

Boom or bust? Shifts in births and fertility rates across the highly developed countries during the COVID-19 pandemic

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1 Introduction

The Coronavirus disease 2019 (COVID-19) pandemic has profoundly affected every aspect of our lives, including family-related behaviours (Settersen et al. 2020). Some early media accounts suggested that the lockdowns may lead to a baby boom as couples spend more time together. However, past evidence on fertility responses to external shocks, such as economic crises and financial turbulences (Sobotka et al. 2011; Comolli 2017) as well as on the outbreaks of infectious diseases such as the Zika epidemic in Latin America in 2015-2016 (Rangel et al. 2020; Marteleto et al. 2020) show that people often postpone or revise their childbearing plans in uncertain times (Vignoli et al. 2020). These responses result in considerable short-term fluctuations in fertility (e.g., Comolli and Vignoli 2021). Indeed, surveys on fertility intentions in Europe and in the United States during the first two waves of the COVID-19 pandemic in 2020 revealed that many women decided to delay or even give up their childbearing plans (Lindberg et al. 2020; Luppi et al. 2020; Arpino et al. 2020).

Especially in the highly developed countries, where couples have access to reliable birth control and most women are employed, the pandemic is expected to depress fertility rates as many people struggle with economic uncertainty, worries about the health consequences of the pandemic and stress related to lockdowns and restrictions to everyday life (Aassve et al. 2020; Settersen et al. 2020; Kearney and Levine 2020a). The pandemic has also affected reproductive behaviour in more subtle ways: marriages were postponed, younger people and couples not living together had fewer opportunities to meet, some couples reported less frequent sexual intercourse (Lehmiller et al. 2020 for the United States), families struggled to accommodate to home schooling and other needs of their children staying at home, and contact with grandparents—important providers of childcare—was often interrupted for many months. While most arguments suggest that the pandemic will lead to a decline in the number of pregnancies and births (Berrington 2021), some factors may also lead to an increased fertility rates in some countries, periods, and population groups. Berrington et al. (2021) mention the possibility of achieving a better work-life balance and improved quality of their relationship among some couples during the lockdown period. In a similar vein, more time spent at home could also lead to a higher frequency of sex among some couples and may bring monetary savings to wealthier families, who had fewer opportunities for trips and activities outside the home. Postponed pregnancies during the peaks of the pandemic may also be partly “made up” during the periods when infection rates decline, lockdowns are ended, and life returns closer to pre-pandemic situation. On balance, the impact of the pandemic on birth trends is likely to vary between countries

and over time, depending on the waves of infections, lockdowns and other restrictions, as well as on the longer-term impact of the pandemic on families. Economic and labour market trends, changes in income, and policies supporting families will therefore be important factors affecting fertility responses to COVID-19.

In the absence of the actual data on initial trends in pregnancies and births, Wilde et al. (2020) used data on Google searches for 40 fertility-related keywords to predict short-term trends in the birth rates in the United States in the wake of the pandemic. They projected that births would start dropping in November 2020 and this fall would accelerate until February 2021, with about 15% fewer births expected compared to October 2020. Media in many countries drew evidence from hospital records and preliminary, often local and small-sample, datasets, which reported fewer pregnancies and births in the last months of the year. An early evidence mostly supported the notion that the COVID-19 pandemic would bring about a sharp decline in the number of births and pregnancies and the initial speculations about possible baby boom have largely vanished, with many reports of the looming COVID-19 “baby bust” (Pinsker 2020) and “baby crash” in 2021. Among the more systematic efforts to analyse first data on birth trends, Philip N. Cohen (2021) reported a substantial decline in the number of births in some states of the United States in December 2020, reaching around 10% in Arizona, California, Ohio and Florida.

Our study looks at monthly trends in the number of births and fertility rates across the highly developed countries with good quality of birth registration. Our analysis is based on Short-Term Fertility Fluctuations (STFF) data series (<https://www.humanfertility.org/cgi-bin/stff.php>) incorporated in the Human Fertility Database (2021). We focus especially on birth trends between October 2020 and April 2021, covering pregnancies initiated during and after the first wave of the coronavirus pandemic in Spring and Summer 2020.

We address the following questions:

- How did monthly birth trends evolve between countries and over time in late 2020 and early 2021?
- Did the birth trends in the wake of the COVID-19 pandemic differ consistently from the pre-pandemic birth trajectory? Is there a convincing evidence of the baby bust induced by the pandemic?
- Did period fertility rates reach record low levels during the pandemic?
- Which factors are associated with birth trends during the pandemic?

