Is Two Still Best? Change in Parity-Specific Fertility Across Education in Low-Fertility Countries

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Abstract
The dominance of two-child families is considered an intrinsic characteristic of low fertility societies. Their share was continuously increasing among baby boom cohorts but the rise ceased afterwards. While parity- and education-specific fertility trends during the expansion of the two-child families have been studied, corresponding analyses of developments in the post-expansion birth cohorts are scarce. This study investigates the parity-specific fertility trends that ended the expansion of two-child families across educational groups. We use data on completed fertility of female cohorts born between 1936 and 1970 in 16 low-fertility countries. Besides examining trends in education- and parity-specific fertility, we provide evidence on increasing variation in family size and on the contribution of parity-specific fertility to the share of two child families among women with low, medium and high education. Our results show that the expansion of two-child families stopped as the variation in family size increased: transition rates to first and/or second birth declined whereas those to third birth increased. This polarisation process was strongest among women with low education. Apparently, as the number of women progressing to second birth declined, they became more selected and family-oriented, and thus more likely to progress to further births. The fact that the strongest polarisation of fertility was observed among the low educated reflects the group’s increasing selectivity. We demonstrate that rising polarisation of family size is a common development to most high-income low-fertility populations, especially among the low educated, regardless of substantial cross-country differences in fertility levels as well as in institutional, economic and cultural settings.

Keywords Cohort fertility · Family size · Polarisation of fertility · Educational expansion · Parity progression ratios · Decomposition

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Introduction

Family size of two children occupies a special place in demographers’ interests because it is the gate-keeper to lowest-low fertility levels: when replaced by childlessness and/or one-child families, societies start experiencing fertility levels much below replacement (Frejka, 2008; Wilson, 2013). The dominance of two-child families has been an intrinsic characteristic of low-fertility societies (Frejka, 2008), in which two children have universally been both the preferred and the ideal family size (Beaujouan & Berghammer, 2019; Bongaarts, 2002; Hagewen & Morgan, 2005; Sobotka & Beaujouan, 2014). In Europe and the English-speaking non-European countries, it was established and consolidated among baby boom cohorts born in the first four decades of the twentieth century. In response to the post-war economic prosperity, unprecedented returns to education and new work opportunities for women, the transition rates to first and second births increased, particularly among women with secondary and high education, whereas higher-order birth rates kept falling, most strongly among the low-educated (Bonvalet et al., 2014). This family size convergence towards two children was intensified by the rapidly growing enrolment in secondary and tertiary education (Van Bavel et al., 2018).

Among cohorts born past 1940, the expansion of education continued but that of two-child families ceased and in some countries turned into a decline (Frejka, 2008; Frejka & Sardon, 2007). The economic and cultural changes resulted in rising instability of the labour market and growing need for self-actualisation, respectively, and led to greater diversity of family-life trajectories (Lesthaeghe, 2010). Higher-order births kept falling in most countries but universally growing childlessness, sometimes combined with a shrinking number of women progressing from first to second birth, halted the spread of two-child families (Zeman et al., 2018).

These developments represent country-level averages. The existing evidence suggests that, at least in some countries, they mask very different trends within the educational strata. The continuous educational expansion that made the group with low education increasingly selected has been accompanied since the 1980s and 1990s by growing socioeconomic inequalities (Bogliacino & Maestri, 2014; Mann & Riley, 2007). In some countries, the gap in family behaviours between social strata has widened (Adserà, 2017; McLanahan & Jacobsen, 2015; Perelli-Harris et al., 2010). For instance, in Britain, the weakening dominance of two-child families in female birth cohorts of the 1960s was caused by opposite developments among the high- and low-educated: a shrinking progression to first and second child among the former and a growing transition to third birth among the latter (Berrington et al. 2015). Evidence from the Nordic countries suggests ‘dual polarisation’ of fertility. First, fertility of the low-educated group increasingly differs from that of higher educated groups. In addition, fertility behaviour is becoming polarised within the group of the low-educated: while experiencing high-order births more often than women with medium and high education, they now also have higher childlessness than any other educational group (Jalovaara et al., 2018, 2020).

This paper investigates the cross-country commonalities and differences in education- and parity-specific fertility trends after the end of the universal rise
in two-child families. Specifically, it examines the educational differentials in parity progression ratios and the resulting share of two-child families across the female birth cohorts 1936–1970 in 16 low-fertility countries. Previous studies have extensively explored the effect of education and other factors on the individual risks of first, second, third and/or further births (e.g. Adsera 2011; Begall and Mills 2013; Klesment et al. 2014; Kreyenfeld 2010). Yet, systematic knowledge of macro-level trends in cohort parity progression ratios by level of education in low-fertility countries remains limited. Van Bavel et al.’s (2018) study has filled this gap but only for the baby boom cohorts, i.e. for women who were at reproductive age in a uniquely prosperous period of time. A recent paper by Lazzari et al. (2021) has quantified the contribution of parity- and education-specific fertility to changes in completed fertility in post-baby boom cohorts but has focussed mainly on the role of the changing educational structure rather than on the differential fertility trends by the level of education. We first describe the mechanisms known to have led to an increase and then to a decrease or plateau in the share of two-child families. Next, we summarise how these mechanisms may have translated into educational and regional variations in parity progression ratios and, consequently, in the share of two-child families. Using large-scale data, we show that the rise in the share of two-child families (i.e. their expansion) was halted by an increasing variation in family size across and within the educational strata. This process of divergence has been strongest among women with low education, who on the one hand remain childless increasingly frequently and on the other hand have more and more often three or more children, especially in countries where educational expansion has made the group of low-educated women very small and selected.

