Seeding the gender revolution: Women's education and cohort fertility among the baby boom generations

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Abstract

In Europe and the USA, female educational attainment started to increase around the middle of the twentieth century. The expected implication was fertility decline and postponement, whereas in fact the opposite occurred. We analyse trends in the quantum of cohort fertility among the baby boom generations and how these relate to women's education in fourteen European countries and the USA. The proportion of parents with exactly two children rose steadily, and homogeneity in family sizes increased over the 1901 to the 1945 cohorts. Progression to a third child and beyond declined in all the countries, continuing the ongoing trends of the fertility transition. In countries with a baby boom, and in particular among women with post-primary education, this was compensated for by decreasing childlessness and increasing parity progression to a second child. These changes, linked to earlier stages of the fertility transition, laid the foundations for later fertility patterns associated with 'the gender revolution'.

Keywords: Baby boom, cohort fertility, childlessness, education, Europe, United States

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Introduction

The changing relationship between women's education and fertility is one of the key ingredients in the ongoing transformation of gender roles and family life, which has been termed 'revolutionary' by a number of scholars (Goldin 2006; Esping-Andersen 2009; Esping-Andersen and Billari 2015; Goldscheider et al. 2015). During most of the twentieth century, women with higher levels of education had the lowest fertility. This negative female educational gradient in fertility was associated with the Western male breadwinner-female homemaker family model. As women were not supposed to combine their family roles with a professional career, women holding higher academic qualifications were rare, and typically had low marriage and fertility rates (Goldin 1990; Goldscheider et al. 2015).

In the heyday of the male breadwinner model, there was an important revival of fertility: in the middle of the twentieth century, in many Western countries a baby boom interrupted the decades-long decline of fertility dating back to the nineteenth century (Macunovich 2002). Neither demographers nor other social scientists were able to foresee this (Van Bavel 2010; Van Bavel and Reher 2013). One of the reasons why it was totally unexpected was that it occurred at a time when female participation in education was expanding. In Europe and North America, the process of educational expansion beyond the primary level accelerated in the period following the Second World War, with growing proportions of not just men, but also women completing secondary and higher levels of education (Boli et al. 1985; Aldcroft 1998; Schofer and Meyer 2005). Given the negative educational gradient in fertility, the expected impacts of rising female participation in education were fertility postponement and further decline. What happened, in fact, was a revival of fertility in countries as diverse as Spain (Reher and Requena 2014), Sweden (Sandström 2014) and Belgium (Van Bavel 2014).

This paper addresses the apparent paradox of increasing fertility in times of the growing educational attainment of women on the one hand, while there was a negative relationship between women's education and fertility on the other hand. We investigate

trends in the quantum of cohort fertility underlying the baby boom in fourteen European countries and in the USA. The baby boom was primarily a phenomenon typical of Western countries, but to enhance the comparative perspective our paper also includes former state-socialist countries of Central and Eastern Europe. This will help us to gain insight into the conditions explaining the presence or absence of a baby boom, and more particularly into the role played by women's education in different contexts. We analyse how components contributing to completed fertility (entry into motherhood, and progression to lower and higher-order parities) differ by women's educational attainment across countries and cohorts.

The results show fertility revival in all educational groups in countries experiencing a baby boom, largely offsetting the composition effects implied by women's increased educational attainment. In these countries, the proportion of women with more than two children was on the rise, but we demonstrate that this can be explained without assuming any increase in intended or ideal family size. We show, on the one hand, that trends display quite universal features of the transition to modern fertility (including increased homogeneity of family formation patterns across educational groups and the consolidation of the two-child family), but on the other hand, that there were also more-specific features that generated a baby boom only in a subset of countries. A baby boom is only observed in countries where the increasing tendency to have one or two children was strong enough to compensate for the decreasing propensity to have higher-order births. We conclude by linking these findings back to the ongoing discussion about changing gender roles and family behaviour.

The baby boom, fertility and women's education

So far, there is no widely accepted overall explanation for the baby boom, but some factors are well known (Macunovich 2002; Van Bavel and Reher 2013). The most important is that the baby boom, as a period phenomenon, was fuelled by a shift towards earlier marriage and family formation. This change was in line with a secular trend that emerged in a growing number of countries in the nineteenth century (Hajnal 1965; Watkins 1986; Alter 1991).

Nuptiality had already increased gradually between the second half of the nineteenth century and the 1930s in many European countries west of the Hajnal line (Hajnal 1953; 1965; Watkins 1986), notably in countries with advanced demographic transitions (Coale and Treadway 1986). The Great Depression slowed down marriage rates for a number of years in many countries, but the subsequent marriage boom (Hajnal 1953) represented the acceleration of an ongoing trend, weakening the old Malthusian marriage pattern in Europe. Even if there is no conclusive, generally accepted explanation for the marriage boom and the shift towards earlier childbearing, explanations based on increasing opportunities for the cohorts coming of age after the Great Depression (e.g., Easterlin 1987) are plausible.

This shift in tempo explains a large part of the baby boom (Van Bavel and Reher 2013): for the US, Ryder (1980) estimated that 58 per cent of the increase in period fertility underlying the baby boom can be attributed to changes in the timing of childbearing to younger ages. However, we consider the rising fertility quantum the most puzzling part of the story, because it runs against the tide of the secular fertility transition, which involved the spread of family size limitation. For instance, declining childlessness was a major ingredient of the baby boom (Reher and Requena 2014; Sandström 2014; Van Bavel 2014), while the group of childless women had expanded during earlier stages of the fertility transition (Morgan 1991; Rowland 2007).

The revival of fertility occurred in a period when women's education was on the rise, although the spread of mass education features prominently in explanations of fertility *decline* (Caldwell 1982; Axinn and Barber 2001; James et al. 2012). With regard to the mechanisms that might explain how more education would lead to lower fertility, some theories focus on the schooling of parents as a determinant of fertility preferences and behaviour. Other theories focus on the role of children's schooling rather than that of parents (Axinn and Barber 2001). Below, we connect the perspectives of parents and children to give clues to the changing linkage between education and fertility during the baby boom; that is, the perspectives of older generations (investing in the education of their offspring) and younger generations (coming of age as better educated than previous generations).

In a context of the increasing importance of education in the social structure of modernizing societies, one of the major strategies parents pursued to invest in the quality and prospects for their offspring was sending them to school, and doing so for longer periods of time (Caldwell 1982; Axinn 1993; Axinn and Barber 2001; Reher 2011). In the nineteenth century, many parents did this even before governments started to enforce primary education by law, and many parents encouraged their children to continue schooling beyond the compulsory age (Soysal and Strang 1989). Sending children to school clearly entails economic costs for parents (Caldwell 1982), so schooling is associated with increased parental investment in a smaller number of children, with a preference for 'child quality' rather than 'child quantity' (Michael 1975; Hanushek 1992).

Accordingly, in the nineteenth and early twentieth century, parents started to limit their family size and invested more in the education of their offspring. What happened next in these younger, better educated generations? The expansion of mass education beyond the primary level speeded up sharply after 1940, which was equally the case for women (Meyer et al. 1992). Based on this, fertility was expected to decline due to at least four mechanisms: 1) longer school enrolment leads to later age at union formation and childbearing, due to role incompatibility; 2) an increased level of education reduces the gains from marriage and therefore leads to lower marriage rates among higher-educated women; 3) with regard to childbearing, higher-educated women face greater opportunity costs, since it will reduce their activities in the labour market; and 4) better-educated women are more effective in using contraception than women with less education (Rossi 1984; Blossfeld and Huinink 1991; Lappegård and Rønsen 2005; Kravdal and Rindfuss, 2008). However, despite these pervasive negative effects of education on fertility, a revival rather than a decline in the fertility rate was observed among these better-educated, younger cohorts, not just in the timing, but also the quantum dimension (Van Bavel and Reher 2013).

How can we make sense of this unexpected combination of increasing female education and fertility? In the following, we investigate three aspects of the quantum distribution: the declining proportion of the childless, the spread of the two-child family and

parity progression beyond two children. In a nutshell, our argument is as follows: economic and cultural factors converged to establish and consolidate the two-child norm for people across the whole educational distribution; childlessness declined and the proportion of women having at least two children increased. The latter implies a greater number of families with three or more children, even if rates of parity progression beyond the second child remained stable.

Family formation on the rise among educated women

At the turn of the nineteenth and twentieth century in Western countries, many women never started a family. As far as the evidence shows, childlessness rates peaked in the 1880 to 1910 birth cohorts (Morgan 1991; Rowland 2007). Childlessness was particularly widespread among educated women, perhaps because they wanted to capitalize their degree in the labour market. They often refrained from starting a family or postponed it. Postponement could entail experiences and circumstances that made it less likely they would ever marry and have any children at all (Morgan 1991). Below, we discuss some general developments explaining the rise in family formation at the time of the baby boom, and then we establish the link between educational level and family formation. By 'family formation', we refer to the process of starting a family, including union formation and having children.

