Reframing Reproduction:
A Prospective Approach to the Intergenerational Transmission of Educational Attainment and Political Orientation

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Chapter 1: Introduction

1.1 Background and Aim of the Dissertation

“The apple doesn’t fall far from the tree”

This conventional proverb suggests that children often resemble their parents in terms of behaviour, personality, or values. It implies that traits and characteristics are passed down from one generation to the next. This notion has long attracted sociological interest, and parent–child similarities across various domains have been the subject of extensive empirical investigation.

One prominent line of sociological research focuses on the resemblance between parents and children in terms of specific social attributes – such as occupation, income, education, or social status – to assess individuals’ relative chances of attaining particular positions within the social hierarchy, depending on their family background (e.g. Bloome et al. 2018; H.-P. Blossfeld et al. 2016; Breen et al. 2010; Erikson et al. 1992; Hertz et al. 2008). This body of scholarship, rooted in the field of social stratification, primarily concerns itself with issues of inequality of opportunity and intergenerational social mobility.

Another strand of sociological research investigates the transmission of values, attitudes, and behaviours from parents to children, with a focus on understanding the formation and persistence of cultural and behavioural patterns within a society (e.g. Cemalcilar et al. 2018; S. Fox et al. 2019; Glass et al. 1986; Grønhøj and Thøgersen 2009; Kalmijn 2022; Van Ditmars 2023).

Most of these analyses rely on existing parent–child pairs, beginning from the perspective of the children (the "destination") and tracing back to their parents (the "origins"). This retrospective approach, however, has a key limitation: by design, it conditions on fertility, as it includes only individuals who have become parents. Yet, childless individuals also play a role in the intergenerational transmission of social attributes and attitudes, precisely by not passing on their status to future generations. If parenthood itself is socially stratified, this can significantly affect the overall reproduction of a given social characteristic. This consideration already demonstrates that the mechanisms linking generations are complex and dynamic, and retrospective approaches are inherently limited in capturing the full range of processes involved in the reproduction of social outcomes.

Not only childlessness, but also other demographic factors such as partner selection, fertility behaviour, and timing, shape the formation of a new generation. As these demographic characteristics are themselves socially stratified, they contribute to the stratification of the offspring generation. Studying intergenerational reproduction with a prospective framework – beginning with the reproducing generation – allows for the simultaneous examination of both demographic and social pathways of reproduction. Prospective studies thus not only offer a more comprehensive account of the actual process of reproducing social stratification, but also avoid retrospective biases such as the overrepresentation of larger families and the exclusion of childless individuals.

Despite its limitations, much of the research on parent–child similarity continues to adopt a retrospective approach (e.g. Breen and Müller 2020; Durmuşoğlu et al. 2023; Kalmijn 2022; Van Ditmars 2023). Within this framework, the intergenerational transmission of social status has been analysed through parent-child similarities in dimensions such as occupational class, social status, income, wealth, and education. Among these, education holds particular significance, as the economic value of higher education has increased significantly in Western societies that have shifted from industrial to service-based economies. This transformation increased the importance of formal qualifications, which increasingly function as both material and symbolic resources, akin to new forms of property (Grusky 2001). As a result, formal education has become the principal mechanism through which individuals are stratified into social classes, making it a central focus for studying the intergenerational transmission of inequality.

Given its central role in contemporary stratification systems, educational attainment is one of the most extensively studied and cross-nationally comparable indicators of intergenerational mobility. The persistent association between parents' and children's levels of education is among the most robust findings in intergenerational mobility research (Bloome et al. 2018; H.-P. Blossfeld et al. 2016; Breen 2010; Breen et al. 2009, 2010; Breen and Jonsson 2005; Breen and Müller 2020; Bukodi et al. 2014; Erikson 2016; Erikson et al. 1992; Hertz et al. 2008; Pfeffer 2008; Shavit and Blossfeld 1993; Suárez–Arbesú et al. 2024).

Although scholarly debate continues over how social mobility has evolved over time, there is a broad consensus about cross-national differences in the degree of educational mobility (Hout and DiPrete 2006). Notably, research findings are relatively consistent in ranking countries by the degree of educational persistence: the Nordic countries, Denmark, Finland, Norway and Sweden show the least educational reproduction (Blanden 2013; Hertz et al. 2008; Pfeffer 2008), while the German speaking countries, Italy, France and Belgium, and the USA are societies with relatively high educational reproduction (Breen and Jonsson 2005; Hertz et al. 2008; Pfeffer 2008).

Within the broader field of intergenerational transmission of values and attitudes, a substantial body of research consistently finds that individuals often share political orientations with their parents (Dinas 2014; Durmuşoğlu et al. 2023; Hooghe and Boonen 2015; Jennings et al. 2009; Kroh and Selb 2009; Rico and Jennings 2016; Van Ditmars 2023; Ventura 2001). This pattern of intergenerational similarity has been observed across various country contexts and spans multiple dimensions of political orientations, including party identification, voting intentions, and ideological self-placement on the left-right scale.

Both the retrospective studies on educational reproduction and those on the transmission of political orientations share the inherent limitations of the retrospective approach outlined above. In the field of educational reproduction, however, these limitations have been explicitly acknowledged (Duncan 1966). In response, researchers have developed and applied prospective models designed to better account for the dynamic and multifaceted nature of intergenerational reproduction (Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Skopek and Leopold 2020; Song and Mare 2015). Despite these advances, comprehensive cross-national comparisons remain scarce in this line of research.

This dissertation builds on the growing body of prospective research on intergenerational reproduction in two key ways. First, the prospective perspective on educational reproduction is further developed and applied to a broader cross-national context. Second, the prospective approach is extended to another domain of intergenerational transmission – political orientation – where research to date has relied exclusively on retrospective designs. In doing so, the dissertation adopts a more literal understanding of reproduction: as a process that involves both the transmission of a social attribute (such as education or political orientation) and the demographic reproduction of the populations that carry this attribute.

Accordingly, the first objective of this dissertation is to expand the prospective perspective methodologically. Thereby, the focus lies on the further advancement of the inferential method proposed by Song and Mare (2015) and Skopek and Leopold (2020) that enables prospective analysis with much lower data requirements than classic long-running panel data traditionally needed for prospective analyses. The second objective of this dissertation is to expand the substantive research on the intergenerational reproduction of educational attainment by incorporating cross-national accounts of the interplay between demographic and social aspects of educational reproduction.

These two aims are addressed in Studies 1 and 2. In the first study, Gordey Yastrebov and I study educational reproduction prospectively by applying the inferential method developed by

Skopek and Leopold (2020) to a comparative context covering 12 European countries. We model prospective patterns of educational reproduction by simultaneously incorporating fertility behaviour and social transmission. In addition, we further refine both the inferential method and the subsequent decomposition approach, thereby enhancing their applicability in cross-national research.

In the second study, again in collaboration with Gordey Yastrebov, we extend the analysis by incorporating patterns of educational assortative mating – another key demographic mechanism – into the prospective model, which covers the same 12 European countries. Through a three-way counterfactual decomposition, we further disentangle the relative contributions of fertility, assortative mating, and social transmission. Thereby, we first provide a deeper insight into the different mechanisms underlying the intergenerational reproduction of education and second, extend the counterfactual decomposition method by an additional factor.

The third objective of this dissertation is to extend the prospective approach to intergenerational transmission beyond education to another domain in which parent–child resemblance has been well documented: political orientation. This aim is addressed in Study 3, which I have written in sole authorship. In this study, I apply a prospective framework to the intergenerational transmission of political orientations, a field where the role of demographic processes has received little attention. Drawing on prospective household data, this study simultaneously examines fertility patterns and the social transmission of political orientations in Germany. Thereby, I offer a more comprehensive perspective on the process of intergenerational reproduction of political orientations, a perspective that is entirely new in this field of research.

In sum, this dissertation lies at the intersection of sociological and demographic research, offering substantive contributions to both fields. The incorporation of political orientations into the prospective framework contributes to a deeper understanding of intergenerational processes within political sociology. As such, the dissertation adopts an interdisciplinary perspective while maintaining a coherent analytical approach across all three studies.

1.2 Core Assumptions and Theories

The background and theoretical framework of my dissertation comprise several components. Building upon the general context and the significance of the reproduction of social structures discussed in the preceding section, this chapter provides a more detailed examination of the specific dimensions of social transmission and the theoretical perspectives that inform their analysis. I begin by outlining key theories related to the transmission of educational attainment, with a particular focus on social reproduction theory and rational choice theory. Subsequently, I turn to the theoretical explanation for the intergenerational transmission of political orientations, focusing on social learning theory. Finally, I present the core methodological assumption that underpins my dissertation by reviewing the methodological approaches to the study of intergenerational transmission and situating my research within this broader scholarly landscape.

1.2.1 Transmission of education

Social reproduction theory offers a framework for understanding how educational inequalities persist across generations. At its core, the theory posits that both individuals, particularly in their roles as parents, and institutions, notably the education system, are central agents in reproducing social hierarchies (Bourdieu and Passeron 1977; Ikpuri 2023).