Two-Child Family in the Twentieth-Century Birth Cohorts

Expansion Phase of Two-Child Families: Why Have They Become Prevalent?

The pathway to smaller families in European and English-speaking non-European societies began with the societal and technological changes set in motion by the industrial revolution. Consequently, parents started to invest in their children’s schooling (Axinn, 1993; Axinn & Barber, 2001; Reher, 2011). This entailed a financial cost which led parents to limit their number of offspring, preferring ‘child quality’ over ‘child quantity’ (Caldwell, 1982; Hanushek, 1992). The transition was first observed among the upper social classes, but with time it spread down to the lower social strata.

Family researchers point out to several reasons for which two and not one or three became the preferred and dominant number of children (see Sobotka & Beaujouan, 2014 for a more detailed elaboration). Two is the smallest number of offspring that gives a chance for reaching the universally shared ideal of having a child of each sex, a girl and a boy (Hank, 2007). It can also be seen as an insurance strategy: having two children instead of one increases the chances for meeting parents’ expectations about their offspring. Furthermore, only children are believed to be spoiled,
selfish and anti-social (Blake, 1981; Hagewen & Morgan, 2005; Mancillas, 2006). They are also likely to be lonely and so providing companionship for a sibling is often a strong motivation to have a second child (Bulatao, 1981; Jefferies, 2001).

In the late 1960s and early 1970s, i.e. in times when the 1940s birth cohorts were at their peak reproductive ages, the post-war developments that were so favourable to family formation (Van Bavel et al., 2018) still largely prevailed, but first signs of their looming end started appearing. The first post-war economic downturn and rise in unemployment came at a similar time as the rising fear of a ‘population bomb’ (Ehrlich 1968) which in many Western European and the English-speaking non-European countries (the West) triggered socio-political movements like ‘zero population growth’ (ZPG), encouraging (future) parents to have no more than two children (Lück & Bujard, 2018). The public debate explicitly promoted the two-child family model, creating a negative image of larger families and strengthening the dominance of the two-child family model.

In the European state-socialist countries (the East), such debate was largely absent as governments were mostly worried about fertility rates that had been plummeting since the 1950s (Macura, 1974). In many countries, the decline was part of the ongoing fertility transition, intensified by massive industrialisation and urbanisation (Sobotka, 2011). The very high levels of female labour force participation, heavily promoted, if not imposed, by the state-socialist governments, together with a traditional gender division of tasks within the family and cramped living conditions, created further incentives to keep family size small (Brzozowska, 2015). In response to falling fertility rates, the governments adopted pronatalist policies encouraging citizens to start a family earlier rather than later (Sobotka, 2011).

**Post-expansion phase of two-child families: Why have alternatives to two grown in importance?**

The ideal of two-child family has outlived the baby boom (Sobotka & Beaujouan, 2014) but the rise in the share of two-child families has not (Zeman et al., 2018). The ‘post-expansion’ phase came along with developments—technological, cultural, social and economic—that led to an increasing destandardisation of life trajectories. Below, we briefly describe how the changes in values and partnership trajectories together with the rise in opportunity costs of having children, growing economic inequalities, and labour market instability affected parity-specific fertility in different educational strata.

The intensive cultural changes, or the shift towards post-materialist values (Inglehart, 1977), are closely linked to the spread of the pill. The ability to effectively control the timing and quantum of childbearing was a game-changer in gender and marriage relations (Lesthaeghe, 2010). It made it possible for women to try and satisfy their desire for self-actualisation and independence, including a full-time professional career. Inevitably, this increased the opportunity costs of motherhood (Joshi, 1990, 1998), especially in a context where childcare was considered primarily women’s duty (Goldscheider et al., 2015). The rising importance of self-fulfilment and individualism, both among women and men, often clashed with the constraints and
responsibilities of raising children. Consequently, a growing number of women (and also men) decided to either forego or, more often, postpone childbearing. This led to a reduction in the ‘progressing-towards-two’ behaviour. Furthermore, the value shift and the increasing independence of women involved more complex partnership trajectories, marked by an increased number of union dissolutions, including divorces. These developments were first observed in higher social strata in Northern and Western Europe and in English-speaking non-European countries. Later on, however, they spread across social groups and geographic regions, occurring also in Southern Europe and, after the collapse of state socialism, in Central-Eastern Europe (Lesthaeghe, 2010), where they usually unfolded far more quickly (Sobotka, 2008).

For a long time, foregoing childbearing had a strictly positive educational gradient (Beaujouan et al., 2016; Sobotka et al., 2017, 2018; Wood et al., 2014). It is argued that the opportunity costs of motherhood are highest for women with university education as they have more to lose by sacrificing their professional career: a more fulfilling job and a higher income. They have also been more likely to experience problems with finding a partner as the pool of companions suitable for them, i.e. with education and financial resources at a level comparable to or higher than theirs, is smaller than that suitable for women with low or medium education (Grow & Van Bavel, 2015). Consequently, they tend to remain childless more often than other educational groups. However, as a result of the education expansion the group of university graduates has been growing and becoming increasingly more heterogeneous, whereas the selection into the shrinking group of population with low education has been increasing. In today’s Europe, women who face particularly severe obstacles to have (more) children are those with low education. The labour market is becoming increasingly tough for them, they struggle with economic hardship (Beaujouan & Berghammer, 2019; Impicciatore & Zuanna, 2017) and are most likely to remain never-partnered (De Hauw et al., 2017). In many countries, the childlessness rates among them are as high as among the university-educated or higher (Jalovaara et al., 2018; Lazzari et al., 2021; Sobotka et al., 2017, 2018). At the same time, however, low-educated women are nowadays more likely to experience complex family trajectories that often include multiple unions and children within each relationship (Thomson et al., 2014).