After the Great Depression and the Second World War, the economic and social circumstances as well as general advances in wealth and health resulting from post-war prosperity were very favourable for starting a family in Europe and North America. The economy boomed: jobs were in abundance, male wages rose, the demand for an educated workforce grew and vertical social mobility rocketed (Coontz 2005). The economic conditions helped make the late nineteenth century's bourgeois family ideal a reality for a growing number of men in terms of earning enough to allow their wives to stay at home and care for a limited number of children. This led to the heyday of the male breadwinner-female homemaker family model (Cherlin 1983; May 1988; Creighton 1999; Murphy 2002), although many working-class men did not earn enough to be able to support a stay-at-home

wife (Pott-Buter 1993; Janssens 1997). This family model, with its glorification of the mother and housewife, was a strong ally of the baby boom in the West (Bean 1983). On the Eastern side of the Iron Curtain, gender role specialization in household tasks and childrearing prevailed, as it did in the West. Yet because male wages were usually not high enough to support a family, and because the rapidly industrialized economies desperately needed new workers (Berend 2005), women were expected or even compelled to participate in the labour market (Stloukal 1999; Fidelis 2010).

In parallel, the expanding service and light industry sectors, which were considered suitable for women (Cherlin 1983; Goldin 1990; Pott-Buter 1993), also needed workers and employees in the West. Female labour force participation became a conventional part of most women's life course, although they were perceived only as secondary earners and were expected to leave the labour market when starting a family. At the same time, the newly emerging possibilities to work part-time, and the development of household appliances, enabled women to combine family life with participation in the labour market: once their children reached school age, they could go back to work. Taking into account that they had their children (typically not more than three) in their twenties and that they tended to cluster births close together, they could re-enter the labour market as still relatively young workers and employees. Accordingly, investment both in work and in (smaller) families became increasingly compatible for younger generations of better-educated women (Morgan 1991; Bonvalet et al. 2014).

Summing up, the above arguments imply the following mechanisms linking the early stages of the fertility transition with the baby boom. First, the diffusion of family size limitation in the earlier generations was linked with increased educational attainment in the next generation (i.e., from 'child quantity to child quality'). Next, when family size limitation had become a structural part of family life, educated women could start a family, stop childbearing early, and still realize their earning potential and personal ambitions in the labour market. Conversely, a larger proportion of women with a predisposition to start a family would now pursue post-primary education, and the group would become less and less

select in terms of family ambitions (Van Bavel 2014). As a result, the proportion of those who started a family would increase among educated women, and the expansion of education would not lead to decreasing fertility in the overall population. To the extent that the inclination to start a family grew at a greater pace than educational enrolment and attainment, fertility could even increase.

Recent evidence about the baby boom is consistent with this interpretation. Using decomposition techniques, Reher and Requena (2014) show that despite educational expansion and the negative female educational gradient in family size, total fertility still increased, because people of all educational levels exhibited rising rates. The positive effect of the increasing fertility rates outweighed the negative effect of the changing population composition by education in all 11 countries these researchers analysed, including European and non-European ones. Van Bavel (2014) reports a strongly declining educational gradient in total fertility in the cohorts producing the baby boom in Belgium, with increasing marriage rates and declining childlessness explaining the larger part of the convergence between women of different education levels. Sandström (2014) finds that fertility differentials by education level were much reduced among Swedish women, which produced the baby boom peak of the 1960s. He argues that the convergence in childbearing behaviour between high and low-educated women was crucial for the 1960s boom in Sweden, as the proportion of secondary and post-secondary educated women increased substantially in the cohorts born after the mid-1930s.

These pieces of evidence refer to the Northern and Western parts of Europe, which by the end of the Second World War were well advanced in their fertility transition. Most countries lying on the Eastern side of the Hajnal line and in the South still showed large family sizes (Frejka 2008). Nevertheless, a recent study of Spanish women born during the first half of the twentieth century shows that the negative association between education and fertility there also mainly resulted from differential rates of family formation. After selecting married women with at least one child, the educational gradient in fertility disappeared (Requena and Salazar 2014).

Given our theoretical arguments and these earlier findings, we expect that the association between female education and family formation changed in important ways during the baby boom, namely that an increasing proportion of women with advanced education started a family and had at least one child.

The consolidation of the two-child norm

Although a large part of the baby boom took place in times of economic prosperity and optimism, stimulating early family formation, these factors can at most only partially explain it. Further, the revival of fertility had already started in the mid-1930s (Van Bavel and Reher 2013). It seems plausible that the boom also involved a pro-natalist cultural tide that played a role of its own, perhaps related to 'the fear of population decline' (Teitelbaum and Winter 1985; Van Bavel 2010). For the USA, there is survey evidence that the revival of fertility during the baby boom was fuelled by increases in the normative pressure to have two children (Blake and Das Gupta 1975). In his review of the explanations for the baby boom, Bean (1983) also concludes that the acknowledged cultural emphasis on the family, home and motherhood must be assigned some independent causal role. Nevertheless, it remains hard to quantify and prove this empirically.

What has been documented, however, is the increasing homogeneity in family sizes observed during the period: the baby boom involved more people having at least two children and fewer people having more than four children (Bean 1983; Reher and Requena 2014; Requena and Salazar 2014; Sandström 2014; Van Bavel 2014). Bean (1983, p. 356) interprets this increasing homogeneity as signalling the emergence and consolidation of a two-child norm: part of the baby boom resulted from larger and larger proportions of the population being able to 'comply' with the norm that it is best to have at least two children. The two-child norm has proved to be pervasive and persistent (Sobotka and Beaujouan 2014).

This normative interpretation follows the categorization of the parity distribution proposed by Ryder (1980): first, the proportion remaining childless (as opposed to those starting a family with at least one child); second, the proportion having the 'normative'

number of children (namely two); and third, the proportion having 'optional' children (i.e., more than the normative number, meaning three or more). The justification for this categorization is that social norms 'pressed people into a preference for marriage over non-marriage, parenthood over non-parenthood, and at least two children rather than an only child [...] Beyond the second child, the progression is primarily a matter of individual preference' (Ryder 1980, p. 33). To explain variation in low-parity progression, 'one should look within the realm of normative pressure in relation to the socio-economic context' (Ryder 1980, p. 34). By contrast, to explain variation in parity progression past the second child, one should look 'within the realm of discretionary reproduction', although the latter will also be the repository of unwanted or unplanned pregnancies (Ryder 1980). Testa, Cavalli and Rosina (2014) recently showed that the distinction between 'normative' and 'discretionary' (or 'optional') parity progression remains relevant for childbearing decisions even today.

The question remains to what extent increasing homogeneity around the two-child family holds across countries and within countries, when comparing women by level of educational attainment. A recent study by Reher and Requena (2014), using the coefficient of variation to measure heterogeneity, indeed reports increasing homogeneity in the number of children ever born in a range of European as well as non-European countries, including the USA, but looking at all women irrespective of education. In the current paper, we investigate whether increasing homogeneity also holds between educational groups (i.e., did differences between educational groups become smaller?), within educational groups (i.e., did the variance in fertility measures decrease within each level of education?), as well as among all women irrespective of education within countries.

Third births and beyond

In the US, the baby boom involved an increase in both 'normative' and 'discretionary' parity births: not only did a growing proportion of the population have at least two children, a growing proportion also had more than two (Ryder 1980). The latter is particularly notable, since it represents an unexpected departure from the secular, downward trend driven by the

diffusion of family size limitation. Survey evidence suggests that part of the increase in the proportion of third, fourth and higher-order births did not result from an increase in intended high parity births, but instead from an increase in unintended births (Ryder 1978. See also discussions in Bean and Swicegood 1979; Bean 1983). Furthermore, Emeka (2006) shows that the generations that produced the baby boom, born around the Depression era, were the only twentieth-century cohorts in the US that had higher actual than ideal fertility. The study also shows a continued decline of ideal fertility from the 1880s until the 1940s cohorts, from an ideal family size of just over three children to about two-and-a-half. According to Emeka's study, the decline in ideal fertility continued monotonically over the cohorts that produced the baby boom, although this contradicts an earlier study by Blake (1966).

Here, we argue that the proportion of women having three or more children could rise as a result of two different pathways. First, it may be that a larger proportion of women who already have two children move on to have additional, 'discretionary' children. This pathway would imply that parity progression ratios after the second child would be on the rise. The second pathway is that parity progression after the second child remains stable or even reduces, but that more women have at least two children and, as a result, more women are at risk of having three children or more. To see to what extent each scenario applies, depending on the country and level of education, we compare parity distributions with parity progression ratios. Time series describing simple parity distributions will tell us whether an increasing incidence of high parity births contributed to the baby boom. Comparison with time series of progression ratios will inform us about the applicable scenario.

The second scenario could explain why more third and higher-order births occurred, without the need to assume either increasing family size ideals or a weakening effectiveness of fertility control. The first scenario would instead imply higher family size ideals, less-effective birth control, or both. One possible reason to expect this scenario follows from the fact that the baby boom involved a shift towards earlier family formation. This shift implies that women were exposed to the risk of (unintended as well as intended) pregnancy for a

longer part of their fertile lives, with the additional exposure being concentrated in 'prime-time' ages, when couples are younger, sexually more active and in their peak years of fecundity (Ryder 1978).