At the individual level, families transmit not only economic capital but also cultural and social capital, which shape children's educational trajectories. Parents with higher levels of education are more likely to engage in practices that align with the expectations of the school system, such as using elaborated language codes, encouraging independent thinking, and fostering a learning-oriented environment (Becker 1992; Ikpuri 2023; Weininger and Lareau 2007). These families also possess the institutional knowledge and resources to navigate and influence educational decisions, thereby increasing their children's likelihood of academic success. In contrast, families with lower levels of education often lack access to these forms of capital, making it more difficult for their children to succeed in systems that reward such cultural alignment (Bourdieu and Passeron 1977).

Beyond the family, the educational system itself functions as a powerful mechanism of social reproduction. Instead of functioning as objective spaces of equal opportunity, schools often validate and reward the forms of knowledge, behaviour, and communication associated with the dominant social classes. This institutionalised cultural capital is misrecognized as merit, effectively converting social advantage into the appearance of personal educational achievement (Bourdieu and Passeron 1977). As a result, students from privileged backgrounds are not only better equipped to succeed academically but also more likely to be tracked into advantageous educational trajectories, thereby securing their class position. Structural features, such as curriculum design, assessment practices, and mechanisms of selection and stratification, amplify these inequalities (Ikpuri 2023).

Thus, according to social reproduction theory, the dual mechanism, whereby families transmit informal advantages and schools institutionalise them, ensures that existing educational inequalities are reproduced.

While social reproduction theory emphasises the unconscious transmission of cultural advantages and institutional structures that favour dominant classes, *rational choice theory* offers a perspective grounded in purposive action. Thereby, this approach explains educational decisions as the outcome of deliberate evaluations of costs, benefits, and probabilities of success. Educational decisions, according to rational choice theory, are informed by three key elements: the utility of educational outcomes (e.g., job prospects, income), the subjective probability of success, and the perceived direct and opportunity costs associated with educational pathways. Thus, higher-educated parents are more likely to invest in their children's education and to encourage higher educational trajectories because they anticipate the long-term returns and are able to manage the associated costs (Breen and Goldthorpe 1997). Moreover, adolescents themselves internalise these family-based expectations and make similarly rationalised decisions, especially at key transition points in their educational careers (Morgan 1998, 2002). Expectations and aspirations are formed and adjusted in response to structural constraints and anticipated outcomes. As such, intergenerational educational reproduction is seen as an active process of risk management and strategic planning based on differential access to resources and information.

This framework complements rather than contradicts social reproduction theory by highlighting how inequalities are transmitted not only through the unconscious reproduction of class-based traits but also through rational adaptations to unequal opportunity structures.

1.2.2 Transmission of political orientations

Social learning theory provides a framework for understanding how individuals acquire attitudes, values, and behaviours through social interaction and observation (Bandura 1969; Jennings 1984). A key mechanism in this process is observational learning, whereby individuals, particularly children, internalise and reproduce behaviours and beliefs by observing others in their environment (Rico and Jennings 2016). The family constitutes the primary sphere of early socialisation for children, with parents serving as their principal role models (Bandura 1969; Jennings et al. 2009). Thus, parents transmit their attitudes and values not only through explicit communication but also via everyday behaviour. This transmission can be both intentional and unintentional, as children are sensitive to both deliberate instruction and subtle modelling cues. The frequency, clarity, and emotional salience of these cues, as well as the consistency of the behaviour, significantly shape the learning outcome (Bandura 1969; Jennings et al. 2009).

When applied to the field of political orientations, social learning theory provides a robust explanation for the intergenerational transmission of these orientations. Thus, it has often been used as a theoretical explanation of the observed political similarity between parents and children (Corbetta et al. 2013; Dinas 2014; Durmuşoğlu et al. 2023; S. Fox et al. 2019; Hooghe and Boonen 2015; Jennings et al. 2009; Jennings and Niemi 1968; Ojeda and Hatemi 2015; Van Ditmars 2023). Accordingly, children observe and imitate their parents' political behaviours, such as discussing political issues, expressing preferences for parties or candidates, or engaging in civic activities. In response, children gradually form their political identities, influenced by their parents' political behaviour. The effectiveness of this transmission is shaped by the consistency, frequency, and clarity of parental political cues. Politically engaged families that provide stable and frequent ideological signals tend to have higher parent-child similarities in political orientations, as they provide consistent learning environments (Jennings et al. 2009). Accordingly, politically homogamous parents have a transmission advantage over politically disagreeing parents, as they show more consistent political behaviour (Hooghe and Boonen 2015; Van Ditmars 2023).

Consequently, like the transmission of education, the intergenerational transmission of political orientations operates through both conscious practices and unconscious socialisation, reflecting an interplay of intentional guidance and habitual behaviour.

1.2.3 Retrospective vs. prospective approaches to transmission

In this section, I will outline the principal methodological approaches employed in the study of social inequality transmission and how this dissertation is situated within this literature.

Conventional approaches to studying the intergenerational reproduction of certain social characteristics focus on parent-child resemblance. Duncan (1966) was the first one to acknowledge the limitations of that approach in capturing the full complexity of the reproduction process. Forty years after Duncan, Mare and Maralani (2006) pioneered the subsequently growing movement of scholars viewing the reproduction process more holistically by taking into account not only social pathways of reproduction but also demographic pathways shaping the reproduction process of a generation. This is designated as the distinction between retrospective and prospective approaches, where conventional, retrospective approaches start with the offspring generation (G2) and study existing parent-child pairs and their similarity in the aspect of interest (e.g., education (Bukodi et al. 2014;

Hertz et al. 2008; Pfeffer 2008; van der Weide et al. 2024; van Doorn et al. 2011), income (Bloome et al. 2018; Gregg et al. 2017), occupation (Breen 2004; Breen and Müller 2020), social status (Bukodi et al. 2014), or political orientation (Van Ditmars 2023)). In contrast, prospective approaches start with the reproducing generation (G1) and follow them until some of them reproduce, demographically and regarding the respective status characteristic. Thus, this distinction reflects conditional and unconditional approaches, whereby retrospective studies implicitly condition on parenthood.

The prospective approach to studying intergenerational transmission offers two major advantages. First, it addresses key biases inherent in retrospective designs, particularly the implicit conditioning on parenthood and the overrepresentation of individuals with higher parity. While retrospective analyses implicitly condition on parenthood by considering existing parent-child dyads, in the unconditional prospective models, childlessness is explicitly accounted for as a mechanism of non-transmission. By including the full reproducing cohort, prospective analyses eliminate the bias of overrepresenting large families. Second, prospective approaches enable the integration of processes related to family formation, such as partnership dynamics and fertility behaviour. Therefore, mechanisms such as partner selection, the partner's resources, fertility behaviour, and relationship stability can be directly integrated into the analysis. This enables a more comprehensive examination of how demographic and social processes interact in shaping inequality. However, the application of prospective approaches poses substantial data demands, requiring long-term, high-quality longitudinal data to track individuals over extended time spans.

As there are several approaches to the prospective study of intergenerational reproduction, I will introduce the key methodological strategies employed to model social mobility prospectively and discuss how my dissertation is situated within this methodological framework.

One line of prospective research on educational reproduction has identified and studied causal relationships using marginal structural models with inverse probability weighting (Breen and Ermisch 2017; Corti and Scherer 2022; Lawrence and Breen 2016). This method aims to discern the causal effect of obtaining a college degree on the likelihood of having a child who also achieves a college degree. By reweighting the observations within the sample of college degree holders, this technique ensures that the distribution of different outcomes remains unaffected by whether an individual belongs to the treatment group (those with a college degree) or the control group (those without a college degree).

The other line of prospective research approaches the question of educational transmission using demographic, rather descriptive, population renewal models. These models predict the number of *j*-educated children in the offspring generation by calculating a rate representing the average number of children with educational level *j* that a woman of educational level *i* gets (Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006; Song and Mare 2015). Depending on the study, partnerships and the education of potential partners are also considered in this rate (Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006).

Although Song and Mare (2015) used prospective panel data in their study, they also innovated a technique to recalibrate retrospective data, mitigating biases associated with retrospective sampling. By comparing estimates derived from prospective data with those from adjusted retrospective data, they demonstrated that their correction method effectively reconciled nearly all discrepancies between the two sets of estimates. Building on this, Skopek and Leopold (2020) developed a comparable approach to generate prospective estimates without long-term panel data, which was also applied by Wittemann (2023) and in studies 1 and 2 of this dissertation.

The method builds on estimating different components of a stylised reproduction model, using different data sources. Essential for this is the accurate matching of the reproducing generation with the corresponding offspring cohort, based on assumptions about natural fertility boundaries. For instance, when examining the educational reproduction of women born between 1940 and 1950 – assuming a fertility window from ages 14 to 40 – their offspring would be born between 1954 and 1990. Then, each different component of the reproduction model can be estimated using separate data sources. To address the overrepresentation of large families in retrospective data, inverse probability weighting is applied (Skopek and Leopold 2020; Song and Mare 2015). This together enables prospective analyses with substantially reduced data requirements.

The resulting model estimates can be integrated into a counterfactual decomposition framework (Leesch and Skopek 2023; Skopek and Leopold 2020) to quantify the contributions of different pathways to prospective transmission rates. A more detailed description of the method is provided in the Data and Methods sections of the empirical studies presented in chapters 2 through 4.

1.3 Summary of the Three Studies

In the following subsections, the individual studies that comprise this cumulative dissertation are presented. A summary of these studies is provided in Table 1-1.

