic women born in 1975-1988 in Figure 7[5]. All forecasting methods produce consistent results in terms of the direction of the forecast, although the point estimates and the width of the confidence intervals vary to some extent. Our reading of the results does not put special emphasis on any single method, but rather summarizes what the results generated by these methods jointly suggest about the future of cohort fertility.

Regardless of which method is applied, the findings indicate that cohort fertility will slowly decrease or stabilize in Denmark and Sweden, but will decline sharply in Finland, Iceland, and Norway. Finland is expected to continue to have the lowest cohort fertility among the Nordic countries, reaching levels substantially below 1.75, which marks the threshold between low and

[5] The exact values are available in Appendix Table 1.

"very low" cohort fertility (Zeman et al. 2018). The weakest declines in cohort fertility are observed when applying the nonparametric approach, which does not assume any stability or continuity in trends, but which allows for the possibility that sharp recoveries could occur. However, even when this method is used, we observe declines in cohort fertility for three out of five countries, and the 95% confidence interval for the youngest cohort includes completed fertility at levels of 1.48-1.76 in Finland, 1.65-1.93 in Norway, 1.77-2.06 in Iceland, 1.73-2.01 in Sweden, and 1.68-1.97 in Denmark.

At the other end of the methods spectrum are the five-year extrapolation and Bayesian approaches that that rely on the extrapolation of trends. These methods produce lower estimates of cohort fertility than the nonparametric approach because recent trends have been negative. The Bayesian approach, which is accompanied by prediction intervals, also produces narrower intervals than the nonparametric approach because of its added assumptions regarding smoothness. However, the overall qualitative conclusions regarding the trends, when derived using the extrapolation approaches rather than the nonparametric approach, are very similar: i.e., overall cohort fertility will decline, although not necessarily in Denmark and Sweden.

The freeze rates approach assumes that the current period fertility will persist into the future. This method produces forecasts that are in between those generated by the nonparametric approach and the extrapolation methods. The freeze rate method gives completed fertility estimates for the youngest cohort of 1.60 in Finland, 1.77 in Norway, 1.81 in Denmark, 1.85 in Sweden, and 1.90 in Iceland. Although the freeze rate method has been criticized in the past for underestimating completed fertility when fertility is being postponed, the estimates it produces may be more reasonable in the current circumstances, in which the long-term increasing trend in older age fertility appears to be changing, and we do not yet know whether this trend change in fertility at older ages is temporary. According to the freeze rate method, the Nordic average completed fertility will decrease from 2.0 to an all-time low of 1.8.

[FIGURE 7 ABOUT HERE]

Discussion

This study analyzed recent fertility dynamics in the Nordic countries. The fertility patterns in these countries are of considerable interest because the Nordic countries are known for combining comparatively high fertility with high female labor market participation rates, which is often attributed to their work-family reconciliation policies; and because many of the theories that predict that gender equality is a critical factor in preventing very low fertility in developed countries have been based on empirical associations between gender equality and fertility observed in the Nordic countries. Therefore, it is important that we investigate the question of whether the unexpected period fertility decline that started in 2010 in the Nordic region and in other relatively high fertility countries will affect Nordic cohort fertility, representing a departure from the historical pattern. Our study was the first to analyze the most recent trends by age and parity, and to forecast cohort fertility for the Nordic countries using up-to date data from the Human Fertility Database and Nordic statistical agencies. We consistently found strong indications across all of the methods and approaches applied that the recent period decline in fertility in the Nordic countries is not fully attributable to timing effects, or to postponement. The forecasts show that the period decline will likely translate into a decline in cohort fertility, and that cohort fertility will likely fall to an all-time low: from an average of two children for the 1970s cohorts to an average of around 1.8 children for the late 1980s cohorts. Two separate trends appear to be occurring in the Nordic countries, with fertility declining strongly in Iceland, Norway, and Finland; and fertility decreasing less sharply, or even stabilizing, in Denmark and Sweden. In terms of levels of completed cohort fertility, Finland is diverging from the rest of the Nordic countries, with levels in Finland expected to fall well below the very-low fertility threshold. Tempo adjustments to period fertility measures produced results consistent with the estimates in the forecasts: i.e., the recent fertility decline in the Nordic countries reflects a decline in fertility quantum, and the largest declines are occurring in Finland, Iceland, and Norway. Thus, these new developments not only represent a challenge to the Nordic model, implying that the idea of a common high fertility regime in the Nordic region is no longer valid; they also call into question the broader theories that postulate a positive association between gender equality and fertility.

Previously, despite the ongoing trend toward fertility postponement in the Nordic countries, cohort fertility in this region has remained stable due to high levels of fertility recuperation at older ages (Andersson et al. 2009; Lesthaeghe 2010). Welfare provisions and organizational features that support dual-earner families with young children have been considered to promote fertility recuperation at older ages (Kravdal and Rindfuss 2008; Lesthaeghe 2010). However, in addition to observing a long-term negative trend in fertility rates at ages below 30, we documented that older age fertility has been declining since 2010 in all Nordic countries. We found signs of accelerated fertility postponement, particularly in Iceland, Norway, and Finland. Nonetheless, changes in fertility timing failed to fully explain the recent period fertility decline. As we found that fertility at around age 30 is declining for the Nordic cohorts born in the 1980s, and that older age fertility is increasing only slightly, it appears that fertility recuperation is weakening in the Nordic countries, despite their highly developed family-friendly policies.

Parity-specific analyses showed that declining first birth intensities explain most of the recent period fertility decline in all Nordic countries. First birth intensities declined the most in Finland, but decreased substantially in Norway and Iceland as well. While the declines in first birth intensities were heavily concentrated at ages below 30, there was also a notable decline in first birth intensities at ages above 30. These findings indicate that the decline in 30+ fertility reflects a new postponement trend in family formation. Furthermore, we observed almost no signs of fertility recuperation among older women for any parity in any of the Nordic countries. In contrast with previous findings showing that decreasing progression to third and higher order births has been driving the weak downward trend in cohort fertility that started with the 1960 cohort (Zeman et al. 2018), the cohort fertility decline that is currently forecasted also seems to be driven by increasing childlessness. Consequently, the plateau in the increasing childlessness trends in Denmark, Norway, and Sweden (Jalovaara et al. 2019) may be temporary. Declines in subsequent childbearing were observed in Iceland in particular, where declining third birth intensities explain one-quarter of the period fertility decline. However, less extreme declines in subsequent childbearing were also found in Finland and Norway.

