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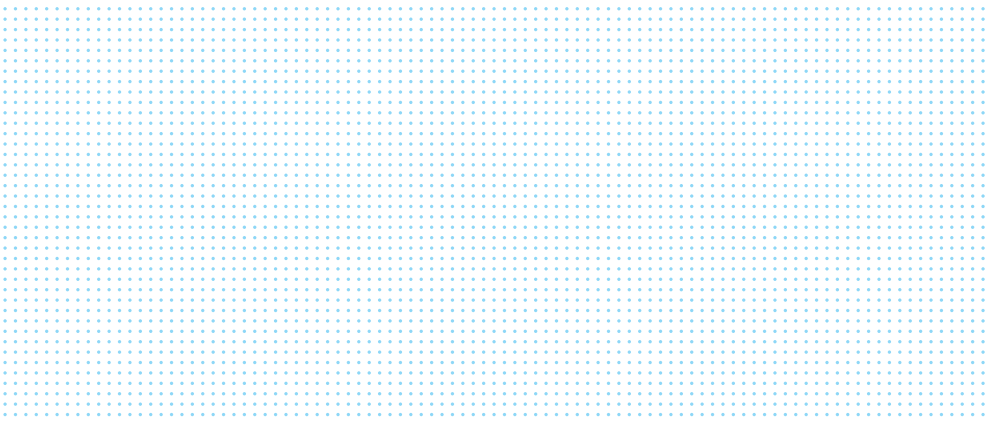

Nº 43

FEMALE EDUCATION AND FERTILITY UNDER STATE SOCIALISM AND AFTER THE TRANSITION TO MARKET ECONOMY: A DECOMPOSITIONAL ANALYSIS IN HUNGARY

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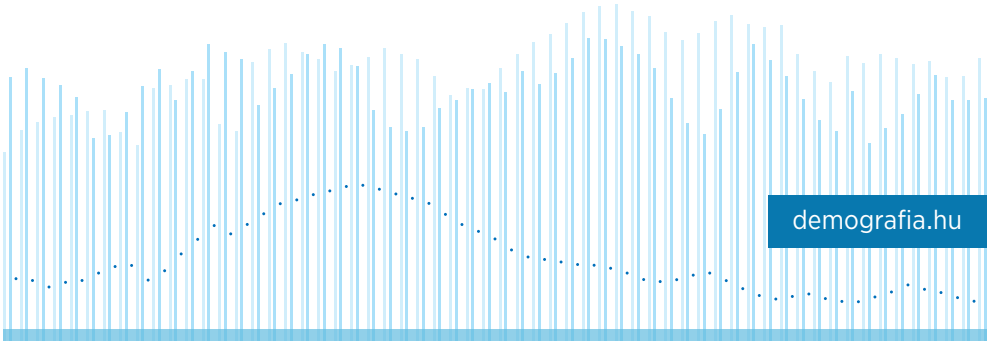
Laura Szabó and Zsuzsanna Makay



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ABSTRACT

This study examines whether changes in completed cohort fertility (CFR) among Hungarian women born between 1920 and 1982 were driven by shifts in educational composition or by changes in fertility within educational groups. Using data from six full, individual level population censuses (1970, 1980, 1990, 2001, 2011, and 2022) and Kitagawa's decomposition method, changes in CFR are decomposed into indirect (structural, reflecting educational composition) and direct (rate, reflecting education-specific fertility) components and analysed across three broad birth cohorts: women born in 1935–1959, 1960–1969, and 1970–1982.

Structural effects dominated CFR change in the pre-transition cohort, while changes within educational groups (rate effects) dominated in the post-transition cohort, while both were small and offsetting in the transition cohort (1960–1969). Across cohorts, primary-educated women made the largest contribution to CFR decline due to their shrinking population share. Parity-specific decomposition shows that lower childlessness and second births supported CFR in the pre-transition cohort, whereas rising childlessness and declining second births reduced CFR in the post-transition cohort. In the transition cohort, parity effects were modest and partly offsetting.

Our data prove that both educational expansion and fertility change within educational groups played a role in the decline of cohort completed fertility of women born between 1920 and 1982. However, women whose main childbearing years occurred during the transition period differ from those in the socialist era, due to the varying impact of childlessness and parity 2 on CFR change. Compared to post-transition women, the only distinction lies in the effect of parity 1 on CFR change.

Our findings reveal a generational shift in how education and fertility interacted in Hungary across seven decades. Moreover, our study highlights the importance of both structural and within-group mechanisms and contributes to a more comprehensive understanding of the interplay between education and fertility during societal change.

Keywords: cohort fertility, educational expansion, decomposition, parity

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INTRODUCTION[1]

The transition from state socialism to democracy and market economy in 1989 changed the lives and circumstances of people in Central and Eastern Europe (CEE) considerably. It affected not only the political structure and the economy but also had a significant influence on society and on the everyday lives of families (Spéder and Kamarás, 2008). These changes were mainly driven by structural economic transformations that affected the labour market: the privatisation of numerous factories and enterprises, the closing of state-subsidised workplaces, resulting in unemployment, and high inflation rates, which considerably increased poverty rates (Ferge, 2002). The importance of education grew as career opportunities rose and individual achievements became more important, while income inequalities increased and society became more atomised (Doblhammer and Spéder, 2024; Spéder et al., 2002). Fertility and family formation, in particular, underwent drastic changes, which were mainly due to the transformation of social norms, the spread of modern contraceptive methods, the expansion of education, as well as the changes in living and working conditions. These changes are often referred to as the Second Demographic Transition in CEE countries, since new opportunities arose while social pressure to follow a predetermined pathway of life became less important (Hoem et al., 2009).

Several studies have already analysed the relationship between education and cohort fertility in Central and Eastern Europe. Most of them dealt with the socialist period and showed that changes in education had an important effect on fertility. In the Czech Republic, for example, education-specific completed cohort fertility increased and fertility levels converged upwards among the cohorts born between 1900 and 1970. The two-child family became dominant, while large families disappeared and childlessness decreased considerably (Zeman 2018). An analysis of women born between 1916 and 1960 in seven CEE countries also showed that, despite their common socialist past, there was not a universal pattern of fertility behaviour among women. What was common, however, was the prevalence of the two-child family norm and the fact that, despite the egalitarian ideology, "a strong negative gradient [by education] in fertility persisted" (Brzozowska, 2015; Wood et al., 2014).

The aim of our study is to contribute to these CEE studies by analysing the relationship between education and fertility in Hungary. Taking advantage of the time elapsed since the regime change and the Hungarian population census of 2022, we extend the time period to the 2000s and compare the effect of education on fertility behaviour before and after the transition in 1989. We use a cohort approach and study the quantum of fertility of women born between 1920 and 1982. We distinguish women's cohorts according to when they were in their main childbearing years, differentiating between the periods before the regime change of 1989, the transition years, and the post-transition period.

Our article is structured as follows. First, we discuss the theoretical considerations regarding the relationship between education and fertility. Then we briefly describe the relevant historical background in Hungary in connection to fertility behaviour. Next, we present the methodology, set out the research questions and show the results, which we then discuss in the last section.

1 A short version of this working paper's descriptive findings is published in Demographic Research (Szabó and Makay, 2026). All comments provided by the anonymous reviewers have been fully considered in preparing this extended version.

CONTEXTUAL BACKGROUND

THE SOCIAL AND ECONOMIC BACKGROUND OF CHANGES BETWEEN 1940 AND 2022

The relationship between fertility and education has been extensively researched, focusing on theories like the New Home Economics and the Second Demographic Transition, along with contextual factors, contraception, abortion and changing gender roles (Brzozowska, 2015; Jalovaara et al., 2019; Lappegård and Rønsen, 2005; Spéder, 2023; Wood et al., 2014). These questions have also been largely investigated in post-socialist countries (Brzozowska, 2015; Sobotka, 2011; Szabó, 2020; Zeman, 2018). We briefly examine these factors in Hungary before and after its transition to a market economy, in relation to educational attainment.

The New Home Economics Theory posits that fertility decisions are rational and involve the weighting of opportunity costs against childrearing costs. Higher-educated women often face greater opportunity costs due to better job prospects, potentially leading to lower fertility rates compared to less-educated women. However, higher income may also encourage higher fertility (Becker, 1960; Lesthaeghe, 2010; Wood et al., 2014).

During state socialism in Hungary, women entered the labour market due to industrialization and socialist ideology, however, they faced limited career opportunities and low education levels. Employment rates increased from the late 1940s to the 1970s, but women primarily held low-status jobs (LaFont, 2001). The opportunity costs of childbirth were thus relatively low, since women did not think about work as a "career". Because of the absence of unemployment, they were certain to get a job again after their childrearing years.

In the 1960s paid parental leave was introduced, and women could take three years off after childbirth to stay at home, with the security of being able to reintegrate into the labour market. This eased the everyday "double burden" of the mothers and compensated for some of their income loss (Kocourková, 2002). The benefit was a fixed amount, available for three years, and around 40% of women's average income. Around 67% of eligible mothers interrupted their employment to take advantage of it, and this proportion increased over the next decade (Sulyok, 1979).

