The Three 2010-2020 Fertility Puzzles

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ABSTRACT

Objective: This study investigates the reasons behind the sudden fertility decline in many Western countries after 2010 and explores the contrasting fertility trends within another group of European countries.

Background: In the 2010-20 decade, several countries with previously stable and high fertility rates experienced sharp declines, while others saw stable or increasing birth rates. Why fertility dropped abruptly in some contexts, why they experienced no recovery, and why the opposite prevailed in other contexts constitute three demographic puzzles. Prior research has focused exclusively on fertility-drop countries, thus limiting insights that may derive from comparisons.

Method: We begin with macro-level analyses of 29 European and Western countries, exploring plausible fertility drivers over the 2000-2020 period. We subsequently analyze micro-level data from Generations and Gender Surveys. We explore changes in the probability and timing of

partnership formation and the transition to parenthood, as well as childlessness at age 40 among women in the decades pre-post 2010, with particular attention to differences by educational level.

Results: Fertility-drop countries appear to have departed decisively from pro-cyclicality. The fertility decline is primarily driven by lower-educated individuals, who exhibit pronounced partnership and fertility postponement. Conversely, in countries with stable or rising fertility, lower-educated groups experienced notable fertility recovery in tandem with economic recovery after the Great Recession.

Conclusion: The interaction between partnering and childbearing among the lower-educated is key to understanding the divergent fertility trends across affluent societies after 2010.

1 Introduction

The sudden and surprisingly sharp drop in fertility across a large number of affluent countries in the 2010-20 decade is now well-documented. There is, however, substantial disagreement as to its underlying drivers. Although it is tempting to ascribe the drop to the preceding 2008 Great Recession, the timing of its onset fits this argument poorly, as the fertility decline coincided with economic recovery and growth. As we shall see, this inconsistency has promoted a number of rival hypotheses among demographers. What is not well recognized in the literature are three distinct puzzles: that the drop occurred in the very same countries that had maintained comparatively high fertility; the absence of any fertility recovery in this group of nations; and that a large number of countries displayed exactly the opposite trend, namely stable or even rising fertility rates.

The first puzzle is why this fertility decline occurred primarily in countries that boasted relatively high and stable fertility levels up until 2010, rather than in those that have long struggled with low birth rates. Paradoxically, the very countries that once sustained higher fertility saw the steepest drops, whereas those with historically low fertility remained stable or even experienced notable increases over the same decade.

The second puzzle is that the sharp drop in fertility in a host of affluent societies, including the Nordic and Anglo-Saxon countries, has not (at least yet) produced any subsequent recovery. This implies a departure from the well-known pattern of pro-cyclical fertility, i.e., birth rates did not rise despite economic recovery. In contrast, we see in other countries, including Germany and Czechia, a continued adherence to pro-cyclical fertility, with birth rates increasing in tandem with the resumption of economic growth.

And the third puzzle is, accordingly, why one group of countries – all European - came to exhibit stable and rising birth rates during the economic upswing 2010-2020, while another group went in the opposite direction.

Unsurprisingly, the sharp fertility drop has produced a substantial body of demographic research. Some are single-country studies, including Hellstrand et al.'s (2025) study of Finland, Teng and Margolis' (2024) Canadian study, or Van Wijk's (2024) Dutch contribution. Others have adopted a comparative approach, such as Comolli et al.'s (2021) and Hellstand et al.'s (2021) analyses of the Nordic countries. To our knowledge, except for Lesthaeghe and Zeman (2024), there is still no contribution that has addressed our third puzzle, namely, the divergent fertility dynamics across advanced democracies. Indeed, basically all quantitative studies have exclusively honed in on the 'fertility-drop' countries. A key argument in our study is that attention to the other

country group, and especially its continued adherence to pro-cyclical fertility, offers key insights into the central mechanisms that prevailed in the 'drop countries'.

Our contribution proceeds in two steps. We begin with macro-level analyses of 29 European and Western countries, with the aim of identifying plausible fertility drivers, 2000-2020. We assess the role of economic factors, degree of gender egalitarianism, and also post-materialist values in relation to the second demographic transition framework (Lesthaeghe, 2010).

We subsequently move to micro-level analysis using the Generations and Gender Surveys (GGS). Given that we need data for the 2010-2020 decade, we were compelled to include only six countries that have both rounds of the survey: Austria, Czechia, and Germany, representing countries with stable/rising fertility levels, and the Netherlands, Norway, and Sweden, representing the fertility-drop group. Adopting a female-based analytical approach for the pre-post 2010 decades, we examine changes in the probability and timing of partnership formation, the transition to parenthood, as well as childlessness at age 40. We shall give special attention to differences across educational levels.

In brief, our study aims to break new ground by comparing the fertility decline in previously high-fertility countries with countries where fertility remained stable or even increased. In addition, our adoption of both a macro and micro level approach should enhance our ability to assess the role of economic and social factors behind not only shifts in fertility, but also partnering behavior.

2 A review of the recent literature

Countries that have long enjoyed a comparatively high fertility rate, such as the United States, the United Kingdom, and the Nordic countries, have experienced a sharp drop in their

fertility rates, with no evidence of a substantial recovery in recent years. In contrast, several other European countries saw their fertility rates remain stable or even increase. For instance, according to World Bank data, the Total Fertility Rate (TFR) in the United States, a country previously known for its persistently close to replacement fertility levels, fell from 1.93 in 2010 to 1.64 in 2020. Meanwhile, in Czechia, which hovered for long at the lowest-low fertility levels, TFR rose from 1.51 to 1.74 over the same period. Various explanations have been proposed for the fertility decline. However, to our knowledge, almost no attention has been paid to understanding the stability or increase in fertility levels in other European countries. One exception is the study of Lesthaeghe and Zeman (2024), who acknowledge these diverging fertility trends. They argue that there has been a further postponement of fertility of young adults under the age of 30 within countries that experienced the fertility drop (the United States, Canada, and Western part of Europe), while the same did not occur in the Central and Eastern European countries. Their explanation for the fertility recovery in the latter group are their more traditional patterns of partnership formation, as well as a lower prevalence of the cultural values related to the Second Demographic Transition, such as giving importance to leisure, and harboring a preference for a child-free life.

A growing body of research has examined the impact of the Great Recession on fertility across regions and nations. A recurring finding is that it affected fertility behavior primarily through unemployment, job insecurity, and overall economic uncertainty. Matysiak et al. (2021) examine the relationship between economic conditions and fertility before and during the Great Recession. They present a sub-national analysis of 251 regions in 28 European Union countries, and conclude that fertility decline was strongly associated with rising unemployment and long-term unemployment across all childbearing ages. However, they observe that fertility trends in

Western and Northern Europe were not as closely tied to economic recession indicators as in other parts of the EU. Ayllon's (2019) analyses produce results very similar to those of Matysiak et.al. (2021). These studies, in other words, point to the emergence of societies that do not adhere to pro-cyclical fertility.

A meta-analysis by Alderotti et al. (2021) supports these findings while additionally highlighting gendered effects. They find that unemployment has a stronger impact on male fertility, whereas for women, temporary contracts play a greater role. Hellstrand et al.'s (2025) study of the sharp fertility drop in Finland emphasizes the impact of employment characteristics as well, but adds a special focus on field of education effects. They find that sharper fertility declines occurred in fields experiencing higher unemployment, lower income, and weaker occupational matching, whereas fields with employment and income improvements after the crisis experienced less pronounced declines. Apart from economic factors, structural changes in the prerequisites for parenthood may also influence fertility patterns. Van Wijk and Billari (2024) argue that the link between couples' perception of a favorable economic position and entry into parenthood has strengthened over the last two decades.

The decline in first births has been identified as the principal driver of overall fertility decline since 2010. Zeman et al. (2018) examine the drop in low-fertility countries from a cohort perspective, and find that the decline in completed fertility is largely due to a reduction in first births in German-speaking and Southern European countries, whereas in Eastern Europe, second births have declined more significantly. For the Nordic countries, Hellstrand et al. (2021) find that the post-2010 fertility decline is primarily driven by first births across all ages, with little evidence that this is merely due to postponement. They suggest that the drop is likely to result in a long-term cohort fertility decline. A more detailed analysis of Finland confirms that the decline has been

driven primarily by first births among women under the age of 30 (Hellstrand et al, 2020). However, for the first time, a sustained decline is also observed among women aged 30 to 39, indicating that fertility recovery at later ages has declined, thereby promoting cohort fertility levels comparable to those in very low-fertility countries. Teng and Margolis' (2024) Canadian study suggests similarly that declining fertility quantum, rather than postponement, accounts for most of the overall decline. The dominant contribution comes from reductions in first births among women under 30, with only weak signs of subsequent recuperation.

The relationship between education and fertility is complex and varies across countries, with differences in both childlessness and the timing of first births. Wood et al. (2014) examine the educational gradient of childlessness and cohort parity progressions in low-fertility countries for cohorts born between 1940 and 1961. Even though educational differences in fertility remain relatively stable over time, they are also highly country specific. A consistent pattern for these older cohorts is that childlessness was more common among highly educated women. Miettinen et al. (2015) analyze trends in childlessness across Europe and find that childlessness is most common among women with either very high or very low levels of education, whereas among men it is more prevalent among those with lower educational attainment. Focusing on the Nordic countries, Comolli et al. (2021), as well as Wood et al. (2025), examine the fertility decline and find that first birth rates fell most sharply among the lower-educated. Moreover, Jalovaara et al (2019) find that, in this context, the childlessness levels of both lower-educated men and women increased for younger cohorts and more so than for the higher educated individuals. Trimarchi and Van Bavel (2017) find that higher-educated men are more likely to become fathers across several European countries. However, this positive educational gradient operates primarily through selection into a union, suggesting that partnering plays a crucial role in explaining educational

differences in fertility behavior. As we shall see, our analyses also suggest a strong education effect for the fertility-drop countries, especially: the decline in first births is heavily biased towards the less educated. And this, we argue, is in turn powerfully influenced by increasingly unstable partnerships and singlehood.