1.3.1 Study 1: Reconstructing Prospective Intergenerational Educational Mobility in 12 Countries

A well-established finding in intergenerational mobility research is the strong and persistent association between parents' and children's educational attainment (Breen et al. 2009; Shavit and Blossfeld 1993). The predominant approach to studying this relationship is retrospective, typically comparing individuals to the educational or social status of their parents. However, such analyses often overlook potential differences in fertility between educational groups. Variations in childlessness and family size are crucial when evaluating the full reproduction of educational advantage or disadvantage across generations, as they directly shape individuals' opportunities to transmit their status to the next generation.

In response to the limitations of retrospective approaches, recent research on educational mobility has increasingly adopted prospective methods. However, the majority of these studies focus on single-country cases (e.g. Breen and Ermisch 2017; Kye and Mare 2012; Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Skopek and Leopold 2020; Song and Mare 2017; Wittemann 2023). Thus, it remains unclear whether and how the finding that most of these studies share – that a negative educational fertility gradient partly offsets the transmission of educational advantage across generations – varies across countries and over time, also because many of these studies are not directly comparable.

To date, the only cross-national study addressing this topic is that of Breen et al. (2019), which examines educational transmission in twelve European countries. While it identifies consistent patterns, it also shows that estimates conditioned on parenthood tend to overstate educational reproduction, particularly in Southern and Eastern Europe. However, the study's reliance on limited SHARE data and relatively small sample sizes constrains its capacity to investigate country-specific trends or to assess how fertility-related stratification contributes to cross-national variation adequately. Consequently, a comprehensive cross-national prospective study that explicitly incorporates the role of fertility in intergenerational educational mobility is still lacking.

Table 1-1: Overview of the dissertation studies.

	Study 1	**Study 2**	**Study 3**
Title	Reconstructing Prospective Intergenerational Educational Mobility in 12 Countries	Untangling the Role of Assortative Mating in Educational Reproduction in Twelve European Countries	Left, Right, and Reproduced: The Interplay of Political Orientation and Demographic Patterns Across Generations
Research Question / Study design	How is educational attainment reproduced across generations? What are the separate roles of differential fertility and social transmission in this process? How do these patterns vary across European countries?	Are mating patterns stratified by education? What role do mating patterns play in the intergenerational transmission of education? How does it vary across European countries?	Do fertility patterns vary across political orientations? How do fertility patterns, in conjunction with social transmission, shape the intergenerational reproduction of political orientation?
Method	Prospective Intergenerational Mobility Model Counterfactual Decomposition	Prospective Intergenerational Mobility Model Counterfactual Decomposition	Prospective Intergenerational Mobility Model Population Renewal Model
Data & Sample	Generation and Gender Survey (GGS) Wave 1, Integrated Values Survey (IVS) from 1981-2021, European Social Survey (ESS) Wave 3 from 2006-2007 and Wave 9 from 2018–2019, General Population Survey of Social Stratification In Eastern Europe After 1989 (SSEE) from 1993-1994, Survey of Health, Aging and Retirement in Europe (SHARE) from 2015	Generation and Gender Survey (GGS) Wave 1, Integrated Values Survey (IVS) from 1981-2021, International Social Survey Programme (ISSP) from 1994, 2002 and 2012, European Social Survey (ESS) Wave 3 from 2006-2007 and Wave 9 from 2018–2019, General Population Survey of Social Stratification In Eastern Europe After 1989 (SSEE) from 1993-1994, Survey of Health, Aging and Retirement in Europe (SHARE) from 2015	German Socio-Economic Panel (SOEP) version 39
Authorship	With Gordey Yastrebov	With Gordey Yastrebov	Single authorship
Publication status	Published in Demography (2024, 10.1215/00703370-11463595)	Published in Comparative Population Studies (2024, 10.12765/CPoS-2024-15)	In preparation for journal submission

In this study, we address this gap by applying the inferential method first developed by Song and Mare (2015) and later advanced by Skopek and Leopold (2020). We examine the educational reproduction process among cohorts born between 1925-1950 in twelve countries: Austria, Belgium, Bulgaria, Czech Republic, Georgia, Germany, Lithuania, the Netherlands, Poland, Romania, Russia, and Sweden.

To do so, we integrate high-quality retrospective data from the Generations and Gender Survey (GGS) with a set of low-requirement prospective datasets to estimate the components of a highly stylised educational reproduction model. In addition, we employ counterfactual decomposition techniques to disentangle and quantify he relative contributions of fertility and educational attainment to observed patterns of intergenerational mobility.

Methodologically, this study advances existing counterfactual decomposition techniques to better disentangle the distinct roles of fertility and educational attainment in shaping intergenerational mobility. While earlier work by Skopek and Leopold (2020) acknowledged that larger family sizes may lower children's educational chances, their method did not isolate this effect. We address this gap by introducing a method to "switch off" the influence of family size in simulations, enabling researchers to more accurately measure the extent to which the fertility effect is actually due to sibship size. This innovation enhances the clarity and precision of mobility analyses by distinguishing between direct fertility effects and those mediated through educational outcomes. Additionally, we compared the model parameters that can be identified using retrospective and prospective data – specifically, the fertility rates of parents with higher and lower levels of education – to cross-validate the inferential method.

Our analysis reveals a consistent pattern: higher-educated women are more likely to produce higher-educated offspring compared to their lower-educated counterparts, a trend observed across all countries included in the study. Nonetheless, considerable variation exists in the magnitude of educational inequality, with countries such as Poland and Romania exhibiting particularly high levels, and Russia and Sweden showing comparatively low levels. While fertility differences generally have a modest impact on shaping intergenerational mobility, their influence is most pronounced in Poland and Romania, where they partially offset the reproduction of educational advantage.

The moderating role of fertility in shaping prospective mobility rates is most evident in contexts marked by relatively high inequality in educational opportunity, and correspondingly weakest where such inequality is low. This pattern suggests that the relationship between fertility dynamics and educational reproduction is unlikely to be coincidental and warrants further investigation. Notably, while sibship size effects are often considered theoretically significant, our findings indicate that their empirical influence on educational mobility is limited in most contexts.

With this work, we not only corroborate existing findings on intergenerational educational mobility but also deepen the understanding of how fertility and educational attainment interact in the reproduction of educational inequality. In doing so, we contribute novel empirical evidence from understudied regions, advance the methodological toolkit for prospective mobility research, and open new avenues for examining how fertility dynamics may be intertwined with broader patterns of social stratification.

1.3.2 Study 2: Untangling the Role of Assortative Mating in Educational Reproduction in Twelve European Countries

The second study of my dissertation directly builds upon the first by expanding the analysis of educational reproduction to include mating patterns. This extension allows for a more comprehensive examination of partnership choices, which have been shown to both influence social status attainment (Breen and Andersen 2012; Breen and Salazar 2011; Eika et al. 2019; Fernández and Rogerson 2001) and to be influenced by it (Domański and Przybysz 2007; Erát 2021).

Specifically, a woman’s level of education can influence her likelihood of entering a partnership, thereby shaping who gains the opportunity to reproduce in the first place (Kalmijn 2013). Moreover, individuals with similar educational backgrounds are more likely to form partnerships and start families, reflecting status aspirations and social closure mechanisms (Domański and Przybysz 2007; Mare 1991; Jeroen Smits et al. 1998). As such, educational assortative mating is expected to reinforce the patterns of social transmission and fertility identified in the first study. The educational level of a partner significantly contributes to the overall pool of educational resources within the household, shaping children's opportunities for educational success. Highly educated couples tend to provide their children with greater educational opportunities due to the cumulative advantages of shared qualifications (P. N. Blossfeld et al. 2024; Corti and Scherer 2022; Mare and Maralani 2006; Schwartz 2013). At the same time, under the assumption of a negative educational fertility gradient (Nisén et al. 2021), highly educated couples, despite their greater resource endowment, tend to have fewer children. These dynamic limits the number of children who benefit from greater parental resources. This again intensifies the concentration of resources per child, potentially magnifying educational advantages (Choi et al. 2020; Downey 1995; Gibbs et al. 2016; Kalmijn and Werfhorst 2016).

Few studies have explored the role of mating patterns using a prospective design (Corti and Scherer 2022; Hillmert 2013; Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006; Song and Mare 2017). These studies consistently show that educational assortative mating, where partners share similar levels of education, tends to amplify the advantages of children from highly educated families, while simultaneously reinforcing the disadvantages faced by children from less educated backgrounds. This pattern contributes to the intensification of educational inheritance across generations.

Again, a prospective cross-national investigation of mating patterns, fertility, and social transmission patterns is still missing since the study of Breen et al. (2019) has a different focus. A cross-national perspective is essential, given the considerable variation in the levels and trends of educational assortative mating across Europe. While an upward trend in educational homogamy is well documented in the United States (Kalmijn 1991), the European context reveals more complex and divergent national patterns (Erát 2021; Katrňák et al. 2012; Jeroen Smits et al. 1998). For example, although hypergamy has declined consistently across European cohorts, largely due to rising female educational attainment (Erát 2021), the extent of assortative mating differs markedly. Post-communist countries tend to exhibit stronger patterns of educational homogamy (Domański and Przybysz 2007; Uunk 2024), while countries like Belgium and the Netherlands show comparatively lower levels (Domański and Przybysz 2007; Jeroen Smits et al. 1998). These disparities may reflect differences in the timing and scale of educational expansion across countries (Ballarino et al. 2013; P. N. Blossfeld et al. 2017; Breen 2010). Moreover, evidence suggests a positive relationship between educational reproduction and assortative mating, indicating that more equitable education systems may promote greater inter-educational partnering (Katrňák et al. 2012).