A recent study among Spanish women born in the first half of the twentieth century indicates that contraceptive use was more widespread and more sophisticated among women with a higher level of education (Reher, Requena, and Sanz 2014). If higher-educated women are indeed more successful in limiting their fertility, then we would expect that higher-order birth rates would be less likely to increase among higher-educated women and be more likely to increase among the lower educated. An additional reason for expecting such an association between education and high-parity births follows from timing-quantum interactions, since the higher educated tend to start a family later. A later age at first birth is associated with a shorter 'at risk' period to proceed to higher-order births.

Lastly, we expect that there will be a connection between lower ('normative') and higher-order ('discretionary') parity progressions, notably among higher-educated women. A previous section presented the argument that as family size limitation and the two-child family were gaining a stronger foothold, educated women became more inclined to start a family rather than staying unmarried and childless. This implies a negative correlation between childlessness and family size limitation; or in terms of parity progression ratios, a negative correlation between the progression to the first child on the one hand and progression from the second to higher-order parities on the other. As higher-educated women were better able to stop parity progression after having two children, they would feel less of a need to remain childless in order to realize their non-family career ambitions: they could reach the 'normative' family size without having any 'discretionary' children.

Data and measurements

We use data about women's educational attainment and their final number of children in the USA and fourteen European countries: Austria, Belgium, Croatia, the Czech Republic, Estonia, France, Germany (but only the former GDR), Greece, Hungary, Poland, Slovakia,

Spain, Sweden and Switzerland. These represent a broad range of countries from the Western world in terms of historical and cultural background, as well as regarding demographic conditions. Some countries were already well advanced in the demographic transition and had experienced below-replacement fertility rates during the inter-war years (Van Bavel 2010), and some experienced a baby boom whereas others did not. Hence, comparing these countries will allow us to shed more light on how education relates to fertility trends under different conditions. A drawback of including this number of countries is that we are comparing very different educational systems. In order to minimize any resulting problems of comparative classification, we use broad categories and distinguish between only three levels of education, as discussed below and in greater detail in the Online Appendix.

Retrospective census data

Our analyses rely on data that either cover the complete population or are based on such large samples that sampling error can to a large extent be neglected and tests of statistical significance are superfluous. Table 1 gives country-specific information about the data and sources.

Table 1. Data and sources

With regard to the censuses and their timing, two potential limitations need to be considered. First, the census year should not be too close after the baby boom period, in order for the fertility of the cohorts under study to be treated as (almost) completed. If the age of 40 is taken as the upper limit for childbearing, censuses starting from 1980 allow examination of birth cohorts up to 1940. Second, if a census is from a relatively recent period, selective old-age mortality and gaps in people's memory become a potential source of bias for older birth cohorts (Van Bavel 2014). We discuss these sources of bias and other data-related issues in the Online Appendix. The conclusion there is that selective survival and underreporting of births may produce slight underestimates of fertility, especially for the

older cohorts, to the extent that they are correlated with family size. This could result in somewhat exaggerated estimates of the extent of fertility recovery during the baby boom, although the trends in cohort total fertility based on vital statistics are very similar to the ones we use based on retrospective census data (see the next section). In some cases, we use more than one census in order to optimize cohort coverage. For the Czech Republic and Austria, the youngest birth cohorts used in the analysis have been taken from a later census (the birth cohorts of 1900–1940 are from the 19801981 census and cohorts of women born after 1940 come from the 1991 census).

Cohort fertility

Our main objective is to examine the change in the extent of fertility related to educational attainment. Although the baby boom is generally understood as a period phenomenon, the aim is to observe the fertility outcomes of the birth cohorts who produced the baby boom, namely the people born during the first four decades of the twentieth century. Considering, for example, that in the period view the baby boom peaked between 1955 and 1965, then the cohorts who mainly contributed to this were born between 1920 and 1940. Women born before 1915 belong to generations that largely completed their childbearing before the baby boom. For women born after 1940, their childbearing years were typically after 1965.

We calculated completed fertility rates by five-year birth cohorts and compared these with corresponding official statistics based on vital statistics (available from the online INED database of developed countries: http://www.ined.fr/) as an external consistency check. The results of the comparison are presented in Figure 1. To avoid clutter, the figures only give the starting year of birth for each cohort interval. As can be seen, the two time-series match closely. In this and all the other figures, countries are ordered by the percentage change of completed fertility observed for all women (irrespective of education), as reported in Table 2. The general pattern that emerges confirms earlier observations (Van Bavel and Reher 2013): there was only a revival of cohort fertility in countries where the fertility transition was well underway and had reached low cohort fertility levels (typically around two children per

woman) in generations born after the turn of the twentieth century. Estonia is one country where there was no upward trend, but a downward one, even if fertility had already declined earlier towards about two children per woman. Frejka and colleagues (2004, pp. 253–70) attribute this absence of a baby boom to the violent reorganization of society and large-scale repression that took place in the 1940s and 1950s. Recent micro-data analysis lends support to this explanation (Puur and Klesment 2014). In Croatia, Greece, Hungary, Poland and Slovakia, fertility was still relatively high in the oldest cohorts and it declined subsequently. In Spain, it was very high at first, declined substantially afterwards, but then rose slightly in the most recent cohorts.

Figure 1. Completed cohort fertility as estimated from our retrospective (census) data compared with vital statistics data from the INED database

Educational attainment

Comparing educational attainment across countries is not straightforward, given the cultural and institutional diversity in educational systems (Schneider 2010). For example, specialized intermediate studies such as nursing are classified as 'secondary' in some countries, but as non-tertiary, post-secondary in others (UNESCO 2003). In order to minimize problems of equivalence, we chose to group attainment levels into three very broad groups based on the International Standard Classification of Education (ISCED-97, UNESCO 2003): low (ISCED 0–2), medium (ISCED 3–4) and high (ISCED 5–6). The Online Appendix details our approach. For convenient reference, low, medium and high education are used here interchangeably with primary, secondary and tertiary education.

Figure 2 shows the evolution of the proportions of low, medium and highly-educated women by country and birth cohort. In all countries, the proportion of women with education beyond the primary level rises. However, the extent to which this happens varies strongly by country. In Greece, Belgium and particularly in Spain, the changes are minor. By contrast, in the USA, there were already more medium than low-educated women after the 1910–1914 cohort. Several other countries also make this crossover, but later. Typically, the proportion

of women with at most primary qualification went down, most notably from the baby boom cohorts onwards (born in the 1920s and 1930s, coming of age in the 1940s and 1950s).

Although there was a rise in the proportion of highly-educated women in all countries, it still remained very limited in most, with the corresponding line looking almost flat in many of them. The largest increases in the proportion of highly-educated women are visible in the USA and Estonia. The decline of the proportion of low-educated women is driven in the first place by the proportion that completed secondary education. Therefore, when we talk about the expansion of female education, it was for the most part limited to secondary education in the generations studied here. Nevertheless, the shift from primary only to secondary level has proven to be a crucial one for reproductive behaviour (Cohen 2008).

Figure 2. Percentage distributions of women by cohort and level of educational attainment

In the next section, we relate women's educational attainment to their completed fertility as measured at the time of the census, although actual childbearing often occurred much earlier. Since the available data does not allow us to determine the exact timing of school completion in relation to actual childbearing, it is important to note that the causal relationship between education and fertility may run in both directions. The educational path chosen by a woman can have an impact on her childbearing behaviour, but in some cases early childbearing also influences future educational attainment. As a result, the associations presented below should not be interpreted as estimates of the causal effect of education on fertility. This is discussed in greater detail in the Online Appendix (Part A. 4).

Results

The following section first paints the general picture of completed cohort fertility by level of education and verifies to what extent the hypothesis of increasing homogeneity in family size applies. Subsequently, we focus on the role played by declining childlessness and increasing

family formation across educational groups. Lastly, we investigate our questions regarding higher-parity births.

Cohort fertility by level of education

Figure 3 presents the cohort total fertility by country and level of education. Countries with a baby boom typically show an increase in cohort fertility across all educational groups. An exception is France, where the fertility of the highly-educated shows a decline, at least for the early 1920s cohorts. The fertility of the very small group of highly educated in the 1915–19 cohort seems suspiciously high, however, so we are sceptical about whether this figure depicts a realistic picture of what actually happened. In countries where the overall completed cohort fertility did not rise (Croatia, Estonia, Greece, Hungary, Poland, Slovakia and Spain), this was because the fertility of low-educated women did not increase. Nevertheless, in these countries fertility levels still rose among medium or highly-educated women. In sum: the fertility of secondary and tertiary-educated women increased almost everywhere, but whether or not there was a revival of overall cohort fertility largely depended on the behaviour of the still very large group of lower-educated women. In a number of countries, there seems to be a clear convergence in total fertility rates between educational levels (Belgium, Croatia, Estonia, Greece, Hungary and Spain). In other countries, the trends for different levels of education run more in parallel.