Changes in partnership dynamics have been identified as significant determinants of declining fertility in low- and higher-fertility contexts. Examining Finland, Jalovaara and Andersson (2023) find that marriages have decreased across all educational groups. The concomitant rise in cohabitation has not offset this decline, leading to an overall reduction in union formation, particularly among the lower-educated. Similar trends are observed in Sweden, where Cantalini et al. (2024) document a steady decline in first marriages since 2010. Although cohabitation rates have remained stable, cohabiters are now less inclined to transition into marriage or to parenthood, suggesting that changes in relationship dynamics contribute to fertility decline. Sturm and Van Bavel (2024) find a significant decline in entry into cohabitation among the lower-educated in most European regions. These findings suggest that changes in partnering among the less educated may be a key factor behind contemporary fertility decline more generally.

Kuang et al. (2025) review the literature on the relationship between shifts in partnering and fertility in Europe and the United States. They conclude that marriage remains a stronger predictor of childbearing than cohabitation, and that stable partnerships formed earlier in life are associated with higher fertility. They argue that the increasing complexity of relationship dynamics, including delayed unions and higher rates of union dissolution, will likely have a negative impact on fertility. That said, Hellstrand et al.'s (2022) identification of the drivers of Finland's first birth decline suggests that, even though increasing cohabitation dissolutions and declining marriage rates contribute to lower fertility, the primary driver is reduced fertility within

unions. They suggest that the postponement or forgoing of childbearing within unions, rather than changes in partnership dynamics, play the most significant role in explaining Finland's fertility decline.

3 Research questions and hypotheses

As outlined in the literature review, various competing explanations have been proposed for the recent fertility decline. Our contribution shall adopt a two-step analytical approach.

In the first step, we explore the links between macro-level factors and fertility trends, distinguishing between countries that have experienced a sharp fertility decline since 2010 and those that have maintained stable or increasing birth rates. We investigate the key factors that differentiate countries with stable or rising fertility from those experiencing a sharp decline, and whether we are witnessing a move away from pro-cyclical fertility behavior in the latter group of countries.

We then turn to an exploration of individual-level behavior across the two country groups and time periods that may help explain diverging fertility dynamics. We focus on postponement in both partnering and childbearing, as well as a rise in childlessness, as key drivers of fertility decline, while also examining differences across educational groups.

Changes in the timing and likelihood of partnership formation may be driving fertility variations (Trimarchi & Van Bavel, 2017). To account for this, our fertility analyses will be preceded by an estimation of stable partnering probabilities before and after 2010, across the two country groups and stratified by education. As noted, previous research has documented a significant decline in partnership formation among recent cohorts, particularly among the less educated in Northern and Western Europe (De Hauw et al., 2017; Sturm & Van Bavel, 2024). We

hypothesize that postponement of partnering, as well as a higher likelihood of remaining single, is most pronounced in countries that have contemporarily experienced a sharp fertility decline (Hypothesis 1).

Moreover, it has been firmly established in the literature that highly educated individuals typically postpone childbearing, whereas the less educated historically had children at younger ages (Balbo et al., 2013). Given the evidence on changes in fertility between educational groups in declining fertility countries (e.g., Comolli et al., 2021; Hellstrand et al., 2021; Jalovaara et al., 2019), and considering that it is unlikely that further substantial postponement will occur among the highly educated, we hypothesize that the fertility decline will be primarily concentrated among the less educated. That is, in countries experiencing a fertility drop, we expect to observe postponement of childbearing and potentially rising childlessness, especially among the less educated (Hypothesis 2a). In contrast, in stable or rising fertility countries, we do not expect any significant postponement or rise in childlessness among the lower educated (Hypothesis 2b). The dynamics that inform Hypothesis 2b are very much related to the continued pro-cyclical fertility in the latter group. Here, economic growth benefits the job and income status of the less educated, which, in turn, promotes childbearing in this social stratum.

Even though our primary interest lies in understanding differences in partnering and fertility behavior between the genuinely low-skilled and others, due to data limitations explained in the Data and Methodology section, we are compelled to work with a simple distinction between citizens with a tertiary or non-tertiary education level. Therefore, when referring to the "lower-educated" group in the following sections, it is important to note that this category will also include individuals with moderate or even upper-secondary level of schooling.

In summary, addressing our first two fertility puzzles, we hypothesize that the sudden fertility drop is driven mostly by the lower-educated, due to delayed partnership formation in the post-2010 period, which could result in a higher likelihood of remaining single and ultimately childlessness. As regards our third fertility puzzle, and similarly to Lesthaeghe and Zeman (2024), we expect no such increase in couple instability in the other group of countries, and this should, in turn, result in stable or rising fertility levels.

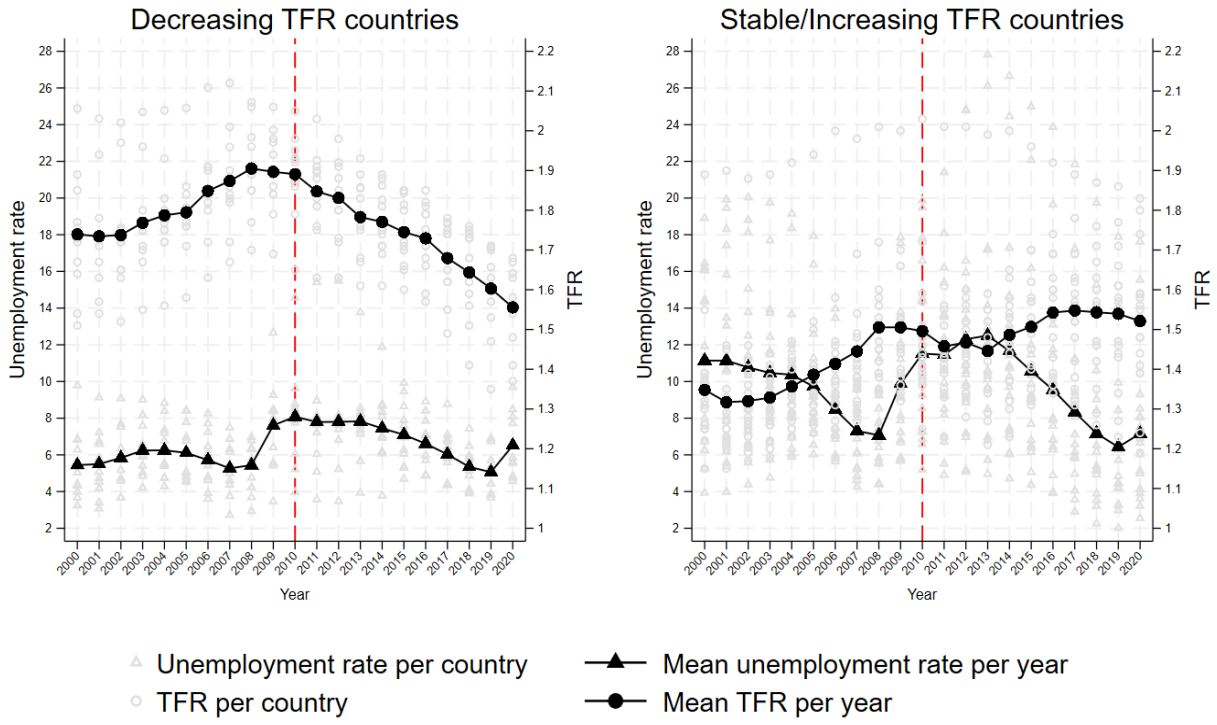
4 Data and Methodology

4.1 Macro-level analyses

The aim of our macro-level analysis is to explore how fertility differences across countries are related to economic factors, post-materialist values, and degrees of gender egalitarianism. We focus, on one side, on the countries that exhibited a sharp decline in total fertility rates post-2010, with no signs of recovery. This group includes 11 countries: Australia, Belgium, Canada, Denmark, Finland, Ireland, the Netherlands, Norway, Sweden, the United Kingdom, and the United States. On the other side, we examine 18 European countries that in the same decade exhibited stable or increasing TFR rates. Within this group, France, Spain, Italy, Greece, and Estonia actually experienced a slight decline; however, we classify them as stable since their post-2010 fertility trend is consistent with their long-term pattern (see Appendix Figure A1 for TFR trends between 1990 and 2020 across all 29 countries in our analysis). Additionally, we tested our models for the stable/increasing group while excluding these five countries, and the results remained unchanged (see Table A2 in the Appendix). Our analyses span the period 2000–2020. We exclude data beyond 2020 to prevent potential confounding effects caused by the COVID-19 epidemic.

A standard finding is that changes in fertility are powerfully influenced by the business cycle, responding positively to favorable economic conditions (Sobotka et al., 2011). We use the unemployment rate as our primary economic indicator. As illustrated in Figure 1, contrary to theoretical expectations, countries in the declining TFR group (the fertility-drop group) exhibit a noticeable absence of pro-cyclical fertility behavior post-2010. Unlike in the pre-2010 period, fertility fails to respond positively to declining unemployment post-2010. In contrast, in the stable/increasing TFR group, we see strong pro-cyclical fertility patterns both before and after 2010.