The social and economic developments have turned out challenging not only for the low-educated. Since the baby boom generations, the gap between social strata in their lifestyles, family behaviours and income has been widening (Adserà, 2017; Atkinson et al., 2014; McLanahan & Jacobsen, 2015; Perelli-Harris et al., 2010). This trend, strongly linked to the progressing shift towards individualistic values, the shrinking welfare state and an increasingly competitive labour market, has been further strengthened by the spread of intensive parenting style (Hays, 1998; Romagnoli & Wall, 2012). Middle-class parents in particular have been under a growing pressure to extensively invest in their children, both in terms of time and financial resources. In addition, in many countries, there has been a steady increase in the number of jobs in the upper and lower segments of the labour market, while middle-level jobs are disappearing. Consequently, it is increasingly difficult for women (and men) with middle-level qualifications to find ‘good’ jobs (Adserà, 2017). This also
makes the ‘progressing-towards-two’ behaviour increasingly more difficult, especially among parents with medium education as they typically have more modest resources than those available to university graduates.

Almost all the developments described above (might) have reduced the transition rates to first and second births. In that case, women who progressed to second birth in the ‘post-expansion’ phase would be more selected and more family-oriented than in the ‘expansion’ phase of two-child families. This might have led to increases in the progression to large families. Notwithstanding the fact that this process was likely to occur in all educational groups, the transition rates to third birth have typically remained highest among the low-educated (Impicciatore & Zuanna, 2017; Wood et al., 2014).

Educational and regional differences in family size variation and in the share of two-child families

The existing evidence suggests that in the late ‘expansion’ phase of the two-child family model, there was an East–West divide in parity-specific fertility trends (Frejka & Sardon, 2007; Van Bavel et al., 2018; Zeman et al., 2018). The West usually saw substantial declines in parity progression ratios to third births—in other words: the spread of ‘stopping-at-two’ behaviour—and mild decreases in the transition rates to first and second child. By contrast, the developments in the East were dominated by increases in ‘progression-towards-two’ behaviour (see a graphical summary of the expected developments in Table 1). On both sides of the Iron Curtain, the parity-specific developments resulted in a weakening variation of the family size and in its further convergence towards two children. We expect that these developments were fairly similar across educational strata, as at that time educational divergence in life trajectories had not set about yet.

For reasons described in the previous section, we anticipate an increase in the variation of family size across and within countries and educational strata in the ‘post-expansion’ phase. The only fairly universal trend was the rise in childlessness, seen in low-fertility countries since the 1940s birth cohorts and starting later only in the post-socialist countries (Beaujouan et al., 2016). The strongest increases in childlessness have been experienced in the German-speaking and Southern European countries, i.e. in cultures which adhere to a traditional family pattern, with mothers caring for children at home and fathers providing for their families, and where opportunity costs of motherhood are thus particularly high (Anxo et al., 2011; Baizán, 2009; De Rose et al., 2008; Klüsener et al., 2013; Pailhé et al., 2019). In these two regions, childlessness has a clear positive educational gradient, and women have adopted the ‘child-free lifestyle’ and the ‘culture of childlessness’ more often than anywhere else in Europe (Klüsener et al., 2013; Sobotka & Testa, 2008). In Southern Europe, childlessness rates are further pushed up by the economic difficulties (Impicciatore & Zuanna, 2017).

Another stronghold of traditional model of gender roles within the family are the post-socialist countries. Under state socialism, the pressure to become a parent was very strong, and further increased by pronatalist measures such as easier access
to independent housing for families with children or subsidised products and services for children (Baban, 1999; Frejka, 1980; Haney, 2002; Stloukal, 1999). As a result, over nine in ten women born between 1940 and the late 1950s became mothers (Beaujouan et al., 2016; Brzozowska, 2015). After the collapse of communism, among women born in the late 1950s and later, childlessness began to rise, especially among women with low and high education. Compared to other countries, however, it has remained lower and less socially accepted.

The flip side of universally low childlessness in the East were decreasing progression ratios to second birth among women born past 1955. The decrease was particularly sharp in economically weaker Eastern European countries, e.g. in Russia, Belarus or Ukraine (Zeman et al., 2018). It seems that in response to the continuously high pressure to become a mother on the one hand, and to the double burden of a traditional division of housework combined with female full-time employment on the other, women who were not solely family-oriented often opted for one child (Brzozowska, 2015; Frejka, 2008; Sobotka & Testa, 2008; Merz and Liefbroer, 2012). This pattern must have strengthened after 1989, first because the unstable and demanding labour market raised women’s opportunity cost of having children (Avdeev & Monnier, 1995; Philipov et al., 2006; Sobotka, 2011), and second because parental aspirations for children’s educational and financial success shot up in the middle-class while household budgets, even among professionals, remained

Table 1

| Region                        | Education | Late-expansion phase | Post-expansion phase |
|-------------------------------|-----------|----------------------|----------------------|
|                               |           | PPR01 PPR12 PPR23    | PPR01 PPR12 PPR23    |
| English-speaking non-European | Low       | ↓↓                  | ↓↓↓                 |
| countries                     | Medium    | ↑↑                  | ↑↑↑                 |
|                               | High      | ↑↑↑                 | ↑↑↑                 |
| Northern and Western Europe   | Low       | ↓↓                  | ↓↓↓                 |
|                               | Medium    | ↓↓                  | ↓↓↓                 |
|                               | High      | ↓↓                  | ↓↓↓                 |
| West Germany                  | Low       | ↓↓                  | ↓↓↓                 |
|                               | Medium    | ↓↓                  | ↓↓↓                 |
|                               | High      | ↓↓                  | ↓↓↓                 |
| Southern Europe               | Low       | ↓↓                  | ↓↓↓                 |
|                               | Medium    | ↓↓                  | ↓↓↓                 |
|                               | High      | ↓↓                  | ↓↓↓                 |
| Central-Eastern Europe        | Low       | ↑↑                  | ↑↑                  |
|                               | Medium    | ↑↑                  | ↑↑                  |
|                               | High      | ↑↑                  | ↑↑                  |