Drawing on the inferential method employed in the first study, we overcome the typical data constraints of prospective research, allowing for a comparative analysis across 12 European countries and several cohorts of women (born 1930-1950). By leveraging harmonised datasets, we estimate the components of a stylised reproduction model. These estimates inform a counterfactual analysis that quantifies the relative contribution of key pathways – educational assortative mating, fertility behaviour, and the social transmission of education from mother to child – to inequality in prospective educational reproduction rates. This framework enables us to evaluate how these mechanisms function and differ across both national contexts and birth cohorts.

We find persistent and substantial inequalities in educational production rates: higher-educated women consistently contribute more higher-educated offspring, while lower-educated women contribute more lower-educated offspring. These patterns vary across countries, with the highest inequalities observed in Poland, Romania, Belgium, and Austria, and the lowest in Sweden, Russia, the Czech Republic, and Lithuania. While direct educational inheritance, i.e., the effect of a mother's education on that of her child, emerges as the most influential pathway in reproducing educational inequality, we also show that fertility patterns play a nuanced role, mostly mitigating inequality due to negative educational fertility gradients.

Assortative mating further contributes to inequality, both through its impact on educational resources and its interaction with fertility, although its influence varies across different contexts. In some contexts, such as Austria, Georgia, Germany, Lithuania, and Sweden, mating patterns do not significantly shape the number of higher-educated children. Where mating is more educationally stratified, however, it reinforces inequality in educational production rates. In contrast, we find no consistent educational differences in partnership formation itself, suggesting that the primary impact of mating lies in partner selection, not access to partnership, a finding that diverges from previous research relying on alternative measures of marital status.

Taken together, our findings confirm that inequalities in educational reproduction are deeply embedded in demographic behaviours and vary substantially across national and historical contexts. Specifically, our findings highlight that assortative mating is a critical yet underexplored mechanism that reinforces intergenerational inequality, with significant cross-country variations. However, limitations such as binary education coding, descriptive design, and data constraints highlight the need for further research using more detailed and longitudinal data.

1.3.3 Study 3: Left, Right, and Reproduced: The Interplay of Political Orientation and Demographic Patterns Across Generations

A substantial body of research demonstrates that political orientations tend to align between parents and children across various cultural contexts and dimensions, including party identification (Dinas 2014; Jennings et al. 2009; Jennings and Niemi 1968; Kroh and Selb 2009; Ojeda and Hatemi 2015), ideological self-placement (Corbetta et al. 2013; Durmuşoğlu et al. 2023; Jennings 1984; Van Ditmars 2023), voting intentions (Hooghe and Boonen 2015; Ventura 2001), and issue-specific attitudes (S. Fox et al. 2019; Verweij et al. 2008). However, this literature is based exclusively on retrospective designs that assess the political orientations of children in relation to those of their parents. This approach inherently conditions on parenthood, thereby overlooking important demographic mechanisms such as childlessness and differential fertility. A prospective approach, by contrast, starts with the reproducing generation and enables a more holistic understanding of political reproduction, capturing how both social transmission and demographic behaviour jointly shape the ideological composition of the next generation.

Fertility differences across political orientations may influence how political attitudes are reproduced across generations, particularly when certain ideological groups have systematically higher fertility rates. Although empirical research directly linking fertility and political orientation remains limited, existing studies suggest that individuals with right-wing or conservative orientations tend to have higher fertility or stronger fertility intentions than those on the left. This pattern is especially evident in contexts such as the U.S. and parts of Europe (Arpino and Mogi 2024; Fieder and Huber 2018; Rackin and Gibson-Davis 2024).

Additionally, several factors, such as religiosity, traditional family values and lower levels of educational attainment, are associated with both higher fertility and with right-wing political views (Arpino and Mogi 2024; Beyer and Schnabel 2019; Frejka and Westoff 2008; Guetto et al. 2015; Nisén et al. 2021; Van Bavel 2014; Werfhorst and Graaf 2004). In contrast, left-leaning individuals often prioritize autonomy, individualism, and higher education, all of which are linked to lower fertility and higher childlessness (Piurko et al. 2011). As a result, even if left-wing individuals hold a transmission advantage in terms of ideological consistency (Van Ditmars 2023), differential fertility could gradually alter the ideological composition of future generations, depending on how these patterns interact.

This study adopts a prospective approach to model the intergenerational reproduction of political orientations, explicitly incorporating fertility as a key demographic pathway. The analysis focuses on German women born between 1940 and 1960, allowing for a generational perspective on political transmission that extends beyond conventional parent-child comparisons. To examine how political orientations are reproduced across generations, I apply demographic methods adapted from research on educational mobility. Specifically, I calculate prospective transmission rates (Skopek and Leopold 2020; Yastrebov and Wittemann 2024), which integrate both demographic and social pathways of political transmission. In addition, I model the population renewal of the reproducing generation and assess the relative influence of key components by simulating a series of hypothetical scenarios. Each scenario modifies one element of the reproduction process, such as group composition or fertility rates, while holding others constant, allowing for a clearer understanding of their individual and combined effects.

I find that political orientations are predominantly reproduced within the same ideological group, with left- and right-wing women more likely to have offspring who share their political orientation. However, centrist orientations remain the most common in the offspring generation, primarily due to the large share of centrist women in the reproducing generation (G1). Fertility differences by political orientation are minimal in West Germany but more pronounced in East Germany, where right-wing women exhibit higher fertility than their left- and centre-oriented counterparts. Despite this, even substantial fertility advantages among right-wing women, simulated through hypothetical scenarios, are insufficient to produce a right-leaning next generation, largely due to their small population share. These findings underscore the importance of considering both demographic and social transmission mechanisms in understanding the long-term reproduction of political orientations, and they reveal a structural resilience of the political centre in Germany under current conditions.

1.4 Conclusions

1.4.1 Summary of the Key Findings and Contributions

This dissertation pursued three main objectives. The first objective was to expand the prospective approach methodologically by further advancing the inferential method that enables prospective analyses without relying on long-running panel data. The second objective was to contribute substantively to prospective research on educational reproduction by incorporating cross-national comparisons across European countries. The third objective was to extend the prospective perspective beyond the domain of education to another arena in which intergenerational similarity is well established: political orientation. Addressing these objectives has further developed prospective research in various ways.

First, the application of the inferential method, which requires less complex data, was further established and developed, enabling the application of prospective analyses in countries where long panel data are not available. This is also demonstrated by the expansion of the prospective research on educational reproduction to countries previously not included in this perspective. Second, this dissertation has provided the impetus to transfer the prospective perspective to other domains of intergenerational transmission. Transferring the prospective idea to a field where this perspective is entirely novel provides new insights into the political stratification of fertility and how this, in conjunction with social transmission, influences the intergenerational reproduction of political orientations. More broadly, this extension offers a thought-provoking impulse and numerous opportunities to expand and improve research in areas of intergenerational transmission.

Regarding the first objective, this dissertation contributes to the validation and refinement of the inferential method. In Study 1, we assess its functionality by cross-validating model parameters that can be estimated using both prospective and retrospective data. The results demonstrate strong alignment between estimates derived from different data sources, thereby supporting the robustness of the method. Additionally, we improve the counterfactual decomposition approach used to disentangle the effects of different components of the reproduction model. Study 1 identifies limitations in the conventional separation of these effects by showing that fertility is linked to educational reproduction in two distinct ways: (1) directly through the number of offspring, and (2) indirectly through the impact of sibship size on educational attainment. We propose a specification that captures the extent to which the fertility effect is mediated by sibship size. In Study 2, we further develop the decomposition technique by extending it from a two-way to a three-way counterfactual decomposition. This advancement allows us to isolate the individual contributions of fertility, assortative mating, and social transmission. Together, these methodological validations and innovations enhance the applicability of the inferential method and facilitate its use in prospective research, including in countries with limited data availability.

With respect to the second objective, this dissertation demonstrates that prospective patterns of educational reproduction vary substantially across countries, underscoring the importance of comparative research in this area. Considering all processed (demographic and social) combined, studies 1 and 2 depict a very similar pattern where countries such as Poland and Romania show particularly high levels of educational reproduction – and thus stronger persistence of inequality – while countries like Russia and Sweden exhibit comparatively low levels of educational inequality. These cross-national differences persist even after disentangling the different pathways of reproduction. While the first study of this dissertation reveals that fertility patterns play only a modest role in the studied countries, their contribution to educational reproduction is highest in Poland and Romania. However, in these countries, the negative fertility gradient partially offsets the reproduction of educational advantage. In other words, if higher-educated women in these countries did not have lower fertility, educational inequalities would be even more pronounced. Study two of this dissertation complements these findings by demonstrating that the effect of assortative mating on educational reproduction also varies across countries. While mating patterns have minimal influence in contexts such as Austria, Georgia, Germany, Lithuania, and Sweden, in others, assortative mating significantly amplifies educational inequality. These findings clearly indicate that the interaction between demographic factors and social transmission is context-dependent and cannot be assumed to operate uniformly across national settings.