Figure 1: TFR and Unemployment Rates



Over the past decades, many countries have seen a sharp rise in housing prices, outpacing the growth of earnings. This may help explain declining fertility to the extent that it adversely influences access to suitable housing for raising children. Rising housing costs may delay leaving the parental home which then delays family formation (Van Wijk, 2024). Conversely, it can be argued that rising housing prices can have a positive fertility effect by increasing the wealth of existing homeowners, potentially encouraging larger families (Clark & Ferrer, 2019). To assess this relationship, we include the housing price-to-income ratio as a second economic influence in our analysis.

Our third variable is the proportion of one-person households among citizens under the age of 64. On one hand, a rising share of such units may indicate greater opportunities for young adults to achieve residential independence, which could create favorable conditions for family formation. On the other hand, the prevalence of one-person units may signal increasing individualism, relationship instability, and delays in partnership formation, all of which are expected to be negatively associated with fertility (Lesthaeghe, 2010). In short, this variable is potentially quite ambiguous.

Employment instability is a key factor influencing fertility decisions (Sobotka et al., 2011). Job insecurity can deter long-term commitments, such as starting a family. Temporary contracts promote less financial stability, and this may delay childbearing and/or opting for fewer children (Alderotti et al., 2021). To assess this dynamic, we include a variable for the percentage of temporary contracts among employed individuals aged 25–54.

Furthermore, we examine the relationship between fertility and post-materialist values. Central to the Second Demographic Transition thesis, post-materialist values prioritize individual autonomy, self-expression, and quality of life rather than traditional family commitments. As a

result, fertility may decline as citizens focus on their careers, personal fulfilment, leisure, and non-traditional life trajectories (Lesthaeghe, 2010; Van De Kaa, 1987). Using data from the European Values Survey (EVS) and the World Values Survey (WVS), we capture these values with a measure of the percentage of individuals who, in a given country and wave, agree that marriage is an outdated institution, as a declining taste for marriage may indicate weaker family-related norms.

Lastly, we examine the association between gender egalitarianism and fertility. We operationalize gender egalitarianism with the EVS/WVS question "When jobs are scarce, men should have more right to a job than women", calculating the percentage of individuals who disagree with this statement in each country and wave. Several studies suggest that the nexus between gender role attitudes and fertility can be context specific. It may depend both on the prevailing family model in a country, and on how well institutions and policies have adapted to the revolution of women's roles (e.g., McDonnald 2000a; 2000b; 2006; Arpino et al., 2015; Esping-Andersen & Billari, 2015).

We estimate longitudinal fixed-effects models separately for the two country groups. We begin by estimating the association between the unemployment rate and TFR, then we sequentially introduce our additional variables, one by one. In all models, we lag the independent variables by one year, and include year indicators to account for the time trends. We opt for this bivariate approach due to the small number of observations in our samples. The data sources for all variables, along with country and year coverage, are detailed in Appendix Table A1. Note that questions about post-materialist values and gender egalitarianism were asked at most three times per country in the EVS/WVS from 2000 to 2020. Therefore, to create a time series of post-materialist values and gender egalitarianism, we interpolated the trends for these variables between two consecutive waves.

4.2 Micro-level analyses

We use the Generations and Gender Surveys (GGS), combining the first waves of rounds 1 and 2 for six countries that had collected both at the time of this study: Austria, Czechia, Germany (representing rising fertility rates); and the Netherlands, Norway, and Sweden (representing our fertility-drop countries). The two rounds were not conducted in the exact same years across these countries. However, for all countries, the first round occurred in the early 2000s (except for Sweden, which collected the first round in 2012/13), and the second round was conducted after 2020.

GGS contains full retrospective fertility and partnership histories, allowing us to construct a longitudinal dataset. Individuals report the start and end dates of their current and past unions, enabling us to calculate the timing and duration of each partnership. Moreover, respondents provide information on the number of children as well as their year and month of birth. We can accordingly construct a dataset that follows individuals and their fertility and partnering behavior from age 20 until the time of the interview.

The first part of our micro-level analyses examines changes in partnering, and the second focuses on first births. In both cases, we compare across the two country groups and the two decades 2000–2010 and 2011–2020. Regarding partnership formation, we analyze the event of entering into a first stable relationship, which we define as a co-residential status (either marriage or cohabitation) lasting at least 12 months. We follow women from the year they turn 20 until they enter their first stable relationship, reach age 45, or until the end of the observation period, whichever comes first. We apply the same strategy to investigate the transition into parenthood.

The main independent variables in our analysis are period, years since the 20th birthday, educational level, and their interactions. We classify education based on the highest level

completed at the time of the interview, grouping individuals into non-university (ISCED 0–5) and university (ISCED 6–8) categories. We would have preferred a more fine-tuned distinction between individuals with an upper secondary level education and those with only compulsory or lower-secondary education. This, however, was not viable as the GGS data for several countries included very few cases of the latter population. In other words, the genuinely low educated are under-represented in the data.

Additionally, we account for migration status, distinguishing between natives, migrants from the European Union, migrants from outside the EU, and migrants with unknown origins. Migrants are included in the analysis only from the year they arrived in the destination country. We also include measures for whether respondents belong to a religious denomination and for parental education. The latter is measured as follows: both parents with low education (ISCED 0–2), both with medium-high education (ISCED 3–8), only the father with medium-high education, only the mother with medium-high education, or unknown parental education. For the transition to parenthood, we further include an indicator for whether the respondent was in a stable relationship at any given age. Among these variables, only period and partnership status are time-varying, whereas all others are measured only at the time of the interview and are held constant over time.

Our analyses of partnering and births are estimated with discrete-time event history models. The dependent variables are the entry into a stable relationship and the birth of the first child (lagged by one year), with separate models for the two country groups. A key specification in our models is the triple interaction between years since the 20th birthday, educational level, and period. This interaction allows us to assess how partnership and fertility evolve within and between educational groups across periods, as well as potential shifts in the timing of these life course

events. Additionally, we include a quadratic term for years since the 20th birthday, and an interaction between period and this quadratic term, capturing potential non-linearities in age-related risks, and changes in these patterns over time. The models also incorporate the previously mentioned socio-demographic controls, along with country indicators.

In the third part of our micro-level analyses, we look at the other side of the coin, estimating childlessness at age 40. Here we opt for a comparison across birth cohorts rather than periods. We compare the cohort that turned 40 in the early 2000s (cohort born between 1961 and 1965) with the cohort that turned 40 around 2020 (cohort born between 1976 and 1980). In this way, differences in childlessness across our studied periods are captured via differences across the two cohorts. Therefore, starting from our person-year data constructed for the previous analyses, we keep the observations of women from the two cohorts when they turned 40, and our dependent variable in this part of the analyses is being childless at that age (compared to motherhood status). We estimate logistic regressions separately for the two country groups, with the main explanatory variables of interest being cohort, education level, and their interaction. The models control for the above-mentioned socio-demographic controls and country indicators.

We replicated all analyses with men to examine potential gender differences in the observed patterns. Given that the results closely mirror those found for women, we do not present the findings for men here, but they are available by request.

Table 1 presents the sample composition by dependent variable and country group. In the stable/increasing fertility group over the years of observation, approximately 57% of women entered their first stable relationship, whereas around 43% had their first child. In the fertility-drop group, 53% of women entered their first stable relationship, and approximately 44% experienced their first childbirth over the observed time. Moreover, approximately 21% of women are childless

at age 40 in the stable/increasing group, whereas in the drop group, they represent around 17% of the whole sample.

Overall, the sample compositions are quite similar between our country groups. An exception is the proportion of women by level of education. In the stable/increasing group, there is a larger proportion of non-university (55%) than university (45%) women; in the drop group, these percentages are reversed. This difference is expected given that it reflects later and lower tertiary education expansion among women in the stable/increasing group compared to the drop group of countries. In fact, in the early 2000s, the mean percentage of tertiary-educated women aged 25-64 was approximately 15 in the stable/increasing group and 31 in the drop group. In 2020, these percentages were around 30 and 49, respectively (Eurostat, 2022). Another notable difference can be found in the proportion of observations across periods. The share of observations in the pre-2010 period is greater in the fertility-drop group because Sweden conducted its first-round survey in 2013, allowing for a greater number of observations in that period compared to other countries where interviews were conducted around 2005. Moreover, in the samples of childlessness at age 40, we do not observe individuals born after 1980, whom we instead include in the analyses of entry into stable relationship and transition to parenthood. Therefore, we can see that the proportion of women with non-university education, and those whose both parents have lower education, is higher, as well as the proportion of religious women in the fertility-drop group. Lastly, the samples for entry into a first stable relationship are smaller than those for the transition to parenthood, because individuals who had already entered a stable relationship prior to age 20 are excluded.

Table 1: Micro-level analyses: Sample descriptive statistics by country group and dependent variable

	Stable/increasing countries				Decreasing countries		
	Stable relationship	First birth	Childlessness at age 40		Stable relationship	First birth	Childlessness at age 40
	%	%	%		%	%	%
Time-invariant variables							
Educational level							
Non-University	54.5	57.1	64.1		45.0	46.2	53.0
University	45.5	42.9	35.9		55.0	53.8	47.0
Migration status							
Native	90.5	89.6	89.0		90.5	90.2	89.2
Migrant - EU	4.1	4.7	5.4		3.4	3.7	4.4
Migrant - non-EU	5.4	5.7	5.6		6.1	6.1	6.3
Religious denomination							
No	34.3	34.7	37.3		39.8	38.1	29.5
Yes	56.0	56.1	56.2		47.2	49.7	62.1
Unknown	9.7	9.2	6.5		13.0	12.2	8.5
Parental education							
Both low	6.1	7.2	14.8		14.1	16.0	26.1
Only father med-high	7.2	8.1	13.6		8.5	9.7	13.5
Only mother med-high	3.7	4.0	4.1		9.7	10.0	10.2
Both med-high	57.1	55.7	46.7		47.6	44.9	31.5
Unknown	25.9	25.0	20.8		20.1	19.4	18.7
Country							
Austria	22.0	24.7	25.4	Netherlands	33.3	32.3	29.9
Czechia	15.8	16.1	24.3	Norway	33.0	32.3	28.1
Germany	62.2	59.2	50.3	Sweden	33.7	35.4	42.0
Cohort							
1961-1965	-	-	43.8		-	-	65.1
1976-1980	-	-	56.2		-	-	34.9
Time-variant variables							
Being in a stable relationship							
No	-	58.0	-		-	55.4	-
Yes	-	42.0	-		-	44.9	-
Period							
Before 2010	55.1	52.9	-		60.6	62.1	-
After 2010	44.9	47.1	-		39.4	37.9	-
Events	8,121	7,926	997		4,603	5,749	670
Individuals	14,159	18,359	4,791		8,758	13,027	3,939
Individual-years	85,792	151,060	-		48,324	93,297	-

Note: Frequencies and percentages are calculated regarding the unique individual observations for time-invariant variables and regarding individual-years for the time-variant variables.

