Education, labour, and the demographic consequences of birth postponement in Europe

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Research Article

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Abstract

BACKGROUND
This article questions the demographic consequences of birth postponement in Europe.

OBJECTIVE
Starting from the fact that there is no obvious link between the timing of first births and fertility levels in Europe, we find that under certain circumstances, birth postponement potentially facilitates rather than impedes starting a family.

METHODS
We apply a synthetic cohort approach and distinguish between different socioeconomic determinants of the timing of first births by using the European Union Statistics on Income and Living Conditions (EU–SILC). Data is compiled specifically to reduce endogeneity and to eliminate structure effects.

RESULTS
We find that the probability of becoming a mother is higher for women who postpone first childbirth due to education and career investment than for women who postpone due to unrealized labour market integration.

CONCLUSION
Educated and economically active women certainly postpone first childbirth in comparison to women who are less educated and who are not working, but they end up with a higher probability of starting a family.

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CONTRIBUTION
The article contributes to the academic discussion of circumstances that may lead to birth postponement resulting in higher fertility for younger cohorts in European countries.

1. Introduction

The postponement of first childbirth has been occurring in most European countries for some decades now. In France, Portugal, Sweden, the Netherlands, and Norway, for example, the mean age of women at first childbirth rose from 24/25 in 1970 to 28/29 in 2010. In most Eastern European countries the increases have been even more drastic: for example, from 23 to 28 in Hungary and the Czech Republic (Human Fertility Database 2013). In public and media discussion, birth postponement is often rather glibly associated with the fact that more women are going to university and getting jobs, and consequently want fewer children. This article focuses on these correlations on the basis of survey data from the European Union Statistics on Income and Living Conditions (EU–SILC). The advantage of this survey is that it can be used to examine the interaction between demographic and socioeconomic variables for a large number of European countries. This distinguishes our research from most previous studies, which until recently have generally focused on a single country.

The hitherto existing literature shows that investment in education leads to postponement of first births (Happel, Hill, and Low 1984; Cigno and Ermisch 1989; Gustafsson 2001; Lappegård and Rønsen 2005). For older cohorts (cohorts born in the 1940s), birth postponement due to education and career investment has been found to decrease completed fertility, as shown by country-specific studies such as Schulz (1985) and Heckman and Walker (1990) for Sweden, Tasiran (1995) for Sweden and the USA, Ermisch and Ogawa (1994) for Japan, Merrigan and St-Pierre (1998) for Canada, and Joshi (1990) for Great Britain. For more recent cohorts (up to the 1965 cohort) the educational gradient of completed fertility is still found to be negative, albeit diminishing (for example, Andersson et al. (2008) for the Nordic countries; Kravdal and Rindfuss (2008) for Norway; Neyer and Hoem (2008) for Sweden; Wood, Neels, and Kil (2014) for progression to first birth in 14 European countries). For cohorts currently of childbearing age, the most recent studies covering more than one country find strong variation between European countries in the association between female education and birth hazard (for example, Klesment et al. 2014; d'Albis, Greulich, and Gobbi 2017).

While the literature is unambiguous when it comes to the impact of education on the timing of childbirth, the impact of economic uncertainty is less clear. Some country-specific studies detect a counter-cyclical relation for certain periods (i.e., increasing childbirths in times of high unemployment), while the effect of advanced childbirths on completed fertility is found to be negligible (for example, Kravdal (1994, 2002) for Norway; Hoem (2000) and Andersson (2000) for Sweden; Schmitt (2012) for Germany and the UK). However, for the rest of Europe, the majority of studies find that unemployment postpones childbirth and decreases completed fertility (Meron, Widmer, and Shapiro 2002; Pailhé and Solaz (2012) for France; Impens (1989) for Belgium; Frejka and Sardon 2006; Goldstein et al. 2013, Sobotka, Skirbekk, and Philipov 2011; Wood, Vergauwen, and Neels (2015) for Central, Southern, and Eastern Europe).

The common feature of the cited literature is the finding that for women of the 1965 cohort and older, birth postponement, be it caused by education and career investments or by economic uncertainty, has led to higher childlessness and lower family size in Europe (see also Philipov and Kohler 2001; Kohler, Billari, and Ortega 2002; Frejka and Sardon 2006; Sobotka 2003 and 2004).

This article delivers some indication that the picture is less clear for women who are currently of childbearing age. By taking into account younger cohorts and a larger set of European countries and by differentiating between socioeconomic determinants of birth postponement, we find evidence that under certain circumstances, birth postponement can facilitate rather than impede starting a family.

Based on a synthetic cohort approach, we find that the probability of becoming a mother is higher for those women who postpone first childbirth due to education and career investments than for those who postpone due to unrealized labour market integration. The data is compiled specifically to reduce endogeneity and to eliminate structure effects. A division of European countries into regional groups suggests that in countries where public institutions facilitate parents' work-life balance, educated and economically active women certainly postpone first childbirth in comparison to women who are less educated and who are not working, but eventually they have a significantly higher probability of starting a family.

Thus, our article contributes to the academic discussion of the circumstances that may lead birth postponement to result in higher fertility for younger cohorts in European countries (Sobotka et al. 2011).

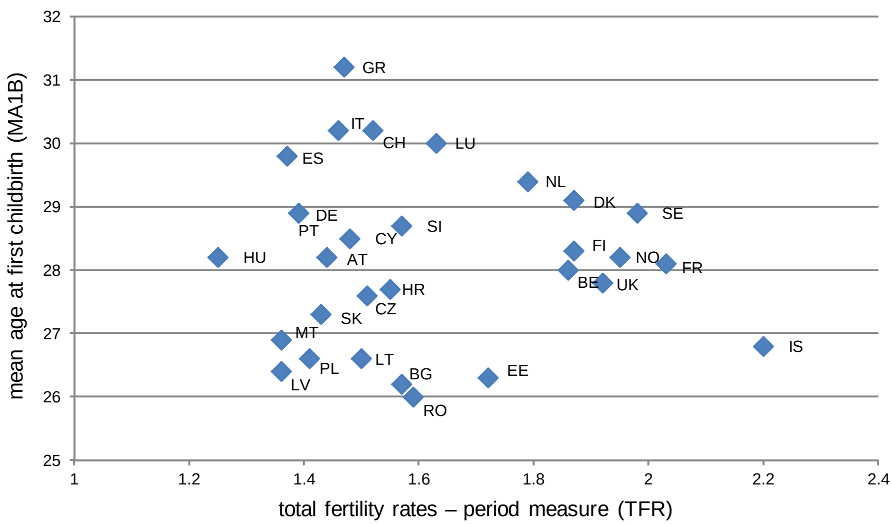
The article is organized as follows. Section 2 illustrates some empirical facts about the link between birth postponement and fertility in Europe, section 3 presents the data and methodology, section 4 presents our results, and section 5 concludes.

2. The relation between age at first childbirth and fertility

A cursory analysis of the relation between age at childbirth and fertility might seem to suggest that the two variables are negatively correlated. In most European countries, from the 1970s until the late 1990s, there was a massive postponement of childbirth accompanied by a fall in both total fertility rates and completed cohort fertility.

However, a more recent snapshot of European countries gives a different picture of the relation between age at childbirth and fertility. Figure 1 plots for 30 European countries women's mean age at first childbirth (MA1B) against the Total Fertility Rate (TFR) observed in 2010, and shows that there is no obvious link between the variables. Those countries in which the mean age at first childbirth is highest do not necessarily display lower fertility rates.

Figure 1: Mean age at first childbirth against total fertility rates, 30 European countries, 2010



Data sources: World Bank WDI, UNESCE
AT–Austria, BE–Belgium, BG–Bulgaria, CH–Switzerland, CY–Cyprus, CZ–Czech Republic, DE–Germany, DK–Denmark, EE–Estonia, GR–Greece, ES–Spain, FI–Finland, FR–France, HR–Croatia, HU–Hungary, IS–Iceland, IT–Italy, LT–Lithuania, LU–Luxembourg, LV–Latvia, MT–Malta, NL–Netherlands, NO–Norway, PL–Poland, PT–Portugal, RO–Romania, SE–Sweden, SI–Slovenia, SK–Slovakia, UK–United Kingdom.

Clearly, the use of a period indicator like the TFR may bias the analysis. For example, a rise in age at first childbirth may well reduce fertility among young women without necessarily increasing it among older women in the preceding cohorts not affected by birth postponement. This would involve a temporary lowering of the period TFR, which then would return to its initial level. Seen in this way, the lack of an obvious link in Figure 1 might be due to the effects of a gap in timing between countries that are not all at the same stage in terms of birth postponement. If some high-fertility countries began birth postponement earlier than others, they may well display higher period fertility levels simply because their birth postponement has come to an end, as compared with other countries where the postponement process began later.

