Pandemic Babies in Detail – Recent Birth Trends by Age of Mother, Birth Order and Selected Socio-Economic Characteristics

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SHORT ABSTRACT (250 words)

The COVID-19 pandemic, that hit severely Europe since March 2020, seriously affected all aspects of social and economic life, which in turn inflicted profound changes in fertility levels and timing. It has been documented that nine months after the pandemic outset, in December 2020 to January 2021, the numbers of births fell in many European populations. After the temporary recuperation in the rest of year 2021, preliminary data for 2022 and 2023 show continuing decline in numbers of births. However, more detailed data by age of mother, birth order, and other characteristics are needed to get deeper insights about the impact of the pandemic. Our paper presents the first evidence on birth trends in Austria, Switzerland, Czechia, Spain, Portugal, and Sweden, based on detailed birth data by age of mother, birth order, origin, and education of mother.

Our analysis is divided into two parts. In the first part, we analyse temporary changes in the short time span of December 2020 to January 2021, where the declines in births were massive in some countries (e.g., Spain by ~20%). In the second part, we analyse consequent decline of 2022–2023.

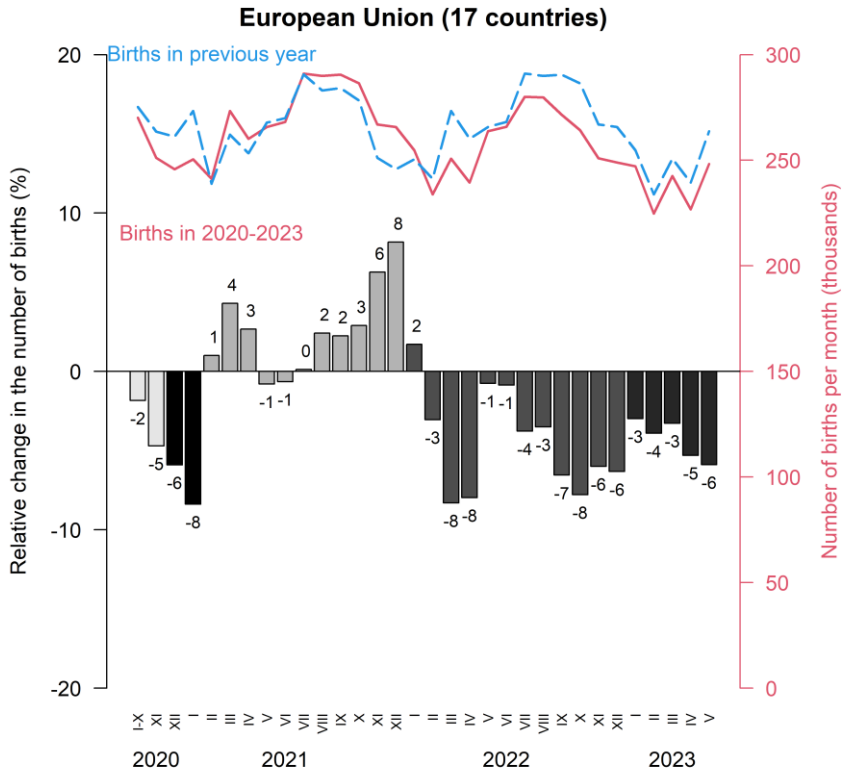
Our hypothesis, that more vulnerable population groups have been more affected by the economic uncertainty and by the policies to curb the spread of the pandemic, was only partially confirmed. Furthermore, we hypothesise, that the two periods of decline might be affected by different mechanisms. We continue to update the data, so we provide the comprehensive picture by the EPC conference.

INTRODUCTION

The COVID-19 pandemic, that hit severely Europe since March 2020, seriously affected all aspects of social and economic life (Settersen et al. 2020). Demographers are especially concerned about mortality and fertility trends. It has been shown that the pandemic is affecting childbearing and family processes, altering couples' fertility plans, and causing delays or declines in family formation, conception, and births (Aassve et al. 2020, Sobotka et al. 2023).

So far, it has been documented that nine months after the pandemic outset, in December 2020 to January 2021, the monthly number of births fell in many European populations. Subsequently, this decline has slowed down or reversed in the rest of 2021, probably as a reaction to the ceasing of the first wave of the pandemic in Europe during the summer months of 2020. However, the recuperation did not last long, and has turned to further significant declines in numbers of births by about 10% yearly in 2022 and first half of 2023 – see the aggregate relative changes for the European Union (17 selected countries) in Figure 1.

Figure 1 Monthly numbers of births and relative change in 17 selected countries of the European Union, 2020 to May 2023



These findings are based on the data from *Short-Term Fertility Fluctuations* (STFF) data series (www.humanfertility.org/Data/STFF) collected in the *Human Fertility Database* (HFD 2023). Our current knowledge on birth trends in the wake of the COVID-19 pandemic is based on the reported trends in monthly numbers of births, which are published by national statistical offices in most of the highly developed countries. Some of these data are preliminary and subject to revisions, and most of statistical offices publish only monthly totals of live births, with a typical delay of about 2–6 months.