Black thick arrows denote the developments in the parity progression ratios, whereas grey thick arrows represent the effect of those developments on the share of two-child families. The arrows are to be read as follows: ↗ mild increase, ↑ strong increase, ↓ mild decrease, ↓↓ strong decrease, → no change or relatively stable.
tight (Thornton & Philipov, 2009). Therefore, we expect that the declines in transition rates to second birth have been largest among women with high and, most of all, medium education.

Steady declines in the transition rates to second birth have been observed also in Southern Europe (Frejka, 2008; Zeman et al., 2018) and were most probably fuelled by similar factors as the rises in childlessness. By contrast, in the German-speaking countries, the transition rates to second birth have remained largely stable for decades (Kreyenfeld, 2002; Zeman et al., 2018). In the English-speaking countries as well as in Northern and Western Europe, the figures tend to mildly decrease or to plateau, and do not show any substantial educational differentiation (Breton & Priaux, 2009; Frejka, 2008; Wood et al., 2014; Zeman et al., 2018).

The trends in the transition rates to third birth have shown steep declines in Southern Europe and more moderate ones in Western Europe and in the English- and German-speaking countries. In Central-Eastern Europe, the figures remained low and steady, whereas in Northern Europe they have been on the rise since the early 1950s birth cohorts (Frejka, 2008; Zeman et al., 2018). These population-level developments may mask considerable educational differences. For instance, we expect that the progression ratios to third birth have actually increased among low-educated women in countries where the group of low educated has shrunk to very small numbers and has become very selected, e.g. in most of Northern as well as Central-Eastern Europe and in Germany and the United States (Jalovaara et al., 2018; Zeman et al., 2014). A different kind of selection effect—selection into the group of mothers who have progressed to second birth—may have also led to increases in transition rates to third birth among women with university education in countries like Germany or Central-Eastern Europe.

A summary of our expectations is presented in Table 1. It shows the expected developments in parity progression ratios (PPRs) to first (PPR01), second (PPR12) and third (PPR23) births—black thick arrows—along with their effects on the share of two-child families—grey thin arrows—across education in the ‘late-expansion’ and the ‘post-expansion’ phases. For the sake of simplicity and brevity, it shows the five analysed regions rather than individual countries, which may result in some oversimplifications in some cases (i.e. some countries may have experienced slightly different developments than the regions they are grouped into).

**Data and Methods**

We use census, register and large-scale survey data for 16 low-fertility countries, which mostly come from the Cohort Fertility and Education database (Zeman et al., 2014); for detailed information about the data see the Appendix. The data contain high-quality information on education-specific childbearing histories of women nearing the end of their reproductive lifespan (aged 40 and older) born between 1936–1940 (i.e. one of the last baby boom cohorts analysed by Van Bavel et al. (2018)) and 1966–1970. We grouped the countries into four broader regions, reflecting geographical, institutional and/or cultural proximity: English-speaking non-European countries (Australia, New Zealand and the United States), Northern and
Western Europe (Denmark, Finland and France), Southern Europe (Greece, Italy and Spain), Central-Eastern Europe (Czechia, Croatia, Hungary, Slovakia, Slovenia and Russia). The territory of former West Germany (hereinafter referred to as West Germany) constitutes a fifth region.

To ensure cross-country comparability, we used a three-category classification of education mostly corresponding to ISCED-97 levels (see UNESCO, 2006 for a description of the International Standard Classification of Education): low (levels 0–2), medium (levels 3–4) and high (levels 5–6). Figure 5 Educational structure in the Appendix shows women’s educational structure over the cohorts analysed. As in most other studies on the relationship between education and completed fertility (e.g. Beaujouan et al., 2016; Jalovaara et al., 2018; Lazzari et al., 2021; Wood et al., 2014), the level of educational attainment was recorded at the same time as fertility, i.e. at age 40 or later. This approach is straightforward and the only possible given the data we use but we are aware that it may produce a bias because some women reach their final level of education after having children, particularly in countries with flexible educational system (Hoem & Kreyenfeld, 2006). However, the number of such women is small (OECD, 2012, 2021) so the possible bias certainly does not alter the results in a way that would affect the conclusions of our analysis.

In all analysed countries, the trends in the share of two-child families comprised two phases: the ‘expansion’ and ‘post-expansion’ phase. We defined the ‘expansion’ phase as finished when the share of two-child families either started declining or reached a plateau, i.e. when the ratio of increase between cohort t and t+1 was lower than one-fifth of that between cohort t-1 and t. Contradictory to our expectations and hypotheses, in some countries and educational groups, the share of two-child families increased in the late 1950s and the 1960s birth cohorts by one or more percentage points. We named this the phase of ‘rebound’.

Our analysis was carried out in several stages. First, we examined the link between the share of two-child families and variation in cohort fertility rate (CFR) measured as coefficient of variation. Then we explored the trends in the progression ratios to first (PPR01), second (PPR12) and third births (PPR23). Finally, we showed how changes in PPR01, PPR12 and PPR23 were related to the proportion of women with two children. To this end, we estimated the contribution of each parity progression ratio to changes in the share of two-child families (p2), first during the ‘expansion’ phase of the two-child family model and then during the ‘post-expansion’ phase. We repeated this exercise for the phase of ‘rebound’ if it was present.