5 Results

5.1 Macro-level analyses

Tables 2 and 3 present results for the stable/increasing and 'drop' groups, respectively. Our fixed-effects longitudinal models confirm the trend observed in Figure 1. In the stable/increasing group, we find a significant negative association between unemployment change and the total fertility rate across all model specifications. However, this relationship does not hold for the drop group. Except for Model 6, where attitudes towards gender roles are included, the unemployment rate is not significantly associated with TFR in the fertility drop group. Our analysis, therefore, suggests that the countries that experienced a sharp fertility drop in the 2010-2020 decade have abandoned pro-cyclical fertility behavior.

Turning to the other explanatory variables, although most of the economic variables are not significantly related to fertility in the stable/rising group, we see that housing costs are positively related to fertility in the drop group (Model 2), thus questioning the thesis that rising housing costs have become a barrier for family formation. In the drop group, moreover, an increase in the proportion of one-person households is negatively associated with fertility (Model 3). Given that young adults in these countries tend to leave the parental home at a significantly younger age than those in the other group (Eurostat, 2022), it is likely that the rise in one-person households primarily reflects a decline in partnering and/or increased union instability. Considering that (stable) partnerships are a key determinant of childbearing, this trend can be expected to contribute to fertility decline (Kuang et al., 2025). We find no such association for the stable/increasing group of countries.

The percentage of temporary contracts does not show any significant association with fertility in the drop group (Model 4). In contrast, we find a significant negative relationship in the

stable/increasing group. Moreover, in the fertility-drop group, a change in the percentage of individuals who consider marriage an outdated institution does not significantly affect fertility (Model 5). However, in the stable/increasing group, the association is negative. Lastly, we find opposite correlations between attitudes towards gender equality and fertility rates. Whereas there is no significant association in the drop group, in the stable/increasing countries an increase in gender egalitarianism is negatively related to fertility.

Overall, the results from our macro-level analysis suggest that economic factors have a relatively marginal influence on fertility in the 2010-2020 decade within the fertility-drop countries. This suggests that non-economic factors may have played a more decisive role. We observe, for example, that a rise in one-person households appears more strongly associated with the observed fertility declines. In contrast, in countries where fertility either remained stable or increased, economic factors, particularly unemployment and employment instability, played a more dominant role in determining fertility in the 2010-2020 decade. Here we witness the persistence of pro-cyclical fertility.

Table 2: Fixed effects longitudinal models of TFR determinants for stable/increasing countries

	Stable/Increasing TFR countries					
	(1)	(2)	(3)	(4)	(5)	(6)
	TFR	TFR	TFR	TFR	TFR	TFR
Unemployment rate	-0.012***	-0.012***	-0.013***	-0.014**	-0.009***	-0.013***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)
Housing price to income ratio		0.001				
		(0.000)				
% of 1 person households below age 64			-0.002			
			(0.007)			
% of temporary contracts (age 25-54)				-0.014***		
				(0.002)		
% saying "Marriage is an outdated institution"					-0.012***	
					(0.002)	

% Gender egalitarian						-0.004***
						(0.001)
Constant	1.45***	1.45***	1.49***	1.58***	1.63***	1.71***
	(0.02)	(0.05)	(0.11)	(0.03)	(0.04)	(0.05)
Observations	360	251	135	356	328	349
R-squared	0.571	0.407	0.573	0.635	0.596	0.600
Number of countries	18	15	18	18	18	18

Standard errors in parentheses. All independent variables are lagged by 1 year. All models include year fixed effects. *** p<0.01, ** p<0.05, * p<0.1
Stable/Increasing countries: Austria, Bulgaria, Croatia, Czechia, Estonia, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Portugal Romania, Slovakia, Slovenia, Spain.

Table 3: Fixed effects longitudinal models of TFR determinants for decreasing countries

	Decreasing TFR countries					
	(1)	(2)	(3)	(4)	(5)	(6)
	TFR	TFR	TFR	TFR	TFR	TFR
Unemployment rate	-0.005	0.005	-0.004	-0.004	-0.004	-0.010*
	(0.003)	(0.004)	(0.004)	(0.004)	(0.007)	(0.006)
Housing price to income ratio		0.002***				
		(0.000)				
% of 1 person households below age 64			-0.025***			
			(0.09)			
% of temporary contracts (age 25-54)				0.007		
				(0.005)		
% saying "Marriage is an outdated institution"					0.006	
					(0.006)	
% Gender egalitarian						0.001
						(0.002)
Constant	1.76***	1.51***	2.30***	1.67***	1.61***	1.70***
	(0.023)	(0.05)	(0.19)	(0.04)	(0.12)	(0.16)
Observations	220	220	139	196	146	186
R-squared	0.725	0.760	0.761	0.752	0.704	0.699
Number of countries	11	11	8	11	11	11

Standard errors in parentheses. All independent variables are lagged by 1 year. All models include year fixed effects. *** p<0.01, ** p<0.05, * p<0.1 Decreasing TFR countries: Australia, Belgium, Canada, Denmark, Finland, Ireland, Netherlands, Norway, Sweden, the UK, US.

5.2 Micro-level analyses

5.2.1 The role of partnering

We begin by examining changes in the formation of a first stable relationship. Childbearing is, of course, closely linked to partnering, but our interest is additionally motivated by our hypothesis that important changes in union formation have come to influence citizens' entry into parenthood. To facilitate the interpretation of our findings, we present the predicted probabilities of entering a first stable relationship by age and across periods for the two country groups. We first show the results for the full samples (Figure 2), followed by a breakdown by education (Figure 3). Full regression outputs are provided in Appendix Table A3.

A first striking difference between the two country groups emerges when looking at partnership formation (Figure 2). In the countries that experienced stable or rising fertility post-2010, we find no significant changes in the likelihood of a stable partnership by age 29 between the two periods. However, from age 29 onwards, there is a sharp increase in the probability of entering a first stable relationship during the post-2010 period, compared to the pre-2010 period. This suggests a general rise in stable partnerships for women in this group of countries. Additionally, we observe a slight postponement of first stable relationship formation: the peak age increased by one year, from 28 to 29, between the two periods.

The fertility-drop countries show a distinctly different trend. Here we see a significant drop in the likelihood of entering a stable relationship among women under age 28. After age 28, however, the probability of entering a first stable relationship does not differ across the two periods. Moreover, the peak age of entering a first stable relationship increased by approximately half a year between the two periods, and there is no evidence of a significant postponement at older ages.

Examining the predicted probabilities by education in Figure 3, several key findings emerge. First, in stable/increasing countries, there is a significant increase in the probability of entering a first stable partnership across almost the entire age span for highly educated women. However, for the less educated, there is some evidence of postponement, as we see a much higher probability of first stable partnering from age 31 onwards. Compared to the less educated, whose peak age of entering the first stable union rose from 27 to about 29, the higher-educated experienced a more modest increase of approximately one year.

In the fertility-drop countries, we observe a much sharper decline in the probability of entering a first stable relationship for the non-university group up to age 30. Moreover, there is no evidence of recuperation at older ages. Among the university-educated women, there is slight evidence of postponement and recuperation at older ages for entry into the first stable relationship, although the recuperation is not significant at the 95% confidence level.

Our results suggest that a significant decline in the probability of entering a first stable relationship in the fertility-drop countries is primarily driven by reduced partnering levels among less-educated women under age 30.