In 1985, a second form of paid parental leave was introduced: the childcare benefit. Its amount depended on the mother's income; it was thus intended to compensate women with higher incomes. The benefit could be claimed during the first two years after childbirth and compensated rather generously for a career break (Kapitány 2008). While the introduction of these childcare benefits aimed to support working mothers, it also reinforced traditional gender roles (Dobrotić and Stropnik, 2020; Lobodzinska, 1996).

Although modern contraceptives were not available until the 1970s, abortion was possible upon request. Abortion rates were very high, surpassing birth rates during the 1960s and the 1970s, which clearly showed women's desire to control the number of their children (David, 1999). The modern pill appeared in 1967, followed by the first intrauterine device (IUD) in 1970. In 1974, 75% of married women aged under 35 used some form of birth control, with 43% of them using the pill or an IUD (Makay, 2015). Differences according to education were visible between women using any form of contraception and those not using it; differences according to modern or traditional methods were, however, much less evident (Kamarás, 1999). Overall, fertility behaviour did not differ much by education; higher-educated women had their children somewhat later but followed the same 'standard' pattern of life-course (early marriage followed by childbirth) as lower-educated women (Spéder, 2019).

After the 1990 transition, employment rates dropped markedly due to job losses, yet social benefits such as parental leave remained (Frey, 2011). Opportunity costs increased, particularly for higher-educated women, as job security decreased. The importance of

education grew, providing some protection against unemployment (Frey, 1997; Szántó and Tóka, 1990).

The lack of adequate childcare facilities also increased opportunity costs and affected women's labour market participation. While 13.7% of children under the age of two had a place in a nursery in 1990, this figure was only 9% in 1995 and 8.4% in 1996 due to the closing of several nurseries after the transition (KSH, 1999). 50,000 nurseries operated in 1990 but only 27,000 in 1997. Improvements began afterwards, but very slowly.

While the parental leave system remained in place, allowing mothers to take two or three years of paid leave after each childbirth, a new form of parental benefit was introduced in 1993 for women with three or more children. They could take a paid parental leave until their youngest child turned eight. This "stay-at-home mothers' benefit" may have contributed to gender role attitudes becoming more traditional after the transition. However, younger generations began adopting more modern views in later years (Spéder, 2023).

All of these factors may have contributed to women becoming less attached to the labour market. Compared to the 1980s, mothers' labour market participation decreased in the years following childbirth. This mainly affected women with low and medium levels of education (Makay, 2018), while childlessness became more prevalent among higher-educated women (Szabó, 2020).

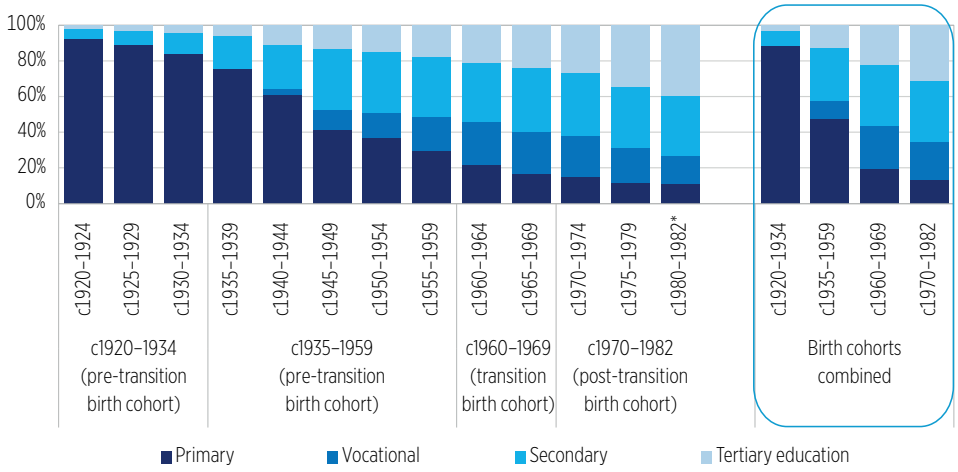
The Second Demographic Transition in Hungary saw rising divorce rates and cohabitation, with changes in childbearing behaviour becoming more differentiated by education and social status from the 1990s (Spéder and Kamarás, 2008). While early marriage and childbearing were common during state socialism, the postponement of childbirth became evident after the transition, driven mainly by increasing education levels (Spéder, 2019). Higher levels of education correlated with later childbearing and lower fertility rates. A clear differentiation in fertility behaviour based on educational attainment emerged (Spéder et al., 2002). Moreover, the transition from a socialist to a market economy exacerbated the conflict between work and family life, thereby influencing fertility decisions (Spéder and Kamarás, 2008). Besides, increased rates of divorce and cohabitation have contributed to the decline in fertility, as partnerships have become more fragile (Spéder and Kamarás, 2008).

CHANGES IN THE EDUCATIONAL ATTAINMENT OF WOMEN AFTER 1940

Following the 1950s, Hungary has achieved substantial educational expansion, including establishing a common eight-year primary school for all children, increasing pre-school training, providing full-time secondary education for 45% of pupils, and rapidly expanding higher education (Richmond, 1966). The proportion of pupils continuing to secondary school after the eight-year primary school increased from 80% in 1970 to 93.4% in 1990, while the proportion of those engaging in higher education increased from 4.1% to 10.4% during the same period (KSH, 1991). Following the transition of 1989, this expansion continued, especially in higher education, with half of 20-year-olds being full-time students (KSH, 1991).

The composition of women by educational attainment has therefore changed fundamentally across different birth cohorts. The proportion of women with an education equivalent to or below the eighth grade decreased from one cohort to the next, from 92% among those born in 1920–1924 to 11% (cohort 1980–1982), while the proportion of women with a secondary education increased from 6% to 34%, respectively, and the proportion of women with a tertiary education increased from 2% to 40% (*Figure 1*). The expansion of secondary education is particularly evident among women born between 1945 and 1949, with secondary education becoming the modal level of education for women born in 1965–1969. In this birth cohort, 24% of women have already obtained a tertiary education.

Over time, tertiary education became less exclusive and is now the most common form of educational attainment for the two most recent birth cohorts (35% and 40% of women born in the 1975–1979 and 1980–1982 cohorts, respectively, had tertiary education by the age of 40–70). As colleges and universities expanded after 1989 to meet the rising demand for higher education graduates, time spent in education became crucial for career success. This led to a surge in tertiary enrolment, surpassing that of secondary school graduates (OECD, 2018). Education offered some protection against unemployment (Frey, 1997, 2011; Szántó and Tóka, 1990), while changes strengthened the incentives to remain in education for longer, delaying family formation (Spéder et al., 2002; Szabó, 2021).



Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.
Notes: Changes among the five-year cohorts are only shown to illustrate the degree of homogeneity or heterogeneity within the pre-transition (1935–1959, n=1,725,455), transition (1960–1969, n=638,549), and post-transition (1970–1982, n=968,441) cohorts. The 1920–1934 cohort serves as the reference cohort for the decomposition of CFR change for women born in 1935–1959 (n=1,031,213). Please note that vocational education was introduced after the second world war in Hungary, meaning that it could only be considered for women born after 1940, see discussed in Szabó (2021:13) and Brzozowska (2015:699). c=birth cohort.

Figure 1
The distribution of women aged 40–70 born in 1920–1982 by their highest educational attainment, %

METHODOLOGICAL BACKGROUND

RESEARCH OBJECTIVE

The objective of our research is to identify the contribution of changes in educational composition (structural component) and education-specific fertility (rate component) on the change in overall CFR among women born in 1920–1982. To better understand the sources of CFR change identified by the direct–indirect decomposition, we further decompose the results by educational attainment to identify which groups contribute most to overall change, and by parity (including childlessness) to reveal the childbearing patterns reflected in the rate component. Finally, an education-by-parity decomposition further disaggregates the within-educational groups component of CFR change, linking parity-specific fertility dynamics to educational groups and thereby identifying which parity transitions within which educational strata drive overall cohort fertility change. Thus, our research questions are:

1. Is fertility changing because women's education changed, or because fertility within educational groups changed? (direct/indirect decomposition)
2. Which educational groups matter most? (education-based decomposition)
3. Which birth orders matter most? (parity-based decomposition)
4. Which birth orders matter most within which educational groups? (education × parity-based decomposition)

The analysis compares birth cohorts of women whose main childbearing years occurred before, during or after the political regime change in 1989. It specifically examines whether there is a clear difference in the impact of the rate and structural components on the change in CFR across these groups. Furthermore, the study aims to determine whether a 'transition' cohort can be identified that demonstrates a shift in the impact of these components. Finally, the role of childlessness and high parity births on fertility changes will be investigated, net of educational attainment.

SOURCE OF DATA

Our analysis is based on data from the six most recent individual-level full population censuses, conducted in 1970, 1980, 1990, 2001, 2011, and 2022. For each census year, we selected five variables: sex, year of birth, age, educational attainment and number of live-born biological children. We then appended the census datasets and selected women aged 40–70 in a given census year, born between 1920 and 1982 (see *Table A1* and *A2* in the Appendices).