Regarding the third objective, this dissertation demonstrates the feasibility and value of applying the prospective perspective to domains of intergenerational transmission beyond education. Specifically, study 3 shows that political orientations – similar to educational attainment – are substantially reproduced across generations. In the context of Germany's multi-party system, however, centrist orientations remain the most prevalent among the offspring generation. This pattern is largely driven by the high proportion of centrist women in the reproducing generation. Moreover, fertility differentials across political orientations are relatively small, and demographic simulations indicate that, given the political distribution among women born between 1940 and 1960, even substantial fertility advantages among right-leaning women would not be sufficient to produce a predominantly right-oriented next generation.

This dissertation contributes to research on intergenerational reproduction in several important ways. First, it further develops the inferential method and the associated decomposition analysis, extending its applicability and reinforcing its methodological robustness. Second, it enhances our understanding of educational reproduction by demonstrating significant variation across European countries. By systematically incorporating both fertility and educational assortative mating into the comparative analysis, the dissertation disentangles the relative contributions of these demographic pathways and highlights their context-specific effects across national settings.

Finally, this dissertation makes a substantial and methodological contribution to the field of political socialisation by introducing a prospective approach to the study of intergenerational transmission. This perspective bridges the micro-level correlation between parental and offspring political orientations with macro-level demographic population renewal, offering a demographic account of political reproduction in Germany. The findings show that the existing distribution of political orientations can serve as a stabilising force, dampening intergenerational change. Moreover, this application demonstrates the feasibility and potential of extending the prospective perspective to other domains of intergenerational transmission.

1.4.2 Limitations

This work has some limitations that should be acknowledged. First, all three studies in this dissertation are descriptive in nature, which does not allow for causal claims. The counterfactual decomposition analysis applied in Studies 1 and 2 is not counterfactual in the causal sense, but it serves to decompose observed differences in educational production rates. Second, all three studies of this dissertation focus on the reproduction of women only, because their completed fertility can be more accurately defined due to the rather strict physiological fertility limit (Menken et al. 1986). This enables the linking of generations, which is essential for the accurate application of the inferential method.

Third, the different components of the stylised reproduction model underlie the simplifying assumptions. Educational attainment is measured dichotomously, distinguishing only between those with and without tertiary education (ISCED level 5 and above). While this approach overlooks important nuances in educational trajectories, it allows for clearer country comparisons and facilitates the decomposition of production rates. Furthermore, the measure does not account for changes in educational attainment over the life course. In countries where lifelong learning is more prevalent, this may lead to an underestimation of educational outcomes.

Similarly, the measurement of assortative mating is limited to a single time point and does not capture union dissolution or repartnering. This constraint stems from data limitations; to partially address potential biases due to mortality, an age cap of 70 years was applied when estimating partnership status. Nonetheless, this strategy may introduce a bias in our results, particularly concerning the selection into partnership. In Study 3, the measurement of political orientations is collapsed into three categories, resulting in a loss of information, but this approach enables the analytical framework adopted in this dissertation.

Lastly, while this dissertation includes key demographic mechanisms – fertility and educational assortative mating – it does not incorporate other socially stratified demographic factors such as union stability, mortality, or the timing of childbirth. These elements should be considered in future prospective research to further improve our understanding of the intergenerational reproduction of social inequality.

1.4.3 Implications and Future Research

While this dissertation advances prospective methods of intergenerational reproduction and extends the prospective framework to the intergenerational transmission of political orientation, it also opens several promising avenues for further investigation.

First, future research can build directly on the methodological advancements proposed in this dissertation by implementing prospective studies in country contexts where data availability has traditionally posed a challenge.

Second, the prospective framework can be applied to different political contexts. Given that party systems and political histories shape the distribution of political orientations, the intergenerational transmission of political attitudes is likely to be particularly sensitive to contextual variation. It is therefore essential to examine how demographic and social pathways of reproduction interact across different national settings. In the United States, for example, the two-party system generates pronounced political polarisation, and prior research has identified fertility differentials between partisan groups (Rackin and Gibson-Davis 2024). The binary nature of political orientation in such systems also enables further steps of analysis, such as a counterfactual decomposition of the different components, as applied in the first two studies of this dissertation.

Third, political assortative mating could be systematically integrated into future prospective analyses, as it is expected to influence political transmission both theoretically (Bandura 1969; Jennings et al. 2009) and empirically (Hooghe and Boonen 2015; Van Ditmars 2023).

Forth, beyond education and political orientation, there are numerous other domains where intergenerational similarity has been documented, such as the transmission of specific values and behaviours (Cemalcilar et al. 2018; Gottfredson et al. 2017; Grønhøj and Thøgersen 2009; Kalmijn 2022; Melchior et al. 2010). If demographic behaviour is also stratified by these aspects, applying a prospective approach to the reproduction process could yield valuable insights.

Fifth, future research can directly address the limitations mentioned in this dissertation by incorporating additional demographic aspects, such as union stability, mortality, and the timing of childbirth, into the study of intergenerational reproduction. Integrating these factors would further refine the analysis of intergenerational reproduction and contribute to a more comprehensive understanding of how certain attributes persist across generations.

Finally, while the studies in this dissertation are descriptive in nature, other prospective literature demonstrates the feasibility of prospective, causally oriented analyses of educational reproduction (Breen and Ermisch 2017; Corti and Scherer 2022; Lawrence and Breen 2016). These approaches remain rarely applied because they impose high data requirements (e.g., multigenerational linkage, detailed background information, and long follow-up). A further limitation is the outcome metric: the studies estimate the causal effect of parental higher education on the probability of having at least one highly educated child. While informative, this outcome presents an incomplete picture of the reproduction process. Future research should thus advance causal methodology for prospective reproduction studies, for example, by integrating event-history modelling with multi-state and multi-process frameworks from epidemiological research. Such designs enable prospective, causal assessment of intergenerational reproduction while also capturing the dynamic sequencing of union formation, parity progression, and educational attainment across the life course.

Chapter 2: Reconstructing Prospective Intergenerational Educational Mobility in 12 Countries

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2.1 Abstract

In this paper, we reconstruct prospective intergenerational educational mobility and explore the role of fertility in this process for the women born between 1925 and 1950 in 12 European countries. We do so by piecing together high-quality retrospective data (Generations and Gender Survey) and a series of low-requirement prospective datasets using the inferential method developed by Song and Mare (2015) and advanced by Skopek and Leopold (2020). Our analysis shows that the negative educational fertility gradient partly compensates for the inequality in prospective mobility rates between lower- and higher-educated women and it is most pronounced in high-inequality contexts. However, the role of fertility is small and declining and thus does not account for much of the differences in mobility rates between countries. We also explore the relative importance of sibship size effects in mediating the effect of fertility gradient and show that it is accordingly negligible. Finally, we explore the correspondence between prospective and retrospective estimates in the reconstruction of prospective mobility rates and suggest why the former must be preferred, when available.

Keywords: educational reproduction, social mobility, prospective models, educational fertility gradient, sibship size effects, European countries, cohort comparison

2.2 Introduction

Does an average higher-educated individual contribute more higher-educated offspring compared to a lower-educated one? Persistent correlation between parents’ and children’s educational achievements – one of the most robust findings in intergenerational social mobility research (Shavit and Blossfeld 1993; Hertz et al. 2008; Breen et al. 2009; OECD 2018) – might suggest that should be the case. However, this intuition may be premature because it does not consider potential differences in fertility rates between the higher- and the lower-educated. If the higher-educated have fewer children on average, the inequality in the rates of production of higher-educated offspring due to intergenerational inheritance of educational (dis)advantage may as well be tempered.

However, the role of fertility in the process of intergenerational educational mobility remains relatively underexplored, as much of this research is based on the so-called retrospective approach. In this approach, mobility is evaluated "backward", i.e., by comparing individuals' status to the status of their parents, thus only addressing the extent to which this status is *inherited*. Yet such comparison implicitly conditions on parenthood, and thus individuals who do not have children remain completely ignored. While one might think they are not involved in the mobility process because they do not have children, this is not entirely correct, because they contribute to mobility rates precisely by *not* transmitting their status to the next generation. Failing to account for them is thus why "retrospective studies of intergenerational mobility are not really studies of mobility across generations" (Lawrence and Breen 2016, p. 533).

In contrast, a prospective approach evaluates social mobility "forward", i.e., by observing whether and how an individual *transmits* his or her status to the next generation. More specifically, this implies that individuals are observed to trace both whether and how they reproduce demographically, i.e., the *fertility* aspect of mobility, and what status is attained by their offspring, i.e., the *attainment* aspect. The fertility aspect is comprehensively accounted for in the prospective approach because this approach does not condition on parenthood.