Figure 2: Predicted probability of entering a stable relationship by period

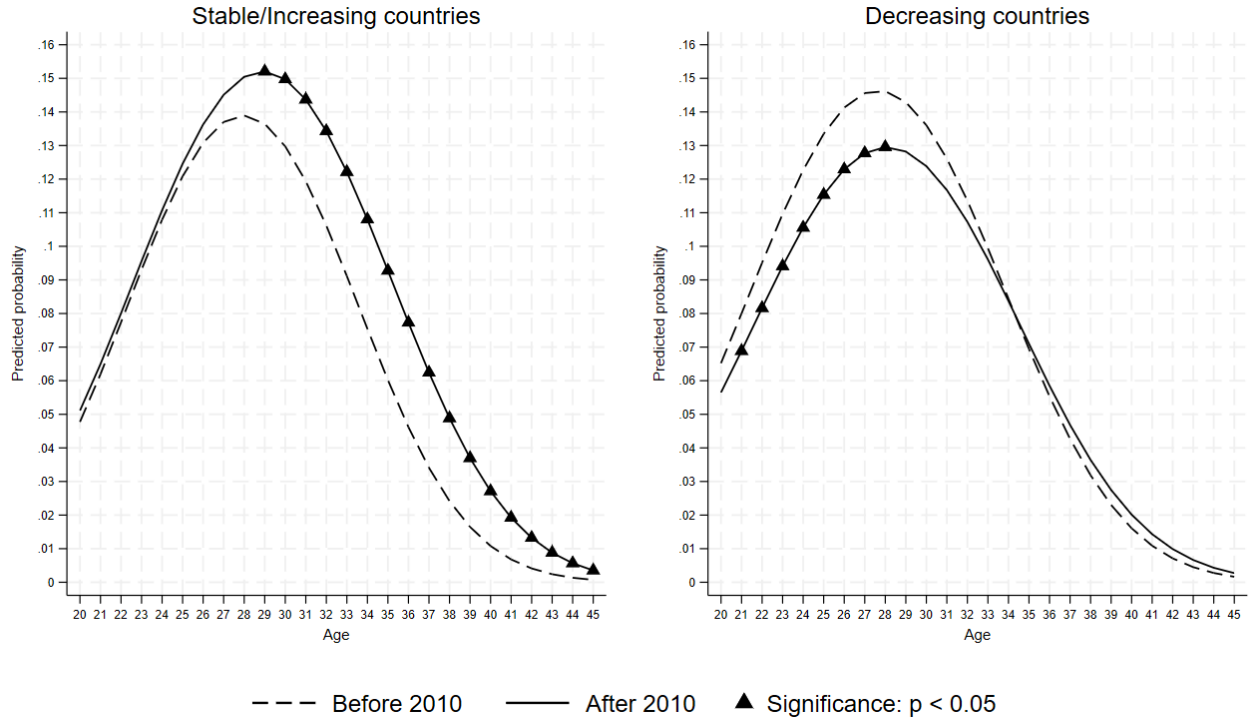
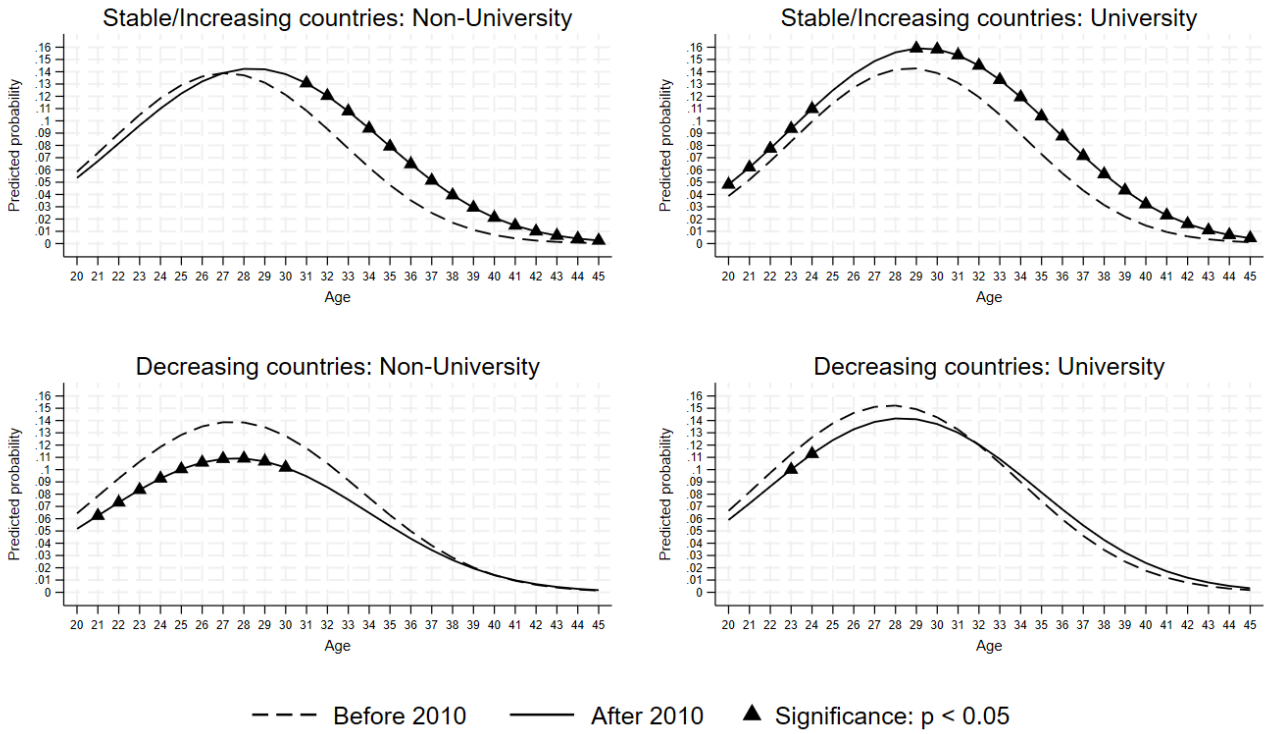


Figure 3: Predicted probability of entering a stable relationship by period and educational level



5.2.2 The transition to parenthood

We now turn to the estimation of entry into motherhood. As above, we first present the predicted probabilities of having the first child for the overall samples (Figure 4), followed by a breakdown by education (Figure 5); full regression outputs are provided in Appendix Table A3.

Figure 4 presents the predicted probabilities of having a first child across the two decades in the two country groups. Once again, noticeable differences emerge both between country groups and across time. In the stable/increasing fertility group, we observe significant postponement but also subsequent fertility recovery. Women in the post-2010 decade are less likely to become mothers before age 27, but significantly more so between ages 30 and 37. This shift closely aligns with our previous findings for partnerships, suggesting a parallel trend in relationship and fertility trajectories. Additionally, the peak age for first births has shifted from around 30 in the pre-2010 period to approximately 32 in the post-2010 period. In contrast, in the fertility-drop group we find a uniform downward shift in the probability of entering motherhood across all ages. Women in the post-2010 period are significantly less likely to have a first child before age 26, and we see no sign of recuperation in older ages. This implies an overall decrease in first births and a possible surge in childlessness.

Figure 5 illustrates the probability of entering parenthood by education for both country groups. In the stable/increasing group, postponement is evident across both education levels, albeit somewhat more pronounced among women without a university degree. The less educated show a declining probability of becoming a mother before age 27 in the post-2010 period, but this is offset by an increase from age 30 onward, suggesting that postponement is followed by a subsequent catch-up. Among university-educated women in the same country group, we also find significantly lower probabilities of first childbirth before age 26 in the post-2010 period, though

the magnitude of decline is smaller compared to the non-university group. Moreover, between the ages of 30 and 36, there appears to be a higher probability of having a first child for this group of women, although not significant at the 95% confidence level. This suggests a shifting pattern in parenthood timing, particularly among the less educated, who are more likely to delay than forego the transition into motherhood.

In the fertility-drop countries the results are quite different, particularly considering less-educated women. Although we do find that their probability of having a first child is significantly lower in the post-2010 period below age 25, no substantial recovery occurs at later ages, as shown by the parallel downward shift in the probability of first childbirth in the post-2010 period. This suggests that in this group, women are consistently less likely to enter motherhood throughout their reproductive life course, rather than merely postponing it. In contrast, for the university-educated, we find no significant differences in the probability of entering motherhood between the two periods.