A potential limitation of using administrative data to study parity progression is that such data may underestimate the parity of foreign-born women, as children are recorded in the population registers only if they also immigrate to the host country with their mother. Nonetheless, the available evidence indicates that this is a minor issue that should not significantly affect fertility trends for the total population, because it is unusual for a mother to migrate during her childbearing ages while leaving a child behind in her home country (see Mussino, Miranda, and Ma 2018, p. 6).

The magnitude of the expected cohort fertility decline varies between the countries. Denmark and Sweden are on a trajectory with relatively weak declines in cohort fertility. For these two countries, there is still a reasonable possibility that the weak declines will be counterbalanced by increases in older age fertility. Cohort fertility decline would accelerate if the current trend in older age fertility continues, but the decline could level off for the late 1980s cohorts if Swedish women currently in their early thirties catch up on postponed births following the recuperation patterns of earlier cohorts. However, in Finland, Iceland, and Norway, large declines in cohort fertility will be difficult to avoid, even if women currently of childbearing age in these countries began to catch up on postponed births with a higher intensity than was typically observed in earlier cohorts. While the trajectories of the sharp decline in cohort fertility in these three countries differ from the cohort fertility trends in Denmark and Sweden, the cohort fertility trends in each of these three countries also differ. For the cohort born in 1970, the cohort fertility rate is 2.3 in Iceland, 2.1 in Norway, and 1.9 in Finland. These differences have been attributed to the large proportion of women with three children in Iceland and the large proportion of women without children in Finland. Iceland is exceptional in that the main drivers of its cohort fertility decline seem to be decreasing family size, and, to a lesser extent, decreasing progression to a first birth.

The Nordic countries are frequently cited in demographic theories positing that the increasing participation of men in family life and stronger institutional support will be critical components of efforts to prevent fertility from falling to very low levels in rich countries (Esping-Andersen and Billari 2015; Goldscheider, Bernhardt, and Lappegård 2015; Anderson and Kohler 2015). There are no signs that gender equality is declining or that family policies are weakening in the Nordic countries (World Bank 2012; Rostgaard 2014), which could, according to these theories, cause fertility to decline. Rather, we are witnessing a general decline in fertility in these countries despite their favorable characteristics. It could be argued that Finland differs from the rest of the Nordic countries because it does less than the other countries to promote work-family reconciliation (Hellstrand, Nisén, and Myrskylä 2019). For example, in Finland, the preference for the childcare leave on home care allowance is strong; the uptake of parental leave among fathers is low; and the rate of part-time employment is also low. However, the declines that were also observed in the other Nordic countries require alternative explanations. Among the Nordic countries, Sweden has the longest and most flexible parental leave scheme, Iceland has the most gender-equal parental leave scheme, and Norway has the longest earmarked paid parental leave reserved for the father. In most of the Nordic countries, fathers tend to take full advantage of parental leave, and most children are enrolled in day care from an early age. (Duvander et al. 2019) Beyond the potential case of Finland, the differences in family policies or in levels of gender equality across the Nordic countries do not appear to explain the expected differences in declines in CFR levels.

The period fertility decline that started in 2010 in the Nordic countries has also been observed in other countries with relatively high fertility, like France, Ireland, the United Kingdom, and the U.S. (Human Fertility Database 2019). If the cohort fertility decline estimated for the 1970s and 1980s cohorts in the Nordic countries turns out to be part of a global trend, the Nordic countries (though probably not Finland) may still have fertility levels that are higher than those in other countries, but are lower than they were in the past. Thus, it could be argued that cohort fertility would be even lower in the Nordic countries in the absence of the region’s generous family policies.

The mechanisms that underlie the Nordic fertility decline are still unclear. Labor market status has become a central determinant of childbirth in many modern societies (Matysiak and Vignoli 2008), and fertility trends tend to correlate with economic cycles (Andersson 2000; Sobotka, Skirbekk, and Philipov 2011; Schneider 2015). While recent comparisons of Nordic countries have shown that fertility levels during and after the recent recession in 2008-2014 did not correlate with the severity or duration of the economic crisis, it has also been suggested that the recent decline in period fertility could be attributed to the broader experience of increasing labor market insecurity (Comolli et al. 2019). Finland may also be in a special position, as the Finnish cohorts currently of childbearing age survived the recession of the early 1990s, which was particularly damaging in that country. Cultural factors likely also play a role in the variability in fertility (Inglehart 1990; Surkyn and Lesthaeghe 2004). There are some indications that in Finland, preferences regarding family life and childbearing have been changing (Berg 2018). However, comparable research on shifts in such preferences is missing for the other Nordic countries. It is possible that childlessness and having fewer children is becoming increasingly accepted in the Nordic countries.

This study has produced new insights into current and future childbearing developments in the Nordic countries. Our results suggest that the long-standing pattern of stable cohort fertility close to replacement level across the Nordic countries is no longer warranted. Thus, our findings indicate that the idea of a common Nordic fertility regime characterized by high fertility levels may no longer be valid. More broadly, our results call into question our understanding of the patterning of fertility across high-income countries, and illustrate that fertility declines can occur even in countries with comparatively favorable contexts for work-family reconciliation and comparatively high levels of gender equality. Consequently, more nuanced studies on the relationship between gender equality and fertility are required. Future comparative research that explores the links between economic uncertainty on the one hand and the value placed on family on the other, while also investigating actualized fertility, could shed light on the causes of the recent fertility decline in the Nordic countries and beyond. Future studies should pay particular attention to the transition to parenthood and the increase in childlessness, as decreasing first births is the main driver of the recent decline in period fertility.

Online Appendices (Electronic Supplementary Material)

Appendix 1 Methods

Tempo-adjusted TFR

The tempo-adjusted total fertility rate (BF) (Bongaarts and Feeney 1998) is the sum of order-specific adjusted fertility rates $TFR_i(t)/(1 - r_i(\text{t}))$, which adjust for the order-specific changes in the mean age of childbearing. The adjustment factor $r_i(t)$ is estimated by

$$r_i(t) = \frac{MAC_i(t+1) - MAC_i(t-1)}{2}$$

where $MAC_i(t)$ is the mean age at childbearing by birth order i at year t. We consider the birth orders 1,2,3,4, and 5+, and apply a smoothed version of the BF using a five-year moving average of the adjustment factor by each birth order.