Yet, although prospective analyses of intergenerational mobility offer certain advantages over retrospective analyses, such studies are still relatively rare and they usually zoom in just on separate countries (Maralani 2013; Lawrence and Breen 2016; Song and Mare 2015; Breen and Ermisch 2017; Hillmert 2013; Skopek and Leopold 2020; Kye and Mare 2012; Mare and Maralani 2006; Wittemann 2023). While most of these studies corroborate the intuition that the negative educational fertility gradient partly offsets the transmission of educational advantage across generations (Mare and Maralani 2006; Kye and Mare 2012; Maralani 2013; Song and Mare 2015; Lawrence and Breen 2016; Breen and Ermisch 2017; Song and Mare 2017; Breen et al. 2019), whether and how this varies across countries and over time remains largely unknown because many of those studies are not directly comparable. Besides, only two studies directly evaluate the role of the fertility aspect of mobility vis-à-vis the attainment one. Both Skopek and Leopold (2020) and Wittemann (2023) report that the role of the fertility gradient is rather small, and that the (dis)advantage transmission is largely a reflection of unequal rates of educational attainment. Nonetheless, existing research on educational fertility differences and inequality of educational opportunity reveals substantial differences between countries and over time (e.g., Balbo et al. 2013; Nisén et al. 2021; Hertz et al. 2008; OECD 2018). This suggests that the variation in the patterns of mobility, as well as their underlying demographic and social mechanics can indeed be non-trivial.

The single prospective study analyzing several countries is the study by Breen et al. (2019). The study considers 12 European countries and focuses on the relationship between the estimates of educational transmission that do and that do not condition on parenthood. The study concludes on the striking similarities in this relationship across countries, albeit with conditional estimates overstating the rates of educational reproduction. Furthermore, it reports that the gap between these estimates tends to be larger in the countries of Southern and Eastern Europe (in particular, Italy, Spain, and Greece) compared to the countries of Northern and Western Europe. It is, however, not explicitly discussed to what extent this gap is due to the regional differences in the stratification of childlessness rates (or fertility, in general) vis-à-vis the differences in inequality of educational opportunity.[1] Besides, the study is based on suboptimal data: it relies on the Survey of Health, Aging, and Retirement in Europe (SHARE) which provides limited data on the reproduction (up to four children alive at the time of the survey) and features rather small sample size. The latter also explains why the study neither zooms in on specific countries (but rather compares regions, i.e., North-West and South-East of Europe) nor evaluates how educational reproduction evolved in these countries over time.

Thus, a comprehensive cross-national study prospective study of intergenerational educational mobility explicitly focusing on the role of fertility is still lacking. The primary reason such research is scarce is that it poses challenging data requirements. Specifically, it requires comparable prospective longitudinal data covering a sufficiently long observation window: the time it takes for the generation to accomplish its fertility plans plus the time for this generation's offspring to complete education. For many countries, such data may not be readily available yet.

In this study, we leverage the inferential method first developed by Song and Mare (2015) (henceforth S&M) and later advanced by Skopek and Leopold (2020) (henceforth S&L) to overcome these limitations and to "reconstruct" and analyze prospectively the process of educational mobility of the generations born between 1925 and 1950 in twelve countries –

[1] While intuitively, the gap between conditional and unconditional estimates of reproduction must be due to the educational gradient of childlessness, the evidence reported in the paper reveals that this gradient is actually not that much different between regions (e.g., Figure 2 of the paper, which presents fertility by education). Accordingly, it appears that regional differences in the gap are merely a reflection of regional differences in conditional estimates, corresponding to the inequality of educational opportunity (which is stronger in South and East compared to the North and West).

namely, Austria, Belgium, Bulgaria, Czech Republic, Georgia, Germany, Lithuania, the Netherlands, Poland, Romania, Russia, and Sweden. To this end, we piece together a high-quality source of retrospective data – Generations and Gender Survey (GGS) – and a series of low-requirement prospective datasets to estimate the components of a highly stylized educational reproduction model. Our list of countries represents post-socialist countries of Central-Eastern and South-Eastern Europe (Bulgaria, Lithuania, Georgia, Romania, and Russia), and the countries of Western (Netherlands and Belgium), Central (Austria and Germany) and Northern Europe (Sweden), thus featuring a broad variety of European welfare state regimes (Gø sta Esping-Andersen 1990; Cook 2007), as well as demographic (Skirbekk 2008; Nisén et al. 2021) and educational contexts (Pfeffer 2014a; H.-P. Blossfeld et al. 2016).

Specifically, with our analysis, we make several contributions. First, we reconstruct and evaluate the prospective intergenerational educational mobility rates for the selected countries and cohorts. Unlike conventional, i.e., retrospective estimates of intergenerational mobility, our estimates provide a perspective on mobility from the viewpoint of the reproducing rather than the offspring generations, and, most importantly, comprehensively account for the fertility aspect of mobility. In doing so, we go beyond the cross-national analysis by Breen et al. (2019), whose main quantity of interest – i.e., the likelihood of producing a higher-educated offspring – provides a limited[2] account of fertility. Besides, we contribute the cases of Bulgaria, Georgia, Lithuania, Romania, and Russia (previously unfeatured in prospective mobility research) and evaluate the trends over time.

Second, using the counterfactual decomposition approach proposed by S&L, we explicitly evaluate the relative importance of differential fertility and attainment rates in the process of intergenerational educational mobility. Here we advance over S&L in two respects. First, we scale their analysis to several countries, allowing us to evaluate the commonalities and differences in the mechanics of mobility. Second, we propose and implement a method to quantify the relative importance of sibship size effects on educational attainment, which partly mediate the effect of fertility on prospective mobility rates.

Finally, we contribute on the methodological side by showing that there are several ways to combine retrospective and prospective data to recover prospective intergenerational mobility rates and explore the correspondence between alternative estimates.

[2] It is limited in the sense of considering education-specific probability of childlessness only, rather than completed fertility rates.

The paper is structured as follows. First, we introduce the model of prospective intergenerational educational mobility, show how it can be informed empirically, and discuss how it can be advanced to provide a richer and more accurate account of the process in question. This is followed by the exposition of our data and details on the estimation and decomposition procedure. In what remains, we present and discuss our findings.

2.3 The model of prospective intergenerational mobility

2.3.1 Model description

Following S&L, we consider a very simple model, in which the main quantity of interest r_{ji} is defined as the number of children attaining educational level j produced on average by an individual with educational level i. S&L refer to it as “the rate of educational reproduction”, but it is probably more appropriate to refer to it as the *educational production rate* because reproduction is only a special case of $i = j$. Yet even better, defining i as origins and j as destinations, as is widely accepted in social mobility literature (Blau and Duncan 1967; Breen and Jonsson 2005; Breen and Müller 2020), the term r_{ji} can also be defined as the rate of prospective intergenerational educational mobility from i to j, or *educational mobility rate* for short. In referring to r_{ji}, we will, therefore, use the terms *educational production rate* and *educational mobility rate* interchangeably.

The rate can be expressed as

$$r_{ji} = \sum_{f} \pi_{f|i} f \pi_{j|i,f}$$

Eq. 2-1

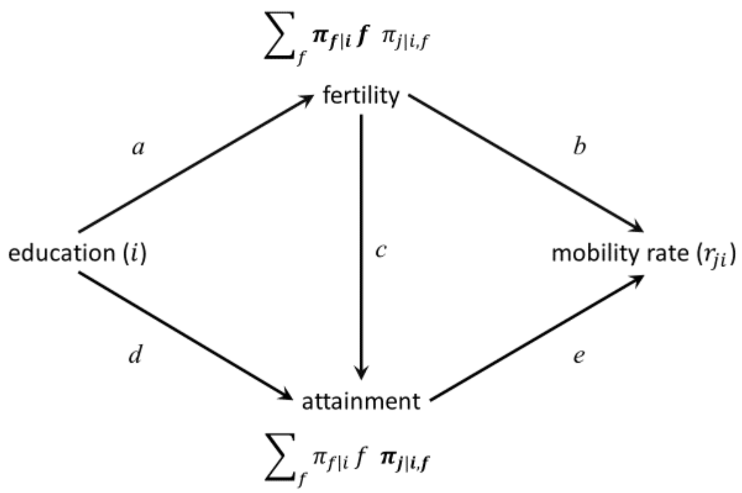
where $\pi_{f|i}$ is the probability an individual with education i will produce f number of children; quantity f is simply any feasible number of children (i.e., zero, one, two, three, etc.); finally, $\pi_{j|i,f}$ is the probability of attaining education j, given the parent’s education i and sibship size f. The model thus (plausibly) assumes that (1) fertility distributions might differ for individuals with different educational levels (Skirbekk 2008; Nisén et al. 2021; Vasireddy et al. 2023), (2) children’s educational attainment depends on parental education (Hertz et al. 2008; OECD 2018) and (3) children’s educational attainment additionally depends on sibship size (Downey 1995; Kalmijn and Werfhorst 2016; Choi et al. 2020).

In Figure 2-1, we present a more intuitive causal path diagram linking origins i to destinations j in terms of r_{ji}. The diagram is also helpful to illustrate two sets of pathways, corresponding to what we have earlier termed as fertility and attainment aspects of mobility.[3] In Figure 2-1, the correspondence of each pathway to the parameters of Eq. 2-1 is highlighted in bold type. Importantly, the two pathways are not entirely exclusive because of the assumed contingency of $\pi_{j|i,f}$ on f, which embeds the idea that sibship size potentially matters for educational attainment.

2.3.2 Identification of the model's parameters

For any given generation G1, i.e., a reproducing generation, all parameters of Eq. 2-1 can be identified using long enough prospective data on that generation plus the generation of its children G2, i.e., G1's offspring. However, such data is not easily available and may not even exist yet for some countries.