Figure 4: Predicted probability of first childbirth by period

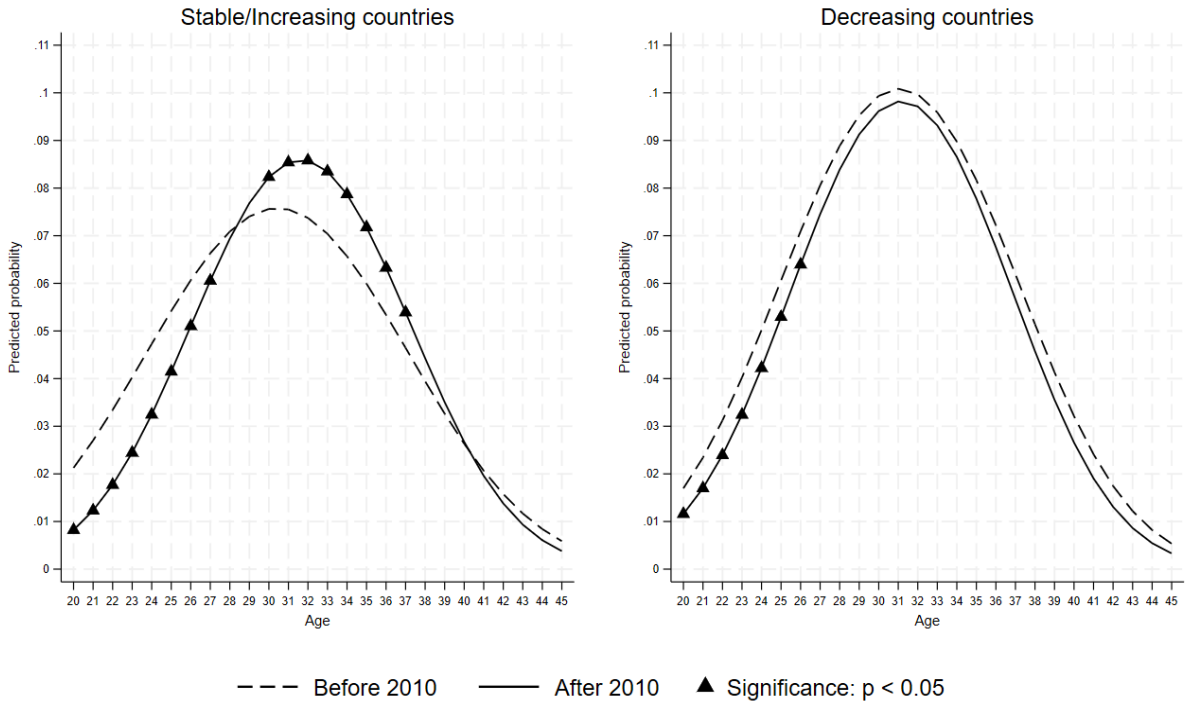
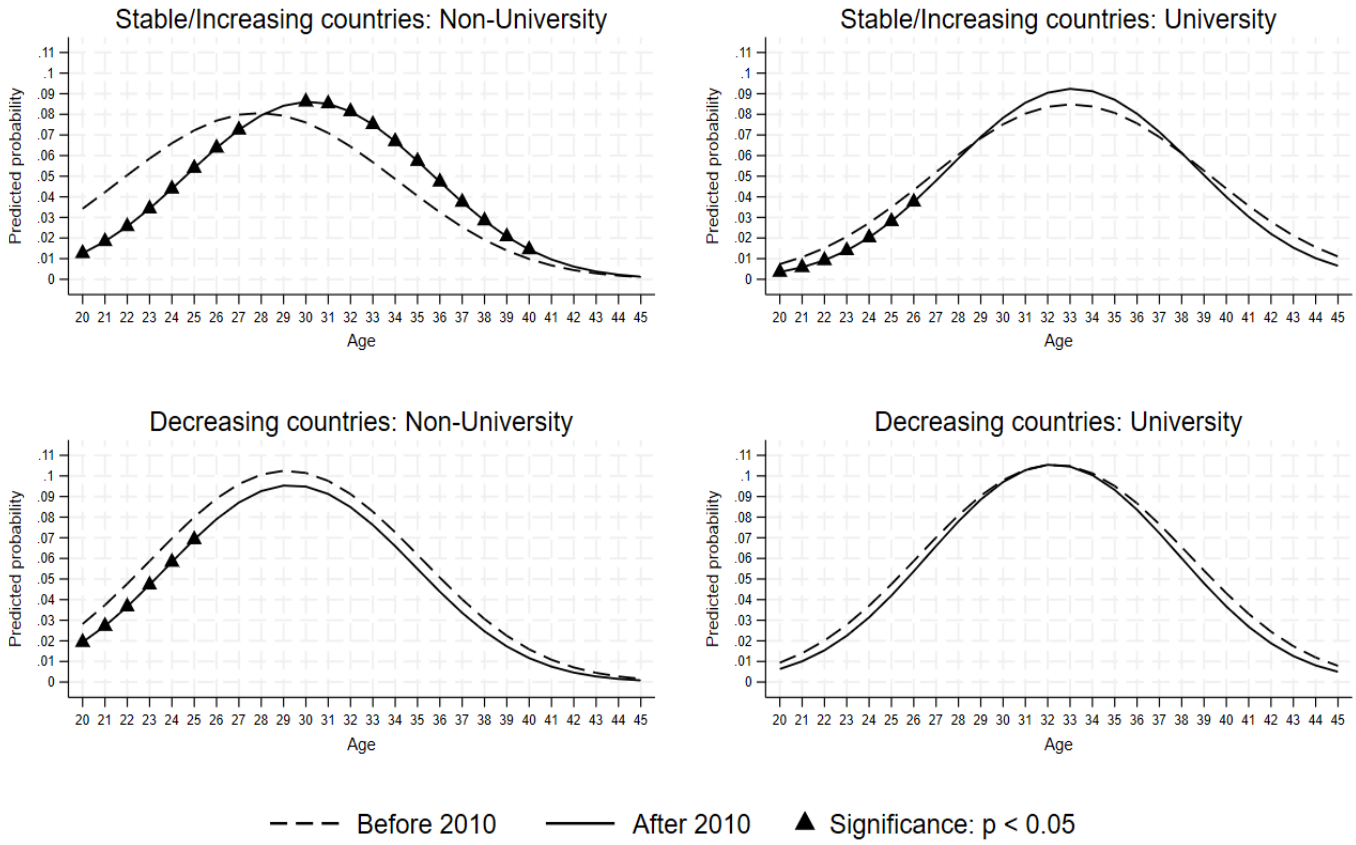


Figure 5: Predicted probability of first childbirth by period and educational level



5.2.3 Childlessness at age 40

To conclude our empirical analyses, we now turn to the likelihood of childlessness at age 40. As explained above, we estimate childlessness for women of two cohorts: an older cohort born between 1961-1965 who turned 40 at the beginning of the 2000s, and a younger cohort born between 1976-1980 who turned 40 towards the end of the 2010s. Figure 6 presents the predicted probabilities of childlessness for the two cohorts by education and country group; the complete regression outputs are shown in Appendix Table A4.

We observe that childlessness levels for the younger 1976-1980 cohort are higher compared to the older cohort in both country groups. Another similarity between the country groups is that among the university-educated women, the rise in childlessness is much less pronounced, and is not statistically different between the two cohorts. Moreover, childlessness rates remain consistently higher for the higher-educated women across the two cohorts in the stable/increasing fertility group compared to the fertility-drop countries.

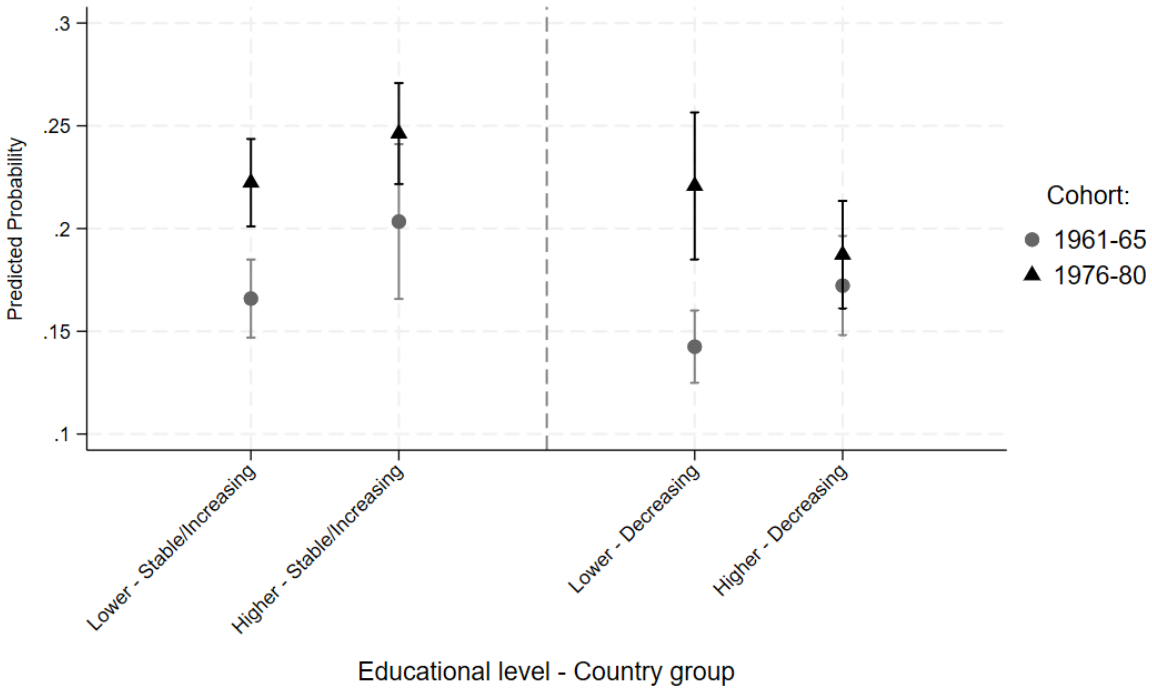
However, a key finding emerges when focusing on the less educated. Here, childlessness levels increase in the stable/increasing group. This implies that the recuperation of births at older ages was not strong enough to compensate for the decline at younger ages. For the 1961-1965 cohort, around 17% of less educated women remained childless at age 40 compared to approximately 22.5% in the 1976-1980 cohort.

Nevertheless, in the fertility-drop group, the increase in childlessness among less educated women is much more pronounced and matches the level of their peers in the stable/increasing group. Whereas the predicted childlessness at age 40 was around 14% for the older cohort, childlessness for the 1976-1980 cohort rises to around 22.5% as well, the same level as in the stable/increasing group. All told, our childlessness analyses parallel our results for the transition

to parenthood: among the less educated in the fertility-drop countries, there is a general decrease in first births, whereas in the stable/increasing countries, this decrease is partly offset by recuperation at older ages.

We compared our findings with the OECD's Family Database data on ultimate childlessness for the female cohort born in 1975, which is the only cohort available for all countries in our study. According to the OECD data, for this cohort the average childlessness rate is around 17% in stable/increasing TFR countries and about 14% in fertility-drop countries (OECD, 2024). In our sample, the overall estimated childlessness at age 40 is approximately 24% and 21% for the same groups of countries, respectively. Even though our estimates are higher, the difference between our figures and those from the OECD is roughly 7 percentage points in both country groups. Moreover, this gap can be partially explained by the fact that we estimate childlessness at age 40, rather than ultimate childlessness.

Figure 6: Predicted probability of being childless at age 40 by cohort and educational level



6 Discussion and Conclusions

Our study identified and addressed three fertility puzzles that emerged in the 2010-2020 decade. First, several countries that previously boasted relatively stable and high fertility rates experienced a sharp drop from 2010 onwards – why? Secondly, how do we explain the absence of a fertility recovery in these countries? And lastly, how do we account for the fact that another group of countries went in the opposite direction, displaying stable and in some countries increasing birth rates?

In the first part of our study, we explored how economic factors, post-materialist values, and gender egalitarianism are linked to fertility trends across 29 countries over the two decades, 2000 - 2020. These macro-level analyses suggested that economic conditions had a less substantial impact on fertility trends in countries that experienced a significant decline in fertility levels post-2010. In these countries, social factors, such as increases in one-person households, are more strongly correlated with fertility declines.