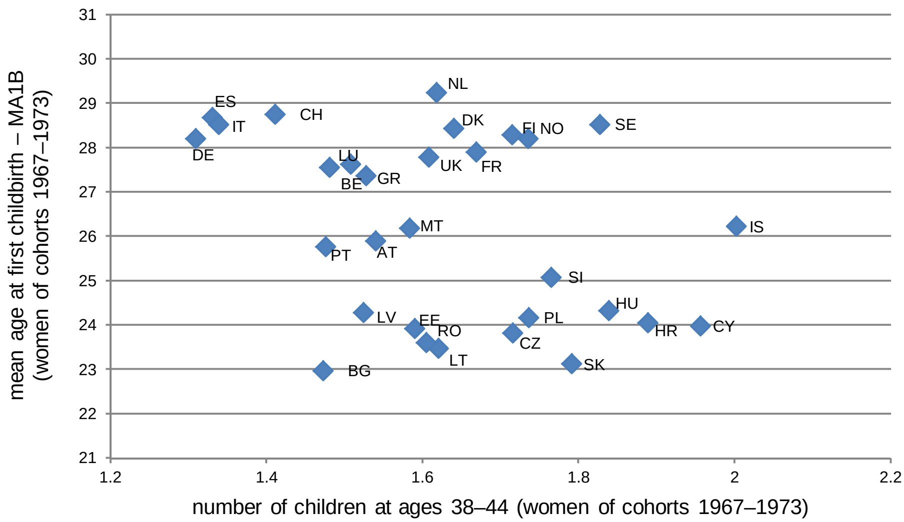
Consequently, it is important to complement the use of period fertility indicators with indicators of completed fertility by cohort. We can formulate two hypotheses here. Birth postponement might simply be a time shift in births within each cohort of women, involving only a temporary reduction in the number of births and not leading to any reduction in the total number of births a woman has experienced by the end of her childbearing period. In this case, the tempo effect associated with birth postponement has no impact on the total number – the quantum – of births. Alternatively, birth postponement might lead not only to a reduction in the period number of births but also to a reduction in the mean completed fertility by cohort. In this second case, birth postponement would be part of a real reduction in the fertility rate: the quantum of births would indeed be affected by birth postponement.

In order to get an idea of the relation between the timing of fist childbirths and the quantum of fertility in Europe, we use data from a cross-sectional sample of the EU–SILC (European Union Statistics on Income and Living Conditions), which allows us to cover 30 European countries. Figure 2 plots, for each country, women's mean age at first childbirth against the average number of children per woman for the cohorts 1967 to 1973 (i.e., women aged 38 to 44 in 2011 (cross-sectional sample).[4] Like Figure 1, Figure 2 shows that there is no obvious correlation between women's mean age at first childbirth and the average number of children per woman.[5]

[4] We aggregate several cohorts to obtain a sufficient number of observations per country and to smooth out cohort fluctuations, and we stop at age 44 to avoid a significant downward bias in the fertility measure. These data issues are discussed in more detail in section 3.

[5] The cohorts born from 1967 to 1973 are not representative of younger cohorts. To assess the robustness of the result, we also observe cohorts currently of childbearing age while using a fertility indicator that controls for tempo effects. For this purpose, we plot women's mean age at first childbirth (a period indicator measured in 2010, UNECE) against tempo-adjusted fertility rates (see Bongaarts and Feeney 1998; Sobotka 2004; Bongaarts and Sobotka 2012) for 2010 (Human Fertility Database). Here again, we find no obvious link between age at childbirth and tempo-adjusted fertility. Tempo-adjusted fertility rates are only available for 14 European countries, which is why the data is not presented here (results available on request).

Figure 2: Mean age at first childbirth and average number of children at ages 38–44 (women of cohorts 1967–1973)



Data source: EU–SILC CS 2011
AT–Austria, BE–Belgium, BG–Bulgaria, CH–Switzerland, CY–Cyprus, CZ–Czech Republic, DE–Germany, DK–Denmark, EE–Estonia, GR–Greece, ES–Spain, FI–Finland, FR–France, HR–Croatia, HU–Hungary, IS–Iceland, IT–Italy, LT–Lithuania, LU–Luxembourg, LV–Latvia, MT–Malta, NL–Netherlands, NO–Norway, PL–Poland, PT–Portugal, RO–Romania, SE–Sweden, SI–Slovenia, SK–Slovakia, UK–United Kingdom.

Figures 1 and 2 both show that countries in which women postpone childbirth are not necessarily the ones with lower (or higher) fertility levels. In fact, cross-country variation between European countries in the link between age at first childbirth and fertility is large. The low-fertility countries Italy and Spain show highest average ages at first childbirth, but mean age at first childbirth in other low-fertility countries like Poland and the Czech Republic are amongst the lowest in Europe. Norway and Sweden have high fertility rates together with relatively high mean ages at first childbirth. Finally, France, Belgium, Germany, and the UK have similar mean ages at first childbirth, but differ in terms of fertility.

The absence of a clear pattern suggests that the factors causing the cross-country variations in fertility level and childbearing age patterns are complex and context-based. Norms, institutions, and policies that shape the national context differ among European countries. When discussing the link between institutional and societal context and European fertility patterns, the literature mostly distinguishes between four welfare-state types, more or less dividing the countries into four European regions: Nordic, Western European, Southern European, and Central and Eastern European (CEE) countries (Esping-Andersen 1990, 1999; Gauthier 2002; Thévenon 2008, 2011, and 2015; OECD 2011).

Given the fact that each welfare state is the outcome of a country-specific history, attempts to classify European countries into a small number of welfare-state types necessarily involves significant simplification. The classification is even more difficult in light of the numerous dimensions of the welfare state (fiscal policy, pensions, unemployment insurance, health insurance, etc.). It is possible that for some welfare state dimensions a country belongs to a particular group, whereas for another, distinct, dimension the same country is closer to another group. Moreover, it is also possible that a given welfare-state group includes countries that differ in some important dimensions. Thus, classifications of welfare states are fragile, but are nonetheless widely used, since they can cast some light on important differences across countries in terms of public policy.

In particular, focusing on family policies, the distinction between the four types of welfare state (which coincide with the four European regions mentioned above) can help us describe how different family policies are across countries.[6] The literature on comparative family policies shows that these four groups exhibit important differences in terms of family policies supporting the combination of work and family life, and in terms of the redistributive impact of these policies within and between households (see Thévenon 2011). Let us present briefly the main differences across the four welfare-state types in terms of family policy.

Although there are significant differences between their welfare states, in comparison to other countries the Nordic countries (Sweden, Finland, Iceland, Denmark, and Norway) are characterized by continuous strong support for the combination of work and family life and promotion of gender equity in the workplace and family. Coverage of public childcare is high in comparison to the other European countries, especially for young children aged 0 to 2. Parental leave is an independent and nontransferable right for both parents and is paid as a percentage of salary. In addition, partners are taxed on an individual basis.

By contrast, the Southern European countries (Spain, Italy, Portugal, Greece) provide more limited assistance for dual-earner families. As shown in Gauthier (1996) and Bettio and Plantenga (2004), these countries are characterized by institutional and normative climates that hinder rather than encourage mothers to work, as male-

[6] Note here again that separating family policies from other dimensions of the welfare state, such as fiscal policies and pensions, itself constitutes a simplification. Indeed, government budget constraints impose some relation between the generosity of the various policies (child allowances, pensions, etc.) and the level and progressivity of taxes. Moreover, the impact of a particular policy on, for instance, fertility (in quantum and tempo) may be affected not only by family policies but also, indirectly, by other policies such as income taxation (see Pestieau and Ponthière 2013).

breadwinner couples are often considered the best environment for childbearing. In addition, the labour market structure in these countries makes it more difficult for women to re-enter the labour market after a baby pause and/or to adapt working hours. Although the larger prevalence of the male-breadwinner model in those countries is not the only determinant of fertility and labour market participation choices, it nonetheless contributes to reducing the capacity of many mothers to combine childbearing with full-time work, which can affect both the quantum and the tempo of births.

The male breadwinner model is still also quite strong in several Western European countries. The German-speaking countries, and to a lesser extent the Netherlands and Luxembourg, are characterized by attitudes that regard women as supplementary income providers, thus resulting in a male breadwinner/female part-time-career model. Dual-earner families with young children under age 3 receive limited support, even though these countries have recently made some effort to increase formal childcare supply. Although this limited support is obviously not the only factor affecting fertility and labour choices, since Barro and Becker (1989) the economic theory of fertility choice has largely underlined that the time cost of children (in terms of foregone labour income) can significantly affect fertility choices. A corollary of this is that policies that facilitate the combination of childbearing and full-time work (by relaxing time and budget constraints) can have a significant impact on fertility and labour supply decisions. In the absence of such policies, women who prefer to combine a full-time career with family life may often resign to start or enlarge a family. However, in other Western European countries like France and Belgium, support for dual earners through formal childcare was expanded during the 1970s and 1980s, and today many mothers work in full-time jobs. The UK and Ireland also encourage maternal employment, but they are characterized by relatively expensive private childcare and a high reliance on informal childcare, with a policy focus on financial support for low-income parents. What the Western European countries have in common is a tradition of relatively generous lump-sum cash benefits, which in general still tend to be higher than in other European countries.