Figure 2-1: Educational mobility rate



Retrospective data on G2 often contains sufficient information to estimate the probability of educational attainment by parents' education i and sibship size f ($\pi_{j|i,f}$): i.e., G2's education in adulthood (j), the number of their siblings (f), and G1's (G2's parents') education (i). One thing that is important to address in this case is that the retrospective data supplied by G2 will underrepresent lower-parity parents of G1 – S&M recognized this first and proposed a solution by simply reweighting the data using the inverse of the sibship size. However, as far as fertility is concerned, the respective component $\pi_{f|i}$ can only be estimated for the non-childless

[3] S&M and S&L refer to those as "fertility" and "mobility" pathways. However, we find the former label somewhat tautological, given that both pathways refer to mobility, even if understood in a peculiar, i.e., prospective sense.

individuals because G2 cannot provide information on G1 who never produced children. Thus, only $\pi_{f|i,f>0}$ and, accordingly, $r_{ji|f>0}$ can be estimated from the retrospective data. Exposition below makes this problem explicit:

$$
\begin{aligned}
r_{ji} &= \sum_{f} \pi_{f|i} f\, \pi_{j|i,f} = \underbrace{\pi_{f=0|i} \cdot 0 \cdot \pi_{j|i,f=0}}_{0} + \sum_{f>0} \pi_{f|i} f\, \pi_{j|i,f} = \sum_{f>0} \pi_{f|i} f\, \pi_{j|i,f} \\
&= \underbrace{\left(\frac{\pi_{f>0|i}}{\pi_{f>0|i}}\right)}_{1} \sum_{f>0} \pi_{f|i} f\, \pi_{j|i,f} = \pi_{f>0|i} \sum_{f>0} \underbrace{\left(\frac{\pi_{f|i}}{\pi_{f>0|i}}\right)}_{\pi_{f>0|i}} f\, \pi_{j|i,f} \\
&= \underbrace{\left(1 - \pi_{f=0|i}\right)}_{\pi_{f>0|i}} \underbrace{\sum_{f>0} \pi_{f|i,f>0} f\, \pi_{j|i,f}}_{r_{ji|f>0}} = \pi_{f>0|i} r_{ji|f>0}
\end{aligned}
$$

Eq. 2-2

r_{ji} is thus a product of the probability of being non-childless ($\pi_{f>0|i}$) and the conditional r_{ji}, i.e., r_{ji} among the non-childless. Whereas the latter (conditional) component can be estimated from retrospective data, the former (unconditional) cannot.

Conditioning on fertility thus poses a problem. S&M proposed a parsimonious solution by estimating and extrapolating $\pi_{f>0|i}$ directly from retrospective data. Yet S&L showed how the inference can be further improved by estimating $\pi_{f>0|i}$ using low-requirement prospective data that yield cohort-specific rates of childlessness conditional on individuals' education. It only requires establishing a plausible correspondence of G2 in retrospective data to G1 in prospective data. This is possible if retrospective data provides information on G2's parents' birth years (which may still be exotic in most sociological surveys) because then, for any given G1, G2 can be identified in the retrospective data.

Incidentally, and beyond the identification of $\pi_{f>0|i}$ proposed by S&L, appropriately linked retrospective and prospective data allow for several parameters of educational mobility rates to be identified from both types of data. In Table 2-1, we list those parameters (third column), including those exclusive to each type, with a list of minimal data requirements. In fact, retrospective data is only needed to estimate $\pi_{j|i,f}$. The entire fertility component can be estimated from any data, provided it allows identifying respondents' birth year and education and their completed fertility.

An obviously strong reason to favour prospective data over retrospective data is that the former provides more direct and therefore less biased (even if incomplete) information on G1, whose educational mobility is to be modelled. The sources of bias affecting G2's representation of G1 are not exhausted with the underrepresentation of lower-parity parents as mentioned above. For example, it is not unlikely that some children of G1 do not make it to the retrospective sample because of emigration or premature death, and the likelihood of both is known to be contingent on education (Dustmann and Glitz 2011; Hummer and Lariscy 2011). Children of G2 may as well have difficulty recalling the education of their biological parents, and/or possibly provide inaccurate identification on siblings (e.g., including stepsiblings or siblings that cannot be attributed to these children's biological parents), and the extent of inaccuracy may also be quite selective. Retrospective data are, thus, not the best choice, although, depending on the context, it might have certain advantages beyond the estimation of $\pi_{j|i,f}$. For instance, such an advantage might be a substantially large sample size as compared to the sample sizes entertained with prospective data, because smaller sample sizes might as well undermine the quality of estimates. That said, cross-identified parameters can be cross-validated and in a separate section of our analysis we conduct such cross-validation.

2.3.3 Decomposition of differences in educational mobility rates

In addition to a better estimation of childlessness rates, S&L propose a method to quantify the contributions of fertility and attainment aspects of educational mobility. The method is based on counterfactual simulations, whereby the respective factual components of educational mobility rates – i.e., probabilities of educational attainment ($\pi_{j|i,f}$) and fertility distributions ($\pi_{f|i}$) – are replaced by the counterfactual ones. For example, to understand how much of the educational mobility of the higher-educated, e.g., in terms of production of higher-educated offspring, is due to fertility, one could compare the factual rate to the counterfactual one, in which the higher-educated are assumed to have the fertility rates of the lower-educated. Accordingly, to understand how much is due to the attainment aspect, one could compare the factual rate to the rate, assuming the likelihood of higher educational attainment among the children of the lower-educated.

S&L also suggest a summary measure to quantify the contributions of each aspect that can be derived from a simple linear decomposition of the "effect" of educational origins i on educational destinations j in terms of r_{ji}:

$$\Delta_j = r_{ji} - r_{ji'} = \underbrace{\frac{1}{2}\left(\left(r_{ji} - r_{ji}^{\pi_{f|i'}}\right) + \left(r_{ji'}^{\pi_{f|i}} - r_{ji'}\right)\right)}_{\text{fertility}\left(\Delta_j^F\right)} + \underbrace{\frac{1}{2}\left(\left(r_{ji} - r_{ji}^{\pi_{j|i',f}}\right) + \left(r_{ji'}^{\pi_{j|i,f}} - r_{ji'}\right)\right)}_{\text{attainment}\left(\Delta_j^A\right)}$$

Eq. 2-3

Here, r_{ji} and $r_{ji'}$ correspond to the factual mobility rates in terms of production of children with education j (e.g., higher education) among individuals with education i (e.g., the higher-educated) and i' (e.g., the lower-educated) respectively. All the remaining quantities are counterfactuals. For instance, $r_{ji}^{\pi_{f|i'}}$ may correspond to the counterfactual production rate of higher-educated children among higher-educated individuals but assuming the fertility distribution of the lower-educated (i.e., $r_{ji}^{\pi_{f|i'}} = \sum_f \pi_{f|i'} f\, \pi_{j|i,f}$). Correspondingly, $r_{ji}^{\pi_{j|i',f}}$ would be a counterfactual production rate of higher-educated children among the higher-educated but assuming the probability of higher-educational attainment observed among the lower-educated (i.e., $r_{ji}^{\pi_{j|i',f}} = \sum_f \pi_{f|i} f\, \pi_{j|i',f}$).

Notably, the counterfactual analysis as originally proposed and implemented by S&L, does not entirely separate the fertility and the attainment aspects of mobility. This is because in the underlying model, best illustrated in Fig. 2-1, fertility feeds into the educational mobility rate via two pathways: the more direct one b and the indirect one $c - e$, running through attainment and thus embedding the idea of sibship size effects (Downey 1995; Black et al. 2005; Choi et al. 2020). Accordingly, the counterfactual swapping of fertility rates affects the counterfactual mobility rate via both pathways. For a more concrete example, when higher-educated individuals are attributed the higher fertility rate of the lower-educated, one might expect their counterfactual production rate of higher-educated children to increase simply because they are now assumed to have more children. Yet, at the same time, the rate may also likely decrease because a higher number of children potentially implies a lower probability of higher educational attainment (note that f is the component in $\pi_{j|i,f}$). In other words, the effect of fertility on the reproduction rate among the higher-educated in S&L's counterfactual is potentially suppressed via the sibship size effects pathway. The same is true for the reproduction among the lower-educated.

Although S&L do recognize the implications of omitting family size effects[4], their counterfactual analysis does not elicit to what extent they matter. In other words, it is unclear how much of the fertility effect on the educational mobility rates is mediated (suppressed?) by the sibship size effects pathway ($c - e$ in (Fig. 2-1)). However, it can be quantified, and the solution builds on defining and estimating the educational mobility rate without assuming sibship size effects. Specifically:

[4] "Analyses that omit family size would therefore overestimate educational reproduction of parents that have a higher number of children." (Skopek and Leopold 2020, p. 1259)

$$\bar{r}_{ji} = \sum_{f} \pi_{f|i} f \bar{\pi}_{j|i} = \bar{\pi}_{j|i} \underbrace{\sum_{f} \pi_{f|i} f}_{F_i} = F_i \bar{\pi}_{j|i}$$

Eq. 2-4

where F_i is the fertility rate of individuals with education i, and $\bar{\pi}_{j|i}$ is the probability a child will attain education j if the parent has education i that is no longer assumed to depend on f.