However, more detailed data by age of mother, birth order, and other characteristics are needed to get deeper insights about the impact of the pandemic on births and fertility trends

among specific population groups. Such data have not been published yet for most countries. Our paper aims to present the first evidence on birth trends in selected European countries, based on finer-grained birth data related to the initial period of the COVID-19 outbreak.

DATA AND METHODS

Our analysis is divided into two parts. In the first part, we analyse temporary changes in the short time span of December 2020 to January 2021, where the declines in births were massive in some countries (e.g., Spain by ~20%). In the second part, we analyse consequent decline of 2022–2023.

We present the data for six selected European countries with available data. For the first part we analyse data for Austria, Czechia and Spain, by birth order (1, 2, 3+), age-group of mother (to avoid fluctuations due to low numbers we choose broad categories <25, 25–34, 35+), origin of mother (whether she was born in the country or not), and the educational attainment of mother (harmonised to Low, Medium, High, or Primary, Secondary, Tertiary).

In the second part we analyse development in 2022–2023 in Czechia, Spain, Portugal, Switzerland, and Sweden, looking especially on births by birth order and age of mother. The availability of data and the detail is summarised in Table 1.

Table 1 Summary of data availability

Country	CODE	Last update	Monthly	BO	Age	Origin	Education	Source
Spain	ESP	2021	Y	Y	Y	Y	Y	INE individual data
Spain	ESP	04/2023	Y	N	Y	N	N	INE monthly totals
Austria	AUT	12/2021	Y	Y	Y	Y	N	Birth Barometer
Czechia	CZE	06/2023	Y	Y	Y	N	Y	CZSO
Portugal	PRT	2022	N	Y	Y	N	N	HFD
Switzerland	CHE	2022	N	Y	Y	N	N	HFD
Sweden	SWE	2022	N	Y	Y	N	N	HFD

As the detailed data are still of very limited availability, we restrict our analysis to these six countries, which represent well the differences in birth trends during the early stage of the COVID-19 pandemic in Europe (Sobotka et al. 2023) but also allow for international comparison. Czechia is country of Central-Eastern Europe, with initially very limited reaction to the pandemic – there was no year-to-year decline in the number of births in December 2020, and just a minor decline of 1% in January 2021 (Figure 2). Here also the first wave of COVID was relatively weak, while the second wave, lasting from autumn 2020 to spring 2021, had much more severe health and mortality consequences, which might influence fertility after July 2021. For Czechia we analyse detailed monthly data until June 2023, divided by birth order, by age, and also by education of mothers.

Austria is a representative of Western Europe, as well as of German-speaking country, with only a modest initial decline in the number of births of 5% in December 2020 as compared with December 2019, while in the pre-pandemic period of January to October 2020, the decline compared to 2019 amounted to only 1% (see Figure 2 and Table 2). There has been compensatory increase of births in February and March 2021 of 9% and 4% resp., after which

the fertility trend has further stabilised. Individual birth data for Austria are part of the Birth Barometer dataset (https://www.birthbarometer.at). In the next section we show results for 2021, by birth order, age of mother, marital status, and origin of mother.

By contrast, Spain was severely hit by the first wave of the pandemic, resulting in a sharp decline in number of births by 20% in December 2020 and January 2021 (Figure2 and Table 2), compared to rather moderate decline of 4% in January to October 2020. Also in Spain, the further trend in monthly numbers of births has stabilised. For Spain we analyse individual data published on the webpage of Spanish Statistical Office (https://www.ine.es), which are so far available for 2021. We also analyse preliminary tabulations of births by month and age of mother in 2022–2023.

Another country severely hit by the pandemic in the early stage was Portugal. Here the difference is that in the following years 2022–2023, the numbers of births were rather increasing – in fact it is the only country in Europe with consistently increasing fertility in 2022–2023.

Similar to Austria, we show data for Switzerland for 2022–2023, by birth order and age of mother. The data come from HFD.

Finally, we add Sweden as a representative of Nordic countries. Nordic countries were not hit by the early pandemic decline, but the fertility there is significantly decreasing in 2022–2023.