2 Data and methods

Our study draws from the Short-Term Fertility Fluctuations data series launched on 12 March 2021 and embedded in the Human Fertility Database (HFD) website. The dataset features data on the number of live births per month since January 2000 in highly developed countries with good quality of vital registration data and almost complete coverage of births in their vital statistics. The STFF dataset is especially suitable for studying birth and fertility fluctuations that arise in response to external shocks—such as an outbreak of the COVID-19 pandemic or economic shocks and turbulences—or in response to significant changes in family-related policies.

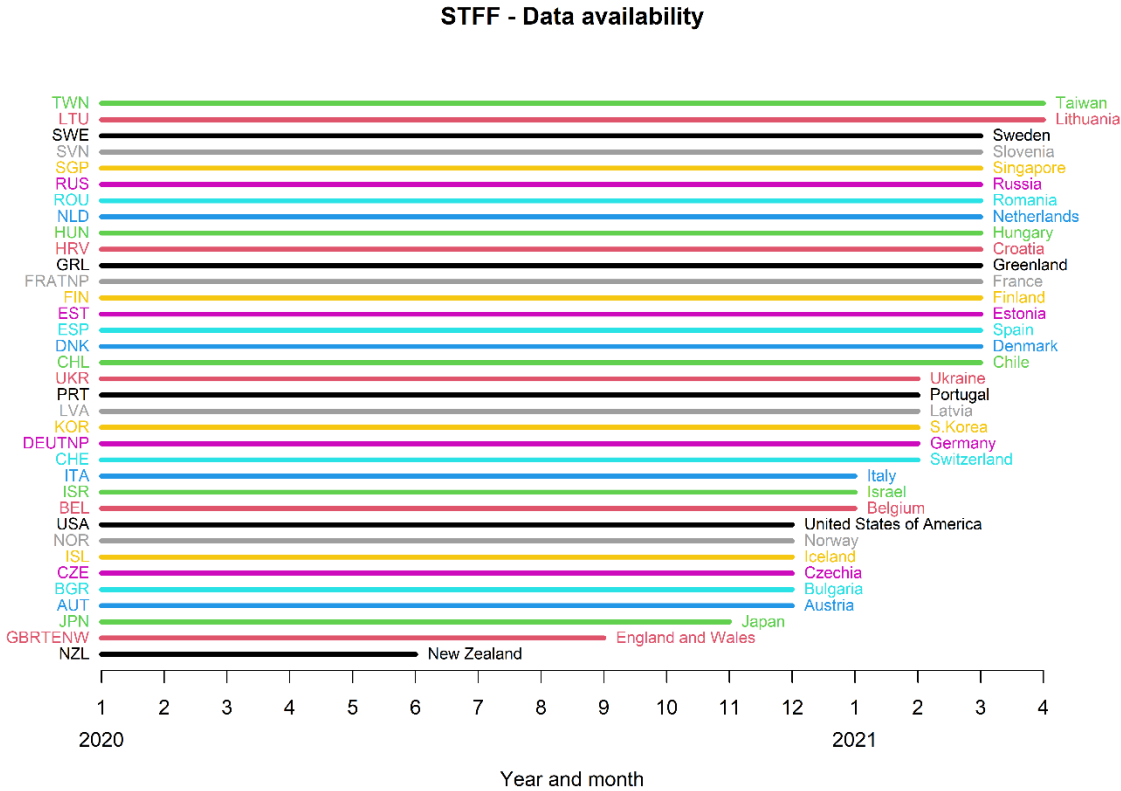
As of 15 May 2021, the STFF data series covers data for 35 countries and areas (Figure 1), most of which has been released and published by national statistical offices. We focus on a subset of these data, covering larger countries (with population over 1 million) for which data were available at least