Next, we used data from the Human Fertility Database (HFD) to determine the main childbearing years for women across three periods in Hungary: state socialism, the transition years, and the period after the transition to market economy.

THE TARGET GROUPS OF OUR ANALYSIS: DEFINING THE PERIODS AND BIRTH COHORT GROUPS

To identify the main childbearing years, we explored the birth patterns for each cohort by recording the number of children born at each maternal age.

Each cohort experienced distinct social and historical contexts. We emphasise the differences between the cohorts: 1) those who mainly had children during state socialism; 2) those who were in their main childbearing ages during the transition years; and 3) those who mostly became parents after the transition. In order to proceed with this distinction, we will use data from the HFD.

Classically, childbearing age is defined as the period between a woman's 15th and 49th birthday, thus it includes more than three decades. If we were to consider all women, this would mean defining those born between 1940 (who were 49 in 1989) and 1974 (aged 15 in 1989) as having had children during state socialism. However, most women have their children within a shorter timeframe, which was particularly true during state socialism, when the "standard" childbearing years followed the end of education and early marriage (Spéder and Kamarás, 2008). In order to provide an objective definition of the cohorts falling into the three periods, we will proceed as follows.

For each cohort, defined by the women's birth year, we recorded the number of children born at each maternal age. This enabled us to calculate the total number of children born to each cohort as a whole, as well as the cumulative distribution of births by maternal age. From this distribution, we identified the maternal ages at which the 25th, 50th, and 75th percentiles of all births occurred within each cohort. These percentiles thus correspond to the ages by which 25%, 50%, and 75% of the total births within the cohort had taken place. By adding these ages to the women's birth year, we obtained calendar years representing the timing of childbearing. Specifically, we concentrated on the second and third quartiles of the birth distribution, defined as the calendar years in which the 25th to 75th percentiles of all births occurred for each cohort. This range captures the period during which the middle 50% of births took place, serving as a proxy for the core childbearing years within each cohort. These periods were used to classify cohorts according to whether the majority of their fertility occurred before, during, or after the post-socialist transition.

The method can be represented mathematically as follows.

Let be the year of birth of a cohort and let be the number of children born to women born in year y at maternal age a. The total number of children born to women in birth cohort y is:

$$b_y = \sum_{a=15}^{49} B_y(a)$$

The cumulative number of children born to this cohort by maternal age a is:

$$F_y(a) = \sum_{k=15}^{a} B_y(k)$$

where k is the summation index, representing maternal ages from 15 up to a.

Let $T_y = F_y(a_{\max})$ be the total number of children born to cohort C_y. Then the ages at which 50% of births occur, denoted by a_{25} and a_{75}, are defined as the minimum and maximum ages such that:

$$F_y(\mathrm{a}_{25}) \geq 0.25 \cdot T_y,\ F_y(\mathrm{a}_{75}) \geq 0.75 \cdot T_y$$

The corresponding calendar years are:

$$P_{25} = y + a_{25},\ P_{75} = y + a_{75}$$

The results of these calculations show that, for almost every cohort, 50% of childbirths fall within a seven-year period, primarily between the ages of 21 and 28 (for cohorts born between 1935 and 1947; see *Table A3*). This period narrowed somewhat for cohorts born between 1948 and 1956, with the 75th percentile decreasing to 27 years. In later birth cohorts, childbirth occurred at an earlier age and over a longer period. The age related to the 25th percentile decreased to 20 years, while the age related to the 75th percentile increased to 28 years between the birth cohorts of 1957 and 1960. It is evident that postponement of childbirth is a trend that has been observed from the 1971 cohort onwards. In the latter group, the age at the 25th percentile increased to 22 years. This figure rose to 24 years in the 1978 cohort.

Based on these calculations from HFD, we classified cohorts into three distinct groups. Women born in 1935–1959 had their children before the transition: the 75th percentile of their births fell before 1987. It is reasonable to date the onset of Hungary's transition to 1987–1988, rather than to the formal institutional changes of 1989–1990, as several political forces that would later become dominant parliamentary parties had already been founded by 1987. The process accelerated further in 1988, when on March 15th mass demonstrations openly demanded democratic representation and political freedoms from the state (Ripp, 2006). Women born in 1960–1969 are the 'transitional cohorts' who experienced their main childbearing years during the transition period, between 1987 and 1998 (Hungary was nearing the completion of its market transition in 1998; Buss 2000). Finally, women born between 1970 and 1982 had their children mainly after the transition period, during the new era of market economy (see *Table A3*).

As the HFD does not contain complete data on the number of children that women born in 1920–1934 had at each maternal age between 40 and 70, this group has not been classified as belonging to the pre-transition cohort. However, we will include this birth cohort as the reference group in the decomposition analysis for those born in 1935–1959.

VARIABLES IN THE ANALYSIS

The variables used in the decomposition analysis were the number of live births recorded for all women aged 40–70 in all censuses, as well as the highest educational attainment of these women. There were no missing data for these variables. To decompose the change in CFR, we calculated the mean number of children by aggregating individual-level data by birth cohort, educational level, and parity from the appended database of the six

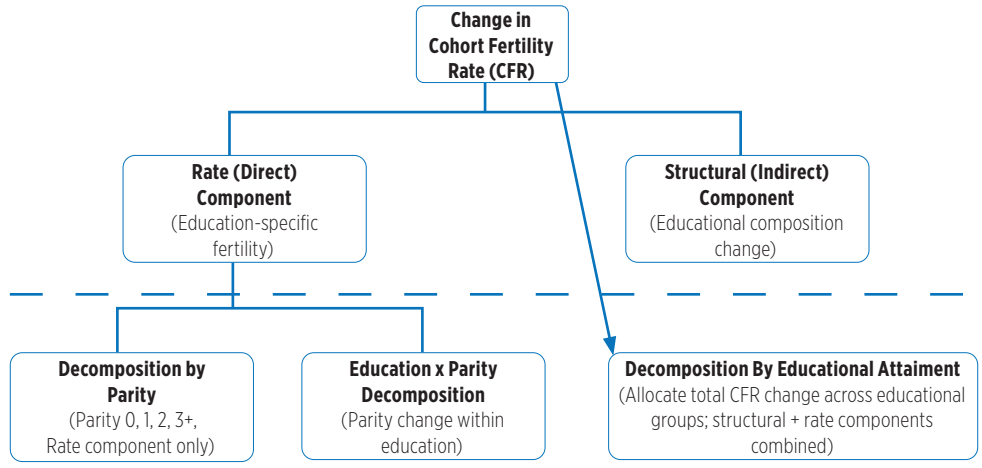
censuses. In this step, we employed four birth cohort groups (1920–1934, 1935–1959, 1960–1969, 1970–1982), a four-category version of educational attainment (primary education, equivalent to ISCED 1997-0, 1 and 2; vocational education – ISCED 1997-3C; secondary education – ISCED 1997-3A, B, 4; and tertiary education – ISCED 1997-5, 6; KSH, 2024) and a four-category parity variable (childless, parity 1, parity 2 and parity 3+).

The average number of children born to women by the age of 50 is known as completed fertility (Eijkemans et al., 2014; Leridon, 2008). In our analysis, we calculate completed fertility for women aged 40–70 (following the methodology of Brzozowska, 2015), by dividing the total number of live births by the total number of women in each birth cohort. This ratio is calculated from all available censuses, and the values are averaged by cohort. This value is then taken as the completed fertility for that cohort. The number of live-born children is collected from all women in all censuses in Hungary (and from all women aged 14 and over in the 1970 and 1980 censuses)[2].

Comparing educational attainment over time presents challenges, as nominally identical categories may represent different content across censuses (Mckenzie, 2014). For consistency, this analysis adopts the four-category classification of highest educational attainment used by the Hungarian Central Statistical Office, assuming homogeneity within these groups.

STATISTICAL ANALYSIS

We performed a descriptive demographic analysis examining the variation in women's fertility according to educational attainment. This analysis was conducted using the *decomposition method* in Microsoft Office Excel Professional Plus 2016. We follow the decomposition presented on *Figure 2.*



Source: authors' design.