Finally, history distinguishes the Central and Eastern group of European countries from the rest. During communism, countries in Central and Eastern Europe encouraged maternal employment through high childcare coverage for children of all ages and extensive leave arrangements. However, some of these countries also experienced repressive pro-natalist measures such as restrictions on family planning and abortion, especially Romania and Bulgaria. After the fall of the Soviet Union, childcare coverage and financial assistance to families decreased dramatically. Here again, this policy shift is not the only factor at work during the transition to capitalism, and probably many other changes affect fertility choices (Frejka 2008). However, the drastic reduction in childcare coverage and financial assistance, together with a more unstable labour market, may have prevented many families from realizing their fertility intentions in post-communist countries. Today, CEE countries such as Estonia, Latvia, and Bulgaria provide relatively high childcare coverage, while others (Hungary, Slovakia, the Czech Republic, Romania, and Poland) have low levels of childcare, similar to Germany and Austria, and support a more traditional division of household labour (Matysiak and Weziak-Bialowolska 2016).

The heterogeneity between European countries suggests that beside individual and household characteristics, the institutional, normative, and economic contexts also influence the link between timing and quantum of fertility. Depending on individuals as well as context, postponement of childbirth can happen by choice (due to education investments and/or career development, for example) or under constraint (for example, due to economic uncertainty). The resulting impact on completed fertility can be negative (limited time left for progression to higher-order births) or positive (easier progression due to lower economic constraints).

This article attempts to account for the multidimensionality in the relation between age at first childbirth and fertility. Covering a large set of European countries, we analyse how far education and employment status are related to the timing of first childbirth, and how far education and employment-related postponement of first childbirth influence quantum measures of fertility. We take into account women who are currently of childbearing age, as well as women who are at the end of their childbearing period. In order to quantify the role of (policy and institutional) context dependencies in the first-birth decision, we will also, as a first approximation, rely on the classification of countries into four groups of welfare-state types.

3. Data and methodology

To analyse the link between women’s educational level and activity status, and the timing of first childbirth and quantum measures of fertility, we mobilize data from the European Union Statistics on Income and Living Conditions (EU–SILC). This survey was created in 2003 as a replacement for the European Community Household Panel (ECHP) and now includes 31 European countries. The data contains cross-sectional samples as well as a rotational panel with a short follow-up period of four years for the majority of countries. The advantage of this data is the large number of European countries included and the comparability of the socioeconomic variables.

We distinguish between women who are currently of childbearing age and women who are at the end of their childbearing period.

For cohorts who are currently of childbearing age, we apply a synthetic cohort approach. Based on a sample of women aged 15 to 45 years, we first calculate the probability of having a first child by age. The probability of having a first child by age can then be used to calculate the intensity of the 'first childbirth' phenomenon. To obtain intensity and mean age at first childbirth, we create a fictional cohort. The hypothesis is that women aged x at date t will display the same fertility behaviour at $t+1$ as women aged $x+1$ at t. This hypothesis is certainly fragile where births are postponed for a long time and where cohorts vary considerably in behaviour. However, compared to simple distribution calculations (distribution of age at first childbirth for each education group, taking into account only those women who have given birth), our calculations based on probabilities, which also take into account those women 'at risk' who have not yet given birth, eliminate structure effects. The intensity can be interpreted as the percentage of women, by age, who have at least one child. This is the inverse of a survival probability of childlessness by age. In contrast to Kaplan Meier or Cox analysis, we do not follow a real cohort but observe women of different ages at a given moment. The results of our synthetic cohort approach can thus be interpreted as the average number of children of birth order one that would be born to a woman by the time she ended childbearing if she were to pass through all her childbearing years conforming to the age-specific fertility rates of order one of the observed time period (which is similar to the interpretation of total fertility rates, except we only consider progression to birth order one).

When calculating the probability by age, we distinguish between education groups and between women who are working and who are not.

For the variable measuring education we use the UNESCO ISCED classification to distinguish three levels (uniform categories across all countries): 'low education' for pre-primary, primary, and lower secondary education; 'medium education' for upper secondary and post-secondary nontertiary education; and 'high education' for first stage of tertiary education (not leading directly to an advanced research qualification) and second stage of tertiary education (leading to an advanced research qualification).

The aim is to analyse the impact of education on the probability of having a first child at a given age for a population at risk of having a first child. Note that calculating the probability of having a first child by age and educational level presents a number of difficulties. The main problem is simply that educational level increases with age. Consequently, when calculating the probability of having a first child at the age of 20, the denominator of the probability may well include women whose educational level at that stage is only average but who within a year or two will achieve a high level. This overestimation of the denominator leads to an underestimation of the probability of having a first child at the age of 20 for women with low and middle education. To avoid this underestimation we apply a retrospective approach for ages 15 to 27. We therefore use the cross-sectional sample of year 2011 and women aged 28,[7] and observe their education level and the number and age of their children. Based on this information, we retrospectively calculate the probability of having had a first child, by age, for ages 15 to 27, differentiated by education group. We stop the retrospective calculus at age 27 because this is the age by which most women have completed their education. This retrospective calculation enables us to subtract from the denominator all those women who will continue their studies, and thus to obtain unbiased probabilities of having a first child while still young for women of middle educational attainment. The retrospective approach also allows eliminating the attrition-caused downward bias of observed first childbirths for young women in EU–SILC (see Greulich and Dasré (2017) for more details on this issue).

From age 28 on, the probability of first childbirth by age and education is observed without the retrospective approach; i.e., we observe women aged 28 to 45 who are currently 'at risk' of first childbirth. In comparison to a complete retrospective approach for women aged 45+, observing younger cohorts allows focusing on women who are actually of childbearing age. We therefore mobilize the longitudinal EU–SILC database and observe, for childless women aged 28 to 45, the educational level in the year preceding the year of (potential) first childbirth. The years of potential childbirth are 2005 to 2010. The fact that we observe education before first childbirth reduces reverse causality to some extent, and therefore facilitates interpreting the observed link between education and age at first childbirth as a causal impact of education on the timing of the first childbirth. However, it is possible that the level of education and age at first childbirth are chosen simultaneously, so that it remains difficult to identify the specific channel of causality.

Besides education, the second variable we examine as a determinant of the timing and intensity of first childbirth is women's activity status. The EU–SILC provides a harmonized measure of activity status for all countries, which corresponds to self-defined economic status.[8] We distinguish between working women (working full-time or part-time, whether employed or self-employed) and those who are not working (mainly the economically inactive and the unemployed). As activity status is not time-constant, a retrospective approach for ages below 28 makes no sense. In order to avoid too great confusion of education with activity status, we only include women aged 25+ in our analysis of the link between employment status and timing of first childbirth. We again mobilize the longitudinal database in order to observe women's activity status

[7] We chose women aged 28 at the time of the survey (and not 27) in order to be able to observe potential first childbirths during their entire 27th year of life.

[8] This variable captures the person's own perception of their main activity and differs from the International Labour Organization (ILO) concept to the extent that people's own perception of their main status can differ from the strict definitions used by the ILO (for example, people who consider themselves as students, homemakers, or job searchers while working part-time).

before childbirth. Like for education, this reduces, but cannot eliminate, potential reverse causality bias due to the fact that the birth of a child affects the mother's activity status.

The EU–SILC data contains information about women's labour market status on a monthly basis, as well as about the quarter and year when their children are born. This enables us observing the activity status during a certain period before (potential) conception of a first child.

Figure A-1 in the Appendix illustrates how the necessary information is collected.

In order to obtain the information needed, individuals have to be observed over a period of at least three years (in the following called year *t-1*, year *t*, and year *t+1*).[9] Children born in the third and the fourth quarters of each year are generally declared in the interview of the following year, as interviews usually take place during the first half of each year. Births that occur at the end of the year are thus not detectable immediately. Three consecutive waves of interviews are thus needed. Based on wave 3 (the interview that occurs during year *t+1*) we identify all first births that occur during the calendar year *t*. Year *t-1* serves to observe the mothers' labour market characteristics over a certain period before potential conception. This is possible as in the survey interview in year *t* (wave 2), individuals give information about their month-by-month activity status in year *t-1*.