Figure 3. Cohort completed fertility by country and level of education

To shed more light on the issue of increasing homogeneity with respect to completed cohort fertility, Figure 4 plots the coefficients of variation (i.e., the ratio of standard deviation to the mean) for completed fertility for the total population (bold squares) as well as separately by level of education. Overall, all countries move in the direction of a more homogeneous distribution of the final number of offspring related to all levels of education. The increasing homogeneity holds not only within countries, but also within educational

groups. In many countries (Austria, Belgium, the Czech Republic and East Germany) the highly educated are more heterogeneous than the other two groups, but this dissimilarity decreases over time. Only in Switzerland does there seem to be a different trend, namely that the variation decreased less within the highly-educated group than within the others.

Figure 4. Coefficient of variation of completed fertility: total population (bold squares) and separately by level of education

Figure 5 shows the extent to which educational groups became more similar to each other over the cohorts. It plots the relative differences in total fertility between attainment levels by cohort. More specifically, it charts low and highly-educated women's completed fertility relative to that of their medium-educated counterparts. The general picture is one of increasing convergence between attainment levels, but there is a stronger convergence between low and medium-educated women than between high and medium-educated women. There are also examples of stability over time in the low-to-medium gradient (such as Switzerland, CH). When comparing highly-educated women with the medium educated, the differences are smaller and more stable. For instance, in Sweden (SE) the two educational groups are almost the same. All in all, these figures suggest that the greatest difference is between women with at most primary education on the one hand, and those with secondary or tertiary education on the other.

Figure 5. Relative fertility ratios by level of education*

*Vertical axis in log scale for symmetry around ratio of unity; axis labels on their natural scale.

Family formation

We expected that the baby boom was partly attributable to a trend whereby increasing proportions of women with education beyond the primary level had ever started a family. Such is indeed shown to be the case. Figure 6 shows that childlessness declined for all three

educational levels in all countries (except in Greece until the 1920 cohort), not only in countries with a baby boom, but also in those without a clear boom (including Estonia, Hungary and Spain). Nevertheless, childlessness generally declined most for medium or highly-educated women. As a result, there was a downward and convergent trend, even though the low educated continued to be the least likely to remain childless.

Figure 6. Proportions of childless by country, cohort and level of education

To what extent can the growth of the proportion of the population having at least one child, particularly among more-educated women, explain both the revival of completed cohort fertility and the diminishing differences between educational levels? To answer this question, we calculated total fertility rates only for women who had at least one child. It turns out that the educational gradient as well as the increase of completed cohort fertility is much reduced when looking only at women with at least one child. In some countries, the educational gradient in total fertility almost disappears in this group: in Belgium and Sweden, the lines for different educational groups are very close to each other. In these countries, the lines also look almost flat, indicating no increase in completed family size among those who had at least one child.

Figure 7. Total cohort fertility for women with at least one child, by country and level of education

In order to obtain a more precise picture, Table 2 presents the percentage change in completed fertility between the 1916–20 and the 1931–35 cohorts by country and level of education. The first cohort was chosen because it is the oldest one available for all countries, and the second because it experienced family formation largely before the advent of modern hormonal contraceptives. The table allows comparison of all women (left-hand side of the table) with those who had at least one child (right-hand side of the table). Most of the numbers on the right-hand side of the table are negative, indicating that in most countries

there was a decline in the average number of childbirths between the two selected cohorts among those who gave birth to at least one child. Thus, for most countries, the revival of completed cohort fertility observed particularly among medium and highly-educated women can be explained entirely by the declining proportions of childlessness. There are some exceptions, including most notably the US with its exceptionally strong baby boom, in addition to Austria and Eastern Germany where family size increased across the educational board. In Sweden it also increased marginally, except among the highly educated. In Greece and Poland, by contrast, family size increased only among the highly educated who started a family.

Table 2. Percentage change in completed fertility between the 1916–20 and 1931–35 cohorts

Parity distribution and parity progression

To what extent did the increase of cohort fertility involve a growing proportion of women reaching the 'mandatory' two-child norm, and to what extent did it involve progression to higher-order 'discretionary' births? Figure 8 shows, per country and level of education, the proportions of women having no children, just one child, two children, or three or more. Figure 9 presents the corresponding parity progression ratios (PPRs). The first line of panels in both figures reiterates the lesson just learned about decreasing childlessness and the increasing propensity to start a family at all levels of education, but in particular among those who completed at least secondary education.

Next, we can see that the rising proportion of women having at least one child did not result in rising proportions having only one child. On the contrary, there was a tendency for the proportions of women having just one child to either decline or stabilize (Hungary is an exception). This results from rising parity progression after the first child: among those who had one child, the propensity to have a subsequent child increased across the board, but particularly among those with at least secondary education.

Figure 8. Parity distributions: proportions ending up with 0, 1, 2 or 3+ children, by country and level of education*

Figure 9. Parity progression ratios: proportion among those with 0, 1, 2 or 3 children proceeding to have additional children*

* See Table 1 for country codes; parity progression ratios for highly-educated women with three children are very erratic in Estonia, Greece, Hungary and Poland due to the very low number of cases in this group.

After the second child, parity progression in most countries appears stable in the oldest cohorts, and typically declines in the cohorts born after 1930; that is, the cohorts that could turn to modern hormonal contraception after having two children from the mid-1960s onwards in most countries. In Central and Eastern Europe, these women also made use of abortion liberalization after the late 1950s. PPRs after the third child were already in decline, even in the older cohorts. However, since parity progression from childless and single-child women had been on the rise, a larger proportion of the population was exposed to the risk of having a third or even more children. As a result, the proportion of women with three or more children could rise for baby boom cohorts, even if the propensity to have more than two children (measured by the PPR) did *not* increase. This occurred in a number of countries, including Austria, Belgium, Switzerland and Sweden, and corresponds to the second of the two scenarios depicted in the background section.

The general pattern that stands out is the increasing dominance of the two-child family, not just in terms of parity distribution (Figure 8, third row of panels) but also in terms of parity progression (Figure 9): PPRs for those with fewer than two children were increasing, whereas PPRs for those with two or more children were decreasing. This occurred in all educational groups, but again, particularly for women who had completed at least secondary education.

In order to see whether the inclination to start a family (PPR0) was gaining ground particularly among women with advanced education as parity progression after the second child (PPR2) was declining, Table 3 presents the correlation coefficients for the association

between the two parity progressions by educational attainment. In general, in all educational groups the correlation across cohorts between the lower and the higher parity progression ratios tends to be negative. The US (in line with the evidence in Morgan 1991) and highly-educated women in Poland appear to be exceptions. Apart from these, the general pattern suggests that the rising propensity to start a family (as indexed by the increasing PPR0-1 across cohorts) went hand in hand with the diffusion of stopping behaviour after having two children (as indexed by decreasing PPR2-3). This holds particularly for educated women.

Table 3. Correlation coefficients for PPR0 vs PPR2 over all cohorts by educational attainment

Conclusion and discussion

In this study, we aimed to explain the apparent paradox of the baby boom when both fertility quantum and the educational attainment of women were on the rise. Our analysis shows that the trends in fertility and education were compatible, because in countries with a baby boom, the negative composition effect of educational expansion was more than compensated for by an overall increase in cohort fertility rates. While women with education beyond the primary level indeed continued to exhibit lower total fertility rates than women with lower education, their proportion in the total female population tended to be still relatively limited, meaning that the revival of fertility rates outweighed the negative effect of the compositional shift. This dominance of the effect of changing rates over changing population composition was reinforced by the increase in fertility across all educational groups, at least in the countries experiencing a baby boom.

The fact that the recovery of fertility rates was not restricted to any specific educational group suggests that it was not significantly related to socioeconomic status. Given the high weight of the low educated in the size of the total female population, the revival of fertility in this group was crucial for the occurrence, or not, of a baby boom in their country: if the fertility rates of the low educated did not increase (but instead continued to

decrease as part of a fertility transition lagging behind), then there was barely a baby boom. This was the case in many Eastern and Southern European countries.

The participation of women with advanced education in the baby boom is, however, most notable: among medium and highly-educated women, the increase in cohort fertility occurred in almost all countries, even in those that barely experienced a baby boom. For women who completed secondary education – who became the dominant group in the younger cohorts – only those in Greece did not show an increase. Since highly-educated women still represented a very small proportion of the population, their influence on the overall picture of total fertility was still limited from a purely statistical point of view. However, their participation was very significant in sociological terms, because it heralded, as we further argue below, a new demographic regime, where pursuing a professional career after obtaining advanced education could be combined with motherhood thanks to family size limitation.