Figure 2

Conceptual diagram of the decomposition of CFR change of women aged 40–70 and born in 1920–1982

The change in women's completed fertility can be decomposed into structural (1) and direct (2) components. We decompose the change in the overall CFR based on variation in the educational composition of cohorts and education-specific CFRs. The

2 Alternatively, the analysis could rely only on women aged 40–49 observed in different censuses. However, when multiple observations are available for the same birth cohort, using all of them yields more robust estimates. For example, women born in 1945–1949 were observed at ages 41–45 in 1990, 52–56 in 2001, and 62–66 in 2011, with little change in completed fertility across these observations (Tables A1 and A2). We therefore use the mean CFR calculated at ages 50, 60, and 70 to represent cohort fertility. Although CFR estimates may vary slightly across censuses, this has negligible impact on cohort-to-cohort CFR change, with differences in delta CFR ranging only from −0.03 to 0.04.

direct component can be further decomposed into the effects of childlessness (2a) and different parities (2b). We used the symmetrical Kitagawa decomposition method, which involves equally dividing the interaction term between the direct and structural components (Kitagawa, 1955). The decomposition follows the following formula, where t is the birth cohort, $p(t)i$ is the share of i educated women among women, $m(t)i$ is the proportion of i educated mothers among i educated women, $MCFR(t)ji$ is the average number of children of mothers with i education and *j* parity, $\Delta CFR(t+1,\ t)$ is the difference between $CFR(t+1)$ and $CFR(t)$. The change of CFR is always relative to the previous cohort. Education-specific, parity-specific, and education × parity decompositions are obtained by aggregating the elementary terms of the above expression over j, over i, or over neither dimension, respectively.

$$\Delta CFR(t+1,\ t) =$$

$$\sum_{i=4}^{4}\sum_{j=1}^{4}\left[(p(t+1)i - p(t)i)\cdot\frac{m(t+1)i + m(t)i}{2}\cdot\frac{MCFR(t+1)ji + MCFR(t)ji}{2}\right] + \quad (1)$$

$$\sum_{i=4}^{4}\sum_{j=1}^{4}\left[(m(t+1)i - m(t)i)\cdot\frac{p(t+1)i + p(t)i}{2}\cdot\frac{MCFR(t+1)ji + MCFR(t)ji}{2}\right] + \quad (2a)$$

$$\sum_{i=4}^{4}\sum_{j=1}^{4}\left[(MCFR(t+1)ji) - MCFR(t)ji\cdot\frac{p(t+1)i + p(t)i}{2}\cdot\frac{m(t+1)i + m(t)i}{2}\right] \quad (2b)$$

We also apply *direct and indirect standardisation* procedures to check what the CFR of the post-transition birth cohort would be if women's educational attainment remained at the level seen for women born in the pre-transition birth cohort (indirect standardisation), and what the CFR of the post-transition birth cohort would be if the CFR of the educational groups remained the same as that of the pre-transition birth cohort born in 1935–1959 (direct standardisation).

RESULTS

CHANGE IN FEMALE COMPLETED COHORT FERTILITY RATE (CFR) OVER TIME

The results show that the CFR decreased slightly from 2.10 to 1.88 for the oldest birth cohorts, born in 1920–1939, increased slightly from 1.85 to 1.93 for the women born in 1940–1959, then decreased again from 1.93 to 1.87 for the 1960–1969 cohort and further from 1.71 to 1.54 among the youngest women, born in 1970–1982 (see *Figure 3* and *Table A2*).[3]

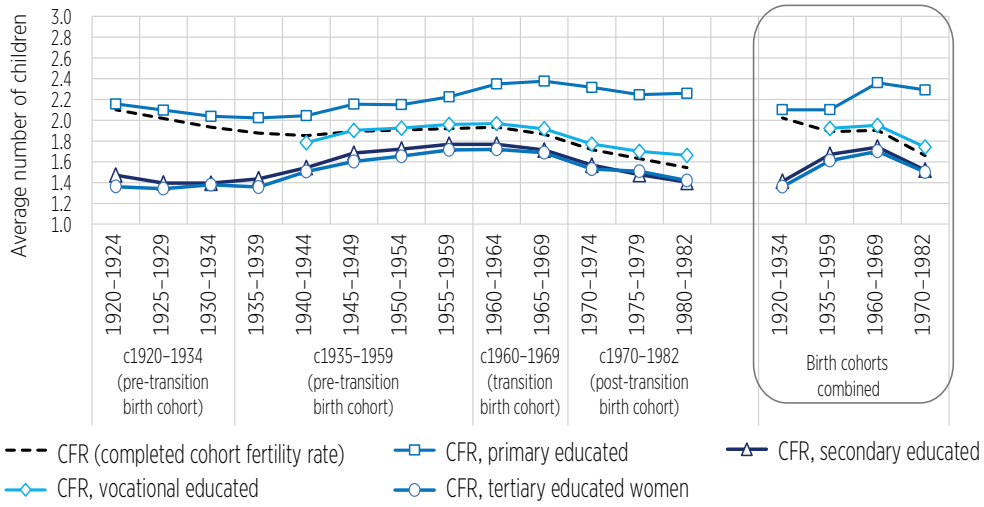
THE CHANGE OF CFR OVER TIME BY EDUCATIONAL GROUPS

Figure 3 illustrates the variation in CFR across educational groups by birth cohorts. The highest CFR is observed among women with up to eight years of education (primary education). The average CFR is observed among those with vocational education, while the lowest one among those with tertiary education, across all birth cohorts. The CFR trend is very similar for women with secondary and tertiary education. While these lines converge among women born in 1920–1959, they diverge for those born after 1960,

3 The completed cohort fertility rate of the youngest generation, born in 1980–1982, may be slightly higher by the time these women reach 50 (they were 40–42 years old at the time of the 2022 census, see Table A1).

mainly due to the fertility increase among those with only primary education. Their CFR increased from 2.1 (c1935–1959) to 2.4 (c1960–1969).

As demonstrated in *Figure 1*, the proportion of women with primary education decreased continuously while their fertility increased. Consequently, the observed increase in their fertility may be attributed to a strong selection process, whereby individuals who did not pursue or were unable to continue their education beyond a basic level were likely to remain in this high-fertility group.



Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.
Notes: Changes among the five-year cohorts are shown only to illustrate the degree of homogeneity or heterogeneity within the pre-transition (1935–1959), transition (1960–1969), and post-transition (1970–1982) cohorts. By the time women born between 1970 and 1982 reach 50 years of age, their CFR may be slightly higher than presented here.

Figure 3

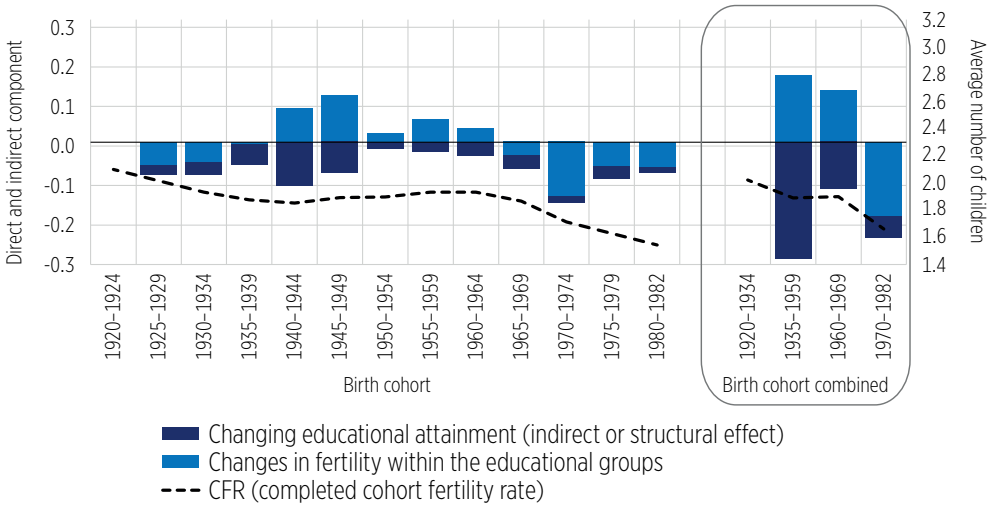
Change in the CFR by educational groups for women aged 40–70 and born in 1920–1982

The data presented in *Figures 1* and *3* will be used for the decomposition analysis described in the following section.

DECOMPOSITION OF CFR CHANGE INTO DIRECT AND INDIRECT (STRUCTURAL) COMPONENTS

Fertility changes over consecutive birth cohorts are decomposed into direct (changes in fertility within educational groups) and indirect (changes in structural composition) components (see *Figure 4* and *Table A3*). The first component is the change in fertility within different educational groups, while the second component is the change in the educational composition of women over time. The sum of these two components is 100%, representing the difference in CFR between two consecutive groups.

Our first calculations demonstrate that an increase in educational attainment has led to a decline in the overall CFR across all cohorts. This is evident since a negative structural component is observed for all birth cohorts, as illustrated in *Figure 4*. This effect is particularly pronounced among women born in the pre-transition cohort, in 1935–1959. However, the change in education-specific fertility increased the overall CFR in the pre-transition and transition birth cohorts, while it decreased it in the post-transition cohort. While the structural effect is larger than the direct effect among women in the pre-transition birth cohort (–0.29 vs. 0.17), the structural effect is smaller than the direct effect in the post-transition cohort (–0.05 vs. –0.19); however, the two effects are almost equal in the transition cohort (–0.12 and 0.13, respectively).