We observe labour market status during the three months before conception for women who had a first child in year *t* (the test group), assuming that the pregnancy lasted nine months. More precisely, for children born in quarter 1 in year *t*, we observe women's labour market status for January, February, and March in year *t-1*. For children born in quarter 2 in year *t*, we observe women's labour market status for April, May, and June in year t-1, and so on. For children born in quarters 2, 3, and 4 we could observe the labour market status over a longer time period than three months, but we use only the three-month information in order to avoid distortion in the measure of labour market status. For women without a childbirth in year *t* (the control group), we arbitrarily chose a three-month period during year *t-1*. As our observation of labour market status is limited to a three-month period, it cannot be interpreted as an indicator of employment stability. In order to integrate a better quantum measure of fertility, we complete our analysis of the impact of education and employment on the timing and intensity of first childbirths by investigating the link between education and the number of children of women who are at the end of their childbearing period. For that purpose,

[9] Around 40% of women are observed not only for three but for four consecutive years. Women observed for four years who have not had a first child in year *t* are included twice in our database (two person-years: two calendar-years of potential childbirth). We refrain from observing a longer period of labour market status for these women in order to avoid distortions caused by heterogeneous measures. This procedure also allows us to increase the number of observations. Estimations of the probability of first childbirth are controlled for the number of person-years.

we use the 2011 cross-sectional module of the EU–SILC survey. We choose women who were aged 38–44 at the time of the survey. Education is observed at the time of the survey, and their number of children is calculated retrospectively for ages 15 to 38–44. Grouping together cohorts 1967 to 1973 allows obtaining sufficient sample sizes for each age and education group.

We cannot assess the link between activity status and the number of children of women aged 38–44 based on a retrospective approach, as we did for education, because, unlike education, which remains largely unchanged from a certain age on, activity status varies throughout a person's life.

We do not observe women older than 44 because in the EU–SILC, children are only observed if they are still living in the parental household. Consequently, any calculations of fertility at higher ages are likely to be subject to a downward bias. Furthermore, measurements of mean age at first childbirth are likely to have an upward bias because some women's first children have already left the family home and consequently cannot be recorded as their 'first child,' which may artificially raise mean age at first childbirth as measured in the EU–SILC survey. For the group of women aged 38 to 44, Greulich and Dasré (2016) find that the average downward bias is less than 10% for most countries when compared to unbiased measures from the Human Fertility Database (HFD). The downward bias is likely to differ by education, however. Lower-educated women are found to have a slightly higher number of children outside the household who are not observed in the EU–SILC, which is why our results have to be interpreted with care.

To test the robustness of our results, we complete our statistical analysis with estimation models. The advantage of the latter is that it is possible to control for various factors such as partner characteristics and year- and country-specific effects.

Our analysis covers 28 European countries. Germany and Switzerland are not covered, as the EU–SILC does not provide longitudinal data for these countries.

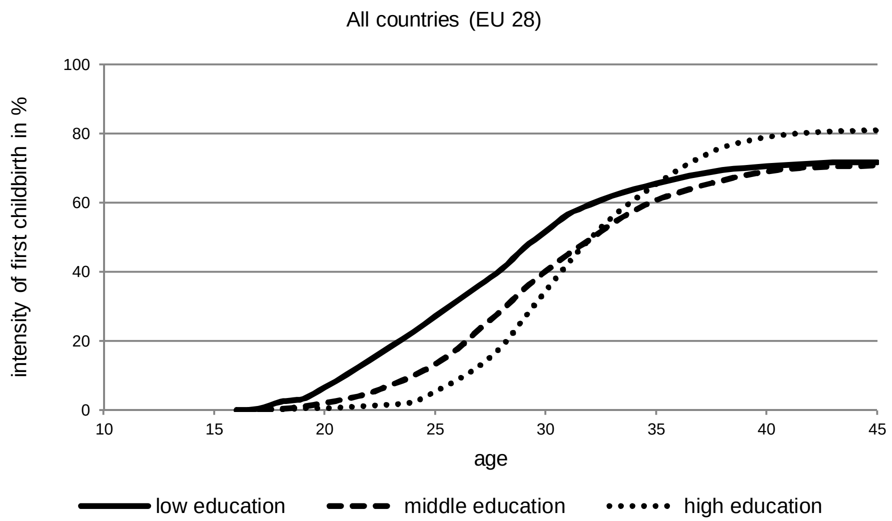
Finally, we account for context-dependencies by dividing the countries into four regional groups (Nordic, Southern European, Western European, Central and Eastern European), which reflect different welfare state settings, as discussed in section 2. As Germany and Switzerland are not included, the group of Western European countries covers a rather homogenous set of countries with relatively high fertility rates in comparison to Southern European and Central and Eastern European countries. A country-by-country analysis of birth probabilities by age, education, and activity status is not possible due to small sample size, especially for the longitudinal sample.

4. Results

4.1 Female education, birth postponement, and fertility

Figure 3 shows the intensity of the 'first childbirth' phenomenon, by age, for various educational levels. The curves show for each education group and age the percentage of women who have at least one child. These intensities increase with age. For the last age considered, 45, Figure 3 shows that the intensity is 71.6% for women with low education, 70.8% for those with middle education, and 81.0% for those with high education.

Figure 3: Intensity of women's first childbirth by women's age and education, weighted averages for 28 European countries



Data sources: EU–SILC LT 2003–2011, CS 2011

Low education: pre-primary, primary, lower secondary education; Middle education: (upper) secondary, post-secondary nontertiary education; High education: tertiary education

For ages 17 to 27: Education observed at age 28; probability of 1st childbirth for ages 17–27 calculated retrospectively (SILC CS 2011)

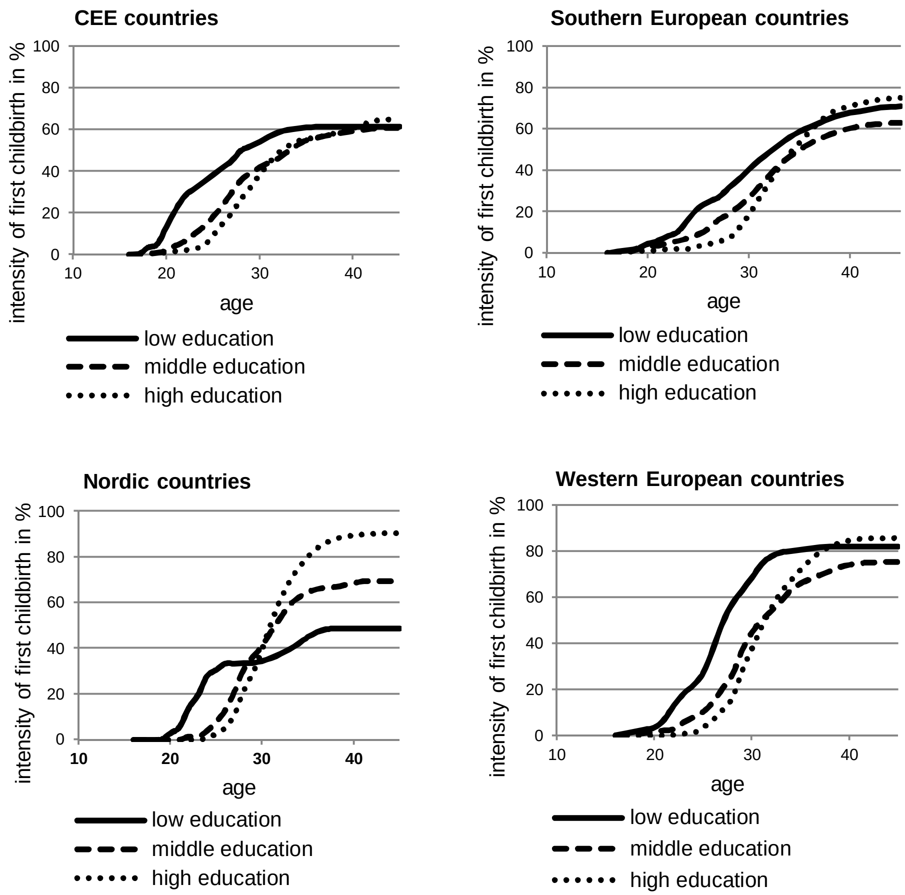
For ages 28+: Education observed at the wave preceding the year of potential conception of a first child (SILC LT 2003–2011)

Weighted average for 28 European countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

Figure 3 illustrates that higher education is associated with birth postponement. Low-educated women are more likely to have a child while they are young than women with middle and high education. Their 'first childbirth' intensity is higher up to age 32. Conversely, women with high education have their first child later than other women, as seen in their lower intensity curve up to age 32. Mean age at first childbirth for the three educational categories is 27.0, 29.5, and 31.0 respectively. However, Figure 3 shows that although high-educated women on average have their first child later than those with middle or low education, they are still more likely to become mothers.