The crucial trend among the cohorts analysed is the decline in childlessness. This decline was very general across countries and educational groups. The decrease in childlessness explains a large part of the revival of cohort fertility: for many countries, cohort total fertility trends show quite flat lines if the calculations are restricted to women with at least one child. To varying degrees in different countries, differential childlessness also explains the educational gradient in total fertility. The decline in childlessness was typically much stronger among women with more-advanced education than among those with only primary education. Virtually all countries show decreasing childlessness and increasing homogeneity in the incidence of family formation across educational levels, irrespective of whether or not the total picture implies a recovery of total fertility levels and a baby boom. Reher and Requena (2014) show that the decline in childlessness was not limited to Europe and North America: it also occurred in countries as diverse as Argentina, Mexico, Morocco, Turkey and China. The fact that childlessness declined even in countries with almost universal and early marriage suggests that it was not only the result of changing marriage

behaviour, but that factors such as improving reproductive health conditions may also have played a role.

The emerging picture among the baby boom generations is one of growing homogeneity and an increasing dominance of the two-child family. This holds within countries, both across and within educational groups. In all countries and educational groups, the proportion of women ending up with two children soared. At the same time, in many countries the proportion of women having more than two children also increased (although the latter trend often reversed in the youngest cohorts). Yet the increase of the proportion of women with more than two children need not imply an increase in ideal family sizes or fertility intentions, since the inclination to have more than two children (as indicated by the relevant parity progression ratio) tended to remain stable or, in the more recent cohorts, go down. The two-child norm gained ever-stronger ground in the very last cohorts studied, which were able to benefit from the advent of efficient hormonal contraception: in these cohorts, the proportions having more than two children started to decline again. Accordingly if more women ended up with more than two children during the baby boom, it was because a greater proportion of them was at risk to have more than two, which followed from decreasing childlessness and increasing parity progression after the first child. All this combined – increasing parity progression until the second child and decreasing parity progression thereafter – is indicative of a strong consolidation across countries, generations and educational levels, of the two-child norm. This norm would later turn out to be persistent and pervasive (Sobotka and Beaujouan 2014).

These observations explain why some countries show a revival of cohort fertility (underlying a baby boom) and others do not. In both groups of countries, we find that PPRs for those with less than two children increased, while PPRs for those with two or more children decreased. Hence, whether cohort fertility was rising or not hinges on the balance between these two opposing trends: the boom occurs only if the increase of the PPRs of those with less than two children appears stronger than the concurrent decrease of the PPRs for those with two children or more. This also explains that the baby boom is typically only

observed in countries where the fertility transition had advanced considerably: in baby boom countries, most of the decline of parity progression after the second child had already occurred before the middle of the twentieth century, so that the increase of parity progression before the second child more easily outweighed any further decline of parity progression at higher parities. In the other countries, mostly Eastern and Southern European, the increase of the progression to the first and the second child was often overwhelmed by strong declines in higher parities.

Likewise, the diminishment of the Malthusian marriage pattern can be regarded as a salient part of the mechanism that led to the revival of cohort fertility. In particular, the fact that the proportion of women not forming a family was so high in Western Europe before the boom allowed the parity progression to first birth to increase markedly during the baby (and marriage) boom. Conversely, in countries where marriage was more universal (such as Greece and Slovakia, and possibly also Croatia and Poland; see Frejka 2008), there was much less room for such an increase, and hence there was no bBaby Boom.

Overall, the Baby Boom involved a unique combination of factors. One factor was the male breadwinner–female homemaker model, with its heyday in Western countries with strongly specialized gender roles despite the expansion of education among both sexes. The post-war decades also show strong economic growth and an unprecedented expansion of welfare states. Although the revival of fertility had already started in many countries before the war, post-war prosperity boosted earlier and more frequent family formation (cf. Sandström 2017). Furthermore, after having been through a period of below-replacement fertility rates, family life was culturally glorified and governments installed pro-natalist policies (Van Bavel 2010). The fifties became 'the golden age of the family': marrying and having children were almost universally valued and widely shared aspirations among both men and women. Moreover, marriage was still generally considered as a life-long commitment, and divorce or marital dissolution were infrequent. Last but not least, all this took place in a context where fertility control was practiced by traditional means (and, particularly in state socialist countries, through abortion), before the advent of more-efficient

contraceptive technology. From the mid-1960s onwards, this pattern was broken by the introduction of the pill, which started to be used not just to prevent high-parity births, but also to postpone or prevent first births.

The baby boom emerges as an important link between a first and a second stage in the transition to low fertility, with the first stage typically ending around the 1930s (depending on the country) and the second stage starting in the 1960s. The first stage was driven by increasing investment in children's education, where the quest for higher child quality motivated parents to limit offspring quantity. In the second stage, this quest and motivation remained, but women were now far better educated than the generations of their mothers and grandmothers, and they could make use of modern contraceptives. This heralded the subsequent changes in family life, including the postponement of parenthood, the rise of unmarried cohabitation and the increase in divorce rates (van de Kaa 1987; Lesthaeghe 2010). The baby boom can thus be seen as a period in which men and women were coming to grips with the implications of the first stage of the fertility transition. Even before the advent of medical contraception, family size limitation was becoming expected rather than unusual behaviour. Women could now pursue a professional career after completing advanced education while also starting a family of a limited size rather than not have any children at all. This combination enabled subsequent changes in family life leading to the gender revolution (Goldscheider et al. 2015).

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Tables

Table 1. Data and sources

Country	Code	Source*	Year(s)	Cohorts covered	N in thousands
Austria	AT	CFE database	1981, 1991	1901–1945	1942
Belgium	BE	Hisstat.be	1981	1901–1945	2049
Croatia	HR	CFE database	2001	1917–1945	644
Czech Republic	CZ	CFE database	1980, 1991	1901–1945	2410
East Germany	DD	IPUMS	1981	1901–1945	1178
Estonia	EE	Census, 25% sample	1979	1901–1945	67
France	FR	CFE database	1982	1917–1942	135
Greece	GR	IPUMS	1991	1901–1945	196
Hungary	HU	CFE database	1990	1901–1945	108
Poland	PL	CFE database	2002	1921–1945	68
Slovakia	SK	CFE database	1991	1901–1945	838
Spain	ES	IPUMS	1991	1906–1945	367
Sweden	SE	Linnaeus database, census and register data	1970+	1916–1945	1301
Switzerland	CH	CFE database	2000	1901–1945	896
USA	US	IPUMS	1990	1901–1945	2138

* CFE Database is the Cohort Fertility and Education Database (CFE 2017, http://www.cfe-database.org/); Hisstat.be is the database that contains the Belgian census data; IPUMS is the Integrated Public-Use Micro-data Series (Minnesota Population Center 2017, https://international.ipums.org/); Estonian data was provided by the Estonian Institute for Population Studies

Table 2. Percentage change in completed fertility between the 1916–20 and 1931–35 cohorts

	All women				Women with at least one child			
	Educational attainment							
Country	Low	Medium	High	Total	Low	Medium	High	Total
Austria	21.7	25.6	17.5	21.3	12.5	14.6	7.5	12.1
Belgium	7.6	12.6	28.9	7.2	-0.4	-7.7	-1.0	-1.3
Croatia	-14.8	1.1	17.5	-15.8	-17.4	-10.8	-5.5	-19.0
Czech Republic	-2.5	1.1	5.7	-5.6	-7.4	-7.3	-9.9	-10.9
East Germany	22.4	12.7	31.0	12.9	14.3	5.4	3.7	5.9
Estonia	-3.7	11.6	24.6	-6.3	-11.5	-3.8	-0.3	-14.2
France	15.1	4.3	-14.9	10.8	2.5	-8.0	-17.2	-0.6
Greece	-20.1	9.7	37.2	-19.7	-22.9	-3.8	10.5	-22.8
Hungary	-7.6	-1.1	-13.3	-9.3	-14.4	-15.9	-20.4	-16.0
Poland	-0.3	5.2	27.8	-5.7	-4.4	-5.3	3.5	-10.3
Slovakia	-0.4	4.0	-1.5	-4.2	-3.9	-7.4	-15.2	-7.9
Spain	-0.6	13.4	23.6	-0.5	-9.9	-1.1	-0.5	-9.6
Sweden	10.9	19.3	24.2	10.7	3.1	4.0	-1.4	2.4
Switzerland	4.4	5.2	0.7	2.3	-3.4	-1.0	-2.6	-3.6
USA	26.4	32.6	20.9	24.2	17.7	21.3	10.1	14.8

Note: for Poland, the base cohort is 1921-25

Table 3. Correlation coefficients for PPR0 vs PPR2 over all cohorts by educational attainment

	Educational attainment		
Country	Low	Medium	High
Austria	0.12	0.05	-0.89
Belgium	-0.51	-0.57	-0.24
Czech Republic	-0.50	-0.42	-0.94
Croatia	-0.95	-0.96	-0.88
East Germany	0.52	-0.23	-0.87
Estonia	-0.97	-0.91	-0.92
France	-0.50	-0.94	-0.51
Greece	-0.29	-0.61	-0.56
Hungary	-0.99	-0.92	-0.13
Poland	-0.98	-0.92	0.61
Slovakia	-0.95	-0.35	-0.96
Spain	-0.84	-0.31	-0.48
Sweden	-0.72	-0.73	-0.77
Switzerland	-0.14	-0.16	-0.68
USA	0.97	0.86	0.61