Figure 2 Rate of change in monthly number of births, six analysed countries, 2020–2023

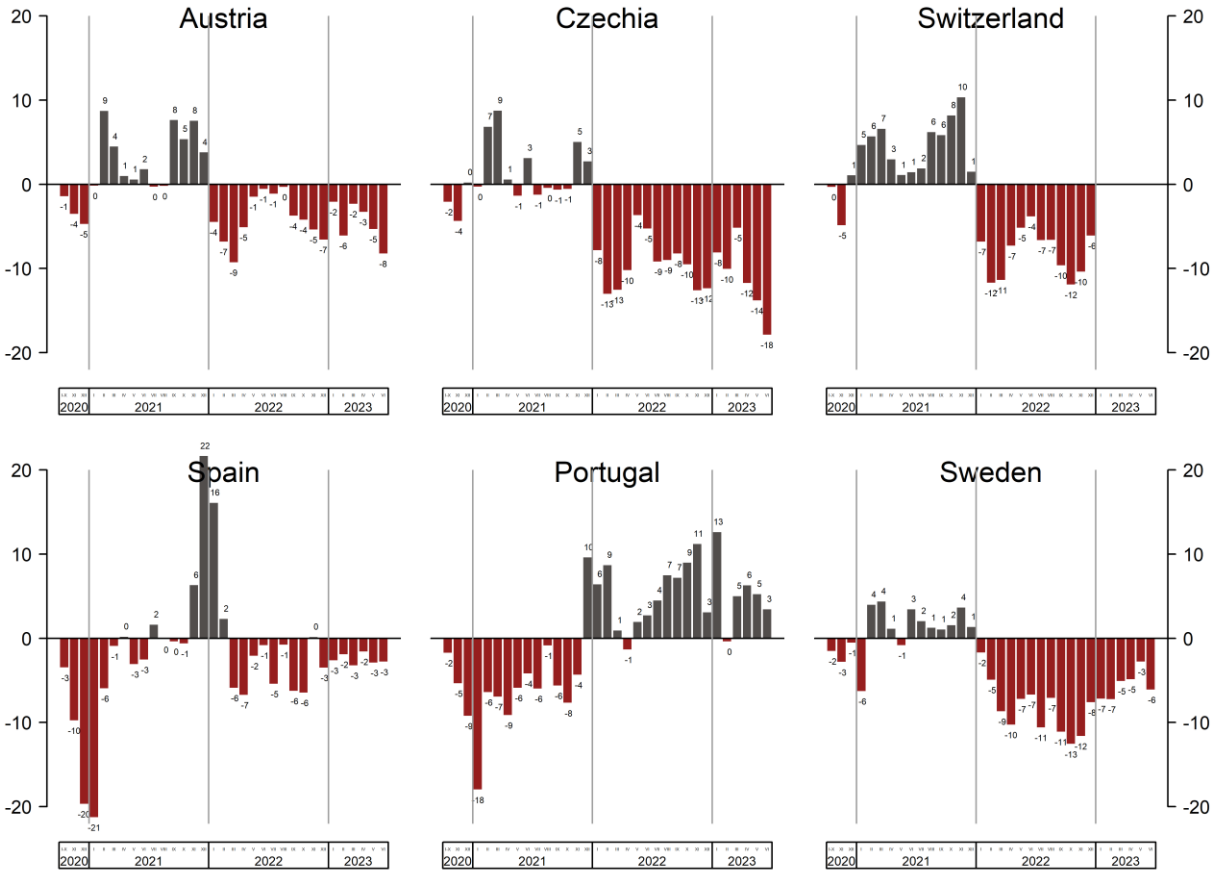


Table 2 Rate of change in monthly number of births, six analysed countries, various periods of 2000–2023

Country	XII/2020-I/2021	rest of 2021	2022	2023
Austria	-2%	3%	-4%	-8%
Czechia	0%	2%	-9%	-11%
Portugal	-14%	-5%	5%	-1%
Spain	-20%	1%	-2%	-6%
Switzerland	3%	4%	-8%	
Sweden	-4%	2%	-8%	-1%

The rate of change in monthly number of births is calculated as relative change (in percent) in the number of births in a given month compared with the same month in the previous year

$$RATE^{c}_{m,t} = \left(\frac{N^{c}_{m,t}}{N^{c}_{m,t-1}} - 1 \right) * 100\%$$

where *N* is number of live births, *m* is calendar month, *t* is a year, and *c* is further characteristic. The numbers for February are adjusted for different numbers of days in leap year 2020.

We expect that the initial fall in the number of births was more pronounced among the population groups whose lives had been more disrupted by economic uncertainty and by the policies to curb the spread of the pandemic—especially young adults below age 25, childless women, foreign-born women, and women with lower socio-economic status (as captured by lower education attainment). For the second decline in 2022–2023, we expect more general decline, spread through the age, birth order, and socio-economic status. However, we expect slower decline among women of higher reproductive ages (35+), women with higher socio-economic status who have more secure jobs, and women in the early stage of their family building (i.e., women with one child), who are often aiming to reach a "normative" goal of a two-child family. These differentials are likely to be less pronounced in Austria, Czechia and Sweden, which have more regulated labour markets, stronger welfare policies and fewer socio-economic inequalities and are likely to be stronger in Spain, where more people face unemployment and economic uncertainty, and also in Switzerland, where social and family policies are less generous.

FIRST RESULTS

Here we present first analysis of data that are available up to now. Country-specific results are displayed in the Appendix Figures. Table 3 also summarises the main findings.