We now divide the 28 European countries into four regional groups. Figure 4 shows that in all regions the intensity of 'first childbirth' is higher for less-educated women than for more-educated women during the younger childbearing years. However, at higher ages the two intensity curves cross. Hence, in all regions the intensity of first childbirth is greater for more-educated women at higher ages. The intensity of high-educated women outnumbers that of low-educated women quite late in Central and Eastern European countries (around age 38), and the intensity at age 45 is not significantly higher than for the other two education groups. The overtaking is earliest and most drastic in Nordic countries, where high-educated women have a much higher intensity of first childbirth at age 45 than low-educated women (49.0% vs. 90.0%). Southern European and Western European countries represent intermediate groups, with the intensity of high-educated women outnumbering that of low-educated women around age 30. In these countries, middle-educated women have the lowest intensity of first childbirth at age 45. Our calculations also reveal that for highly educated women the mean age at first childbirth is highest in Southern European countries (33 years), followed by the Nordic and Western-European countries (31 years) and CEE countries (30 years).

Figure 4: Intensity of women's first childbirth by age and education, weighted averages for European regions



Data sources: EU–SILC LT 2003–2011, CS 2011

Low education: pre-primary, primary, lower secondary education; Middle education: (upper) secondary, post-secondary nontertiary education; High education: tertiary education

For ages 17 to 27: Education observed at age 28; probabilities of 1st childbirth for ages 17-27 calculated retrospectively (SILC CS 2011); for ages 28+: Education observed at the wave preceding the year of potential conception of a first child (SILC LT 2003–2011)

Central and Eastern European (CEE) countries: Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, Slovenia; Southern European countries: Italy, Spain, Portugal, Greece, Cyprus, Malta; Nordic countries: Denmark, Finland, Norway, Sweden, Iceland; Western European countries: Austria, Belgium, France, Netherlands, Luxembourg, Ireland, United Kingdom.

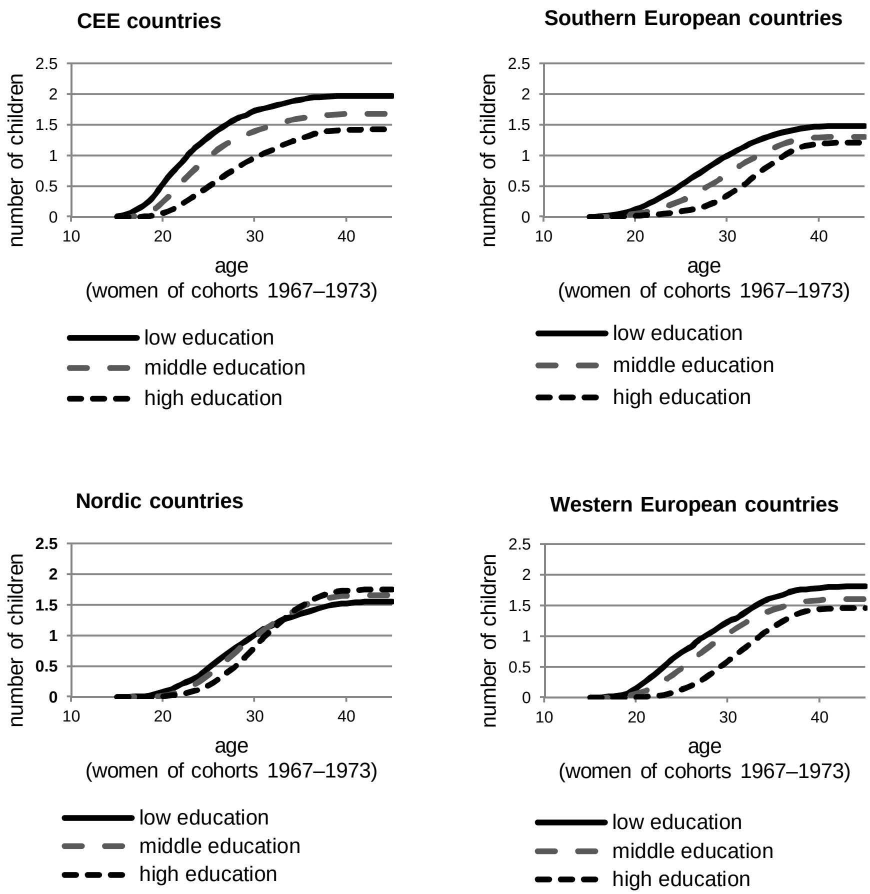
Thus, in all regions we find the same stylized fact: more-educated women wait longer before having their first child than less-educated women, but ultimately, among women at the end of their childbearing years, highly educated women are more likely to have become mothers. At the same time, the regions differ in terms of the size of the gap in intensity between women of different education levels. In the Nordic countries, the gap between high- and low-education women is substantial. In Central and Eastern Europe the gap is negligible, while intensities of all education groups are at a relatively low level. Consequently, educational level is a much greater marker for the probability of being childless at 45 in the Nordic countries than in other European regions.[10] The fact that highly educated women are most likely to become mothers in Nordic countries might be linked to the fact that in this region, public institutions facilitate maternal employment more than in other regions. Other labour-market-related issues such as job stability and income security might also be related to the regional differences illustrated in Figure 4.

It is naturally tempting to interpret the findings on first childbirth intensity as showing highly educated women catching up with the fertility of less-educated women. However, the figures should not be seen in this way because they are based on a cross-sectional sample including 30 cohorts, rather than a single cohort monitored over time. Nevertheless, the figures show a picture of the current fertility behaviour of those cohorts who are actually of childbearing age.

To properly analyse, for each region, the ability of the most educated women to catch up in fertility with the less educated, we have to focus on those cohorts which have already reached the end of their childbearing years. We thus examine fertility differences between education groups by focusing on women aged 38–44 in 2011, while calculating their number of children by age in a retrospective way. Figure 5 shows their average number of children by age, educational level, and region.

[10] Note that the proportion of highly educated women is highest in the Nordic countries, followed by Western European and CEE countries, while the proportion is lowest in Southern European countries (women aged 28, EU–SILC CS, 2011). Women's distribution over education is 65% (high), 31% (middle), 4% (low) in Nordic countries; 59% (high), 35% (middle), 6% (low) in Western European countries; 51% (high), 43% (middle), 6% (low) in CEE countries; 41%(high), 40% (middle), 19% (low) in Southern European countries.

Figure 5: Number of children by age and education, for women of cohorts 1967–1973, weighted averages for European regions



Data source: EU–SILC CS 2011

Low education: pre-primary, primary, lower secondary education; Middle education: (upper) secondary, post-secondary nontertiary education; High education: tertiary education

Education observed at age 38 (cohort 1973) to 44 (cohort 1967) in 2011

Central and Eastern European (CEE) countries: Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, Slovenia; Southern European countries: Italy, Spain, Portugal, Greece, Cyprus, Malta; Nordic countries: Denmark, Finland, Norway, Sweden, Iceland; Western European countries: Austria, Belgium, France, Netherlands, Luxembourg, Ireland, United Kingdom.

Figure 5 illustrates first that in all regions, women with less education start to have children earlier than those with more education, while women with higher education postpone first childbirth. However, only in the Nordic countries is the number of children at ages 38–44 higher for highly educated women than for low-educated women. For the other regions, highly educated women did not 'catch-up' to the fertility level of lower-educated women. This time the differences between education groups are most striking in CEE countries, where low-educated women have relatively high fertility levels, but the fertility of highly educated women stays at quite low levels. By contrast, in Southern European countries fertility levels are rather low for all education groups, with highly educated women nevertheless having the lowest fertility levels.

These findings suggest that difficulties in highly educated women catching up in terms of fertility play an important role in explaining differences in average fertility between the four regions (1.70 children in CEE countries, 1.40 children in Southern European countries, 1.74 children in Nordic countries, 1.51 children in Western European countries, for women aged 38 to 44 in 2011). It seems that these difficulties are strongest in CEE countries and weakest in Nordic countries. Differences in institutional support for combining work and family life may explain this regional heterogeneity, but other economic and social factors may also be crucial. For example, in CEE countries, economic uncertainty during the transition period in the 1990s may have led highly educated women of these cohorts to especially postpone first childbirth, while insufficient economic recovery in later years made it impossible for them to 'catch-up' (Frejka 2008).

When comparing Figure 5 to Figure 4 an important question emerges: what can explain the fact that Figure 4 suggests a fertility 'catch-up' of highly educated women in all regions, while Figure 5 reveals a catch-up in only one region? First of all, the two figures are based on different cohorts. It is possible that the potential 'catch-up' in fertility will be higher for cohorts who are currently of childbearing age. Second, Figure 4 only considers births of order one, while the data presented in Figure 5 includes all birth orders. It is possible that low-educated women currently have a higher probability of staying childless, but once they have a first child they are more likely to have children of higher orders in comparison to highly educated women. For cohorts 1967 to 1973 the proportion of childless women is higher for highly educated women than for low-educated women. However, it is possible that for younger cohorts, completed fertility will be more unevenly distributed among less-educated women: while a significant proportion stays childless, those who do have children might have, on average, more than one child.