Knowing that

$$ p_2 = \text{PPR}_{01} \times \text{PPR}_{12} \times (1 - \text{PPR}_{23}) $$

(1)

a change in p2 between two cohorts (dp2c1c2) can be decomposed into the effect of the PPR01 (e_{01}^{c1c2}), PPR12 (e_{12}^{c1c2}) and PPR23 (e_{23}^{c1c2}) as follows (compare with Das Gupta, 1993, pp. 7–9):

1 Parity progression ratio to first birth and childlessness are complementary so we use the terms “declining parity progression ratio to first birth” and “increasing childlessness” interchangeably.
$dp^{c_{1}c_{2}} = p^{2}c_{2} - p^{2}c_{1} = e^{c_{1}c_{2}}_{01} + e^{c_{1}c_{2}}_{12} + e^{c_{1}c_{2}}_{23}$  \hspace{1cm} (2)

where

$e^{c_{1}c_{2}}_{01} = \left(PPR^{2}_{01} - PPR^{1}_{01}\right) \ast \left(PPR^{1}_{01} * PPR^{2}_{23} + PPR^{1}_{12} * PPR^{2}_{23} + PPR^{1}_{12} * PPR^{1}_{23} \right) / \left(3 \ast \left(PPR^{1}_{01} * PPR^{2}_{01} * PPR^{2}_{23} + PPR^{1}_{01} * PPR^{2}_{12} * PPR^{2}_{23} + PPR^{1}_{01} * PPR^{2}_{12} * PPR^{1}_{23} \right) \right)$  \hspace{1cm} (3)

$e^{c_{1}c_{2}}_{12} = \left(PPR^{2}_{12} - PPR^{1}_{12}\right) \ast \left(PPR^{1}_{01} * PPR^{2}_{23} + PPR^{1}_{12} * PPR^{2}_{12} \right) / \left(6 \ast \left(PPR^{1}_{01} * PPR^{2}_{01} * PPR^{2}_{12} + PPR^{1}_{01} * PPR^{2}_{01} * PPR^{1}_{12} \right) \right)$  \hspace{1cm} (4)

$e^{c_{1}c_{2}}_{23} = \left(PPR^{2}_{23} - PPR^{1}_{23}\right) \ast \left(PPR^{1}_{01} * PPR^{2}_{12} + PPR^{1}_{12} * PPR^{2}_{12} \right) / \left(6 \ast \left(PPR^{1}_{01} * PPR^{2}_{01} * PPR^{2}_{12} + PPR^{1}_{01} * PPR^{2}_{01} * PPR^{1}_{12} \right) \right)$  \hspace{1cm} (5)

All the analyses are carried out for all women in each birth cohort and country and for each of the three educational groups.

Results

Two-Child Families and Fertility Variation

In all countries, the share of two-child families was first increasing (the ‘expansion’ phase) and then it either stabilised or started to decrease (the ‘post-expansion’ phase; Fig. 1). In some countries, the youngest birth cohorts experienced slight increases (the phase of ‘rebound’). Throughout the analysed cohorts, the prevalence of two-child families was highest among women with medium (in 11 countries) or high (in the remaining five countries) education. The education-specific trends largely mimicked those observed in the female population as a whole (dashed line in Fig. 1) except among the low-educated. The latter experienced earlier and sometimes also steeper declines in countries where their number typically fell to very low levels: in Northern, Western and Central-Eastern Europe (excluding Croatia and Slovenia where the share of low-educated women remained relatively high). The exact birth cohorts, in which the phase of ‘post-expansion’ and, if present, ‘rebound’ started in each educational group, are given in Table 2 in the Appendix.

Compared to the ‘expansion’ phase, the trends in the cohort fertility rate (CFR) became more diverse across countries as well as across and within educational groups in the ‘post-expansion’ phase (education-specific trends in CFR are shown in Figure 6 in the Appendix). With few exceptions, the coefficient of variation of family size, both at the population level and within each educational group, decreased during the ‘expansion’ phase and increased during the ‘post-expansion’ phase (Fig. 2). The exceptions are Australia, New Zealand and West Germany where the
variation tended to increase throughout the analysed cohorts, France where it was decreasing continuously and the United States where it increased in the ‘expansion’ phase and decreased in the ‘post-expansion’ phase. In countries with very small numbers of women with low education in the younger birth cohorts, like Denmark, Finland, Spain, Czechia, Russia and Slovakia, the variation surged particularly fast in the least educated group. In the last post-expansion and ‘rebound’ cohorts, i.e. in the late 1960s birth cohorts, in all these countries but Spain family size among low-educated women varied much more strongly than among the university and secondary-school graduates.

Fig. 1 Proportion of women with two children, by education, country and women’s birth cohort. Note: Countries are ordered by region: English-speaking countries, Northern Europe, Western Europe, West Germany, Southern Europe, Central-Eastern Europe. For the exact numbers, see Table S-1 in the Supplement.
During the ‘expansion’ phase, the parity-specific trends were largely similar across the board: progression to first and second births tended to either remain stable or slightly decrease, except in Central-Eastern Europe where PPR01 did not change much, whereas PPR12 was usually rising (Fig. 3a–c; see Figure 7 in the Appendix for trends at the population level). The transition rates to third birth were declining, again with some exceptions in the post-socialist countries.