Tempo- and parity-adjusted TFR

The tempo- and parity-adjusted total fertility rate (BS) (Bongaarts and Sobotka 2012) is defined as

$$BS(t) = \sum_i \left\{ 1 - exp\left[-\sum_a \frac{p_{(a,t,i)}}{1 - r_i(t)} \right] \right\}$$

where $p_{(a,t,i)}$ is the conditional rate: births of order *i* are related to all women who have not yet reached parity *i* at age *a* during year *t*. The adjustment factor $r_i(t)$ is the same as in the BF: it is the average annual change in the mean age at childbearing.

We use the adjustment factor

$$r_i(t)' = MAC_i(t) - MAC_i(t-1)$$

to replace the last year's lost observation, following Goldstein, Sobotka, and Jasilioniene (2009). This crude estimate assumes that the development in the mean age at childbearing will follow roughly the same trend in year t+1 as the trend that was observed in the previous year.

Bayesian forecasting of cohort fertility

The Bayesian forecasting method (Schmertmann et al. 2014) uses two separate, non-overlapping subsets formed from the HFD data: contemporary data and historical data. The contemporary data consist of 10 complete cohort schedules for Nordic cohorts born in 1965-1974 and 30 incomplete schedules for Finnish cohorts born in 1975-2004, and its surface is to be forecasted. The historical data consist of 648 complete cohort schedules for cohorts born in high-income countries between 1900 and 1960, and are used as a priori information about typical shapes of the cohort fertility schedules and time-series trends in fertility rates across countries.

The prior distribution for typical fertility rates is constructed based on three basic categories of prior information: cohort schedule shapes, time-series freeze rates, and time-series freeze slopes. The cohort category of prior information tells us what the typical shapes of the cohort schedules are, and the time-series categories of prior information tell us how smooth a time-series is likely to be at a given age based on historical data. These categories of prior information are then combined to determine which fertility surfaces are likely or unlikely. The general features of the past rate surfaces are assumed to persist into the future. Historically unlikely fertility surfaces that have age patterns in cohort fertility schedules that differ from the patterns in the historical data, and that have patterns in time-series of age-specific rates that differ from the corresponding series in the historical data, have high penalties, and are thus assigned lower prior probabilities. The method automatically includes uncertainty estimates, and no explicit choice needs to be made in the Bayesian framework between the freeze rate approach and the time trend extrapolating approach.

Appendix Table A1: Forecasted completed fertility (CFR) for the 1975-1988 cohorts in the Nordic countries. Note: Forecasted CFR for the 1974-1987 cohorts in Denmark. These results are illustrated in Figure 7.

	Nonparametric 95% CI, upper bound	Nonparametric, point estimate	Nonparametric 95% CI, lower bound	Bayes 95% CI, upper bound	Bayes, point estimate	Bayes 95% CI, lower bound	Freeze rate, point estimate	5-year extrapolation, point estimate
Finland								
1975	1.90	1.90	1.90	1.91	1.90	1.89	1.90	1.90
1976	1.89	1.89	1.88	1.90	1.89	1.87	1.89	1.89
1977	1.89	1.88	1.88	1.90	1.88	1.87	1.88	1.89
1978	1.87	1.87	1.86	1.88	1.87	1.85	1.87	1.87
1979	1.85	1.85	1.83	1.86	1.84	1.83	1.84	1.84
1980	1.83	1.82	1.80	1.83	1.82	1.80	1.82	1.82
1981	1.83	1.81	1.78	1.82	1.80	1.78	1.81	1.80
1982	1.82	1.79	1.75	1.80	1.78	1.76	1.78	1.78
1983	1.81	1.77	1.72	1.77	1.75	1.72	1.76	1.75
1984	1.81	1.76	1.69	1.75	1.72	1.69	1.75	1.73
1985	1.79	1.73	1.63	1.70	1.67	1.63	1.70	1.68
1986	1.79	1.71	1.59	1.67	1.62	1.58	1.68	1.63
1987	1.76	1.66	1.52	1.60	1.55	1.50	1.62	1.56
1988	1.76	1.65	1.48	1.56	1.50	1.44	1.60	1.52
Norway								
1975	2.01	2.01	2.01	2.03	2.01	2.00	2.01	2.01
1976	2.02	2.01	2.01	2.03	2.01	2.00	2.01	2.01
1977	2.01	2.01	2.00	2.02	2.00	1.99	2.01	2.01
1978	1.98	1.98	1.97	1.99	1.98	1.96	1.98	1.98
1979	1.97	1.96	1.95	1.98	1.97	1.95	1.96	1.96
1980	1.96	1.95	1.93	1.96	1.95	1.93	1.94	1.94
1981	1.95	1.93	1.90	1.95	1.93	1.91	1.92	1.92
1982	1.95	1.92	1.88	1.94	1.92	1.90	1.91	1.91
1983	1.93	1.89	1.84	1.92	1.89	1.87	1.88	1.87
1984	1.93	1.88	1.81	1.91	1.88	1.85	1.87	1.85
1985	1.93	1.87	1.78	1.89	1.86	1.82	1.85	1.83
1986	1.94	1.86	1.75	1.88	1.84	1.79	1.83	1.81
1987	1.93	1.84	1.70	1.84	1.79	1.73	1.80	1.77
1988	1.93	1.82	1.65	1.81	1.74	1.68	1.77	1.73
Iceland								
1975	2.20	2.20	2.20	2.25	2.20	2.16	2.20	2.20
1976	2.21	2.21	2.21	2.23	2.19	2.15	2.21	2.21
1977	2.16	2.15	2.15	2.22	2.17	2.13	2.15	2.15
1978	2.23	2.23	2.22	2.23	2.19	2.14	2.23	2.23
1979	2.20	2.19	2.18	2.21	2.17	2.13	2.19	2.19
1980	2.15	2.14	2.12	2.18	2.14	2.10	2.14	2.14
1981	2.11	2.10	2.07	2.14	2.10	2.05	2.09	2.09
1982	2.16	2.13	2.09	2.13	2.08	2.04	2.13	2.12
1983	2.09	2.05	2.00	2.08	2.03	1.98	2.04	2.03