To empirically estimate if and how far the impact of the timing of first childbirth on the final number of children differs between education groups, we run a linear regression with country-fixed effects and robust standard errors based on our 28

European countries. We estimate the number of children for partnered women aged 38 to 44 with at least one child as a function of the woman's age at first childbirth, while controlling for the woman's and her partner's education. We distinguish between women having their first child before or after age 26, which is the mean age of first childbirth in our sample. Marginal effects are represented by the interaction terms.

Table 1: Number of children for partnered women (cohorts 1967–1973) with at least 1 child, 28 European countries, 2011: Linear regression with country fixed effects and robust standard errors

Covariates	estimated coeff.	p-value	t-stat.
Woman's education:			
Low education (primary, lower secondary)	0.160***	0.000	5.52
Middle education (upper and post-secondary)	*Ref.*	/	/
High education (tertiary)	–0.0390	0.151	–1.44
Partner education:			
Low education (primary, lower secondary)	0.0864***	0.000	4.22
Middle education (upper and post-secondary)	*Ref.*	/	/
High education (tertiary)	0.129***	0.000	7.70
Age at first childbirth (A1CB)			
≥ 26	–0.485***	0.000	–26.27
< 26	–		
Interaction terms:			
A1CB ≥ 26 and low educated	–0.173***	0.000	–5.01
A1CB ≥ 26 and high educated	0.101**	0.001	3.21
Intercept	2.166***	0.000	61.04
Test of joint significance:			
p(A1CB ≥ 26 and low educated)	0.0000		
p(A1CB ≥ 26 and high educated)	0.0000		
Country-fixed effects	*yes*		
Number of observations	19,099		
Number of countries	28		
R^2	0.11		

* p<0.05, ** p<0.01, *** p<0.001
Data source: EU–SILC CS 2011
Low education: pre-primary, primary, lower secondary education; Middle education: (upper) secondary, post-secondary nontertiary education; High education: tertiary education.
Education observed at age 38 (cohort 1973) to 44 (cohort 1967) in 2011
28 European countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

Table 1 shows that in European countries, having a first child at age 26 or later significantly reduces the final number of children for middle-educated women (estimated coefficient –0.485). For low-educated women, having a first child at age 26 or later is even more negatively correlated with the number of children at ages 38–44 (estimated impact: –0.485-0.173=–0.658). For high-educated women, the impact of postponement of first childbirth to ages later than 25 on the number of children at ages 38–44 is still significantly negative, but to a lesser extent than in the other education groups (estimated impact: –0.485+0.101=–0.384; p-value for the test of joint significance 0.00).

The regressions also show that among women who have had their first child before age 26, low-educated women have the highest number of children at ages 3–44 in comparison to middle- and high-educated women, but there is no significant difference between middle- and high-educated women. Among women who have had their first child later than age 25, high-educated women have a significantly higher number of children at ages 38–44 than middle-educated women (estimated coefficient: –0.039+0.101=0.062; p-value of joint significance 0.0005), while the difference between low- and middle-educated women becomes insignificant.

The negative impact of child postponement on the number of children at ages 38–44 is thus found to decrease with education in European countries. These findings may be interpreted as follows. Among educated women birth postponement is associated with an investment that pays off later, whereas among less-educated women it may reveal other negative factors such as infertility, couple-related problems, or financial constraints.

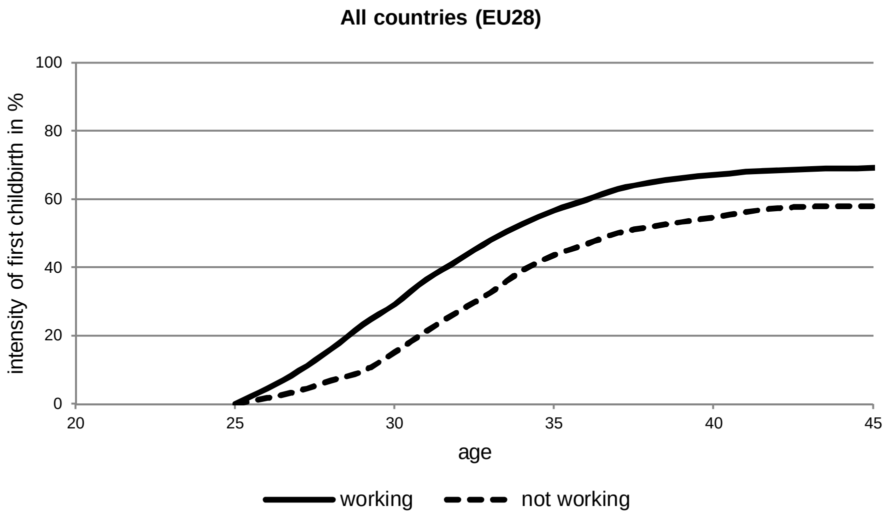
However, the regressions show that postponing births does reduce fertility for women of cohorts 1967–1973. This may not hold for younger cohorts. Figure 3 shows that educated women did postpone their first childbirth but had a higher intensity in becoming mothers. To analyse the effect of timing of births on the completed fertility of those cohorts that are now in their childbearing years, it is necessary to develop models for forecasting fertility by cohort and birth order, controlling for socioeconomic characteristics such as education and activity status. This is an interesting avenue for research but exceeds the scope of this article.

4.2 Female working status, birth postponement, and fertility

Now we examine the effect of women's activity status on the timing and intensity of first childbirth. Therefore, this analysis is limited to the actual childbearing behaviour of women who are currently of childbearing age.

Figure 6 shows the intensity of first childbirth by age and activity status. At all ages, the intensity is higher for women who are working than for those who are not. The gap between the two curves is significant and remains wide until the end of the childbearing years. Note that the final intensity of first childbirth at age 45 is a conditional intensity, i.e., it only applies to the selected group of women who have not had a first child by age 25: among women who have not had a first child by age 25, 73.0% of working women have one by the age of 45. However, only 57.5% of nonworking women who have not had a first child by age 25 have one by age 45. The mean age at first childbirth is 31.0 for working women and 34.0 for the others. We do not include women under 25 in order to avoid too great confusion of education with activity status. As the calculation of intensities only starts at age 25, the final intensities at age 45 are naturally lower than those presented in Figure 3.

Figure 6: Intensity of women's first childbirth by age and activity status, weighted averages for 28 European countries



Source: EU–SILC LT 2003–2011
"working": Employed or self-employed (full-time or part-time) during the three months previous to potential conception of a first child
"not working": Inactive, unemployed, student, military service, early retirement, disability, or any change in activity status during the three months preceding the potential conception of a first child
Weighted average for 28 European countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

The finding that being economically active facilitates the arrival of a first child for women is consistent with other recent studies showing that couples' fertility choices depend not only on the father's activity status but also on the mother's (Ahn and Mira

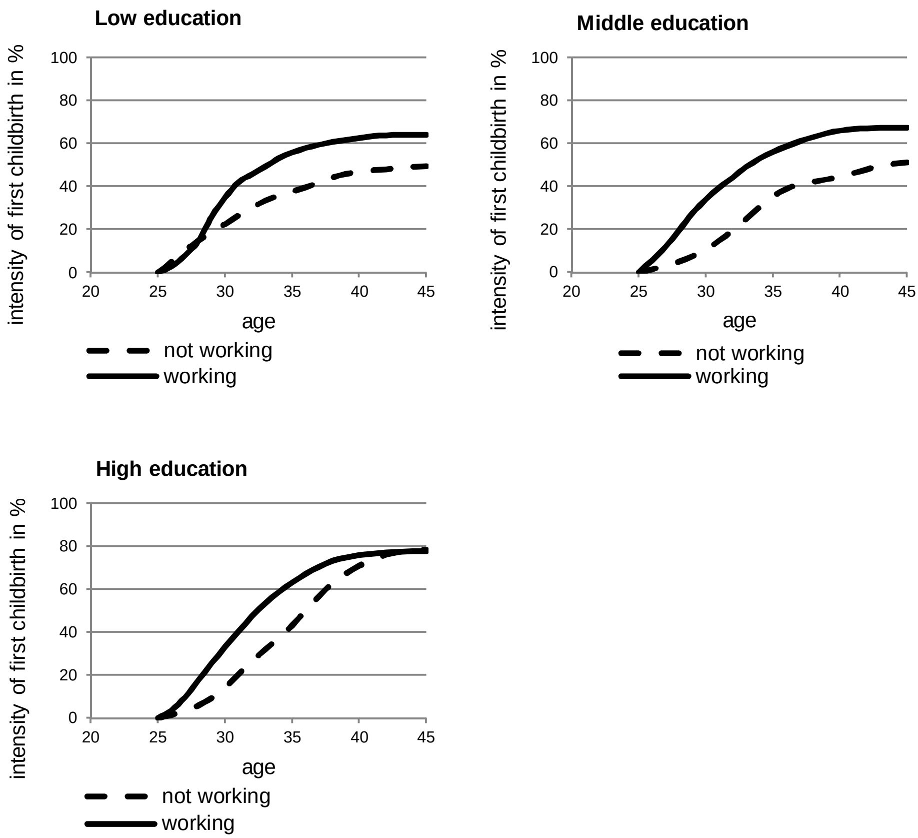
2002, Adserà 2004 and 2011, Sobotka, Skirbekk, and Philipov 2011, Pailhe and Solaz 2012, Goldstein et al. 2013, Greulich, Thévenon, and Guergoat-Larivière 2016). Not having a job emerges as an obstacle to mothers' fertility. Difficulties in entering the labour market are likely to delay or even prevent the start of a family, most likely because parents need a secure economic environment to start a family, which often can only be guaranteed if both partners have earnings.