In the post-expansion phase, parity progression ratios developed increasingly differently across countries and educational groups. The rise in childlessness, while nearly universal, varied strongly in intensity and timing of the onset. For instance, in Central-Eastern Europe childlessness started to increase only in the youngest birth cohorts, and remained much lower than in other regions. Challenging the traditionally positive link between education and childlessness, in many countries where the
a. Low educated

Fig. 3 Parity progression ratios to first, second and third births (solid lines) and share of women with two children (dashed line) among women, by education, country and women’s birth cohort. Note: In all Figures a–c, the vertical dashed line marks the cohort in which the share of two-child families among women with low (a), medium (b) or high (c) education stopped growing. The dotted line, if present, marks the cohort in which the share of two-child families among women with low (a), medium (b) or high (c) education started rising again. Countries are ordered by region: English-speaking countries, Northern Europe, Western Europe, West Germany, Southern Europe, Central-Eastern Europe. For the exact numbers, see Table S-1 in the Supplement. Note: In all Figures a–c, the depicted values represent the average effect per 5-year cohort. Countries are ordered by region: English-speaking countries, Northern Europe, Western Europe, West Germany, Southern Europe, Central-Eastern Europe. The scales of the y-axes vary from figure to figure as the purpose is to show and compare countries within a given phase and not across the three phases.

group of the low-educated had shrunk to very low levels the largest declines in transition to first birth were experienced by low-educated women rather than by university graduates. In both educational groups, the gap between the usually higher values of PPR01 and the usually lower (and often decreasing) values of PPR12 tended to
narrow or even to close. The transition rates to second birth were particularly low in Central-Eastern Europe, especially among women with medium and high education.

The PPR23 largely stopped decreasing and either levelled off or moderately increased. The rise was more pronounced in countries and educational groups in which the share of two-child families stopped growing or declined. It was typically strongest among women with low education. Consequently, the declines in the share of two-child families were seen more often among women with low education (in half of the countries) than among university and secondary-school graduates (in five and six countries, respectively, out of 16). Conversely, the phase of ‘rebound’ followed either steep declines in the outflow (PPR23) accompanied by moderate reductions in the inflow (PPR01 and PPR12) or stabilisation of the outflow in combination with rises in the inflow. The former pattern is observed among high-educated women in Australia and New Zealand and among low-educated women in New

Fig. 3 (continued)
Zealand and Italy, whereas the latter one is typical of university graduates in France and medium- and high-educated women in Denmark.

**Decomposition of Change in the Share of Two-Child Families**

The decomposition analysis quantifies the effect of changes in the parity progression ratios on the prevalence of two-child families in each educational group. We decomposed changes in the proportion of two-child families into the effects of parity progression ratios to first, second and third births during the ‘expansion’ and ‘post-expansion’ phase as well as, if present, during the phase of ‘rebound’. The last birth cohort of the ‘post-expansion’ phase is either the last birth cohort in our analysis.
(1966–1970) or, if there was the phase of ‘rebound’, the last cohort before the share of two-child families started increasing.

The decomposition shows a clear East–West divide during the ‘expansion’ of the two-child family model (Fig. 4a). In the West, the rise was predominantly driven by declining transition rates to third birth. By contrast, in the Central–Eastern European countries, it resulted mainly from increases in the progression ratios to first and, most of all, to second birth (except in Slovakia and, among the low-educated, Czechia, Croatia and Slovenia, where the reductions in large families heavily contributed to the increase in two-child families).
The picture became more nuanced after the share of two-child families had stopped growing (Fig. 4b). In virtually all countries, the spread of childlessness
contributed to the decrease in two-child families, more strongly in the West than in the East (Fig. 4b). The effect was particularly strong among low-educated women in countries where their numbers had shrunk to very low levels. In Southern and Central-Eastern Europe, and to a lesser extent in the English-speaking countries, substantial reductions in the transition rates to second birth fostered further decline in the proportion of two-child families. The strength of the effect varied substantially by education. In Spain, Czechia, Hungary, Russia and Slovakia the effect was strongest among women with secondary and tertiary education. In other countries, the most affected groups were the low- and medium-educated in Greece, the low- and high-educated in Italy and the low-educated in Slovenia.

Further, in some countries, the weakening propensity to have three or more children, especially among better educated women, continued exerting a positive effect on the share of two-child families (Australia, New Zealand, Italy, Spain, Czechia and Slovakia). However, in many countries, particularly in Northern and Western Europe and in most of the post-socialist countries (Croatia, Hungary, Russia and Slovenia), the increase in transition rates to third birth pushed down the number of women with two children. The effect was usually strongest among the low-educated.

In the phase of ‘rebound’ (Fig. 4c), which was observed in five countries, the increase in the prevalence of two-child families was driven by reductions in the ‘progression-beyond-two behaviour’. In Australia and New Zealand, the parity-specific developments looked the same as in the expansion phase (steep declines in PPR23 accompanied by moderate reductions in PPR01 and PPR12). However, unlike in the ‘expansion’ phase, Denmark, France and Italy saw a positive effect of rising transition rates to second birth. Among low-educated women in Italy, it was counterbalanced by increases in childlessness, which were absent in the ‘expansion’ phase.

Conclusions and Discussion

Our study yields valuable insights about parity- and education-specific fertility developments over the last half a century in Europe and the English-speaking non-European countries. The ‘expansion’ of two-child families until after the end of the baby boom showed a clear East–West divide. In Central-Eastern Europe it was fuelled mostly by rises in the transition rates to second birth and, to a much lesser extent, by decreases in childlessness and third-birth rates. In other European and English-speaking countries, it resulted primarily from large reductions in transition rates to third births. It seems that the state-socialist policies largely prolonged the trends of the baby boom era by strengthening ‘progression-to-two’ and ‘stopping-at-two’ behaviour, while reduced ‘progression-to-two’ was already observed in market economies.