until December 2020, when the early impact of the COVID-19 pandemic on births conceived in March 2020 should have become clearly visible. Of the 30 countries and areas that fulfil these requirements, recent data are subject to a number of limitations. Often, initial data that are reported within a few months are preliminary and incomplete, subject to subsequent revisions and adjustments. These adjustments might eventually increase the reported number of births in the most recent months, possibly turning what appears as considerable fall in the number of births to a small blip in a few cases. Many countries report monthly birth data by month of registration rather than month of occurrence, which might be an issue in times when data collection and reporting are disrupted, as was often the case during the early stage of the COVID-19 pandemic. As a result, monthly birth data for some countries suffer substantial fluctuations, which might also affect birth numbers reported in the final month of the year, when some of the late-reported births are added to the database. This factor probably explains a sudden spike in the number of births in December 2020 reported in some countries, often in combination with a “suspicious” time-limited sharp fall in the reported births in March-May 2020, when birth registration might have been put on hold (e.g., in Lithuania, Romania, Russia, Ukraine, and Taiwan). To filter out these fluctuations, we exclude these countries from parts of our comparative analyses. Our core dataset covers 17 countries and regions with high quality of monthly data: Austria, Belgium, France, and the Netherlands (Western Europe), Denmark, Finland, Norway and Sweden (Nordic Countries), Italy, Portugal and Spain (Southern Europe), Czechia, Hungary and Slovenia (Central Europe), Bulgaria (South-eastern Europe), Israel and the United States. In addition, to widen our geographic coverage we also include data collected by month of registration for two large Eastern European countries, Russia and Ukraine and for one East Asian population, South Korea.

In most countries, births display a seasonal cycle during the year. Without filtering out the effects of seasonality as well as uneven length of calendar months and uneven number of weekdays in different months, monthly birth trends cannot be simply compared between adjacent months as most of these monthly fluctuations might be driven by these effects rather than by genuine changes in reproductive behaviour. To address this issue, our analysis of birth dynamics focuses on relating monthly number of births to the same month in the previous year rather than to the preceding months. We also adjust the data for the number of days in February to make them comparable between February 2020 (leap year, 29 days) and February 2021 (28 days). Furthermore, we will employ X-13-ARIMA-SEATS program to filter out the impact of calendar (number of days and specific weekdays in a month) and seasonality to estimate the monthly number of births not affected by these two factors.

Numbers of births and other vital events are crude indicators that are not adjusted for the changing size of population in a given country or region and its changing age and sex composition. Our future analysis will also include estimates of monthly Total Fertility Rates (TFRs) that are not affected by changing age and sex structure of the population.

Figure 1: Countries and areas in the STFF data series: availability monthly data for 2020 and 2021



3 Initial findings

Most countries display distinct dynamics in births since October 2020. Initially, the relative number of births compared to the same month in the previous year declined and this decline accelerated from November 2020 to January 2021. In February this trend reversed and subsequently most countries with available data recorded an upturn in the number of births in March 2021. This dynamics is clearly visible in Belgium and France among Western European countries, in Southern Europe, in Hungary, in Russia and Ukraine (except for the spike in December 2020 linked to delayed reporting of births in 2020) and outside Europe in Israel and, likely, in the United States (data available only until December 2020). Data for France (Figure 2) illustrate this pattern well: a slight decline in the number of births conceived prior to the pandemic (births in January-September 2020 fell by -1.9% year-to-year) was followed by a deepening fall in October 2020 to January 2021, when the relative decline reached 13.2% compared with January 2020. However, two months later, in March 2021, reported births were almost identical to the number of births one year earlier. The fall in relative births was especially pronounced in the three Southern European countries, where births in January 2021 plummeted by 13.3% in Italy, 19.3% in Portugal and 20.2% in Spain (Figure 2). Hungary shows sharp reversals in its birth dynamics, shifting from a rise until November 2020 to a fall in December 2020-January 2021, which was then followed by a renewed and accelerating relative rise in February-March 2021 (Figure 2). Also some countries with irregular data, such as Estonia (Figure 2) and Taiwan, broadly conform to the pattern of a deepening fall in births until January followed by a short-term upturn.

By contrast, birth trends in the Nordic countries (Finland in Figure 2), the Netherlands (Figure 2), Slovenia, and South Korea, appear relatively little affected by the first wave of the COVID-19 pandemic, with no downturn in relative births observed in November 2020 to January 2021. At the

same time, most of these countries still show a clear upturn on the number of births in February-March 2021.

Three figures summarise broader trends across countries and groups of countries. First, the graph on birth trends across 12 European Union countries with good-quality data (Figure 3) shows an acceleration in the decline in the relative number of births compared with the same period in the previous year from -2.0% among births conceived in the pre-pandemic period (births in January-September 2020) to -12.5% for births that occurred in January 2021. One month later, in February 2021, birth trends were identical to the pre-pandemic situation. Second, a comparison of monthly data on relative birth trends for January 2021-March 2021 shows the shift from negative to positive birth dynamics across most countries with available birth data until March 2021 and high quality of recent monthly datasets (Figure 4). This is further illustrated in Figure 5, depicting average trends in relative number of births across eight countries from January 2020 to March 2021. The average decline by 6% in the year-on-year number of births in January 2021 was later followed by a similar rise, by 6%, two month later, in March 2021.