1984	2.09	2.04	1.97	2.05	1.99	1.94	2.03	2.00
1985	2.09	2.03	1.94	2.01	1.96	1.90	2.01	1.98
1986	2.05	1.97	1.86	1.96	1.90	1.83	1.94	1.90
1987	2.01	1.92	1.78	1.91	1.84	1.77	1.88	1.83
1988	2.06	1.95	1.77	1.89	1.81	1.73	1.90	1.84
Sweden								
1975	1.95	1.95	1.95	1.96	1.95	1.94	1.95	1.95
1976	1.94	1.94	1.94	1.95	1.94	1.93	1.94	1.94
1977	1.94	1.94	1.93	1.95	1.94	1.93	1.94	1.94
1978	1.93	1.93	1.92	1.94	1.93	1.92	1.93	1.93
1979	1.93	1.92	1.91	1.94	1.92	1.91	1.92	1.92
1980	1.94	1.92	1.90	1.94	1.93	1.91	1.92	1.92
1981	1.93	1.91	1.88	1.93	1.91	1.90	1.91	1.91
1982	1.92	1.90	1.86	1.91	1.89	1.87	1.89	1.89
1983	1.94	1.90	1.85	1.91	1.89	1.87	1.89	1.89
1984	1.94	1.89	1.82	1.90	1.88	1.85	1.88	1.87
1985	1.96	1.90	1.81	1.90	1.87	1.83	1.88	1.87
1986	1.99	1.90	1.79	1.89	1.85	1.81	1.88	1.86
1987	1.99	1.89	1.75	1.86	1.81	1.76	1.85	1.82
1988	2.01	1.90	1.73	1.85	1.79	1.72	1.85	1.81
Denmark								
1974	1.95	1.95	1.95	1.96	1.95	1.94	1.95	1.95
1975	1.95	1.95	1.95	1.96	1.95	1.94	1.95	1.95
1976	1.96	1.95	1.95	1.97	1.95	1.94	1.95	1.95
1977	1.95	1.94	1.93	1.96	1.94	1.93	1.94	1.94
1978	1.93	1.92	1.91	1.95	1.93	1.91	1.92	1.93
1979	1.92	1.91	1.89	1.94	1.92	1.90	1.91	1.92
1980	1.91	1.89	1.86	1.92	1.91	1.89	1.89	1.90
1981	1.90	1.87	1.83	1.91	1.89	1.87	1.87	1.89
1982	1.90	1.86	1.81	1.91	1.88	1.86	1.85	1.88
1983	1.90	1.85	1.78	1.90	1.87	1.84	1.83	1.87
1984	1.90	1.83	1.74	1.89	1.86	1.82	1.81	1.85
1985	1.90	1.82	1.71	1.89	1.85	1.80	1.79	1.84
1986	1.93	1.84	1.70	1.91	1.85	1.80	1.80	1.86
1987	1.97	1.86	1.68	1.92	1.86	1.79	1.81	1.87
Nordic average								
1975	2.00	2.00	2.00	2.02	2.00	1.98	2.00	2.00
1976	2.00	2.00	2.00	2.02	2.00	1.98	2.00	2.00
1977	1.99	1.99	1.98	2.01	1.99	1.97	1.99	1.99
1978	1.99	1.99	1.98	2.00	1.98	1.96	1.99	1.99
1979	1.98	1.97	1.95	1.99	1.97	1.95	1.97	1.97
1980	1.96	1.95	1.93	1.97	1.95	1.93	1.95	1.95
1981	1.95	1.93	1.90	1.95	1.93	1.91	1.92	1.93
1982	1.95	1.92	1.88	1.94	1.91	1.89	1.92	1.92
1983	1.93	1.90	1.84	1.92	1.89	1.86	1.88	1.88
1984	1.93	1.89	1.81	1.90	1.87	1.84	1.87	1.87

1985	1.93	1.87	1.78	1.88	1.84	1.80	1.85	1.84
1986	1.93	1.85	1.74	1.86	1.81	1.76	1.82	1.81
1987	1.92	1.83	1.69	1.82	1.77	1.71	1.79	1.77
1988	1.94	1.84	1.66	1.81	1.74	1.67	1.79	1.76

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TABLES

Table 1: Cumulated fertility rates and the proportion childless by cohort (age reached in 2018) and country.
*) Note: Cohorts 1970, 1979, and 1987 for Denmark.

	Cumulated cohort fertility rate				
	Finland	Iceland	Norway	Sweden	Denmark*
Cohort 1970 (48)	1.88	2.28	2.06	1.99	1.97
Cohort 1980 (38)	1.70	2.01	1.84	1.79	1.79
Cohort 1988 (30)	0.86	1.07	0.94	0.90	0.88

	Proportion childless (%)				
	Finland	Iceland	Norway	Sweden	Denmark*
Cohort 1970 (48)	19.5	12.5	13.4	13.8	17.0
Cohort 1980 (38)	23.3	16.3	17.7	18.0	20.5
Cohort 1988 (30)	52.2	41.9	46.4	47.8	47.5