Figures

List of figures

Figure 1 Completed cohort fertility as estimated from our retrospective (census) data compared with vital statistics data from the INED database

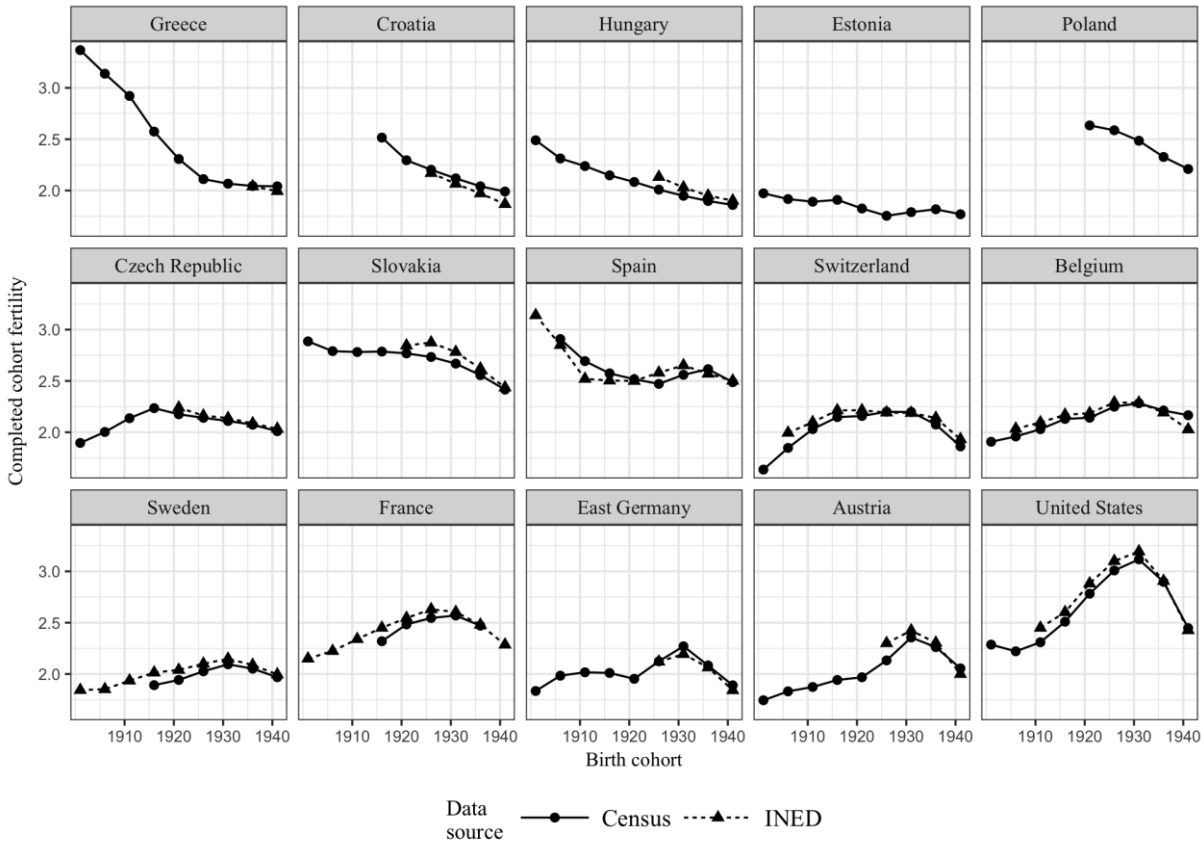

Figure 2 Percentage distributions of women by cohort and level of educational attainment