In countries with stable/increasing fertility levels, we saw that economic factors remain strongly linked to fertility change. This group of nations continues to follow the conventional pro-cyclical pattern, with fertility responding positively to economic improvements. In contrast, the fertility-drop countries appear to have departed decisively from pro-cyclicality. In sum, our macro-level scrutiny confirms the co-existence of two groups of countries displaying contrasting fertility dynamics.

In the second part, we explored differences between the two groups of countries from a micro-level perspective. We examined how stable partnership and first-birth patterns evolved for women as a whole, and also by level of education, before and after 2010. Our focus was on shifts

in these life course events across the two decades. We additionally assessed how these shifts were linked to childlessness levels at age 40 for cohorts born 1961-65 and 1976-80.

We initially hypothesized that the postponement of, or lack of, stable partnerships would be most evident in countries from the 2010-2020 fertility-drop group (Hypothesis 1). Our findings gave support for this hypothesis: women in the fertility-drop group showed a marked decrease in the probability of entering a first stable relationship by age 28, and with no significant recovery at older ages. This decline was especially noticeable among the lower-educated until age 30. In contrast, in countries where fertility remained stable or increased, we observed a notable rise in the formation of stable partnerships for the higher-educated women across almost all ages. Additionally, among the lower-educated women in the same countries, we observed some, albeit weak, evidence of postponement, and significantly higher probabilities of entering a first stable relationship after age 31.

We also hypothesized that fertility-drop countries would show significant delays or even childlessness, especially among the lower-educated (Hypothesis 2a). Our results support this hypothesis. Firstly, for the post-2010 decade we found that less educated women show a significantly lower birth probability until age 25, with no sign of recovery at older ages. Moreover, our estimations of childlessness at age 40 suggest that for this group of women, childlessness increased by around 60% between the 1961-1965 and 1976-80 birth cohorts, i.e., among those women who turned 40 at the beginning of the 2000s or the end of the 2010s. In comparison, for higher-educated women in the fertility-drop group we do not find any significant changes, neither related to the timing nor the probability of entry into motherhood, nor for childlessness levels across the two cohorts.

Lastly, we hypothesized that there would be no significant postponement of motherhood entry among the lower-educated in countries with stable or rising fertility rates (Hypothesis 2b). This hypothesis is not supported, as we found that fertility patterns in these countries, in general, and by level of education, have shifted. Lower-educated women experience postponement of first births, with significantly lower birth probabilities until age 27 in the post-2010 period. Although there is evidence of recovery after age 30, it is not sufficient to fully compensate for the lower transition rates at younger ages. This is reflected in the estimated childlessness rates at age 40, which increased by 30% between our two cohorts.

A number of empirical 'facts' seem to be very clear: as previous studies also found, the sharp drop in fertility in a group of countries was concentrated among first births; in part, the drop is linked to fertility postponement; and in part, it is heavily biased towards less educated populations.

On a more speculative note, the ongoing process of de-industrialization within the fertility-drop countries is very likely a key driver of the less-educated bias in the post-2010 fertility decline. Less skilled individuals have been falling behind economically, and this trend undoubtedly intensified during the Great Recession years. For these social strata, the post-2010 economic recovery did not effectively improve their job prospects or economic stability. And this, in turn, has very likely had adverse effects on both entry into, and stability of, partnerships and family formation.

In contrast, in stable/rising fertility countries, like Czechia or Hungary, the process of de-industrialization has not yet set in decisively. So, when economic growth resumed in these countries, the employment conditions for the lower-educated improved, leading to a more favorable setting for partnership stability and the transition into parenthood.

As Lesthaeghe and Zeman (2024) argue, another possible mechanism that could explain the persistence of pro-cyclical fertility in the stable/rising fertility countries is that here more traditional values and norms regarding union and family formation persist. Whereas in the fertility-drop countries, the lower educated increasingly mirror the postponement behavior of the higher educated, those in the stable/increasing group may continue to adhere to conventional decision-making regarding family life. That said, explanations emphasizing post-materialist values have some difficulty predicting the sharp and sudden fertility decline in so many countries. Value are unlikely to exert a huge influence on birth rates from one year to the next.

There are several limitations to our study. One is our educational grouping in the micro-level analyses. We would have preferred to examine changes in partnership and family behavior by distinguishing between low (i.e., no more than compulsory), medium, and high education levels, rather than just between university and non-university attainment. However, due to the under-representation of individuals in the lowest education group, particularly within the younger cohorts, we were unable to identify possibly distinct effects related to low education.

Furthermore, both TFR and age-specific fertility rates are period measures that can be highly influenced by behavioral changes across cohorts. Given our estimation strategy for the micro-level analyses of entering into the first stable partnership or parenthood, we observe individuals from the same cohort across different age ranges in the two distinct periods. For example, women born in 1980 contribute to the age-specific fertility rates between ages 20 and 30 in the pre-2010 period and between ages 30 and 40 in the post-2010 period. Consequently, our conclusions are closely tied to cohort-specific changes in fertility and partnership dynamics. We cannot predict whether women aged 20 to 30 in the post-2010 period will follow the same trend as women aged 30 to 40 during the same period. This implies that any conclusions about

completed cohort fertility and partnering dynamics for the youngest cohorts in this part of the study remain ambiguous.

Nevertheless, our study makes several contributions. To our knowledge, it is the first study that not only explores the recent sharp fertility decline in previously high-fertility countries, but as well examines countries where fertility remained fairly stable or even increased over the same period, although the latter countries exhibited quite low fertility levels to begin with. Moreover, by combining both a macro- and micro-level approach, we explore both the importance of different economic and societal factors for fertility levels as well as differences in fertility behaviors at the micro-level across the two sets of countries. Finally, via our analyses of the nexus between partnering and entry (or not) into parenthood, our micro-level analyses have helped shed light on key dynamics of contemporary fertility change.

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Appendix

Figure A1: TFR trend by country in the period 1990 - 2020

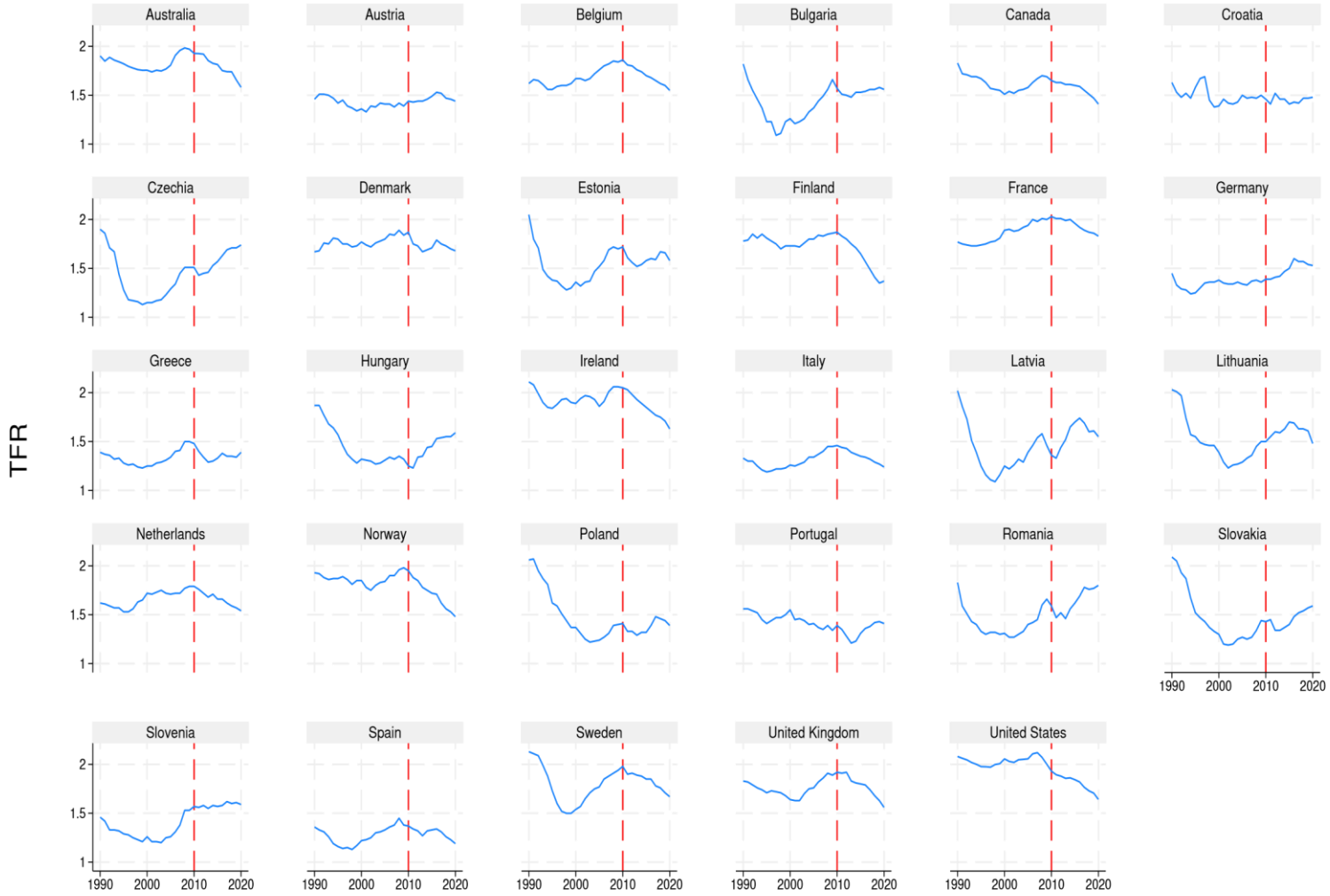

Table A1: Macro-level: Coverage of countries over years and data sources by variable