FIGURES

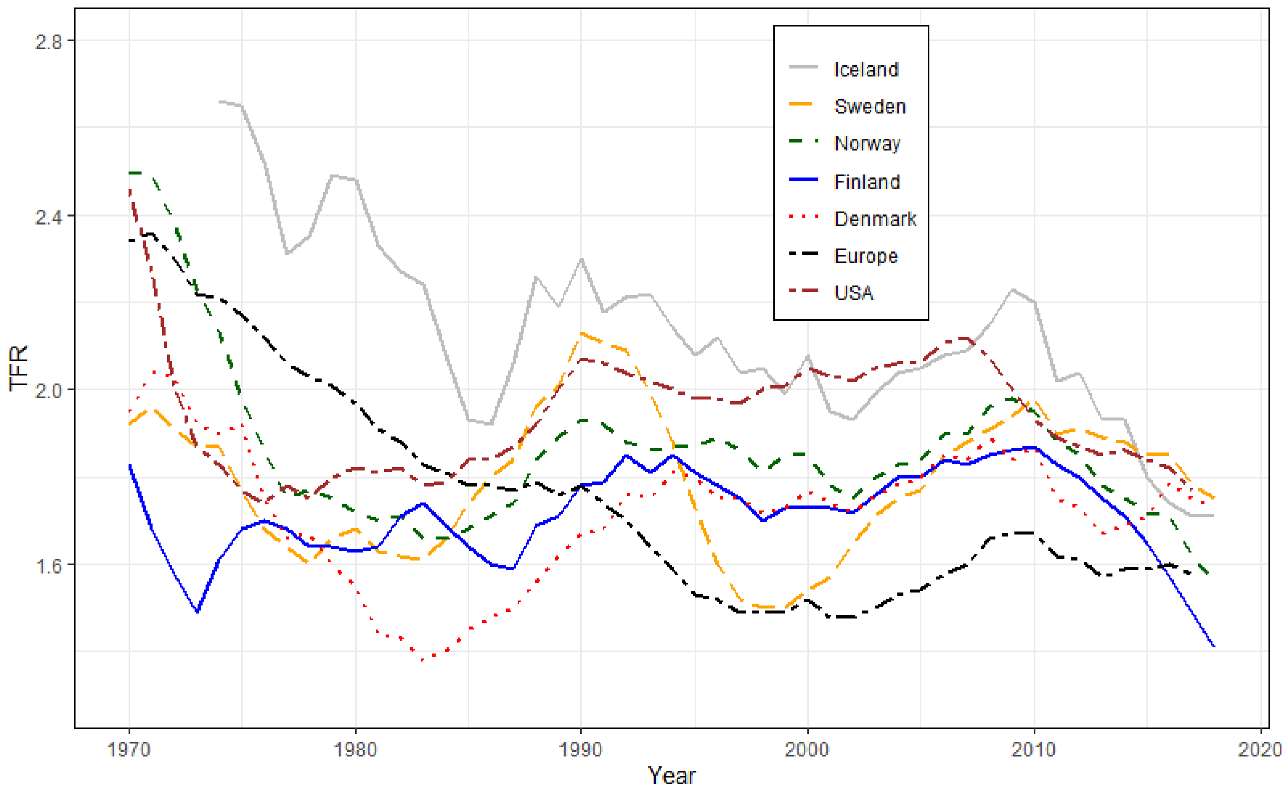

Figure 1: Total fertility rate (TFR) in the Nordic countries and average TFR among European countries in 1970-2018.
European countries included: Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom.
Sources: Eurostat (2019), Nordic statistical bureaus (2019), Human Fertility Database (2019).

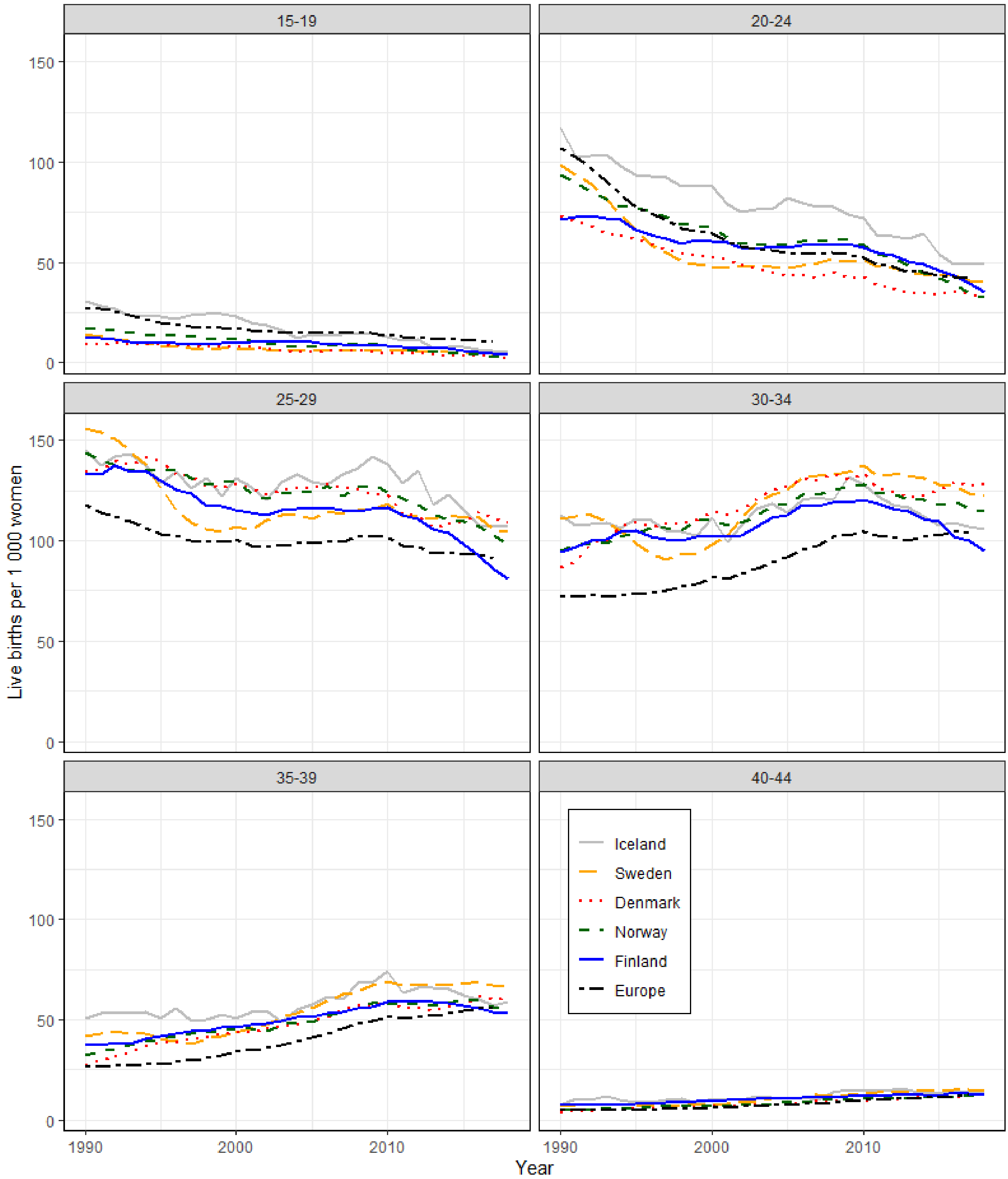

Figure 2: Age-specific fertility rates in the Nordic countries in 1990-2018.
European countries included: Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom.