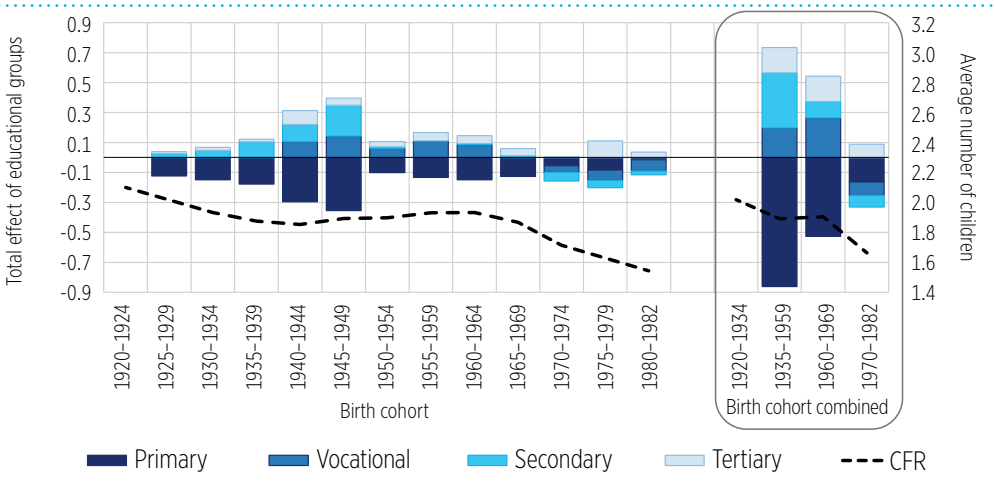


Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.
Notes: Changes among the five-year cohorts are shown only to illustrate the degree of homogeneity or heterogeneity within the pre-transition (1935–1959), transition (1960–1969), and post-transition (1970–1982) cohorts. The change of CFR is always relative to the previous cohort.

Figure 4
CFR and decomposition of its change into direct and indirect (structural) components for women aged 40–70 and born in 1920–1982

DECOMPOSITION OF CFR CHANGE BY EDUCATIONAL ATTAINMENT

Further decomposition of CFR change by educational attainment shows that *primary education* has been the driving force behind the evolution of overall CFR in almost all birth cohorts, particularly among women born between 1935 and 1959, with a less pronounced effect in the youngest birth cohort (women born after 1970; see *Figure 5*). All of these effects were negative. Vocational, secondary and tertiary education had a positive effect on the overall change of CFR in both the pre-transition and the transition cohorts, thereby increasing the overall CFR. For women born between 1970 and 1982, the change of both *vocational* and *secondary* education decreased the CFR. However, only the effect of *tertiary education* remains positive in the post-transition cohort; thus, the primary, vocational and secondary education all have a negative effect on CFR change.



Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.
Note: see notes under Figure 3.

Figure 5
The role of each educational group in the change of overall CFR for women aged 40–70 and born in 1920–1982

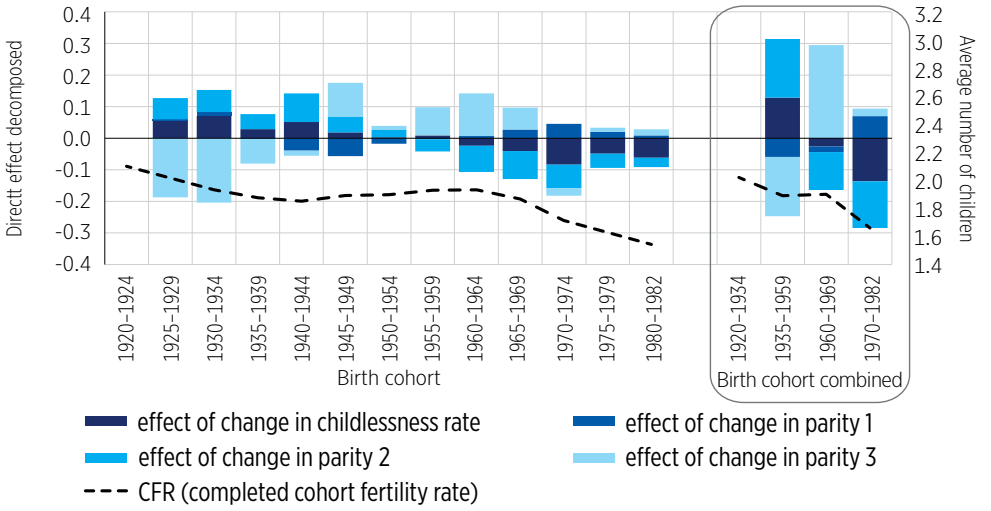
DECOMPOSITION OF CFR CHANGE BY PARITY

Before decomposing the direct component of the CFR changes further, we present the share of women by parity and educational attainment over time (see *Table A4*). Looking at the data for pre-transition, transition and post-transition birth cohorts of women, we found that childlessness rate is lowest among women born in 1935–1959 (8.4%). However, there are significant disparities by education: childlessness is twice as prevalent among women with secondary or tertiary education compared to women with primary education. The proportion of women with one or two children also varies by education. Over time, the proportion of women with three or more children has decreased. However, the highest proportion of women with three or more children is observed among those with primary education.

Examining changes in childlessness by educational attainment shows that the decline in childlessness was most pronounced among women born before 1959 across all educational groups. Among women born in the 1960s, childlessness increased in every educational group and peaked in the youngest cohort, among whom 22% of women born in the early 1980s reported having no children by 2022. The proportion of women with one child varies relatively little by educational group. It increased among women born between 1920 and 1934, remained broadly stable for cohorts born between 1935 and 1969, and then rose steadily among women born after 1969 across all educational groups. The two-child family model was the dominant pattern, with roughly one-third to one-half of women having two children during the observation period. The proportion of women with two children increased across all educational groups up to the cohorts born between 1935 and 1959, after which a steady decline set in. Among the youngest cohorts (1970–1982), the two-child model remains most common among women with vocational, secondary, and tertiary education, particularly among tertiary-educated women (37.0%). The proportion of women with three or more children declined among cohorts born between 1920 and 1959, increased slightly among those born between 1960 and 1969, and declined again among cohorts born after 1969. Among women with primary education born after 1960, three or more children remained the most common completed family size, making it the modal category for this group (see *Table A4*).

Based on the data presented in *Figures 1* and *3* and *Table A4*, we decomposed the direct component of the CFR change by parity, i.e., we looked at how changes in the number of children by birth cohort and educational attainment affected the change in completed cohort fertility. The results are shown in *Figure 6* (and *Table A5*).

The results of the decomposition analysis, broken down by parity, show that the change in childlessness had a positive effect on the overall change in CFR among women in the pre-transition group, while a negative effect among women in the post-transition group (*Figure 6*). The effect of childlessness on the change in CFR among women born in 1960–1969 is negligible, and the same is true of parity 1 among this group. However, the effects of parity 2 and parity 3+ on the overall CFR change differ between the transition and the pre-transition group: parity 2 decreased, while parity 3+ increased the overall CFR in the former. The negative effects of childlessness and parity 2 on the change in the overall CFR are higher in the post-transition group than in the transition group.



Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.
Notes: see notes under Figure 3.

Figure 6

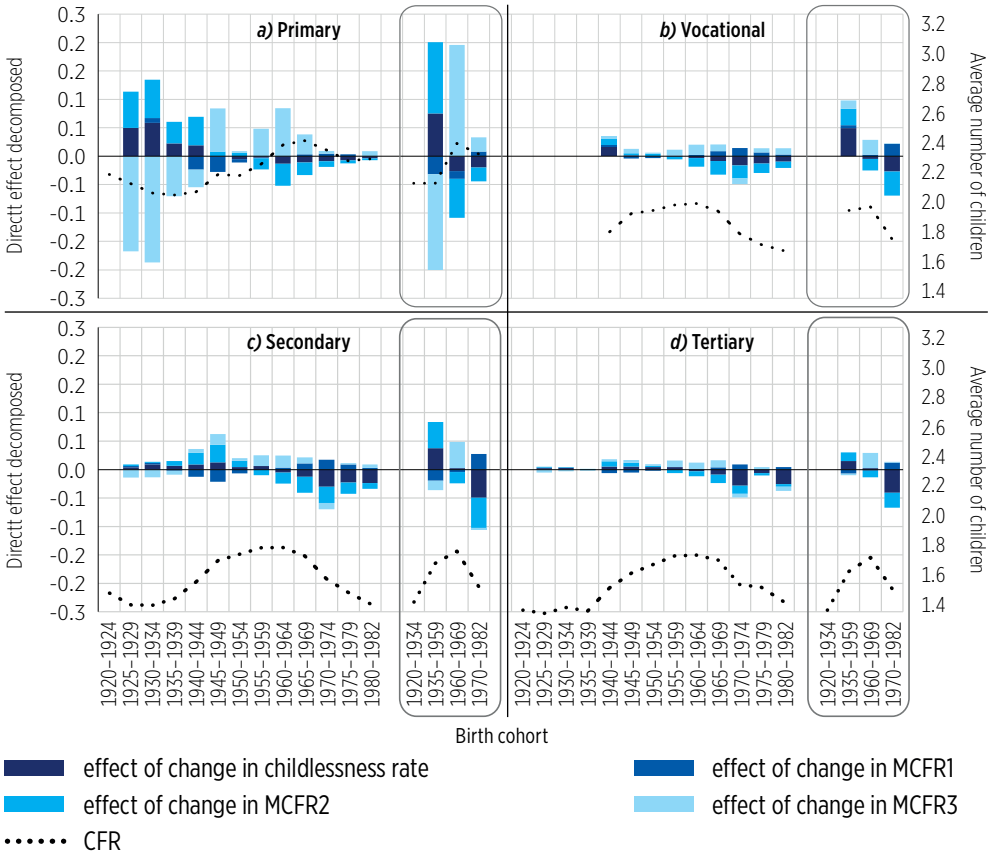
Decomposition of the direct effect by number of children for women aged 40–70 and born in 1920–1982

DECOMPOSITION OF CFR CHANGE BY EDUCATIONAL ATTAINMENT AND PARITY

To further examine fertility within educational groups, we decompose the direct (within-education) component of CFR change by parity (*Figure 7*). Clear differences emerge across both cohorts and educational levels. Among women with *primary education*, changes in second births were the main positive contributor to CFR change in the pre-transition cohort (1935–1959, +0.13), while declining third and higher-order births reduced CFR (−0.17). In contrast, among the transition cohort (1960–1969), third and higher-order births made the largest positive contribution (+0.20), partly offsetting declining second births. In the post-transition cohort, parity effects among primary-educated women were small and partly offsetting.