When our country sample is divided into four regional groups (Figure A-2 in the Appendix), we find that in all regions, economically active women have their first child earlier and have a higher intensity of first childbirth over all ages. The difference in intensity between working women and those who are not working is highest in Western European and Nordic countries and lowest in CEE countries. However, the intensities for both groups are higher in Nordic and Western European countries than in CEE countries. Indeed, the intensities of first childbirth for nonworking women in Nordic and Western European countries are greater than the intensity for working women in CEE countries. Thus, not having a job appears to be a brake on fertility especially in the Nordic and Western European countries, while fertility is hampered for working women in CEE countries. In Southern European countries, working women have a greater chance of becoming a mother than women who are excluded from the labour market, but, in comparison to Nordic and Western Europe, it seems that working women in Southern Europe also face barriers to becoming a mother.

4.3 The impact of activity status on the timing and intensity of first childbirth, differentiated by education

We now combine information on education and activity status to identify the effect of activity status while controlling for differences in education. Figure 7 shows the intensity of first childbirth by age and activity status, for low-, middle-, and high-educated women aged 25 to 45 (for 28 European countries). It is still important to limit this analysis to women aged 25+ so as to not erroneously include women who have not completed their education among those with less education. As in Figure 6, this age limit reduces the final intensities, as we do not observe first childbirths before age 25. As low-educated women are more likely than high-educated women to have their first child before the age of 25, intensities at 45 risk being particularly underestimated for low-educated women. Therefore, in Figure 7 (and in Table 2) only differences between working and nonworking women within each education category are interpretable, and not differences between education categories.

Figure 7: Intensity of first childbirth by age and activity status, for low-, middle-, and high-educated women, weighted averages for 28 European countries



"working": Employed or self-employed (full-time or part-time) during the three months previous to potential conception of a first child; "not working": Inactive, unemployed, student, military service, early retirement, disability or any change in activity status during the three months preceding the potential conception of a first child

Low education: pre-primary, primary, lower secondary education; Middle education: (upper) secondary, post-secondary nontertiary education; High education: tertiary education; Education observed at the wave preceding the year of potential conception of a first child

Weighted average for 28 European countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

Figure 7 shows that, whatever their education, working women have their first child earlier and have a higher probability of having at least one child. The difference between working and nonworking women is particularly wide among those with middle education. For low-educated women the gap is narrower, but does increase with age. For high-educated women the reverse is the case: the gap is wide at younger ages and then decreases.[11] Figure A-3 in the Appendix shows that for highly educated women the gap between working and nonworking women reduces with age especially in Southern European and Western European countries, but not in CEE and Nordic countries. Once again, we see that highly educated women have most difficulty founding a family in CEE countries compared to other European regions, and especially those who do not succeed in integrating into the labour market.

Figure 7 suggests that on average in Europe, working is particularly relevant for first childbirth for middle-educated women. To see if this conclusion is valid when controlling for age, partner characteristics, and year- and country-specific effects, we estimate women's probability of first childbirth with a logit regression with robust standard errors. Table 2 shows the results. We see that among middle-educated women, those who are working have a significantly higher probability of having a first child than those who are not (estimated coefficient: +0.342). Among low-educated women, however, there is no significant difference between those who are working and those who are not (estimated impact of stable employment: +0.342-0.269=0.073; test of joint significance: 0.6226). The difference is also insignificant for highly educated women (estimated impact of stable employment: +0.342-0.236=0.106; test of joint significance: 0.2691).

[11] Low-educated and working: intensity (of first childbirth at age 45) 64.0%, MA1B (mean age of first childbirth) 30.6; low-educated and not working: intensity 50.0%, MA1B 31.4. Middle-educated and working: intensity 67.5%, MA1B 31.0; middle-educated and not working: intensity 53.0%, MA1B 34.0. High-educated and working: intensity 78.0%, MA1B 31.5; high-educated and not working: intensity 78.0%, MA1B 34.0.

Table 2: Probability of first childbirth for childless women aged 25–46, 28 European countries, 2003–2011
Logit regression with country- and year-fixed effects and robust standard errors

Covariates	estimated coeff.	p-value	t-stat.
Woman's activity status:			
Working	0.342***	0.000	(3.67)
Not working	*Ref.*	/	/
Partner information:			
No cohabiting partner	–1.803***	0.000	(–20.04)
Partner working	0.468***	0.000	(5.33)
Partner not working	*Ref.*	/	/
Woman's education:			
Low education (primary, lower secondary)	0.138	0.347	(0.94)
Middle education (upper and post-secondary)	*Ref.*	/	/
High education (tertiary)	0.342**	0.004	(2.86)
Age	1.147***	0.000	(16.23)
Age²	–0.0186***	0.000	(–17.18)
Interaction terms:			
Working and low-educated	–0.269	0.125	(–1.53)
Working and high-educated	–0.236	0.071	(–1.80)
Intercept	–19.99***	0.000	(–17.33)
Test of joint significance:			
p(working and low-educated)	0.6226		
p(working and high-educated)	0.2691		
Country-fixed effects	*yes*		
Year-fixed effects	*yes*		
Number of observations	39,692		
Number of countries	28		
R²	0.1874		

* p<0.05, ** p<0.01, *** p<0.001
Data source: EU–SILC LT 2003–2011
"working": Employed or self-employed (full-time or part-time) during the three months previous to potential conception of a first child; "not working": Inactive, unemployed, student, military service, early retirement, disability, or any change in activity status during the three months preceding the potential conception of a first child
Low education: pre-primary, primary, lower secondary education; Middle education: (upper) secondary, post-secondary nontertiary education; High education: tertiary education; Education observed at the wave preceding the year of potential conception of a first child
28 European countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

5. Conclusions

This paper investigates the link between timing of first childbirth and women's likelihood of becoming a mother. By mobilizing data from the EU–SILC, we show that educated and economically active women postpone first childbirth in comparison to women who are less educated and who are not working, but these women also have a higher probability of becoming a mother.

Factors behind birth postponement are distinct. Where birth postponement is associated with education and career investment it appears to facilitate rather than hinder the formation of a family later in life. Birth postponement can, however, also be caused by difficulties in finding a job, in which case it decreases women's likelihood of becoming a mother.

Successful labour market integration, which is achieved especially by highly educated women, facilitates starting a family. This is particularly the case in the Nordic countries, where educated and economically active women have a significantly higher probability of starting a family than those who are less-educated and not working. By comparison, in Central and Eastern European countries educated and economically active women also postpone first childbirth, but they do not end up with a higher (or lower) probability of becoming a mother. It rather seems that in countries of this region, women of all categories face barriers to starting a family.

The regional heterogeneity identified in this article suggests that region-specific contextual factors are important determinants of the link between the timing of first birth and birth intensity. In the Nordic countries, and to a lesser extent also in Western European countries, institutional support for combining work and family life is important and labour markets are stable in comparison to most countries in Central, Eastern, and Southern Europe. In this context, successful labour market integration for women emerges as a key factor in starting a family, even if it delays first childbirth. In Central and Eastern European countries, and to a lesser extent in Southern European countries, it seems that being employed does not necessarily facilitate women having a child. Lower childcare coverage, more rigid gender and family norms, and unstable labour market conditions may explain this finding. For example, it is possible that women who have succeeded in integrating into the labour market in CEE and Southern European countries consider that childbirth is associated with a high risk of losing their job, while those who do not work do not have the financial means to start a family. Consequently, both working and nonworking women have difficulty starting a family.

Our results indicate that public policies that enable and secure employment and facilitate parents to combine work and family life have the potential to increase fertility, despite birth postponement (as long as birth postponement happens within the biological range of female fecundity). Recent studies actually show that these policies are an important determinant of upturns in total fertility rates (Myrskilä, Kohler, and Billari 2009; Thévenon and Gauthier 2011; Neyer, Lappegård, and Vignoli 2013; Luci-Greulich and Thévenon, 2013, 2014; Arpino and Esping-Andersen 2015).

One way of extending this analysis is to forecast birth intensities of all orders by differentiating between education, activity status, and institutional context. This would allow pursuing the hypothesis that under certain circumstances birth postponement can be associated with higher fertility levels for those cohorts who are currently of childbearing age.