In sum, the evidence presented in our study shows that the first wave of the COVID-19 pandemic, which gathered momentum in March-May 2020, was mostly associated with a declining birth dynamic in November 2020-January 2021. This decline was especially sharp in Southern Europe which has been strongly affected by the initial outbreak of the coronavirus (especially in Italy and Spain). Subsequently, a temporary easing of the pandemic in Summer 2020 was often associated with a decelerated birth decline in February 2021 and then an upturn in the number of births March 2021. This indicates a brief fertility recovery of the births postponed during the first wave. This evidence further suggests that short-term birth trends during the COVID-19 pandemic may follow cycles of temporary baby busts and recoveries, driven by the cycles of rising and falling infections and deaths. If this expectation proves realistic, the highly developed countries would face a renewed sharp downturn in births and fertility rates in Summer 2021, corresponding the second wave of the pandemic in Autumn 2020.

4 Future research

We aim to expand this analysis alongside several dimensions:

- Providing an update to this analysis incorporating trends for more countries and more recent months as more data become available
- Estimating monthly birth numbers not affected by calendar and seasonality effects, using X-13-ARIMA-SEATS program
- Comparing projected number of births past October 2020, based on the previous trends with the observed number of births since November 2020. The projection is also based on X-13-ARIMA-SEATS program
- Estimating monthly an annual General Fertility Rates (GFR) and Total Fertility Rates (TFR) in 2020-2021, using monthly births adjusted for calendar and seasonality factors (see above) and projected population composition by age and sex in 2020 and 2021
- Employing time series data to identify associations between the observed monthly birth and fertility trends on one side and selected indicators pertaining to the COVID-19 pandemic and its social and economic impact on the other side

Figure 2: Recent trends in the number of births by month and relative change in the number of births compared to the same period in the preceding year (selected countries)