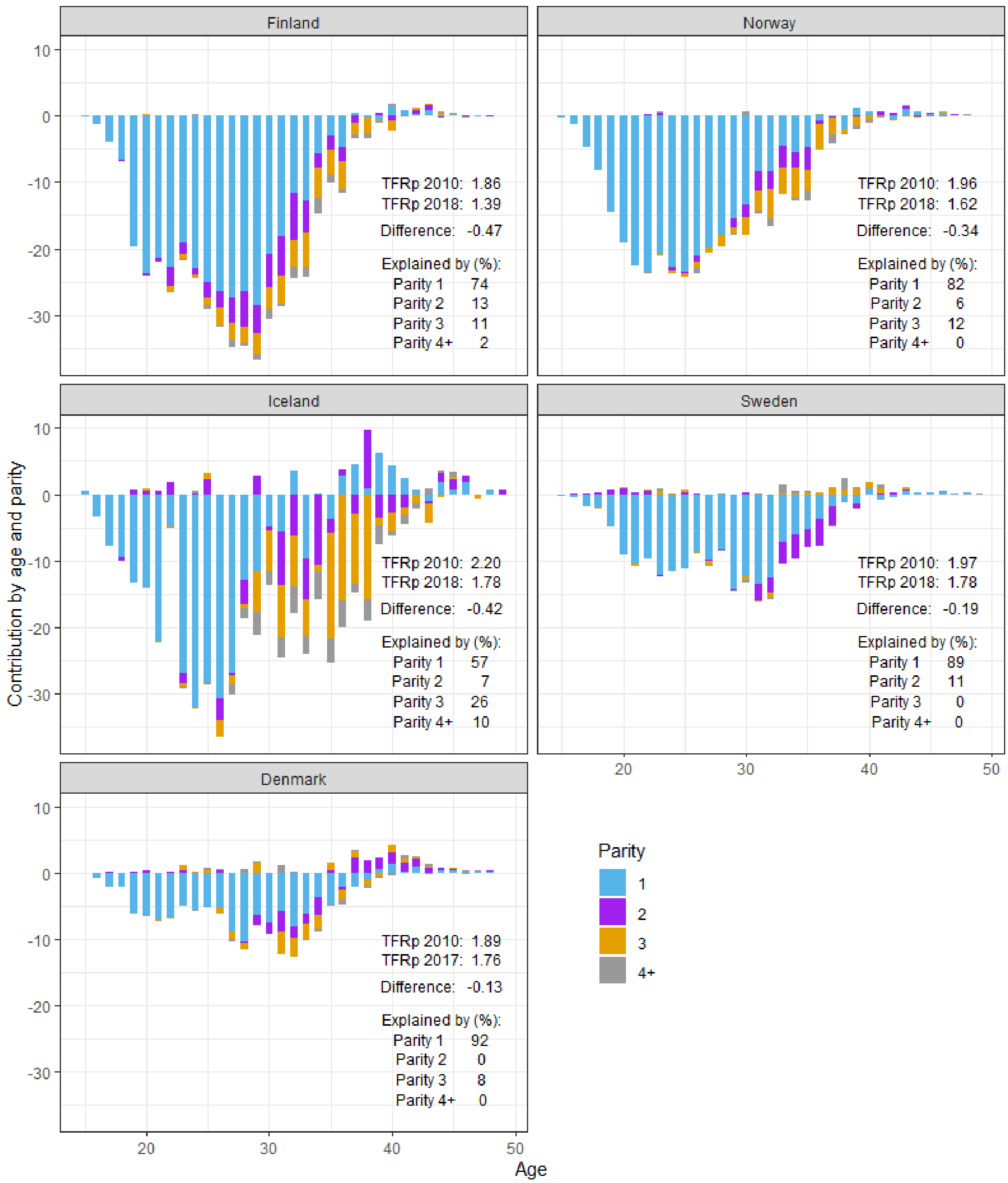

Figure 3: Decomposition of the decrease in the age- and parity-adjusted TFR in the Nordic countries in 2010-2018 by age and parity.

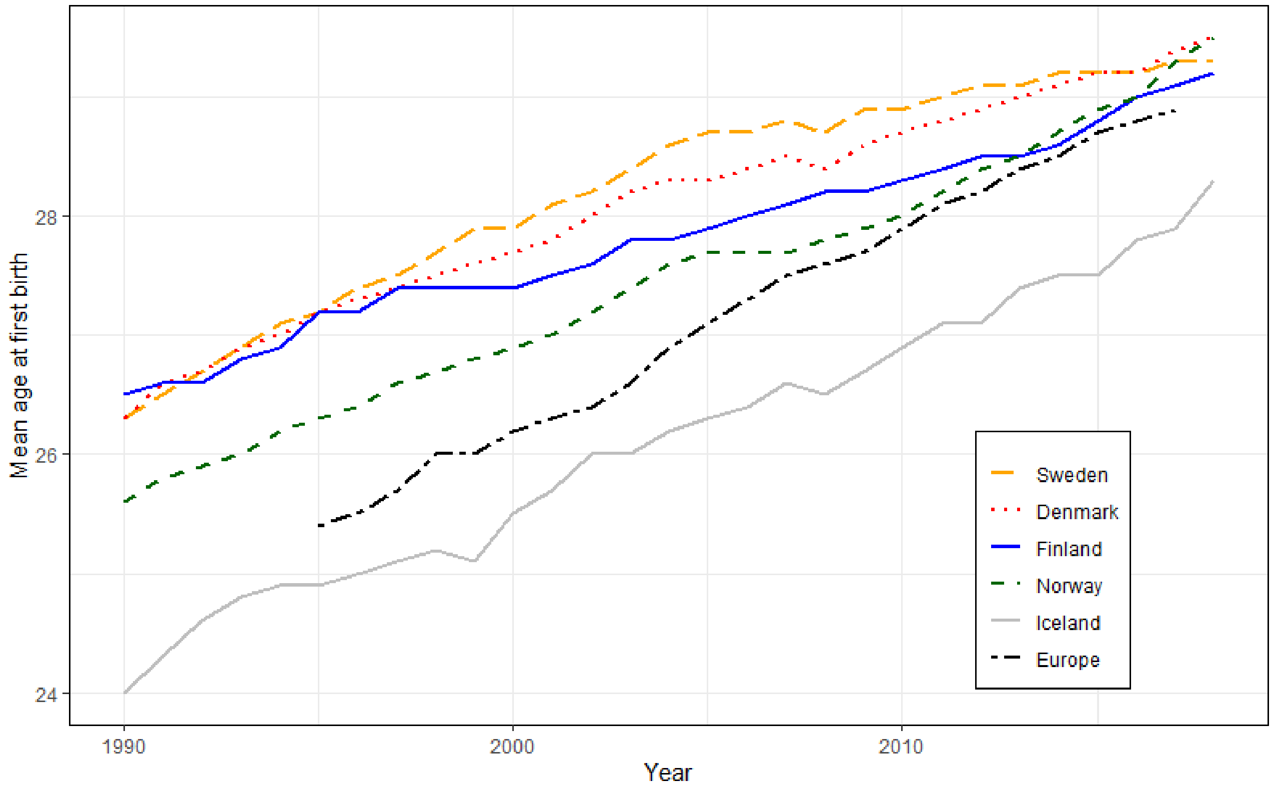

Figure 4: Mean age at first birth in 1990-2018 in the Nordic countries and in Europe.
European countries included: Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom.