Among women with *vocational education*, childlessness contributed most to CFR change in the pre-transition cohort (+0.05), while parity effects were modest in the transition cohort. In the post-transition cohort, declining second births (−0.04) and rising childlessness (−0.03) were the main contributors to CFR decline.

For women with *secondary* and *tertiary education*, childlessness played a key role across cohorts: it increased CFR in the pre-transition cohort but became the dominant negative contributor in the post-transition cohort (−0.05 and −0.04, respectively). In the transition cohort, childlessness and first births had negligible effects, while third and higher-order births contributed positively to CFR change. Overall, parity-specific effects were strongest among women with primary, vocational, and secondary education, and weakest among tertiary-educated women.



Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.
Notes: see notes under *Figure 3.*

Figure 7

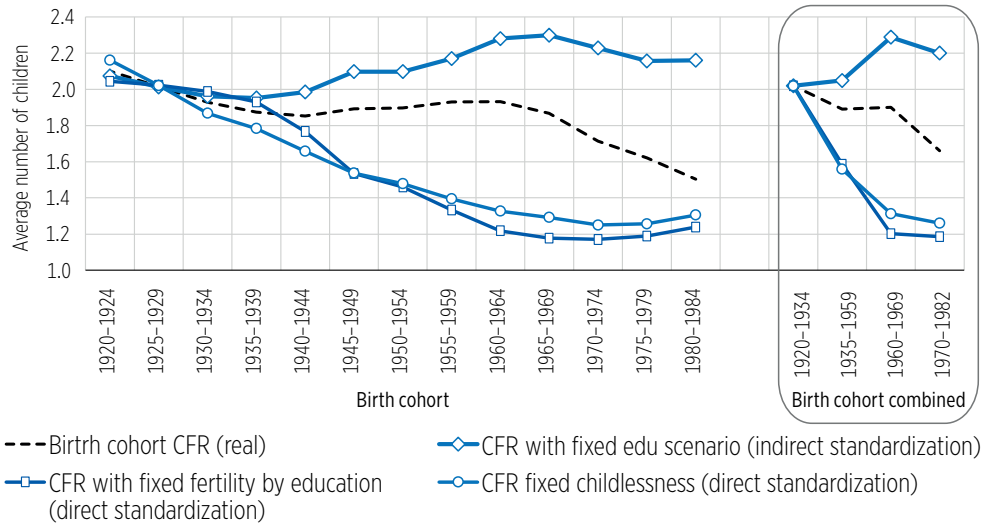
Decomposition of the direct effect by number of children and educational attainment of the women aged 40–70 and born in 1920–1982

THREE HYPOTHETICAL SCENARIOS OF COMPLETED COHORT FERTILITY CHANGE

One may ask what the CFR of the youngest cohort would be if women's educational composition had remained at the level observed among those born in 1920–1934, when the vast majority of women had only primary education. This indirect standardisation provides an illustrative benchmark, fixing the educational distribution across cohorts. Under this scenario, the CFR of the youngest cohort would be 2.20 instead of the observed 1.66, implying a hypothetical level about 33% higher than the actual CFR (*Figure 8*).

Conversely, one can ask what the CFR of the youngest cohort would be if education-specific fertility rates had remained at their 1920–1934 levels. This direct standardisation provides a counterfactual benchmark, fixing fertility within educational groups while allowing educational composition to vary. Under this scenario, the CFR of the youngest cohort would be 1.19 instead of 1.66 – about 29% lower than the observed CFR – indicating that cohort fertility would have declined even in the absence of educational expansion, and by a substantially larger margin than the decline actually observed.

Finally, if childlessness had remained at the level observed among women born in 1920–1934 (12.8%), the CFR of the youngest cohort would be 1.26, around 24% lower than the observed value.



Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.

Figure 8
Hypothetical CFR change scenarios of women aged 40–70 and born in 1920–1982

These scenarios highlight the relative importance of different mechanisms underlying fertility change. Educational expansion exerted a strong downward pressure on cohort fertility, while changes within educational groups partly offset this decline, and rising childlessness played a key role in reducing overall fertility. These estimates should be interpreted as illustrative, as they rely on a reference cohort with a markedly different educational composition and within-group structure. In particular, the oldest cohort is characterised by a very high share of primary-educated women and different within-group fertility patterns, which limits the comparability of these scenarios across cohorts.

DISCUSSION

The direct–indirect decomposition provides the overarching analytical framework by separating changes in completed cohort fertility (CFR) into a structural component, reflecting shifts in women's educational composition, and a direct (rate) component, reflecting changes in education-specific fertility. Building on this framework, the decomposition by educational attainment allocates the overall change in CFR – combining both structural and rate components – across educational groups, thereby identifying which groups contribute most to fertility change. In contrast, the parity-based decomposition, including childlessness, focuses exclusively on the within-group patterns by disaggregating CFR change into contributions from different birth orders, revealing how changes in fertility within-groups (entry into parenthood and progression to higher parities) shape cohort fertility. Finally, an education-by-parity decomposition further disaggregates the within-group (rate) component of CFR change, linking parity-specific fertility dynamics to educational groups and thereby identifying which parity transitions within which educational strata drive overall cohort fertility change. Together, these complementary decompositions allow CFR change to be examined by process (structural vs. rate-related), group (education), parity, and their joint interaction.

Our analysis reveals a clear generational shift in the relationship between education and fertility in Hungary. This shift has been driven by structural and within-group dynamics that have unfolded across three historical periods: state socialism, the transition to a market economy and the post-transition era.

Women born between 1920 and 1959 had their children predominantly under state socialism, when fertility was characterised by relatively uniform and stable patterns. These

cohorts followed a traditional family trajectory, marked by early marriage and childbearing (Spéder and Kamarás, 2008), with a completed cohort fertility rate of around 1.9–2.0. This was lower than the rates observed in other Central European countries, since in most of them (i.e. Bulgaria, the Czech Republic, Poland, Slovakia and Slovenia), cohort fertility reached or surpassed 2.0 in these generations (Brzozowska, 2015; data from the Human Fertility Database). Thus, the fact that fertility was already relatively low may explain why it did not fall further: despite gradual educational expansion during this period, fertility patterns remained relatively stable across educational groups. The relatively generous family support system may have mitigated the opportunity costs of motherhood, particularly for highly educated women. These patterns are consistent with predictions from the New Home Economics framework, since the lower cost of childrearing under socialism helped to sustain fertility, even among highly educated women (Becker, 1960; Neyer and Andersson, 2008). Moreover, even for these women, career opportunities were rather limited, and modern forms of contraception were not yet available, which probably prevented a further fertility decrease.

When decomposing the change in the CFR for women born between 1935 and 1959, compared to the CFR for those born between 1920 and 1934, we found that the structural component was negative (–0.29), while the direct component was positive (+0.17). In other words, the change in educational composition reduced the CFR, while the change in the within-group component increased it. Primary education was the main driver of the change in the CFR of this pre-transition birth cohort. The absolute size effect was –0.86 for primary education compared to 0.20, 0.37, and 0.17 for women with vocational, secondary, and tertiary education, respectively. Furthermore, CFR change in the pre-transition cohort was primarily influenced by changes in parity 2 (0.19) and parity 3+ (–0.19), followed by changes in childlessness (0.13). It was least affected by changes in parity 1 (–0.06).