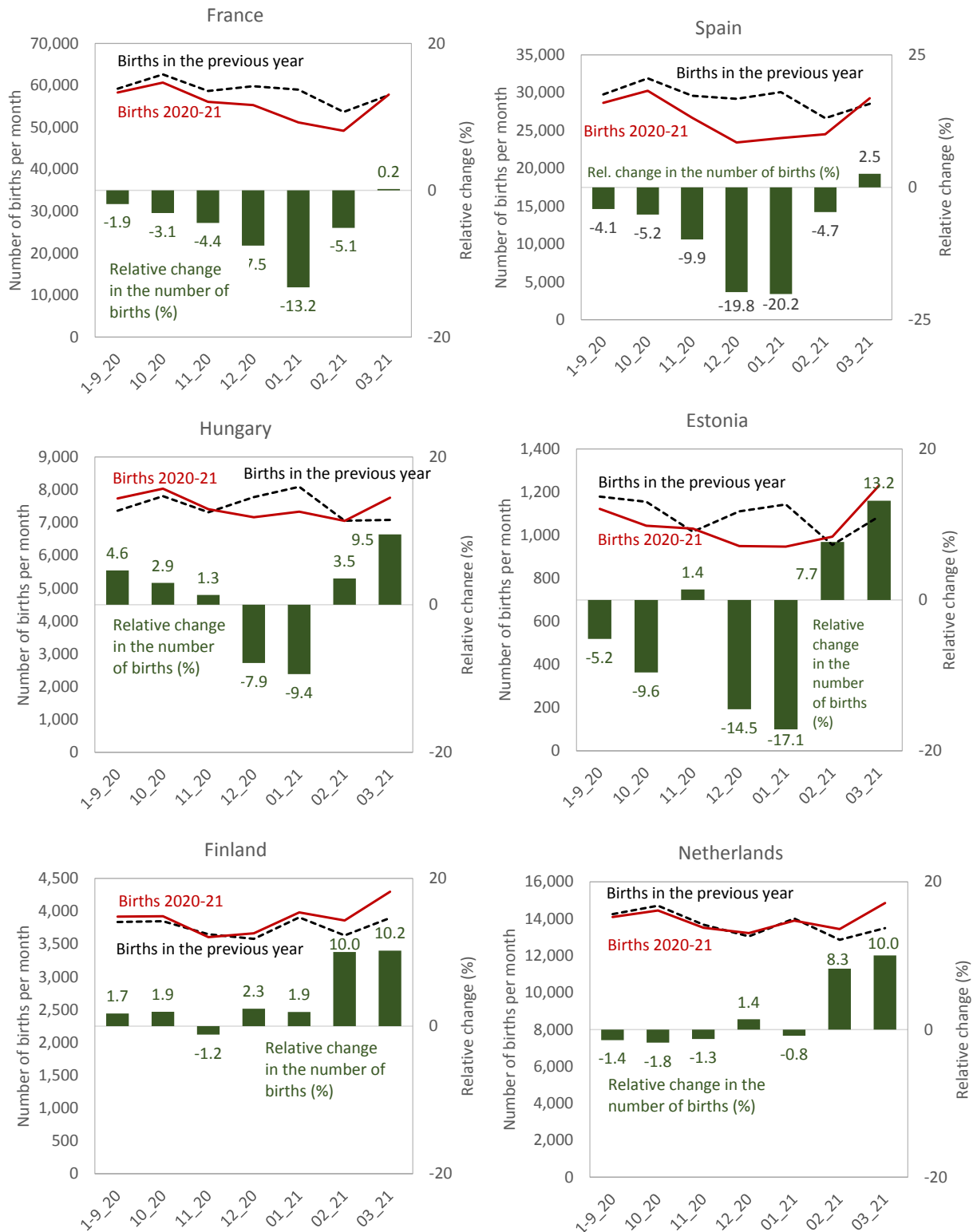
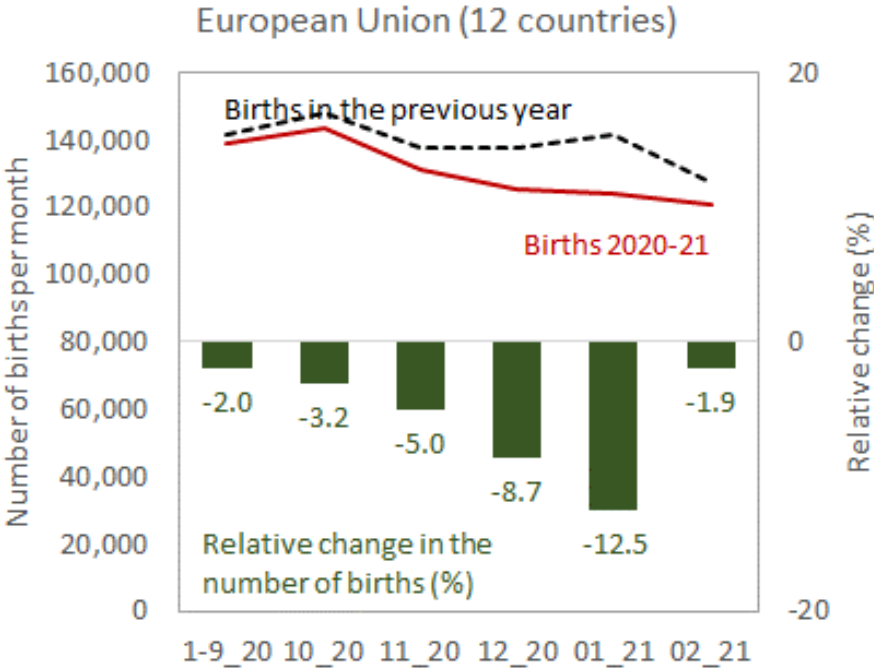


Figure 3: Trends in the number of births by month (January 2020 – February 2021) and relative change in the number of births compared to the same period in the preceding year, 12 countries of the European Union



Note: Data for following countries are included: Croatia, Estonia, Finland, France, Hungary, Lithuania, Latvia, Netherlands, Portugal, Slovenia, Spain, and Sweden. The graph is based on the total sum of births by months in these countries.