For Austria, we dispose of data for up to 2021 only. Figure A1 shows the rate of change in monthly numbers of births in 2020 and 2021 by three important characteristics: age of mother, birth order, and origin of mother. First births seem to be least affected by the pandemic, declining only by 3% in December 2020, while second births declined by 4% (in January to November 2020 the numbers were stable). On the other hand, third and higher order births declined by 10% (compared to 6% in January to November). As of the age group of mothers, the results reveal there was a noticeable decline in the number of births in youngest age group, 15–24 (by 8% in December 2020 and by 13% in January 2021), but yet stronger fall took place among women aged 35+ (by 14% in December 2020). No change was observed at age 25–34. Finally, much stronger decline was reported among mothers born outside Austria (9% and 7%) than among Austrian-born mothers (3% and even increase in January 2021).

For Czechia we dispose of data by birth order, age of mother, and highest attained education of mother (Figure A2). Overall, the number of births was not declining in December 2020 and January 2021, and there was a slight increase in number of births in February–December 2021. However, decline in 2022–2023 amounted to 9–11%. The development was consistent along birth orders, with all orders declining in similar pace (but the decline of third and higher births accelerated in 2023 to 17%). As of age of mothers, the decline was first concentrated among young women below age 25, which was however later accompanied also by older mothers. We also analyse results by education of mother, the only socio-economic characteristic available to us, as of now. While births among low (primary) educated were first falling (by 9% in December 2020 and January 2021), births of secondary and tertiary educated mothers started falling more sharply in 2022–2023.

In Spain (Figures A3 and A4), in December 2020 the births of first and second order declined by around 20%, while among third and higher orders the decline was less pronounced, by 12–19%. As of the age of mother, youngest (<25) and oldest (35+) women showed biggest decline (by around 25%), compared to women at age 25–34 (15–19%). These findings are consistent with Fallesen and Cozzani (2023). Origin of mother was not differentiating the decline, but low educated mothers were the ones with most significant decline (even 37% in January 2021).

In Portugal (Figure A5), where the initial decline of 2021 was also pronounced like in Spain, young women and childless women most affected. However, in subsequent years 2022–2023, numbers of births increased or stagnated among all age and birth order categories.

For Switzerland and Sweden (Figures A6 and A7), we have so far only yearly data for 2021 and 2022. Here, the decline in 2022 seems to be concentrated more to higher birth orders, but among all age categories.

Table 3 Summary of findings

December 2020–January 2021

	Austria	Czechia	Spain	Switzerland	Portugal	Sweden
Age	<25 & 35+	<25	<25 & 35+	<25	<25	<25
Birth order	3+	no diff.	1 & 2	no diff.	1	no diff.
Origin	migrants		all decline			
Education		primary	primary			

2022–2023

	Austria	Czechia	Spain	Switzerland	Portugal	Sweden
Age		all decline	35+	all decline	all increase	all decline
Birth order		all decline		2 & 3	all increase	2 & 3
Origin						
Education		all decline				

CONCLUSIONS AND NEXT STEPS

So far, we do not have enough data to draw robust and significant conclusions. Our hypothesis was, that more vulnerable population groups will be more affected by the economic uncertainty and by the policies to curb the spread of the pandemic. The observed trends are only partly in line with our expectations. The data from the period of December 2020 to January 2021 mostly confirm our hypothesis, but they are also sometimes contradictory – see Table 3 for summary of findings.

- **Age of mothers**: In most countries, significant decline was recorded among youngest women of age 15–24. Fertility of women at age 25–34 was not affected. However, in Spain there was also significant decline in fertility of older women at age 35+, which could be related with the limited availability of assisted reproduction (Fallesen and Cozzani 2023).
- **Birth order**: In Spain, deepest decline was among births of first and second birth order. On the contrary, in Austria it was 3+ births where the decline was most pronounced, while in Sweden and Switzerland it was births of second and third and higher birth order.
- **Origin**: In Austria, the pandemic-related decline in fertility was clearly more severe among foreign-born women than among native women. This was not observed in Spain.
- **Education**: In both Czechia, and Spain, primary educated were especially affected by the birth decline.

In the next step we aim to collect more recent data to gauge the impact of the whole stage of the pandemic and the subsequent development in 2022–2023. By June 2024 (the date of the EPC conference), we should dispose of following data:

Austria – individual data for 2022 and 2023.

Czechia – detailed tabulation of data by age, birth order, education of mother for 2023.

Spain – individual data for 2022 and detailed tabulations by age of mother for 2023.

Switzerland, Portugal, Sweden – detailed tabulation of data by age and birth order for 2023.

We believe that analysing timely data by further characteristics is important for the understanding of the impact of the pandemic on level and timing of fertility.