The 1960–1969 cohort (the 'transition birth cohort') exhibited signs of a demographic transition, with fertility falling below 1.8 for the first time and childlessness rising sharply. This generation faced economic instability and social uncertainty during their peak reproductive years, when the country was transitioning to a market economy. Unemployment, inflation, and cuts to childcare infrastructure likely raised the perceived and actual opportunity costs of motherhood, particularly for women in vocational and secondary education (Fodor et al., 2002; Frey, 1997). This coincided with growing individualism, delayed partnerships, and changing gender norms (Lesthaeghe, 2010; Sobotka, 2004; Spéder and Kamarás, 2008). All of these changes may have affected the change in CFR. The decomposition analysis shows that structural effects (changes in educational attainment) and direct (rate) effects both contributed to the decline in fertility in this cohort compared to women born between 1935 and 1959. A change in educational composition decreased their CFR by 0.12 points, whereas a change in fertility within educational groups increased it by 0.13 points. Trends linked to educational attainment are similar to those experienced by the pre-transition cohort. Primary education was again the driving force behind the change in CFR, decreasing it by 0.53, while vocational, secondary, and tertiary education increased CFR slightly by 0.26, 0.11, and 0.17, respectively. Examining the effects of parity changes reveals some differences between the pre-transition and transition cohorts. For women born in 1960–1969, the change in parity 3+ had the greatest impact on the change in CFR (0.30), followed by the impact of the change in parity 2 in the opposite direction (–0.12). Changes in parity 0 and 1 had a negligible effect on the change in the CFR among women born in the 1935–1959 and 1960–1969 periods (–0.03 and –0.02, respectively).

Finally, among women born after 1970, who mainly had children after the political and economic transition, there was a greater tendency to postpone childbearing. The difference in fertility outcomes according to educational level also widened considerably. Although tertiary-educated women experienced increasing levels of childlessness, they were more likely to achieve the two-child ideal than lower-educated groups. This suggests that while higher education delays fertility, it may also mitigate long-term fertility loss, possibly through greater

access to resources, stronger labour market attachment or different normative frameworks (Basten et al., 2014; Wood et al., 2014). In contrast, women with only primary or vocational education faced dual disadvantages: declining fertility alongside growing economic precarity. Notably, the increase in childlessness was not confined to highly educated women, but was also evident among those with the lowest levels of education, suggesting broader structural constraints beyond individual choice (Szabó, 2020; Testa, 2012). However, the decomposition analysis revealed that the post-transition birth cohort exhibits entirely distinct trends compared to the pre-transition and transition cohorts. Although both the direct and indirect effects of the change in CFR are negative, the direct (rate) effect is now larger than the indirect effect (–0.19 versus –0.05 points). This suggests that changes in fertility behaviour within different educational groups, rather than changes in structural composition, are the main drivers of changes in CFR among younger women. Furthermore, tertiary education is the only factor that has a positive influence, increasing the CFR of this generation by 0.9 points. In contrast, the effects of all other educational groups are negative, i.e. they decrease the CFR: primary education (–0.16), vocational education (–0.09) and secondary education (–0.08). Finally, the effect of parity change is also completely different in post-transition cohort. While parity 1 and parity 3+ increased the CFR of the younger generation of women by 0.07 and 0.02, respectively, changes in parities 0 and 2 decreased it by 0.14 and 0.15, respectively, with the greatest impact coming from changes in parity 2.

CONCLUSION

Our findings suggest a generational shift in the relationship between education and fertility in Hungary, influenced by changing demographic and within-group patterns in different historical contexts. Prior to the transition, changes in completed cohort fertility were primarily driven by structural factors, particularly the shrinking proportion of primary educated women who have traditionally had high fertility. After the transition, however, fertility decline predominantly reflected changes in parity-specific fertility within educational groups. The transition cohort (women born between 1960 and 1969) represents an intermediate regime, in which educational composition and within-group fertility contributed equally to fertility change, which was driven less by entering parenthood (i.e. childlessness or the transition from parity 0 to parity 1) than by progression through successive births. Specifically, the decline in second births and the increase in third and higher-order births shaped the overall change in CFR, a pattern that contrasts sharply with that of the pre-transition cohort and only partly overlaps with post-transition dynamics. These results indicate that cohort differences originate not only from educational expansion, but also from changing parity-specific fertility responses within educational groups under different institutional regimes.

This study is limited by its reliance on census data, which restricts our ability to capture changes in values and aspirations or to include qualitative aspects related to reproductive decision-making.

LIMITATION

Although educational groups are not fully comparable across cohorts due to changes in their internal composition, the use of adjacent birth cohorts in the decomposition reduces this concern, as such changes occur gradually over time. While some bias related to shifting group composition cannot be excluded, the results should be interpreted as reflecting both changes in fertility within groups and changes in the composition of these groups, meaning that within-group differences may also capture increasing selectivity. Nevertheless, the overall patterns are unlikely to be substantially affected.

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APPENDICES

Table A1

The age groups of the selected population of women by period and birth cohorts (years)

Birth cohorts	Census years (period)					
	1970	1980	1990	2001	2011	2022
1920–1924	45–49	55–59	66–70			
1925–1929	40–44	50–54	61–65			
1930–1934		45–49	56–60	67–70		
1935–1939		40–44	51–55	62–66		
1940–1944			46–50	57–61	67–70	
1945–1949			41–45	52–56	62–66	
1950–1954				47–51	57–61	68–70
1955–1959				42–46	52–56	63–67
1960–1964					47–51	58–62
1965–1969					42–46	53–57
1970–1974						48–52
1975–1979						43–47
1980–1982						40–42
N	763,764	1,422,049	1,990,337	2,068,788	2,053,796	2,408,452

Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.

Table A2

The completed cohort fertility of selected women by period and birth cohorts

Birth cohorts	Census years (period)						Mean CFR
	1970	1980	1990	2001	2011	2022	
1920–1924	2.14	2.07	2.09				2.10
1925–1929	2.04	1.99	2.01				2.02
1930–1934		1.94	1.95	1.90			1.93
1935–1939		1.88	1.89	1.85			1.87
1940–1944			1.87	1.84	1.83		1.85
1945–1949			1.90	1.89	1.89		1.89
1950–1954			1.88	1.91	1.91	1.89	1.90
1955–1959				1.94	1.94	1.92	1.93
1960–1964				1.92	1.95	1.93	1.93
1965–1969					1.87	1.86	1.87
1970–1974					1.69	1.74	1.71
1975–1979						1.62	1.62
1980–1982						1.54	1.54
N	763,764	1,422,049	1,990,337	2,068,788	2,053,796	2,408,452	

Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.

Table A3

Lower (Q25) and upper (Q75) limits of the periods and maternal ages within which 50% of women had their children by year of birth

	Year of birth	Q25_Period	Q75_Period	Q25_Age	Q75_Age
Cohorts having had their children during the communist period	1935	1956	1963	21	28
	1936	1957	1964	21	28
	1937	1958	1965	21	28
	1938	1959	1966	21	28
	1939	1960	1967	21	28
	1940	1961	1968	21	28
	1941	1962	1969	21	28
	1942	1963	1970	21	28
	1943	1964	1971	21	28
	1944	1965	1972	21	28
	1945	1966	1973	21	28
	1946	1967	1974	21	28
	1947	1968	1975	21	28
	1948	1969	1975	21	27
	1949	1970	1976	21	27
	1950	1971	1977	21	27
	1951	1972	1978	21	27
	1952	1973	1979	21	27
	1953	1974	1980	21	27
	1954	1975	1981	21	27
	1955	1976	1982	21	27
	1956	1977	1983	21	27
	1957	1977	1985	20	28
	1958	1978	1986	20	28
	1959	1979	1987	20	28
Cohorts having had their children mainly during the years of the transition	1960	1980	1988	20	28
	1961	1982	1989	21	28
	1962	1983	1990	21	28
	1963	1984	1991	21	28
	1964	1985	1992	21	28
	1965	1986	1993	21	28
	1966	1987	1994	21	28
	1967	1988	1996	21	29
	1968	1989	1997	21	29
	1969	1990	1998	21	29
Cohorts having had their children mainly after the transition	1970	1991	2000	21	30
	1971	1993	2001	22	30
	1972	1994	2003	22	31
	1973	1995	2004	22	31
	1974	1996	2006	22	32
	1975	1998	2007	23	32
	1976	1999	2008	23	32
	1977	2000	2009	23	32
	1978	2002	2011	24	33
	1979	2003	2012	24	33

Source: Human Fertility Database. Data downloaded on 04.06.2025.