Figure 4: Relative change in the number of births compared to the same period in the preceding year; January – March 2021, selected countries with high-quality data (data sorted by the relative decline in births in January 2021)

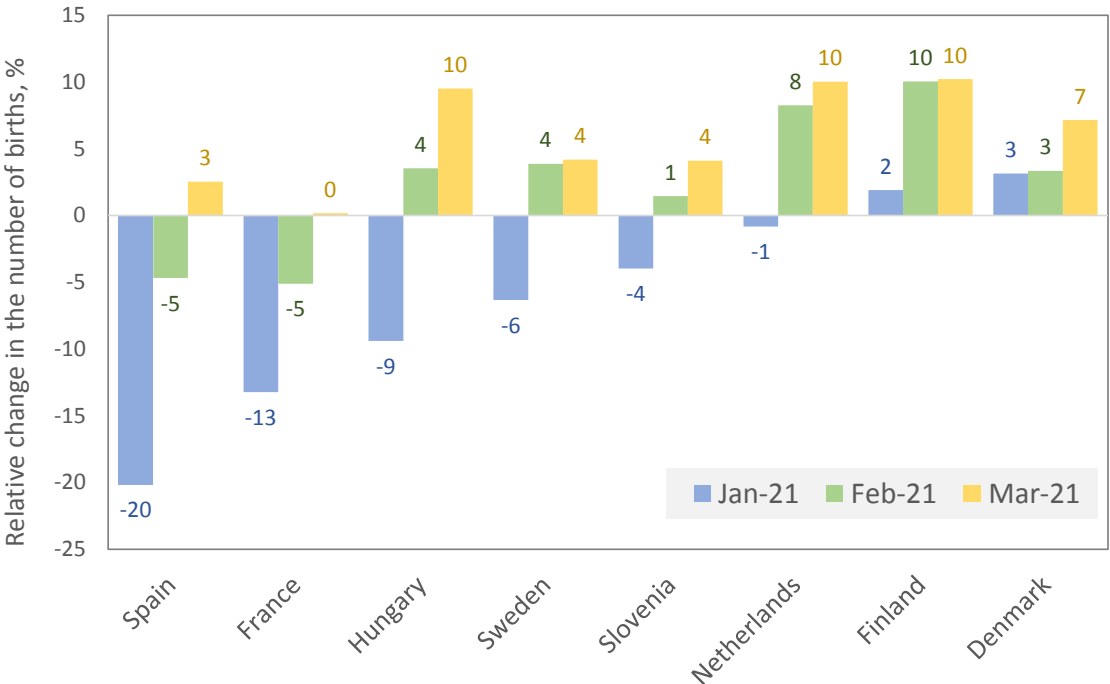
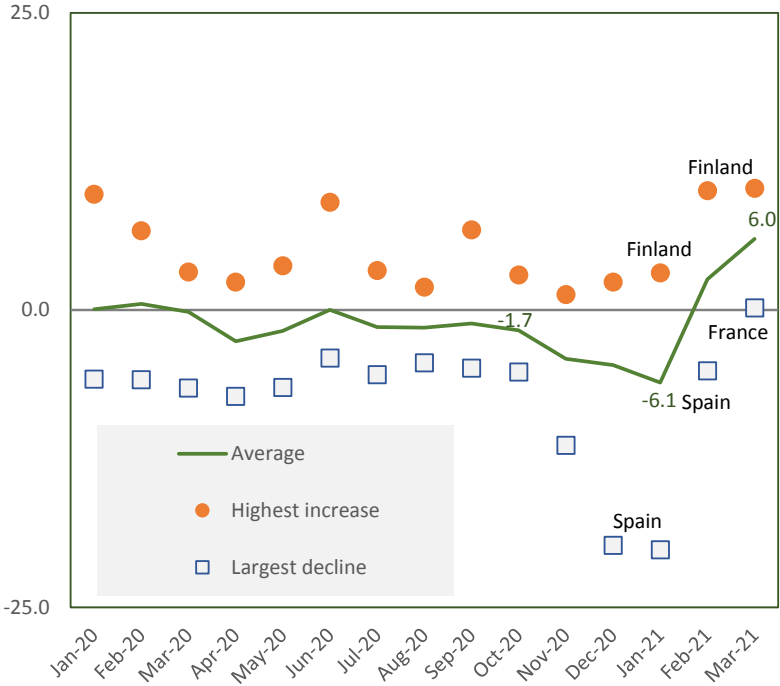


Figure 5: Relative change in the number of births compared to the same period in the preceding year; summary of trends (average, highest and lowest value) across eight countries with high quality of monthly datasets



Note: Data for following countries are included: Finland, France, Hungary, Netherlands, Portugal, Slovenia, Spain, and Sweden. The graph shows an average change in the monthly number of births compared with the same month last year in these countries (simple average, not weighted by population size, is used).

References

(to be added)