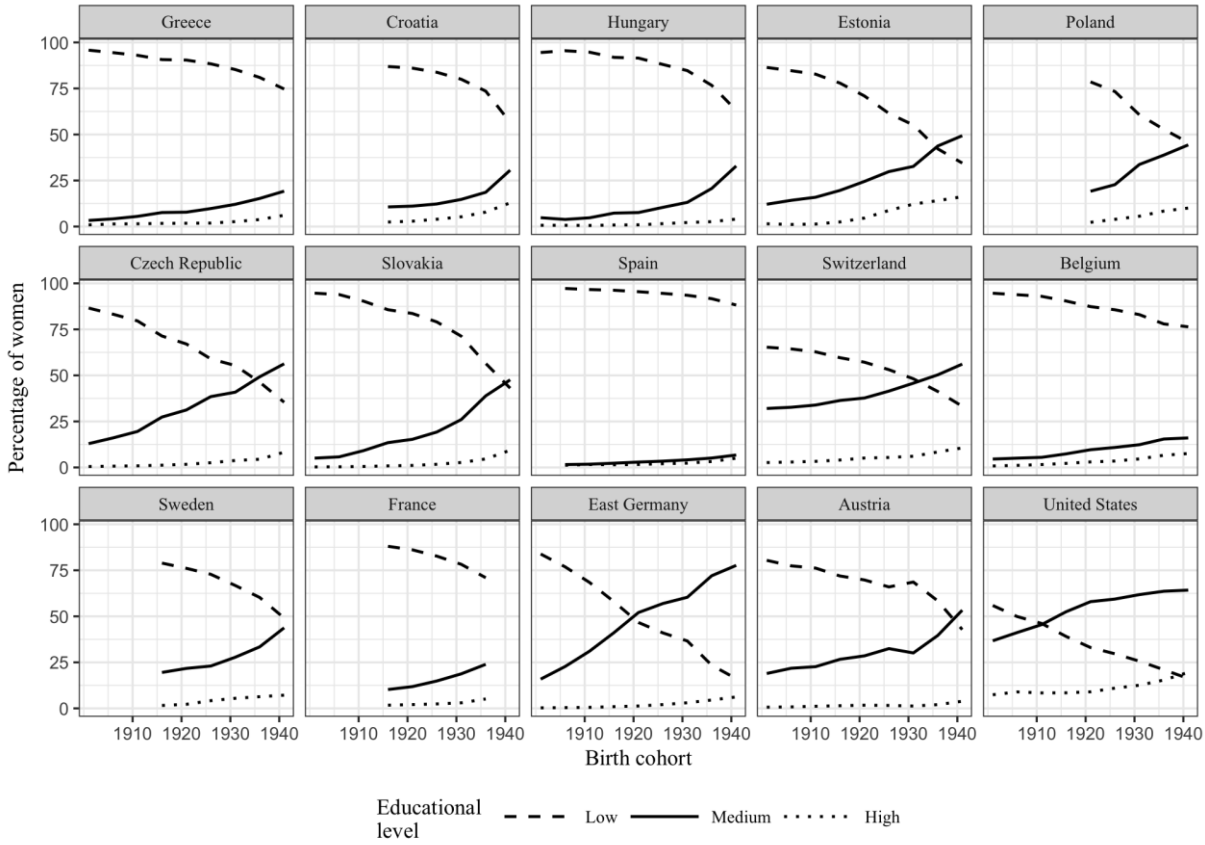

Figure 3 Cohort completed fertility by country and level of education

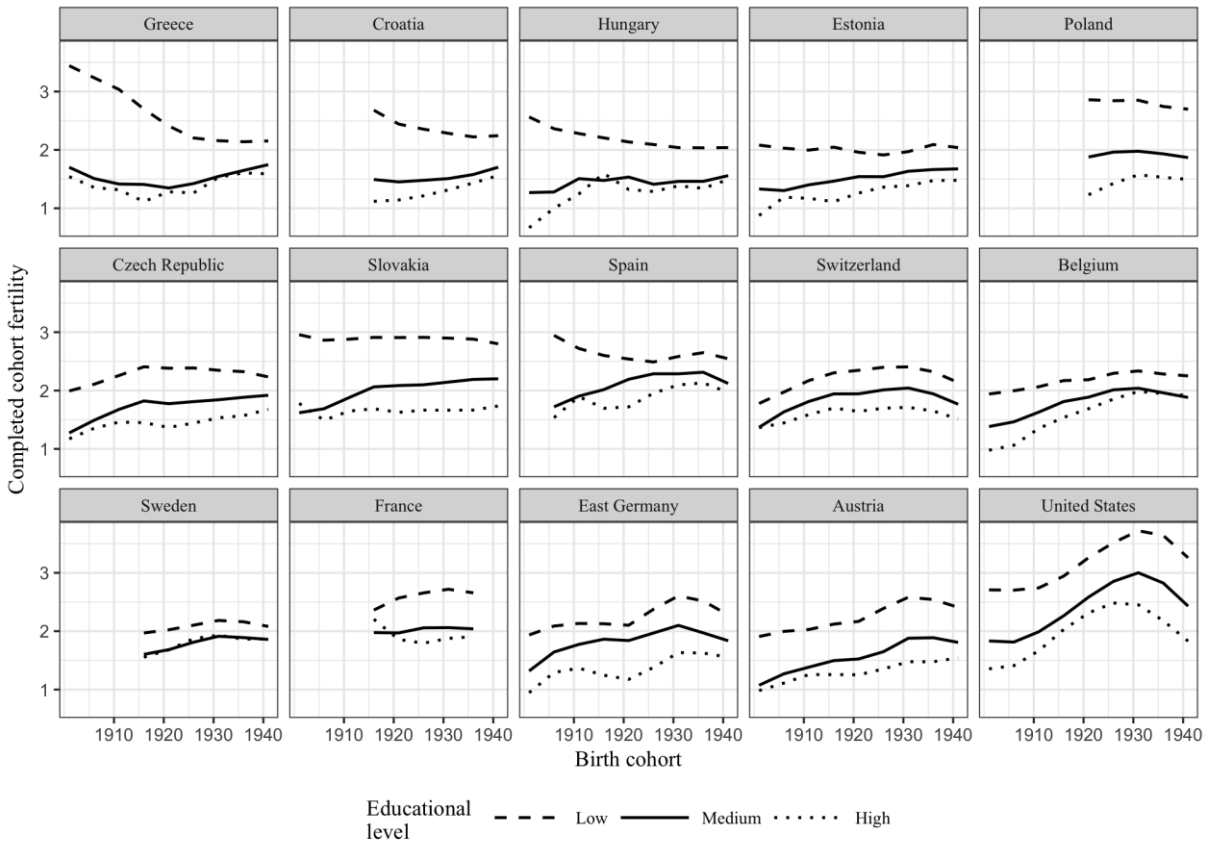

Figure 4 Coefficient of variation of completed fertility: total population (bold squares) and separately by level of education