Table A4

The distribution of women by parity and educational attainment, women aged 40–70 and born in 1920–1982, %

Birth cohort	Childless (parity=0)					With one child (parity=1)				
	Total	Primary	Vocational	Secondary	Tertiary	Total	Primary	Vocational	Secondary	Tertiary
1920–1924	14.9	14.0	–	25.1	30.5	23.3	22.9	–	27.8	25.7
1925–1929	13.0	11.7	–	22.2	24.7	24.5	23.5	–	32.8	30.7
1930–1934	10.2	8.8	–	17.0	20.0	27.2	25.3	–	38.1	34.1
1935–1939	9.5	7.5	–	14.3	20.1	28.4	25.7	–	37.8	34.0
1940–1944	8.7	6.2	6.0	11.8	16.3	25.9	22.6	27.4	32.8	28.5
1945–1949	8.3	6.3	5.1	9.4	14.0	22.0	17.4	22.0	26.2	25.2
1950–1954	8.1	6.9	5.3	8.7	12.5	20.5	15.8	19.7	24.4	24.2
1955–1959	7.6	7.2	5.1	7.6	11.1	20.7	15.4	19.4	24.4	24.0
1960–1964	8.7	9.3	5.9	8.4	11.9	21.6	15.1	20.3	25.2	24.2
1965–1969	10.7	11.5	7.6	10.3	13.9	24.3	16.5	23.6	27.9	25.3
1970–1974	15.0	13.6	11.0	14.8	19.6	27.7	19.0	28.7	31.3	27.0
1975–1979	18.0	15.8	14.1	18.4	20.6	28.9	21.0	30.7	32.6	27.0
1980–1982	21.6	16.9	16.7	22.3	24.2	28.5	20.2	31.2	31.9	26.8
1920–1934	12.8	11.6	–	20.6	23.9	24.9	23.8	–	33.9	31.1
1935–1959	8.4	6.8	5.2	9.7	13.6	23.2	20.4	20.6	27.5	25.7
1960–1969	9.6	10.1	6.6	9.2	12.8	22.8	15.6	21.7	26.4	24.7
1970–1982	16.9	14.6	12.5	16.9	20.7	28.2	19.7	29.6	31.8	27.0
1920–1934	12.8	11.6	–	20.6	23.9	24.9	23.8	–	33.9	31.1
1935–1959	8.4	6.8	5.2	9.8	13.7	23.4	20.6	20.6	27.8	25.9
1960–1969	9.8	10.3	6.8	9.4	13.0	23.0	15.8	22.0	26.6	24.8
1970–1982	17.6	15.0	13.1	17.8	21.1	28.4	20.0	29.9	32.0	27.0

Birth cohort	With two children (parity=2)					With three or more children (parity=3+)				
	Total	Primary	Vocational	Secondary	Tertiary	Total	Primary	Vocational	Secondary	Tertiary
1920–1924	30.9	31.0	–	30.5	28.7	30.8	32.1	–	16.6	15.1
1925–1929	35.2	35.4	–	33.4	34.1	27.4	29.4	–	11.6	10.4
1930–1934	39.9	40.5	–	36.5	37.2	22.7	25.4	–	8.4	8.7
1935–1939	42.6	43.5	–	40.5	38.2	19.5	23.3	–	7.4	7.6
1940–1944	47.4	47.8	52.4	46.6	45.5	18.0	23.4	14.1	8.8	9.6
1945–1949	51.1	48.5	55.6	53.3	49.7	18.7	27.8	17.3	11.1	11.1
1950–1954	52.7	49.0	57.3	55.3	51.6	18.7	28.3	17.7	11.6	11.8
1955–1959	51.6	45.9	56.0	54.6	50.8	20.1	31.5	19.6	13.4	14.0
1960–1964	47.7	37.4	52.0	51.1	48.2	22.0	38.2	21.9	15.2	15.7
1965–1969	43.0	31.0	46.0	46.0	43.9	22.0	41.0	22.7	15.8	16.9
1970–1974	37.5	27.2	39.7	39.7	38.3	19.8	40.2	20.6	14.1	15.1
1975–1979	34.5	24.6	34.6	35.2	37.1	18.5	38.5	20.6	13.7	15.3
1980–1982	31.9	22.8	30.4	32.1	34.8	18.0	40.1	21.6	13.6	14.1
1920–1934	35.2	35.4	–	34.1	34.3	27.1	29.2	–	11.4	10.6
1935–1959	49.5	46.7	56.1	51.8	49.0	19.0	26.1	18.1	11.0	11.6
1960–1969	45.7	35.1	49.5	48.9	46.2	22.0	39.2	22.2	15.5	16.3
1970–1982	35.8	26.0	37.2	37.3	37.3	19.1	39.7	20.7	13.9	15.0
1920–1934	35.2	35.4	–	34.1	34.3	27.1	29.2	–	11.4	10.6
1935–1959	49.2	46.6	56.0	51.5	48.8	19.0	26.0	18.1	11.0	11.6
1960–1969	45.2	34.5	48.9	48.4	45.8	22.0	39.5	22.3	15.5	16.4
1970–1982	35.2	25.5	36.2	36.4	37.0	18.9	39.5	20.7	13.9	15.0

Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.
Notes: In Total columns: distribution of all women by parity. In Primary/Vocational/Secondary/Tertiary columns: the share of women with 0/1/2/3+ children among primary/vocational/secondary/tertiary educated women. Vocational education is measured only for women born after 1934.

Table A5

Decomposition of the CFR change among women aged 40–70 and born in 1920–1982 by birth cohort, number of children and educational attainment

Birth cohort	CFR	CFR by educational attainment, average number of children per women				Share of women by educational attainment, %				Indirect effect	Direct effect	Total effect
		Primary	Vocational	Secondary	Tertiary	Primary	Vocational	Secondary	Tertiary			
1920–1924	2.10	2.16	–	1.47	1.36	0.922	0.000	0.059	0.019	–	–	–
1925–1929	2.02	2.10	–	1.39	1.34	0.889	0.000	0.082	0.030	−0.024	−0.060	−0.084
1930–1934	1.93	2.03	–	1.39	1.38	0.841	0.000	0.116	0.044	−0.033	−0.051	−0.084
1935–1939	1.88	2.02	–	1.43	1.36	0.758	0.000	0.184	0.058	−0.051	−0.005	−0.056
1940–1944	1.85	2.04	1.78	1.54	1.51	0.606	0.039	0.243	0.111	−0.109	0.086	−0.024
1945–1949	1.89	2.15	1.90	1.68	1.60	0.415	0.110	0.341	0.134	−0.078	0.118	0.040
1950–1954	1.90	2.15	1.92	1.72	1.65	0.369	0.140	0.339	0.151	−0.016	0.021	0.005
1955–1959	1.93	2.22	1.96	1.77	1.71	0.297	0.193	0.331	0.179	−0.023	0.056	0.033
1960–1964	1.93	2.35	1.97	1.77	1.72	0.220	0.236	0.335	0.209	−0.033	0.035	0.002
1965–1969	1.87	2.38	1.92	1.71	1.69	0.168	0.238	0.353	0.241	−0.033	−0.033	−0.066
1970–1974	1.71	2.32	1.77	1.57	1.53	0.148	0.233	0.349	0.270	−0.016	−0.137	−0.152
1975–1979	1.62	2.24	1.70	1.48	1.51	0.115	0.201	0.336	0.347	−0.032	−0.061	−0.093
1980–1982	1.54	2.26	1.66	1.40	1.42	0.108	0.160	0.336	0.396	−0.015	−0.063	−0.078
1920–1934	2.02	2.10	–	1.41	1.36	0.885	0.000	0.085	0.031	–	–	–
1935–1959	1.89	2.10	1.92	1.67	1.61	0.474	0.102	0.293	0.130	−0.295	0.168	−0.127
1960–1969	1.90	2.36	1.95	1.74	1.70	0.198	0.237	0.343	0.222	−0.119	0.131	0.012
1970–1982	1.66	2.29	1.74	1.52	1.50	0.133	0.213	0.343	0.311	−0.053	−0.188	−0.241

Birth cohort	CFR	Change in CFR	*Indirect effect*	Decomposition of the direct effect by parity				
				Change in parity 0	Change in parity 1	Change in parity 2	Change in parity 3+	*Total (direct effect)*
1920–1924	2.10	–	–	–	–	–	–	–
1925–1929	2.02	−0.084	*−0.024*	−0.071	0.000	0.033	0.014	*−0.060*
1930–1934	1.93	−0.084	*−0.033*	−0.099	0.000	0.047	0.019	*−0.051*
1935–1939	1.88	−0.056	*−0.051*	−0.168	0.000	0.096	0.020	*−0.005*
1940–1944	1.85	−0.024	*−0.127*	−0.309	0.035	0.088	0.076	*0.086*
1945–1949	1.89	0.040	*−0.077*	−0.400	0.130	0.158	0.035	*0.118*
1950–1954	1.90	0.005	*−0.016*	−0.099	0.058	−0.003	0.028	*0.021*
1955–1959	1.93	0.033	*−0.023*	−0.157	0.103	−0.015	0.046	*0.056*
1960–1964	1.93	0.002	*−0.033*	−0.177	0.084	0.008	0.051	*0.035*
1965–1969	1.87	−0.066	*−0.033*	−0.123	0.004	0.032	0.055	*−0.033*
1970–1974	1.71	−0.152	*−0.016*	−0.046	−0.009	−0.007	0.046	*−0.137*
1975–1979	1.62	−0.093	*−0.032*	−0.075	−0.055	−0.020	0.118	*−0.061*
1980–1982	1.54	−0.078	*−0.015*	−0.016	−0.069	−0.001	0.072	*−0.063*
1920–1934	2.02	–	–	–	–	–	–	–
1935–1959	1.89	−0.130	*−0.295*	0.177	−0.053	0.215	−0.172	*0.168*
1960–1969	1.90	0.010	*−0.119*	−0.026	−0.018	−0.120	0.295	*0.131*
1970–1982	1.66	−0.240	*−0.053*	−0.137	0.070	−0.147	0.024	*−0.188*

Sources: Population censuses 1970, 1980, 1990, 2001, 2011, 2022, Hungary.

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