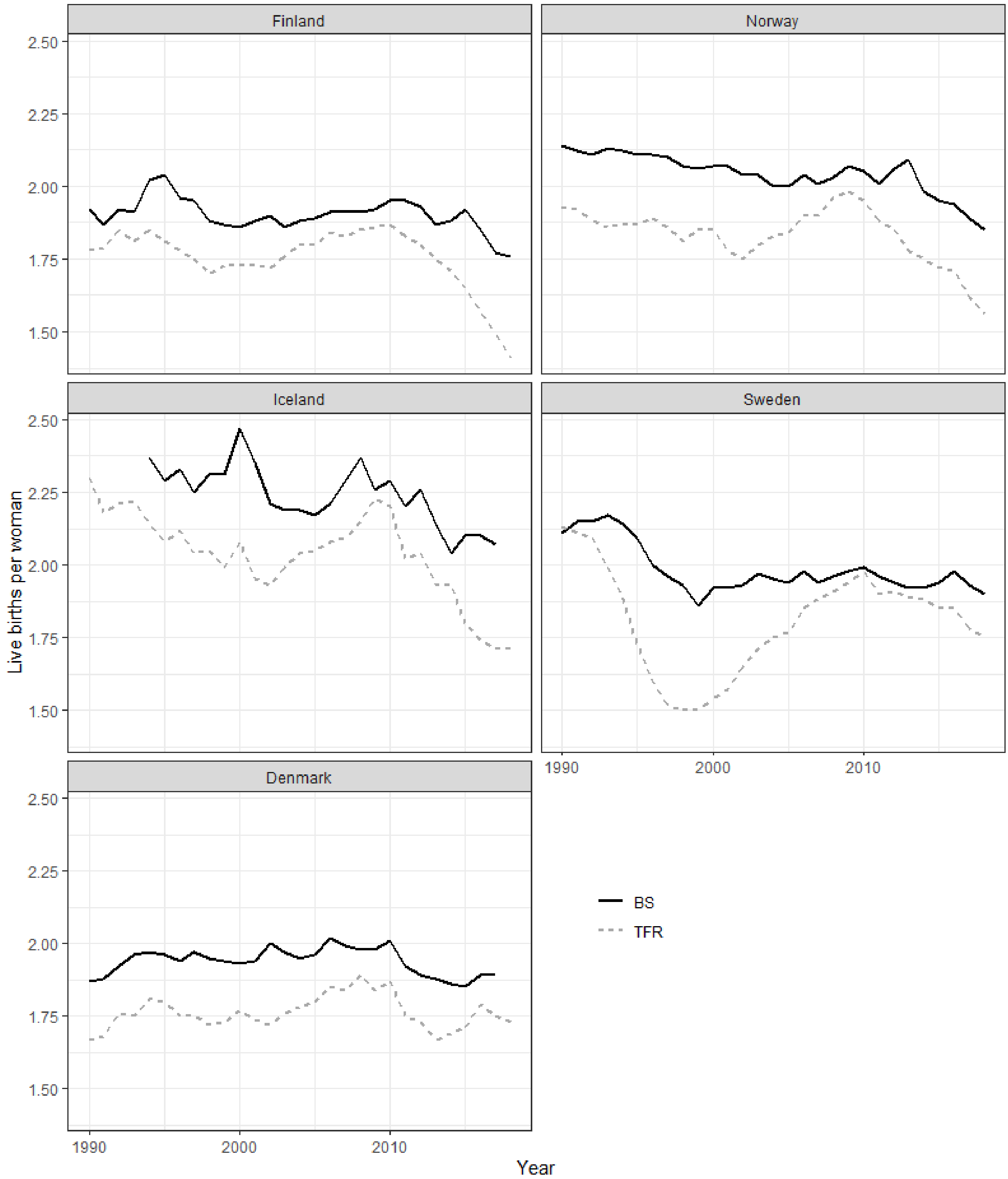

Figure 5: Observed TFR and tempo- and parity-adjusted TFR (BS) in 1990-2018 in the Nordic countries. Note: For Iceland, we use the tempo-adjusted TFR (BF) for the years up to 2008.