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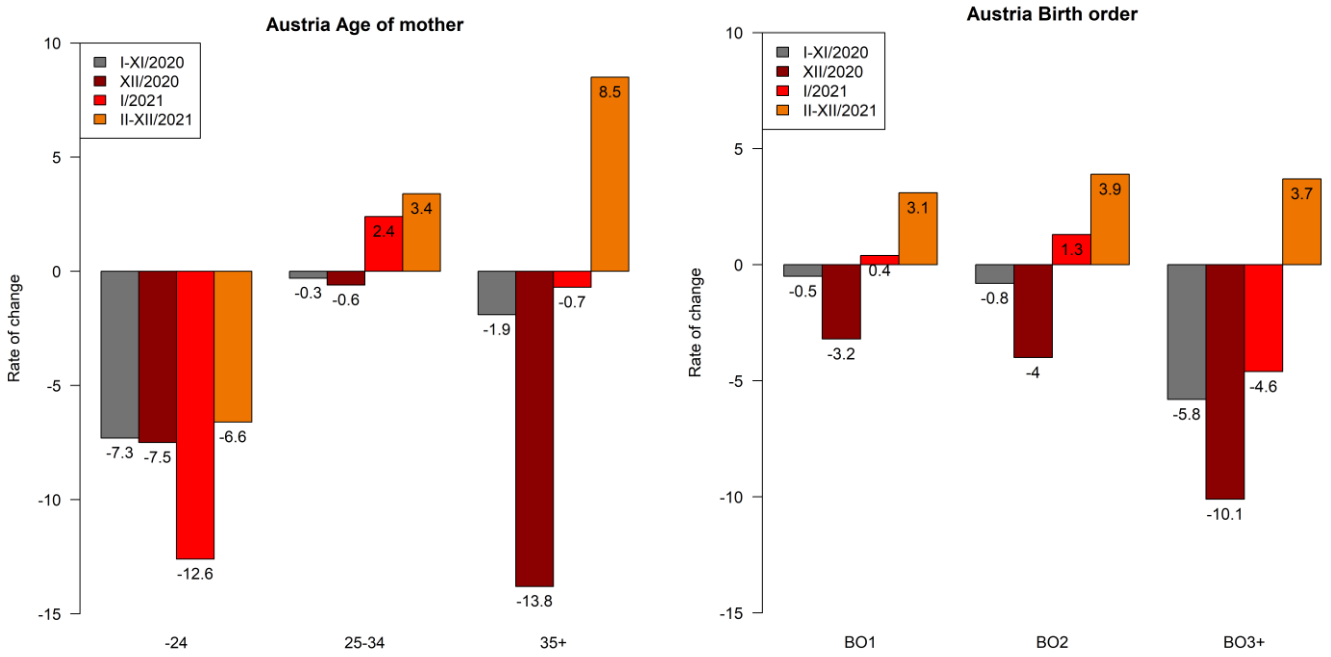
APPENDIX

Figure A1: Live births by month of delivery and other variables (age of mother, birth order, origin of mother), Austria 2020–2021, as related to previous year



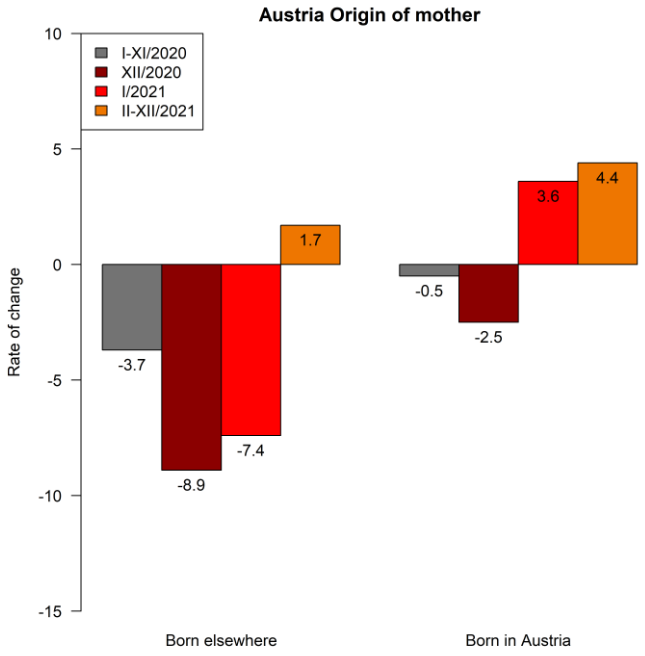


Figure A2: Live births by month of delivery and other variables (age of mother, birth order, education of mother), Czechia, 2020–2023, as related to previous year