In the ‘post-expansion’ phase, family size variation increased, particularly strongly in countries where the share of two-child families not only stopped growing but declined. Thus, family size divergence led to an end of the expansion of the two-child family model. On the one hand, all countries saw decreases in inflow. The universal increases in childlessness rates went hand in hand with a decline in the transition rates to second birth in Southern and Central-Eastern Europe as well as,
to a lesser extent, in the English-speaking countries. On the other hand, reductions in inflow may have fuelled rises in outflow: transition rates to third birth increased. This ‘polarisation of fertility’ can be viewed as a consequence of an increasing selectivity of those who reach a family size of two children while more and more women remain childless or end up with one child only. Two-child mothers are then more family-oriented than in the past and a growing share of them have a preference for a ‘discretionary’ number of offspring, i.e. three or more (Ryder, 1980).

The ‘polarisation of fertility’ is by far strongest among low-educated women, which probably reflects the group’s strengthening selectivity. Childlessness was increasing universally across the board in the post-expansion phase, but in over half of the countries analysed in our study the rise was steepest among the low-educated. The educational gradient in childlessness used to be strictly positive (Beaujouan et al., 2016; Van Bavel et al., 2018). However, in the 1950s birth cohorts it turned into a U-shaped one, with the lowest figures among women with secondary education, in some of the Scandinavian countries (Andersson et al., 2009). More recently, childlessness rates among low-educated women have surpassed those among medium- and high-educated women in Denmark, Finland, Norway and Sweden (Jalovaara et al., 2018). Our study shows that this is not only a Scandinavian phenomenon. In the 1960s birth cohorts, childlessness is highest among low-educated women also in Czechia, Russia and Slovakia, and may become highest soon in Hungary, France, Italy and Spain. In most of these countries, the proportion of women without secondary education has shrunk to very low levels and their labour market situation is worsening: they have increasingly chequered careers, marked by more frequent spells of unemployment as well as growing instability and insecurity (OECD, 2015). Consequently, they are “increasingly [being] left behind in family formation” (Jalovaara et al., 2018, p. 18).

At the same time, however, women with low education experienced extraordinary surges in transition rates to third birth, much larger than women with medium and high education. Previous research has found that the low-educated have more complex partnership histories and live in more unstable unions, which often leads to higher fertility (Härkönen & Dronkers, 2006; McLanahan & Jacobsen, 2015; Thomson et al., 2014). Moreover, an increasing share of the low-educated group consists of women from ethnic minorities who often have, on average, larger families (Desegregation & Action for Roma in Education-Network, 2015; European Commission, 2003; European Union Agency for Fundamental Rights 2014; Pailhé, 2017). In addition, whereas the age at first birth has been continuously rising for decades at the population level, the increases have not been evenly distributed across educational strata, especially in high-income countries with non-universalistic social policies (Ní Bhrolcháin & Beaujouan, 2012; Rendall et al., 2010). In many of them, lower educated women experienced a much more moderate increase in age at first birth than their more educated peers, thus having increasingly more (biological) time to give birth to third and further children compared to women with more education. As a result of all these developments, childbearing behaviour of low-educated women has become increasingly distinct from medium- and high-educated women. The ‘divergence across educational lines’ observed in the Nordic countries (Jalovaara et al., 2018, p. 18) seems to have been present far beyond their borders: in
today’s high-income societies, population without a secondary-school qualification is being left behind not only in family formation but in family life in general.

The prevalence of one-child families grows most strongly among women with medium and high education in the post-socialist countries (with the exception of Croatia and Slovenia). It seems that in order to limit the inevitable double work-family burden while satisfying the social norm of becoming a mother, women with medium and high education more often opt for a one-child family. In Southern Europe and the English-speaking countries, the decreases in the transition to second birth are usually weaker and tend to be rather equally distributed across educational strata. Apparently, the continuously rising expectations about what constitutes good parenting (Hays, 1998; Romagnoli & Wall, 2012) clash with the increasingly demanding and unstable job market. As a result, more and more one-child parents may feel they do not have the time, energy and the necessary resources to raise a second ‘high-quality child’.

Finally, in the 1960s birth cohorts, the share of women with two children modestly increased in those countries and educational groups, in which the variation in family size either weakened or was moderate. These rebounds were driven primarily by declines in transition rates to third birth. Among medium- and high-educated women in two countries known for making it easier for women to combine work with motherhood (Rindfuss et al., 2016), Denmark and France, the effect of the shrinking outflow was strengthened by rises in the inflow: increasing progression to second birth in times of very stable childlessness. Another country present in our study and considered above-average family friendly and gender equal, Finland, saw very similar trends, with a stable share of two-child-families among highly educated women in the 1960s birth cohorts. The education-specific trends in childlessness and completed fertility in Norway and Sweden, not present in our data, strongly resemble those in Denmark and Finland (Jalovaara et al., 2018). It is thus probable that also these two countries are experiencing a rebound of the two-child family among highly educated women. More generally, family-friendly and gender-equal settings possibly create conditions conducive to reaching the family size of two children. However, policy measures that explicitly support the combination of family life with professional career for both women and men would be beneficial to keep the two-child family as a “model” primarily in the better-off segment of the population. To reach the less educated groups as well, additional measures would be needed to improve their access to (more) stable jobs.