The EU–SILC is a unique data set that makes such an analysis possible. It provides a wide range of harmonized socioeconomic measures for a large set of countries and allows merging women with their partners. Yet the EU–SILC is not conceived for demographic analysis, which implies that birth events risk being underreported, mainly because fertility is linked to attrition. However, Greulich and Dasré (2017) find for the majority of countries that there are no significant socioeconomic differences in attrition in the EU–SILC. In addition, our retrospective approach allows circumventing the downward bias to some extent, as for women aged 15 to 27 we do not observe first births shortly after they occurred but with some time delay. For later ages the downward bias for first births is found to be much smaller. Finally, several important determinants of fertility, such as health, the quality of the partnership, and attitudes towards childbearing, are not observed in the EU–SILC. This points to the importance of enlarging the analysis to other data sources.

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Appendix

Figure A-1: Illustration of the construction of the database

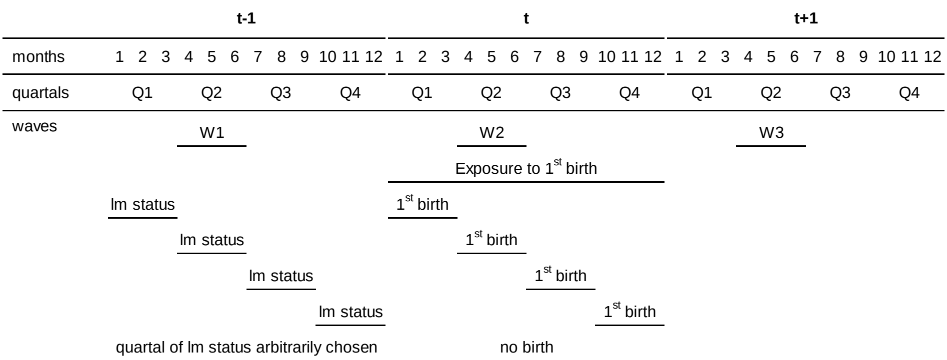
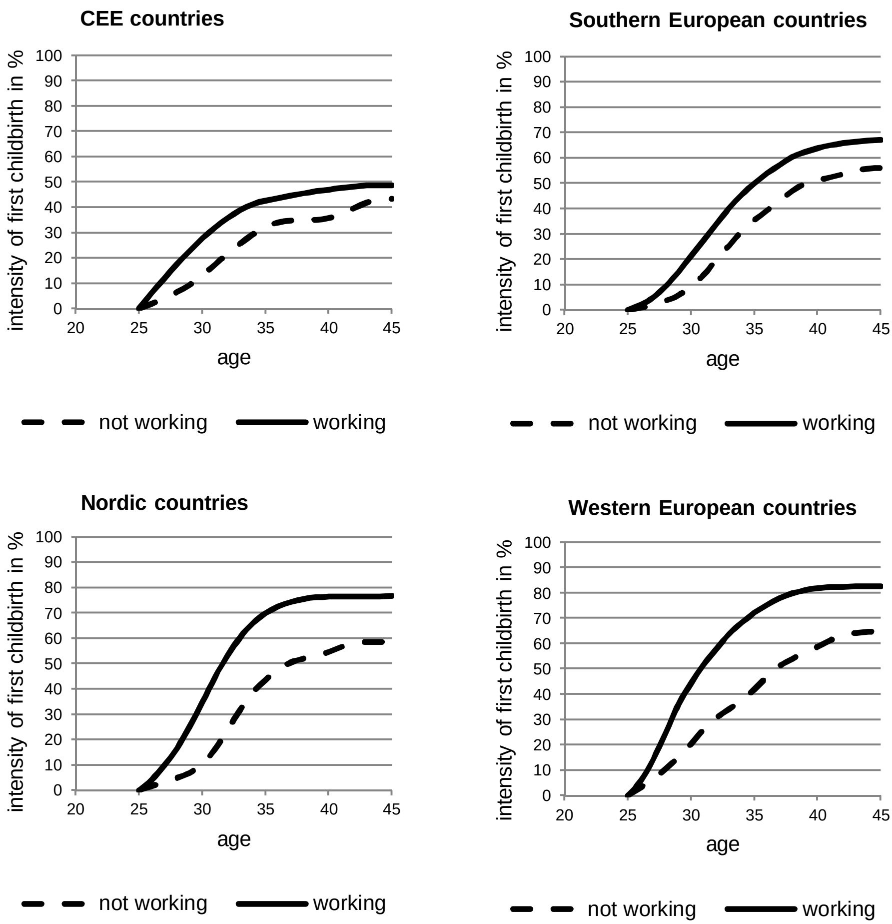
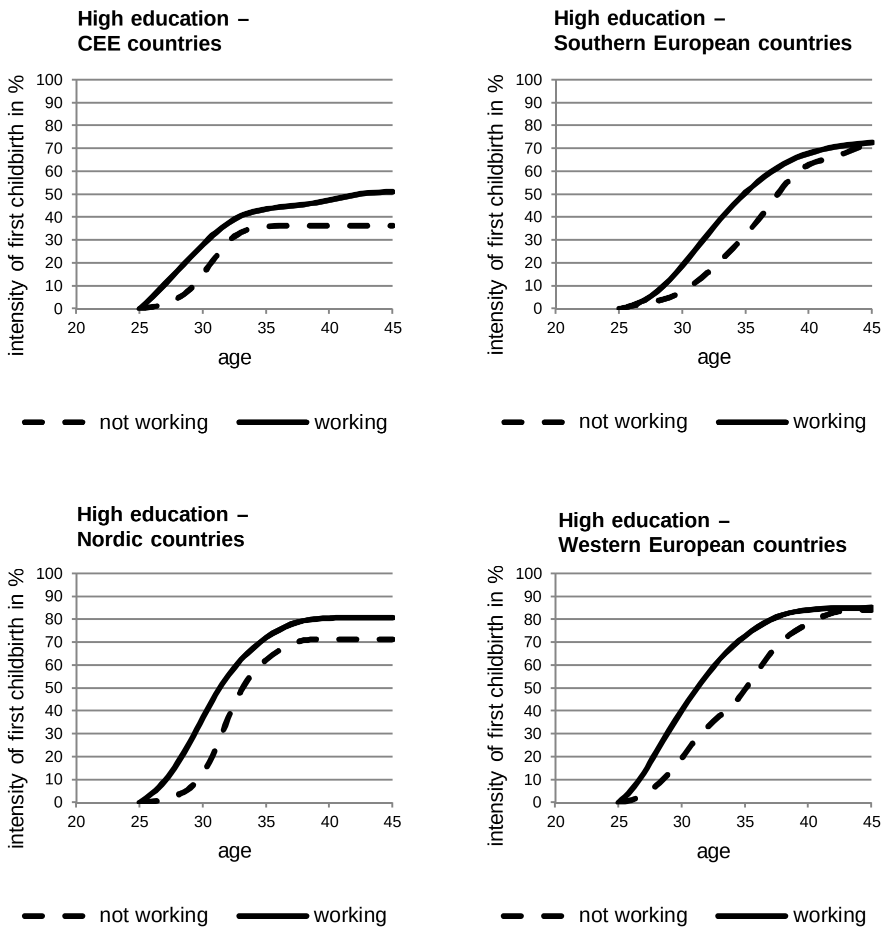


Figure A-2: Intensity of women's first childbirth by age and activity status, weighted averages for European regions



Source: EU–SILC LT 2003–2011
"working": Employed of self-employed (full-time or part-time) during the three months previous to potential conception of a first child
"not working": Inactive, unemployed, student, military service, early retirement, disability, or any change in activity status during the three months preceding the potential conception of a first child
Central and Eastern European (CEE) countries: Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, Slovenia; Southern European countries: Italy, Spain, Portugal, Greece, Cyprus, Malta; Nordic countries: Denmark, Finland, Norway, Sweden, Iceland; Western European countries: Austria, Belgium, France, Netherlands, Luxembourg, Ireland, United Kingdom.

Figure A-3: Intensity of first childbirth by age and activity status, for high-educated women, weighted averages for European regions



Data Source: EU–SILC LT 2003–2011

"working": Employed of self-employed (full-time or part-time) during the three months previous to potential conception of a first child; "not working": Inactive, unemployed, student, military service, early retirement, disability, or any change in activity status during the three months preceding the potential conception of a first child

High education: tertiary education; Education observed at the wave preceding the year of potential conception of a first child

Central and Eastern European (CEE) countries: Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, Slovenia; Southern European countries: Italy, Spain, Portugal, Greece, Cyprus, Malta; Nordic countries: Denmark, Finland, Norway, Sweden, Iceland; Western European countries: Austria, Belgium, France, Netherlands, Luxembourg, Ireland, United Kingdom.