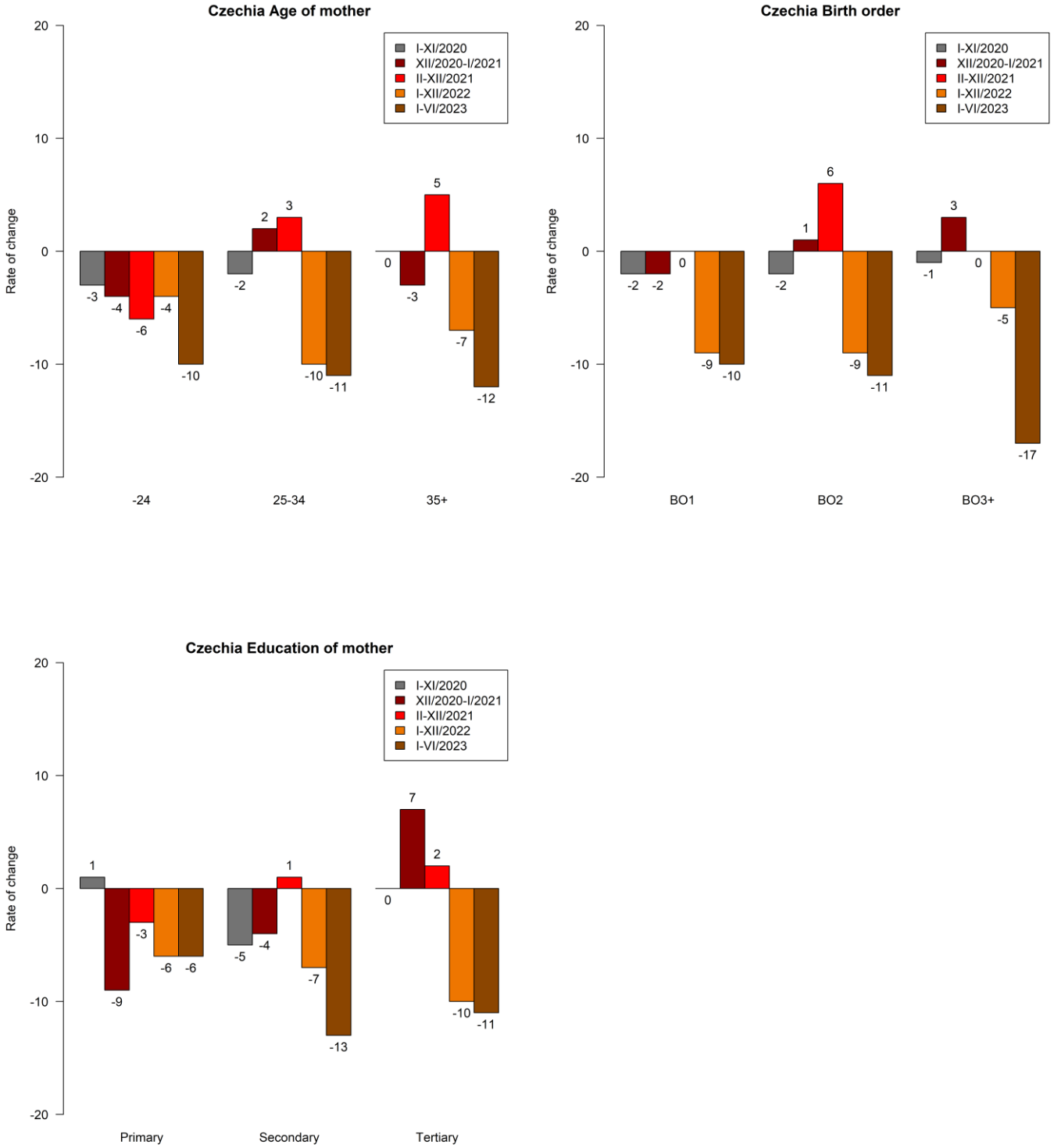


Figure A3: Live births by month of delivery and other variables (age of mother, birth order, origin, education of mother), Spain, 2020–2021, as related to previous year