	TFR		Unemployment rate		Housing price		1 Person households < 64		Temporary contracts		Marriage outdated		Gender egalitarian	
Country	Years	Source	Years	Source	Years	Source	Years	Source	Years	Source	Years	Source	Years	Source
Australia	2000 - 2020	WB[a]	2000 - 2020	OECD[b]	2000 - 2020	OECD	Not available	/	2001/04/06-17	OECD	2005	EVS&WVS[d]	2005 - 2020	EVS&WVS
Austria	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE[c]	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Belgium	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	Not available	/	2000 - 2020	OECD	2000 - 2010	EVS&WVS	2000 - 2009	EVS&WVS
Bulgaria	2000 - 2020	WB	2000 - 2020	WB	Not available	/	2001/11	UNECE	2001 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Canada	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2001/06/11/16	UNECE	2000 - 2020	OECD	2001 - 2007	EVS&WVS	2000 - 2020	EVS&WVS
Croatia	2000 - 2020	WB	2000 - 2020	WB	Not available	/	2001/11	UNECE	2002 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Czechia	2000 - 2020	WB	2000 - 2020	OECD	2008 - 2020	OECD	2005 - 2019	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Denmark	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2020	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Estonia	2000 - 2020	WB	2000 - 2020	OECD	2005 - 2020	OECD	2000 - 2019	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Finland	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE	2000 - 2020	OECD	2001 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
France	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000/06-10	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Germany	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Greece	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2001/11	UNECE	2000 - 2020	OECD	2000 - 2009	EVS&WVS	2000 - 2020	EVS&WVS
Hungary	2000 - 2020	WB	2000 - 2020	OECD	2007 - 2020	OECD	2001/05/11/16	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Ireland	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE	2001 - 2020	OECD	2000 - 2009	EVS&WVS	2000 - 2008	EVS&WVS
Italy	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Latvia	2000 - 2020	WB	2000 - 2020	OECD	2006 - 2020	OECD	2000/11	UNECE	2000 - 2020	OECD	2000 - 2009	EVS&WVS	2000 - 2008	EVS&WVS
Lithuania	2000 - 2020	WB	2000 - 2020	OECD	2006 - 2020	OECD	2001/11	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Netherlands	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Norway	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2005 - 2019	UNECE	2000 - 2020	OECD	2009 - 2020	EVS&WVS	2008 - 2020	EVS&WVS
Poland	2000 - 2020	WB	2000 - 2020	OECD	2005 - 2020	OECD	2002/11	UNECE	2001 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Portugal	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2001/11	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Romania	2000 - 2020	WB	2000 - 2020	WB	Not available	/	2002/11	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Slovakia	2000 - 2020	WB	2000 - 2020	OECD	2005 - 2020	OECD	2001/11	UNECE	2000 - 2020	OECD	2000 - 2009	EVS&WVS	2000 - 2020	EVS&WVS
Slovenia	2000 - 2020	WB	2000 - 2020	OECD	2007 - 2020	OECD	2002/11/15/18	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Spain	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2001/11/13-19	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
Sweden	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	Not included	/	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
United Kingdom	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE	2000 - 2020	OECD	2000 - 2020	EVS&WVS	2000 - 2020	EVS&WVS
United States	2000 - 2020	WB	2000 - 2020	OECD	2000 - 2020	OECD	2000 - 2019	UNECE	2001/05/17	OECD	2000 - 2007	EVS&WVS	2000 - 2020	EVS&WVS

[a] World Bank Database - World Development Indicators; [b] Organisation for Economic Co-operation and Development Database; [c] United Nations Economic Commission for Europe Database; [d] European Values Survey & World Values Survey (Note that yearly observations have been interpolated from the trend between available EVS/WVS waves).

Table A2: Fixed effects panel models of TFR determinants for stable/increasing countries - excluding Estonia, Greece, France, Italy and Spain

	Stable/Increasing TFR countries					
	(1)	(2)	(3)	(4)	(5)	(6)
	TFR	TFR	TFR	TFR	TFR	TFR
Unemployment rate	-0.010***	-0.014***	-0.016***	-0.011**	-0.008***	-0.009***
	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)
Housing price to income ratio		0.000				
		(0.000)				
% of 1 person households below age 64			0.020***			
			(0.007)			
% of temporary contracts (age 25-54)				-0.014***		
				(0.002)		
% saying ”Marriage is an outdated institution”					-0.012***	
					(0.003)	
% Gender egalitarian						-0.004***
						(0.001)
Constant	1.40***	1.49***	1.13***	1.49***	1.59***	1.62***
	(0.03)	(0.06)	(0.12)	(0.04)	(0.07)	(0.06)
Observations	260	156	79	256	239	249
R-squared	0.637	0.621	0.800	0.701	0.635	0.658
Number of countries	13	10	13	13	13	13

Standard errors in parentheses. All independent variables are lagged by 1 year. All models include year fixed effects. *** p<0.01, ** p<0.05, * p<0.1
Stable/Increasing countries: Austria, Bulgaria, Croatia, Czechia, Germany, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia.

Table A3: Discrete-time event history models: Odds ratios of entering a stable relationship or having a first child by country groups

	Stable/increasing countries		Decreasing countries	
	Stable relationship	First child	Stable relationship	First child
Years since 20th birthday	1.39***	1.49***	1.27***	1.53***
	(0.02)	(0.02)	(0.02)	(0.02)
Years since 20th birthday squared	0.98***	0.99***	0.98***	0.98***
	(0.00)	(0.00)	(0.00)	(0.00)
Educational level (Ref: University)				
Non-University	1.51***	4.90***	0.96	3.12***
	(0.08)	(0.39)	(0.06)	(0.25)
Period (Ref: Before 2010)				
After 2010	1.26**	0.48***	0.89	0.67**
	(0.09)	(0.06)	(0.03)	(0.10)
Interactions				
Non-University * After 2010	0.74***	0.74**	0.90	1.00
	(0.06)	(0.09)	(0.10)	(0.15)
Non-University * Years	0.94***	0.85***	0.99	0.90***
	(0.01)	(0.01)	(0.01)	(0.01)
After 2010 * Years	0.96**	1.13***	0.99	1.07**
	(0.02)	(0.03)	(0.02)	(0.03)
After 2010 * Years squared	1.01***	0.99***	1.00	0.99**
	(0.00)	(0.00)	(0.00)	(0.00)
Non-University * After 2010 * Years	1.03**	1.04***	0.99	0.99
	(0.01)	(0.01)	(0.012)	(0.02)
Migration status (Ref: Native)				
Migrant from the EU	1.28***	0.93	1.69***	0.92
	(0.08)	(0.05)	(0.16)	(0.07)
Migrant from outside the EU	1.44***	1.07	1.32**	1.03
	(0.08)	(0.06)	(0.09)	(0.07)

Religious denomination (Ref: No)				
Yes	1.05*	1.24***	1.05	1.28***
	(0.03)	(0.04)	(0.04)	(0.04)
Unknown	1.10**	1.06	0.91*	1.18***
	(0.05)	(0.05)	(0.05)	(0.06)
Parental education (Ref: Both low)				
Only father medium-high	0.96	0.91	1.07	0.96
	(0.07)	(0.06)	(0.07)	(0.06)
Only mother medium-high	1.03	0.88*	0.92	1.02
	(0.08)	(0.06)	(0.06)	(0.06)
Both medium-high	0.94	0.78***	0.88**	0.89***
	(0.05)	(0.04)	(0.04)	(0.4)
Unknown	0.84***	0.80***	0.84***	0.89**
	(0.05)	(0.05)	(0.05)	(0.05)
Being in a stable relationship (Ref: No)				
Yes		8.83***		12.38***
	-	(0.31)	-	(0.59)
Constant	0.04***	0.00***	0.07***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Individuals	14,159	18,359	8,758	13,027
Individual-years	85,792	151,060	48,324	93,297

Standard errors in parentheses. All models include country indicators. *** p<0.01, ** p<0.05, * p<0.1
Stable/Increasing countries: Austria, Czechia and Germany Decreasing countries:
Netherlands, Norway and Sweden.

Table A4: Logistic regressions: Odds ratios of being childless at age 40 by country groups

	Stable/increasing countries	Decreasing countries
	Childlessness at age 40	Childlessness at age 40
Educational level (Ref: University)		
Non-University	0.77*	0.80*
	(0.11)	(0.09)
Cohort (Ref: 1961-1965)		
1976-1980	1.29*	1.11
	(0.18)	(0.14)
Non-University * 1976-1980	1.13	1.55**
	(0.19)	(0.28)
Migration status (Ref: Native)		
Migrant from the EU	1.20	0.83
	(0.18)	(0.18)
Migrant from outside the EU	0.70**	0.89
	(0.12)	(0.16)
Religious denomination (Ref: No)		
Yes	0.62***	0.70***
	(0.05)	(0.07)
Unknown	0.82	0.95
	(0.13)	(0.15)
Parental education (Ref: Both low)		
Only father medium-high	1.20	0.98
	(0.18)	(0.14)
Only mother medium-high	1.35	1.03
	(0.28)	(0.18)
Both medium-high	1.21	0.96
	(0.15)	(0.12)
Unknown	1.82***	1.43***
	(0.25)	(0.19)
Constant	0.24***	0.35***
	(0.04)	(0.05)
Individuals	4,791	3,939

Standard errors in parentheses. All models include country indicators. *** p<0.01, ** p<0.05, * p<0.1
Stable/Increasing countries: Austria, Czechia, and Germany
Decreasing countries: Netherlands, Norway, and Sweden.