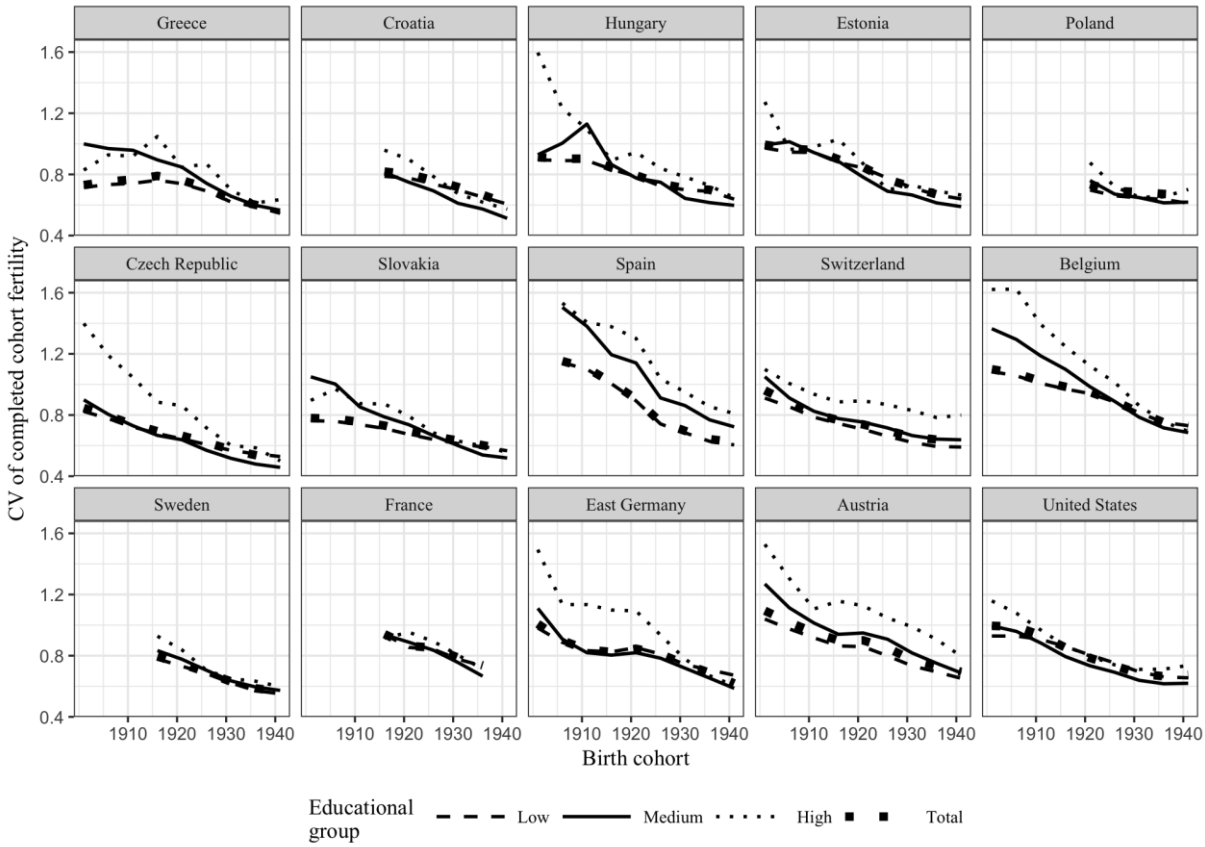

Figure 5 Relative fertility ratios by level of education

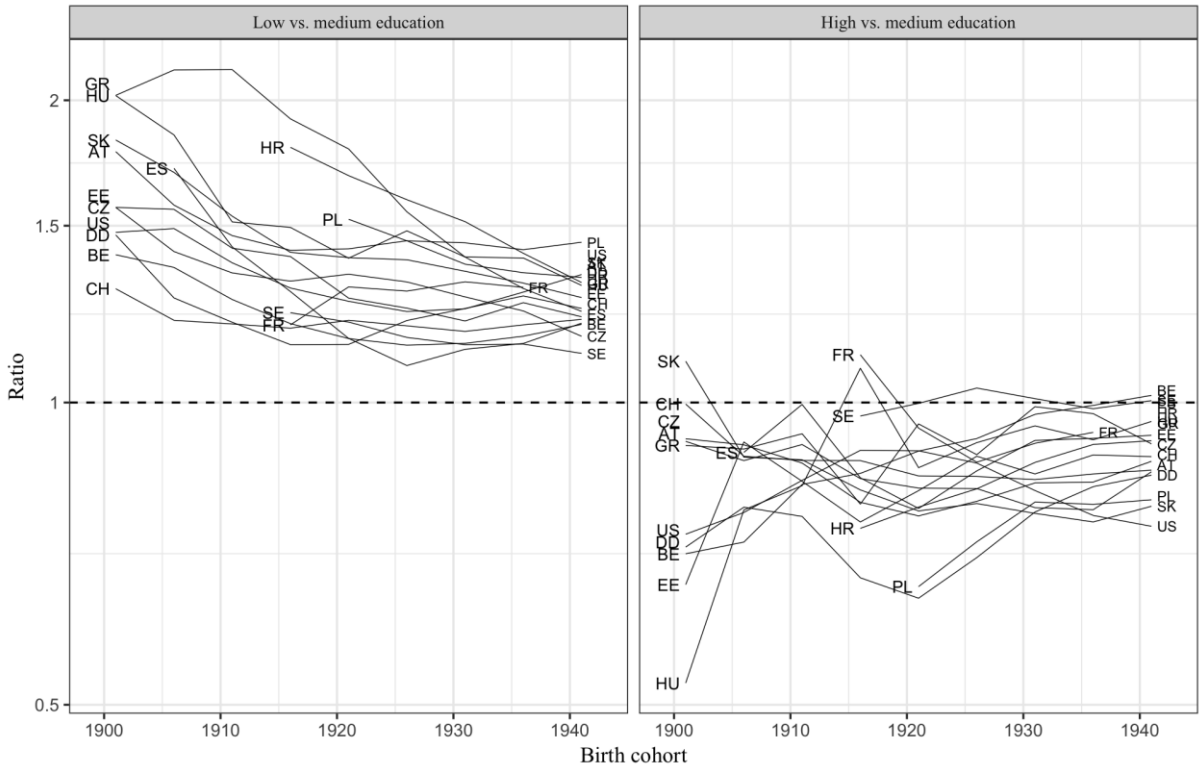

Figure 6 Proportions of childless by country, cohort and level of education

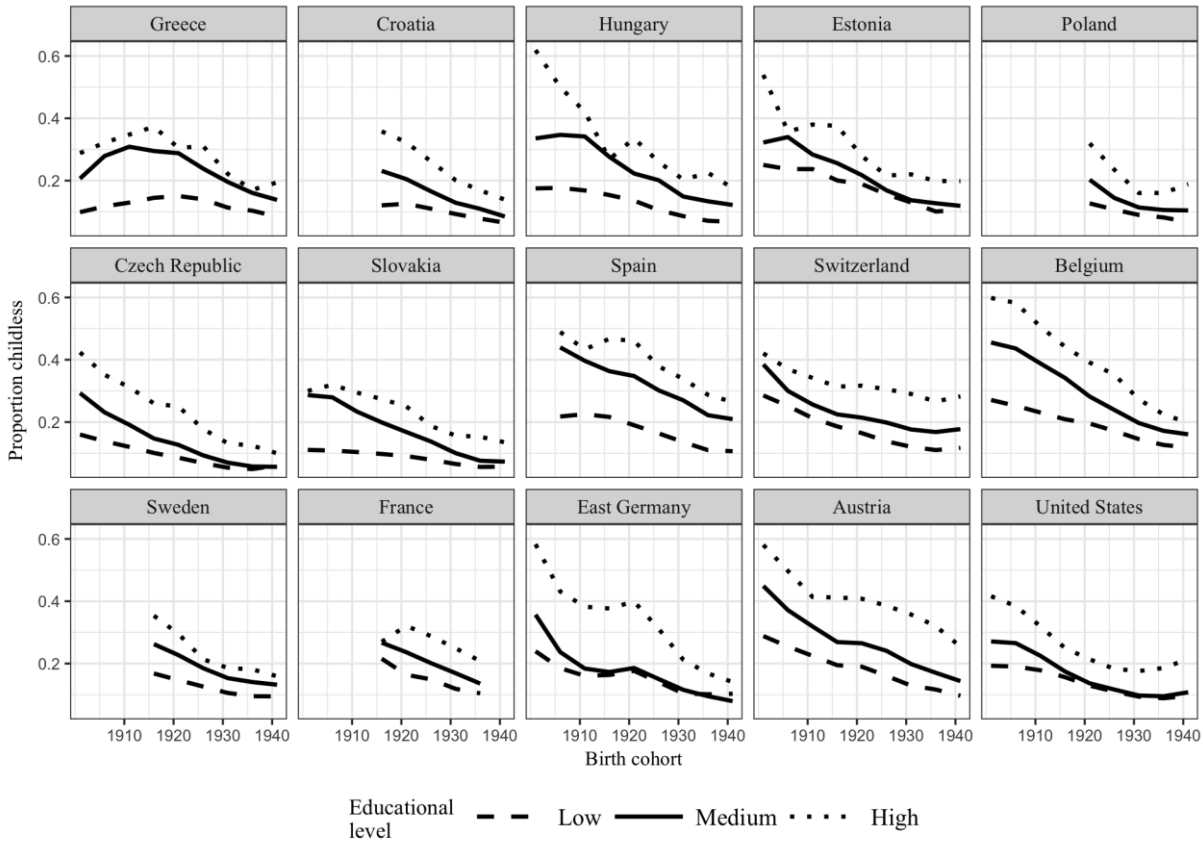

Figure 7 Total cohort fertility for women with at least one child, by country and level of education

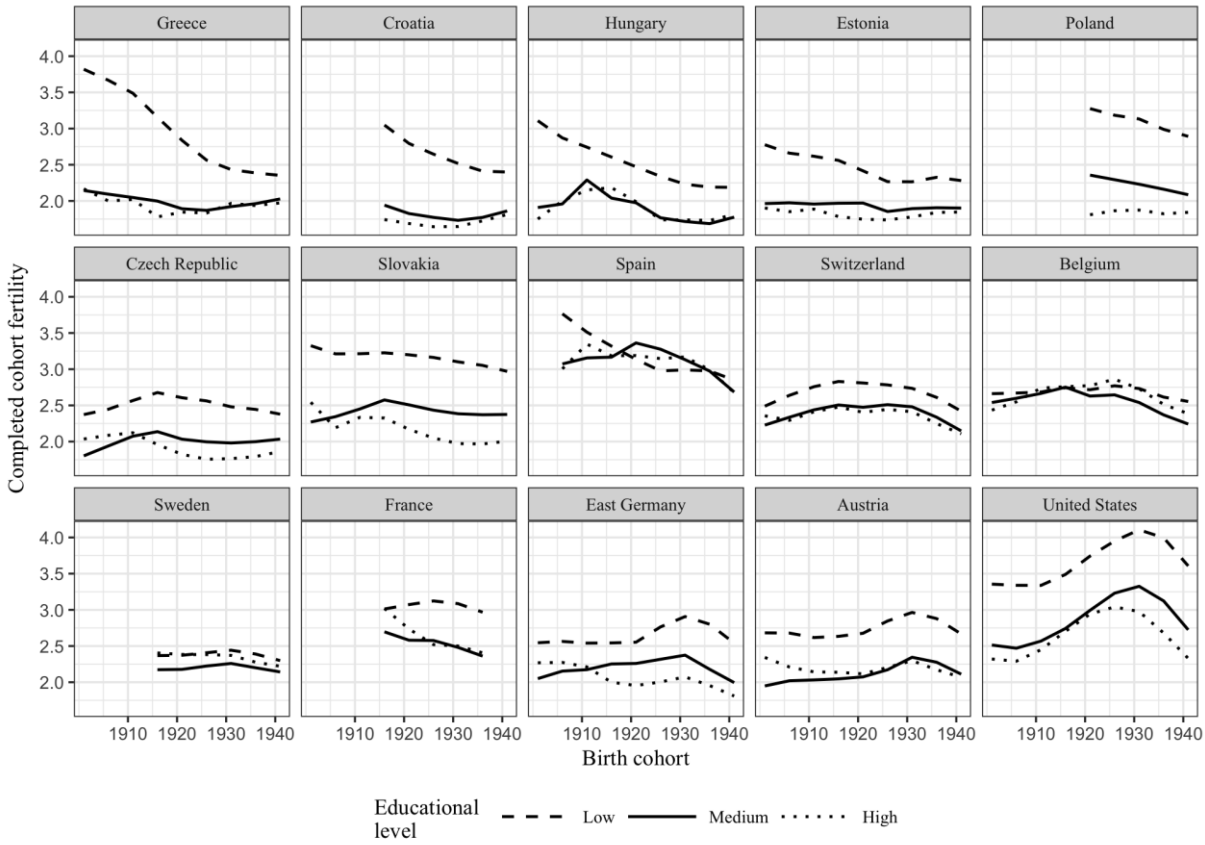

Figure 8 Parity distributions: proportions ending up with 0, 1, 2 or 3+ children, by country and level of education

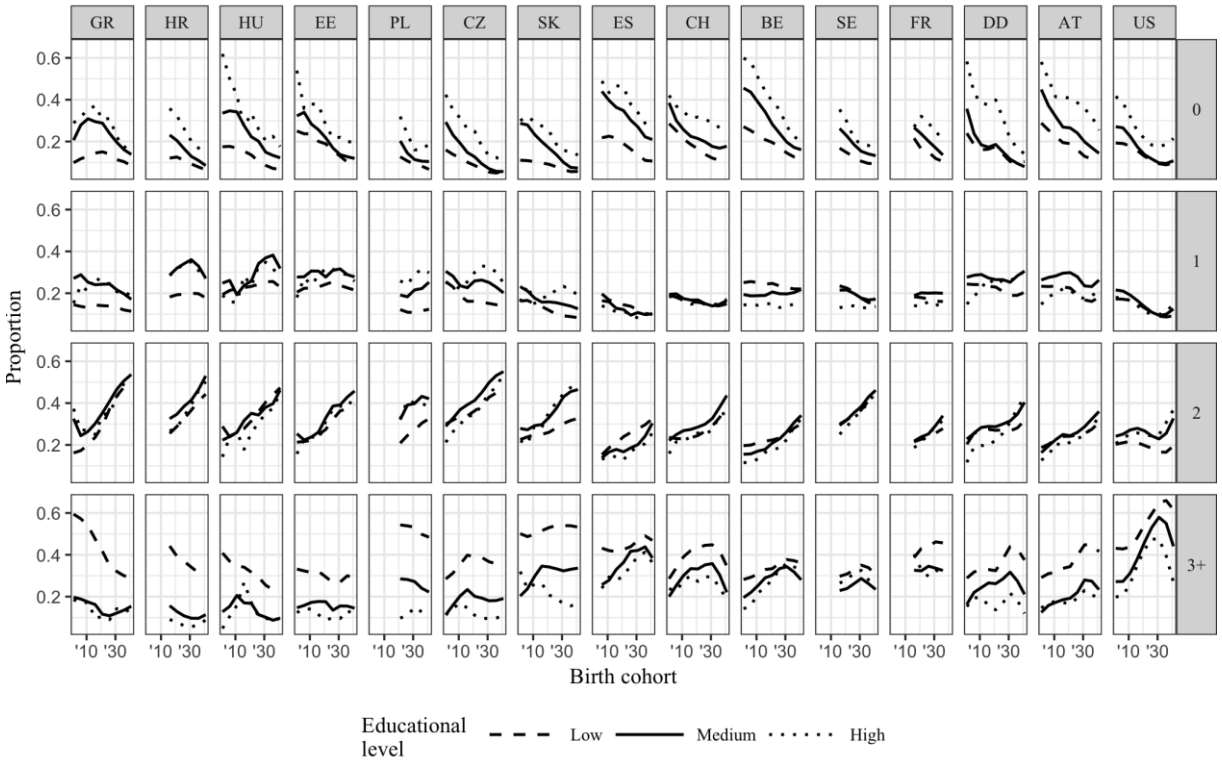

Figure 9 Parity progression ratios: proportion among those with 0, 1, 2 or 3 children proceeding to have additional children