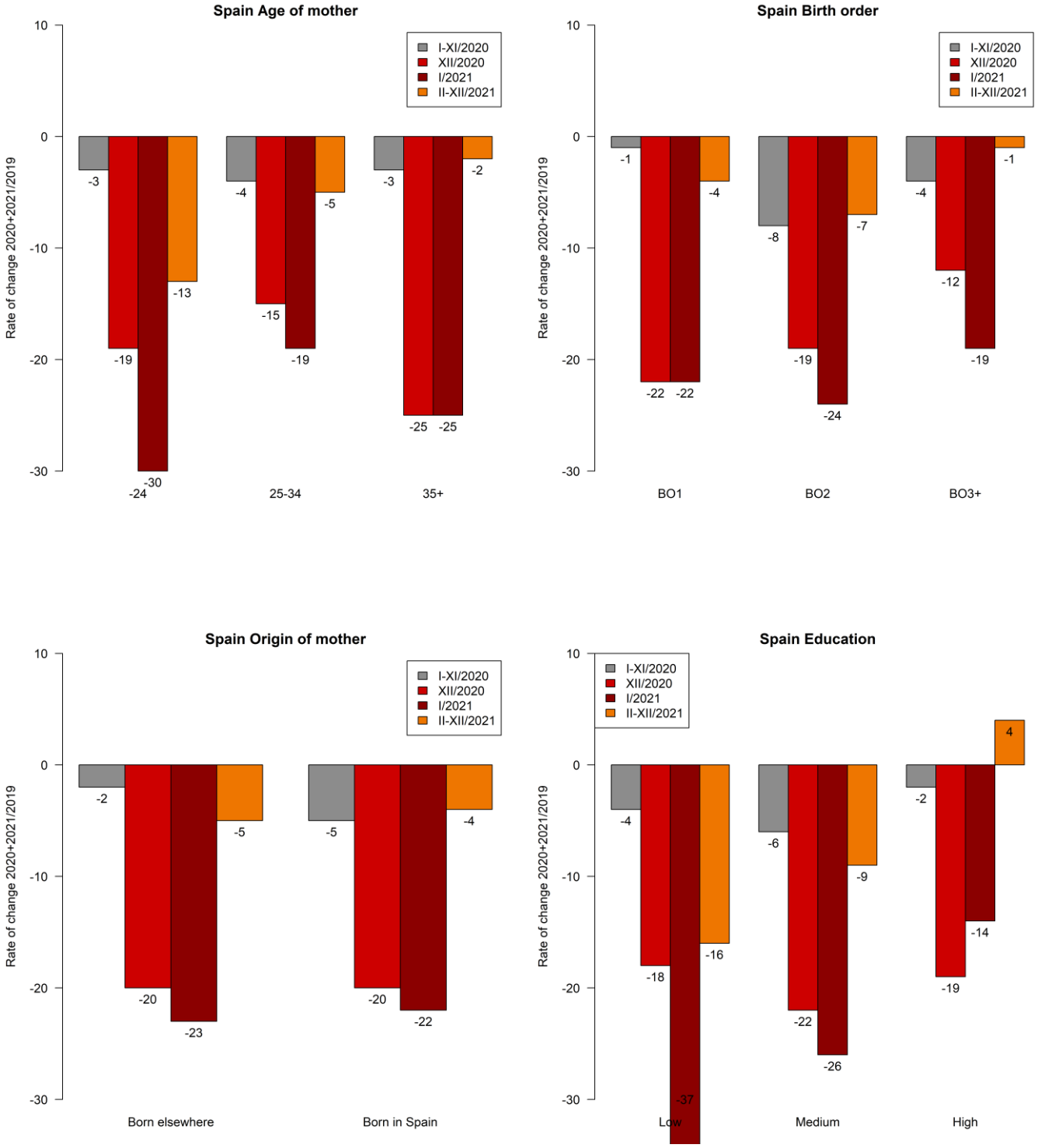


Figure A4: Live births by month of delivery and other variables (age of mother), Spain, 2020–2023, as related to previous year

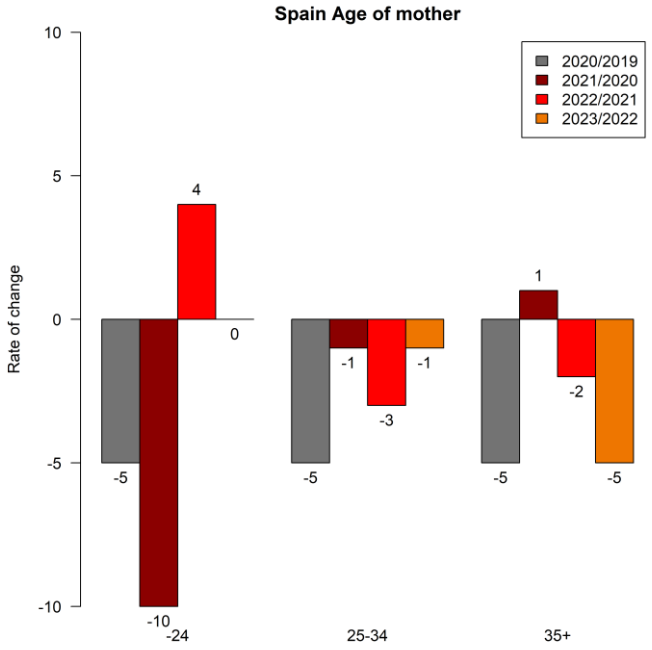


Figure A5: Live births by month of delivery and other variables (age of mother, birth order), Portugal, 2020–2022, as related to previous year