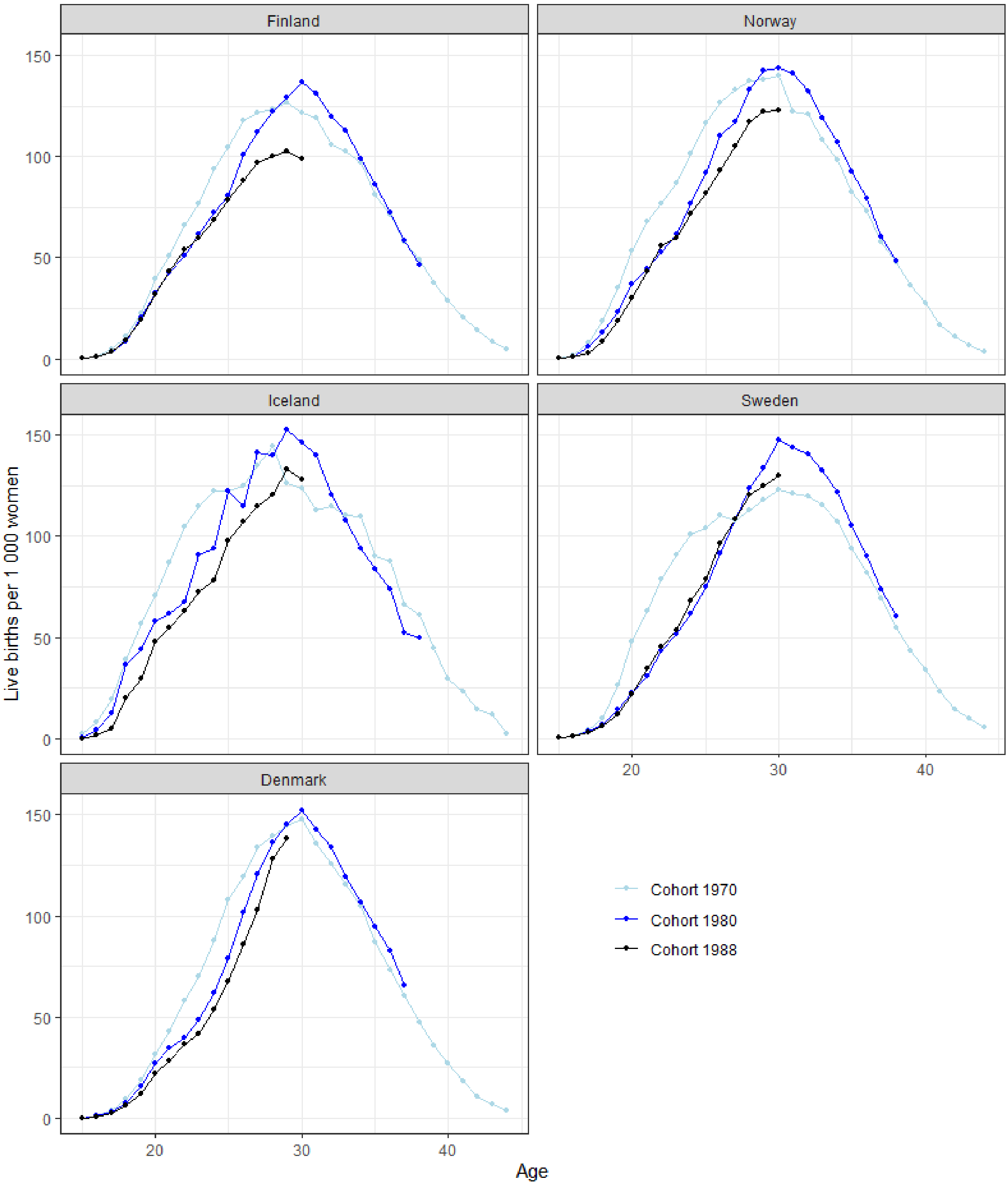

Figure 6: Age-specific fertility rates by cohort and country.

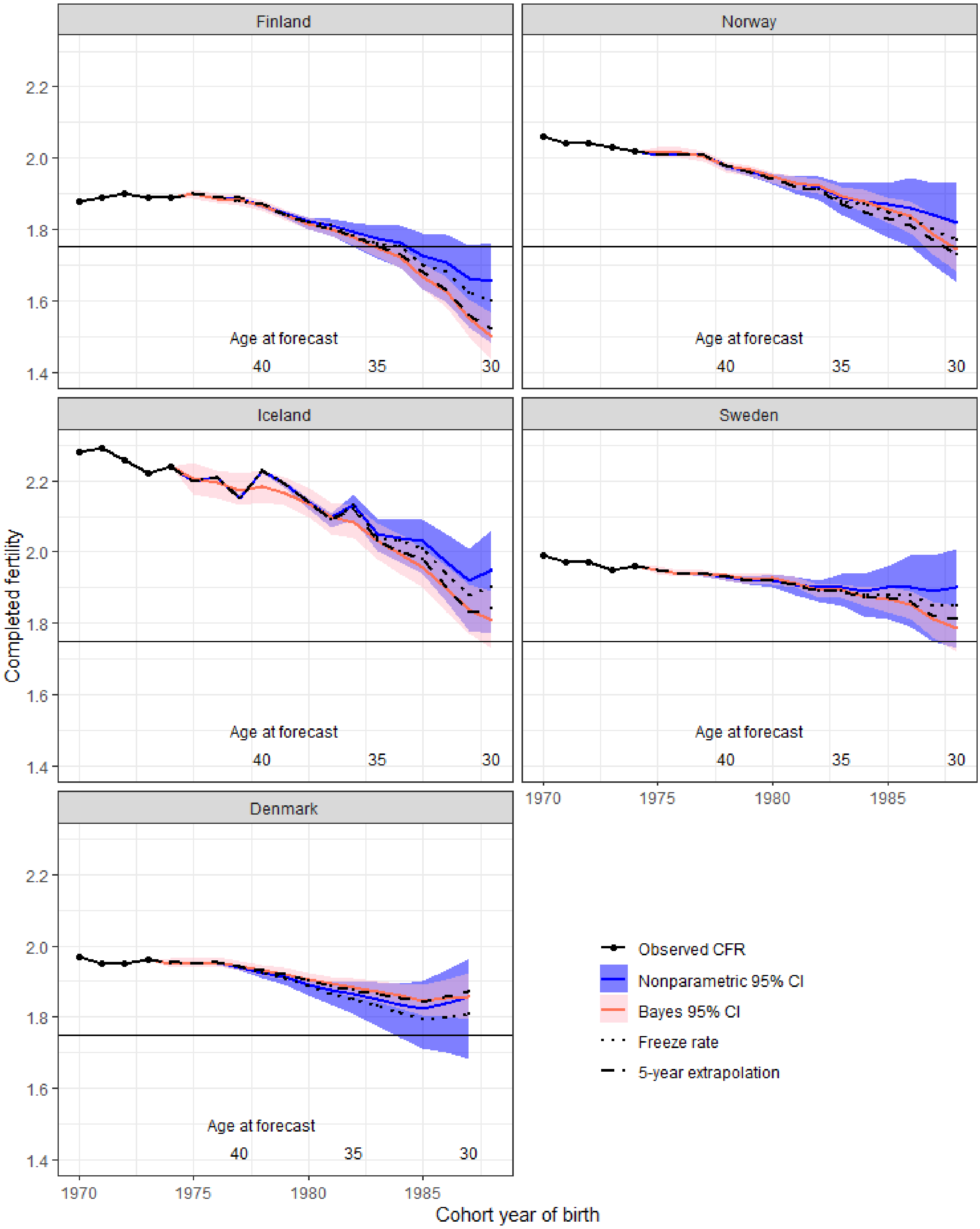

Figure 7: Observed completed cohort fertility rate (CFR) for the 1970-1974 cohorts and forecasted CFR for the 1975-1988 cohorts in the Nordic countries.
Note: Observed CFR for the 1940-1973 cohorts and forecasted CFR for the 1974-1987 cohorts in Denmark. Full line indicates threshold for very low fertility at 1.75.