Appendix 1

Complementary Information on Data

In addition to quality checks during database construction, we carried out specific checks to see whether the general and education-specific trends in fertility (including parity distribution and parity progression ratios) in the countries covered were
consistent across various data sources. Data for the United States were validated against the National Survey of Family Growth (waves 1995 to 2011–2013) and the Human Fertility Database. Data for Australia and New Zealand were given in five-year cohorts, starting from the 1937–1941 and 1938–1942 birth cohorts and finishing with 1967–1971 and 1968–1972 ones, respectively. Thus, the analysed five-year birth cohorts for these two countries are one or two years younger than the respective birth cohorts for other countries. For Finland and Denmark, women are in fact one year older than indicated by the five-year cohort labels: the 1946–1950 birth cohort corresponds to women born between 1945 and 1949, and so on.

Furthermore, in France, the ISCED grouping adopted by us does not seem to match the grouping usually used in OECD studies: the share of the highly educated in our study is half the size reported by OECD (2014). However, the definition and levels displayed are comparable to those of the other countries in this study. Finally, in the data for Australia and New Zealand, a considerable proportion (around 11%) of cases have unknown education. They were excluded from the analysis.

(See Figs. 5, 6, 7 and Tables 2 & 3)

| Table 2 | Data sources used in the analysis |
|---------|----------------------------------|
| Country | Census/Survey                    | Years                                      |
| Australia| census                           | 2011                                      |
| Croatia | census                           | 2011                                      |
| Czechia | census                           | 2011                                      |
| Denmark | register                         | register-based data for native Danish women, 2004 |
| Finland | register                         | Ten-percent sample of the Finnish population resident in Finland during 1970–2010 |
| France  | census                           | 1982, 1990, 1999, 2011                   |
| Greece  | census                           | 2011                                      |
| Hungary | census                           | 2011                                      |
| Italy   | Family and Social Subjects Survey | 2003, 2009                                |
| New Zealand | census                      | 2013                                      |
| Russia  | census                           | 2010                                      |
| Slovakia| census                           | 2011                                      |
| Slovenia| census                           | 2011                                      |
| Spain   | census                           | 2011                                      |
| USA     | Current Population Survey        | 1990–2012                                 |
| West Germany | micro-census     | 2008, 2012                                |
Table 3  Cohorts in which the share of women with two children stopped growing (‘Start of post-expansion’) and started increasing again (‘Start of rebound’)

| Region               | Country     | Start of post-expansion |                    | Start of rebound |                    |
|----------------------|-------------|--------------------------|--------------------|------------------|--------------------|
|                      |             | All          | Low   | Medium | High     | All           | Low | Medium | High  |
| English-speaking     | Australia   | 1946–50      | 1946–50| 1946–50| 1946–50  | 1956–60       |     |         |       |
|                      | New Zealand | 1946–50      | 1946–50| 1946–50| 1941–45  | 1956–60       |     |         |       |
|                      | USA         | 1946–50      | 1956–60| 1951–55| 1946–50  | 1956–60       |     |         |       |
| Northern & Western   | Denmark     | 1946–50      | 1951–55| 1946–50| 1946–50  | 1961–65       | 1961–65|         |       |
|                      | Finland     | 1946–50      | 1946–50| 1951–55| 1941–45  | 1961–65       | 1961–65|         |       |
|                      | France      | 1946–50      | 1946–50| 1946–50| 1941–45  | 1961–65       | 1961–65|         |       |
| German-speaking      | West Germany| 1946–50      | 1946–50| 1946–50| 1946–50  | 1961–65       | 1961–65|         |       |
| Southern             | Greece      | 1951–55      | 1951–55| 1951–55| 1946–50  | 1961–65       | 1961–65|         |       |
|                      | Italy       | 1946–50      | 1946–50| 1951–55| 1946–50  | 1961–65       | 1961–65|         |       |
|                      | Spain       | 1956–60      | 1961–65| 1956–60| 1956–60  | 1961–65       | 1961–65|         |       |
| Central-Eastern      | Croatia     | 1951–55      | 1951–55| 1946–50| 1946–50  | 1961–65       | 1961–65|         |       |
|                      | Czechia     | 1956–60      | 1941–45| 1951–55| 1956–60  | 1961–65       | 1961–65|         |       |
|                      | Hungary     | 1951–55      | 1941–45| 1946–50| 1951–55  | 1961–65       | 1961–65|         |       |
|                      | Russia      | 1956–60      | 1941–45| 1956–60| 1951–55  | 1961–65       | 1961–65|         |       |
|                      | Slovakia    | 1961–65      | 1941–45| 1951–55| 1951–55  | 1961–65       | 1961–65|         |       |
|                      | Slovenia    | 1951–55      | 1956–60| 1946–50| 1951–55  | 1961–65       | 1961–65|         |       |

Empty cells in the ‘start of rebound’ columns indicate that until the last cohort covered by the analysis (1966–70) the share of two-child families continued declining or remained roughly at the same level.
Fig. 5 Educational structure; Note: Countries are ordered by region: English-speaking countries, Northern Europe, Western Europe, West Germany, Southern Europe, Central-Eastern Europe.
Fig. 6  Cohort fertility rate by education and country; Note: Countries are ordered by region: English-speaking countries, Northern Europe, Western Europe, West Germany, Southern Europe, Central-Eastern Europe.
Fig. 7  Parity progression ratios to first, second and third births (solid lines) and share of women with two children (dashed line) among all women, by country and women’s birth cohort; Note: The dashed lines mark the cohorts in which the share of two-child families among women with high education stopped growing (the first dashed line) and in which it started declining (the second dashed line, present only in countries in which there was a decline in the share of two-child families). The dotted line, if present, marks the cohort in which the share of two-child families among women with high education started rising again. Countries are ordered by region: English-speaking countries, Northern Europe, Western Europe, West Germany, Southern Europe, Central-Eastern Europe. For the exact numbers, see Table S-1 in the Supplement.
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Declarations

Conflict of interest The authors declare that they have no conflicts of interest.

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