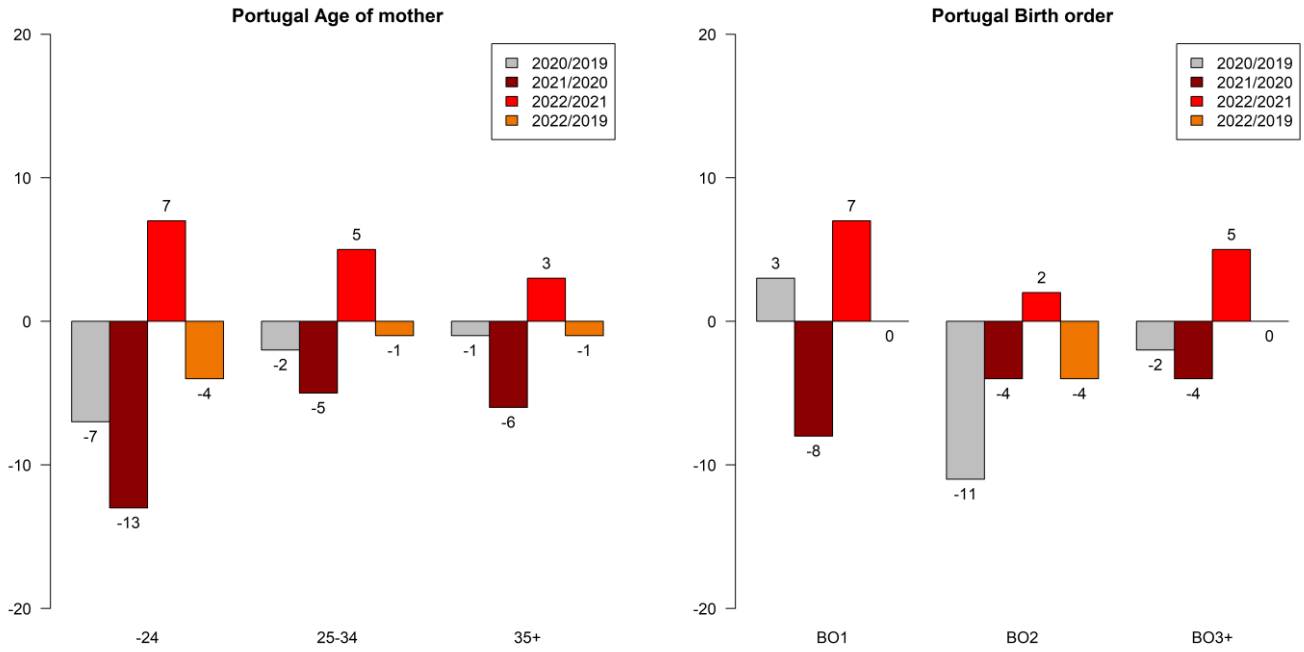


Figure A6: Live births by month of delivery and other variables (age of mother, birth order), Switzerland, 2020–2022, as related to previous year

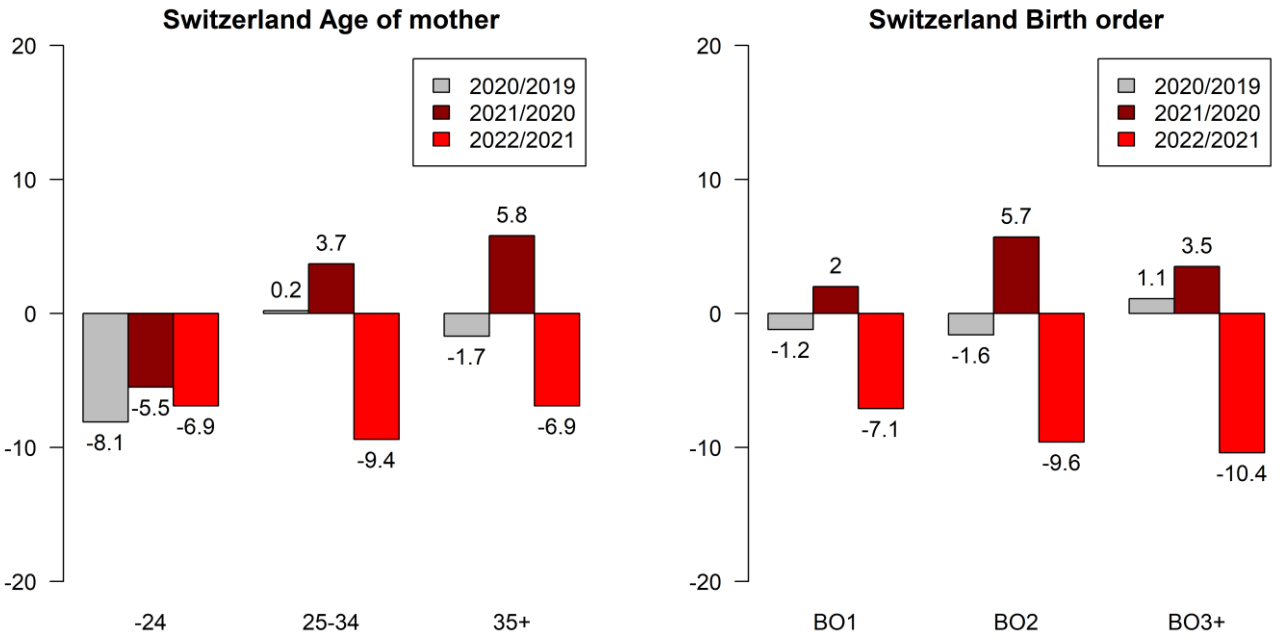


Figure A7: Live births by month of delivery and other variables (age of mother, birth order), Sweden, 2020–2022, as related to previous year