In empirical terms, $\bar{\pi}_{j|i}$ would be simply the average observed probability of attaining education j conditional on parents' education i, and the intuition of defining it this way is that it already incorporates sibship size effects on $\pi_{j|i,f}$ assuming i's fertility by default. This implies that when counterfactual fertility $F_{i'}$ is applied to Eq. 2-4, this does not affect $\bar{\pi}_{j|i}$. Similarly, when counterfactual $\bar{\pi}_{j|i'}$ is applied, it does not interact with F_i, i.e., i's factual fertility. A different way to view counterfactual simulations using Eq. 2-4 is as if the sibship size effect pathway affecting the counterfactual educational mobility rate is deliberately "switched off", when swapping either fertility or educational attainment rates.

Accordingly, a counterfactual decomposition involving the educational mobility rates defined by Eq. 2-4 would yield naïve contributions of the fertility and attainment aspects (i.e., $\bar{\Delta}_j^F$ and $\bar{\Delta}_j^A$, analogously with Eq. 2-3), as if the sibship size effects pathway is ignored. The amount mediated by this pathway can then be inferred by comparing these contributions to those obtained from the decomposition analysis in which educational mobility rates are defined by Eq. 2-1 (i.e., Δ_j^F and Δ_j^A), i.e., those in which sibship size effects are not "controlled away". The corresponding difference would amount to

$$\bar{\Delta}_j = \Delta_j^A - \bar{\Delta}_j^A = \bar{\Delta}_j^F - \Delta_j^F$$

Eq. 2-5

2.4 Data

To inform the model we piece together different sets of data. Our primary source is the first wave of Generations and Gender Survey (GGS). Several reasons make GGS an optimal choice. First, it contains all the data needed to estimate the conditional educational mobility rates, particularly the probability of educational attainment by parental education and sibship size (first column of Table 2-1). Second, it provides information on several countries for some of which educational mobility has never been investigated prospectively. Third, it contains information on respondents' parents' birth years, which is key to identifying the link between G2 and G1, thus enabling the use of supplementary data to inform the prospective model components. Of the 16 countries featured in GGS we sub-select Austria, Belgium, Bulgaria, Czech Republic, Georgia, Germany, Lithuania, the Netherlands, Poland, Romania, Russia, and Sweden, for which all the necessary data is available.[5]

Table 2-1: Types of data and parameter identification.

Identified from retrospective[1] data only	**Identified from low-requirement prospective[2] data only**	**Cross-identified parameters**
probability of attaining education j, given the parent's education i and sibship size f ($\pi_{j\|i,f}$)	unconditional fertility probability distributions and fertility rates ($\pi_{f\|i}$ and F_i), specifically, non/childlessness rates ($\pi_{f>0\|i} = 1 - \pi_{f=0\|i}$)	conditional fertility probability distributions and fertility rates ($\pi_{f\|i,f>0}$ and $F_{i\|f>0}$)

Minimal data requirements: [1] data containing information on respondents' education, number of siblings, their parents' education, and birth year; [2] data containing information on respondents' birth year, education and number of children (ideally, completed fertility rate)

To inform the prospective model components (second column of Table 2-1), we pool several different data sources to achieve a larger sample size: namely, Integrated Values Surveys (IVS) from 1981-2021 (IVS combines World Value Survey and European Values Study), European Social Survey (ESS) from 2006-2007 (Wave 3) and 2018-2019 (Wave 9), General Population Survey of Social Stratification In Eastern Europe After 1989 (SSEE) from 1993-1994, and Survey of Health, Aging and Retirement in Europe (SHARE) from 2015 (Wave 6). The main criteria for including data in our pooled prospective dataset were a decent representation of different birth cohorts and adequate measurements of respondents' educational attainment and fertility.

We chose to focus on five G1 cohorts born 1) 1925-1930, 2) 1931-1935, 3) 1936-1940, 4) 1941-1945, and 5) 1946-1950. In our main analysis, we only consider the reproduction of women because linking G2 to men in G1 between the prospective and the retrospective dataset is much

[5] We exclude France (no data on parents' education), Estonia (extremely high attrition after listwise deletion of observations with missing key data), Hungary (no data on siblings) and Italy (education coded only up to upper secondary level).

more problematic. This is due to two main reasons. First, fertility age among women is more clearly defined due to existence of a physiological fertility limit (Menken et al. 1986). For instance, assuming a lower fertility age bound of 14 years old and an upper bound of 40 years old, we can define G2 cohorts for the above G1 cohorts as those born 1) 1939-1970, 2) 1945-1975, 3) 1950-1980, 4) 1955-1985, and 5) 1960-1990, and these cohorts are reasonably represented in GGS. The relatively narrow fertility age span of women also overcomes the right censoring problem when estimating G1's completed fertility using our prospective data (see below). In contrast, fertility age among men spans much longer (Schoumaker 2019; Dudel and Klüsener 2021), thus compromising the accuracy of male fertility estimates as well as making it problematic to establish the correspondence between G1 and G2 across the datasets. The second reason compromising accuracy is a much higher percentage of missing information on fathers in the GGS dataset (cf. 23% data on education and year of birth missing among fathers vs 12% among mothers). Nevertheless, we replicate our entire analysis for men and briefly comment on the results in the discussion section.

We selected our G1 and respectively G2 cohorts, optimizing between a reasonably wide representation of cohorts and respective case numbers in both datasets. Nevertheless, we recognize that more recent cohorts in GGS may not have accomplished education by the time of the survey (2002-2013 depending on country). Therefore, the estimates for the more recent cohorts (1946-50 of G1 and 1960-1990 of G2 respectively) must be treated with caution.

In GGS anchor samples, we drop respondents who miss information on birthyears, sibling number, education, and parents' birthyears and education. Additionally, we restrict the sample to respondents whose parents are country natives for all countries except Georgia, Lithuania, and Poland where data on parents' birthplace is not available. Nevertheless, we keep those countries because they were not too strongly affected by immigration during the period studied (Fassmann and Münz 1994; Wallace 2002). We also drop respondents reporting an implausibly small difference between their own birthyears and the birthyears of their parents (<14 years, 380 cases). In total, 35,289 cases were dropped. This leaves us with on average 7,250 cases per country, of which on average 3,800 correspond to mothers. Table A2-1 in the Appendix contains basic descriptive information on the retrospective samples.

In the pooled prospective dataset, we drop individuals with missing data on birthyears, gender, education, and the number of children and sub-select those born between 1925-1950. Here we entertain on average roughly 3,300 cases per country. Table A2-2 in the Appendix completes a basic description of this dataset.

In both datasets, we recode all education variables into binaries, distinguishing between *the higher-educated* = ISCED 1997 level 5 and above, and *the lower-educated* = ISCED 1997 level below 5. This corresponds to the distinction between tertiary and non-tertiary education. More refined distinctions are complicated due to much heterogeneity in the coding of below-tertiary education across the datasets that we employ[6]. Also, in the case of Sweden, we had to reckon with the inability to distinguish between ISCED level 4 and 5 among parents in the GGS dataset (ISCED level 4 education accounts for a relatively small share in this country (Halldén 2008)). Using the notation introduced earlier, we define the sets $i \in \{H, L\}$ and $j \in \{H, L\}$ with H and L standing for the higher- and lower-educated respectively.

2.5 Estimation procedure

We use GGS to estimate $\pi_{j|i,f}$'s, $\bar{\pi}_{j|i}$'s, $F_{f>0}$ and $F_{i|f>0}$'s. However, since we use retrospective data on G2 to recover information about G1, we must acknowledge the underrepresentation of lower-parity parents in the anchor sample (Skopek and Leopold 2020; Song and Mare 2015). To this end, we re-weight the data using weights corresponding to the inverse of sibship size (reported by respondent), in addition to GGS survey weights.

We estimate conditional fertility rates ($F_{f>0}$, $F_{i|f>0}$) as simple averages (weighted according to the procedure above) obtained for each subsample formed by the intersection of G1's country, gender, and cohort. For the estimates of probabilities $\pi_{j|i,f}$ we use average predicted values from the logit models regressing respondents' educational attainment ($j = H$) on his/her sibship size plus one (for f) interacted with parents' education (i) for the same set of subsamples (same weighting procedure applied). Probabilities $\bar{\pi}_{j|i}$ are estimated in the same way except that sibship size is excluded from the model. In the retrospective sample, we identify respective subpopulations of G1 based on parents' gender and their reported birth year (Skopek and Leopold 2020).

Accordingly, we use the pooled supplementary dataset to estimate all prospective model components, i.e., childlessness rates ($\pi_{f=0|i}$) and completed fertility rates (F, F_i). In addition to those, we estimate the components which can be cross-validated with the components obtained from GGS ($F_{f>0}$, and $F_{i|f>0}$). We apply normalized survey weights, accounting for both the

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[6] IVS, which constitutes roughly 60% of our pooled prospective dataset, provides limited opportunities for more fine-grained classification of education. For our selection of countries, using the ISCED-coded variable (X025R) makes 70% of the IVS sample redundant. Using the less refined variable (X025), allowing the distinction between tertiary and non-tertiary education, reduces this number to 20%.

sampling design of each specific survey and survey sample size in the pooled dataset. The estimates are simple averages over subsamples intersecting country, gender, and cohort. We do not account for age and deal with right-censoring in our estimation because since the youngest respondent in our pooled prospective dataset was 43 years old at time of interview and may thus be assumed to have largely completed fertility and education.

We could not estimate $\pi_{j=H|i=H}$ for the earliest-born cohorts of women in Austria due to a lack of cases and zero variance in several key variables and therefore exclude them from our analysis.

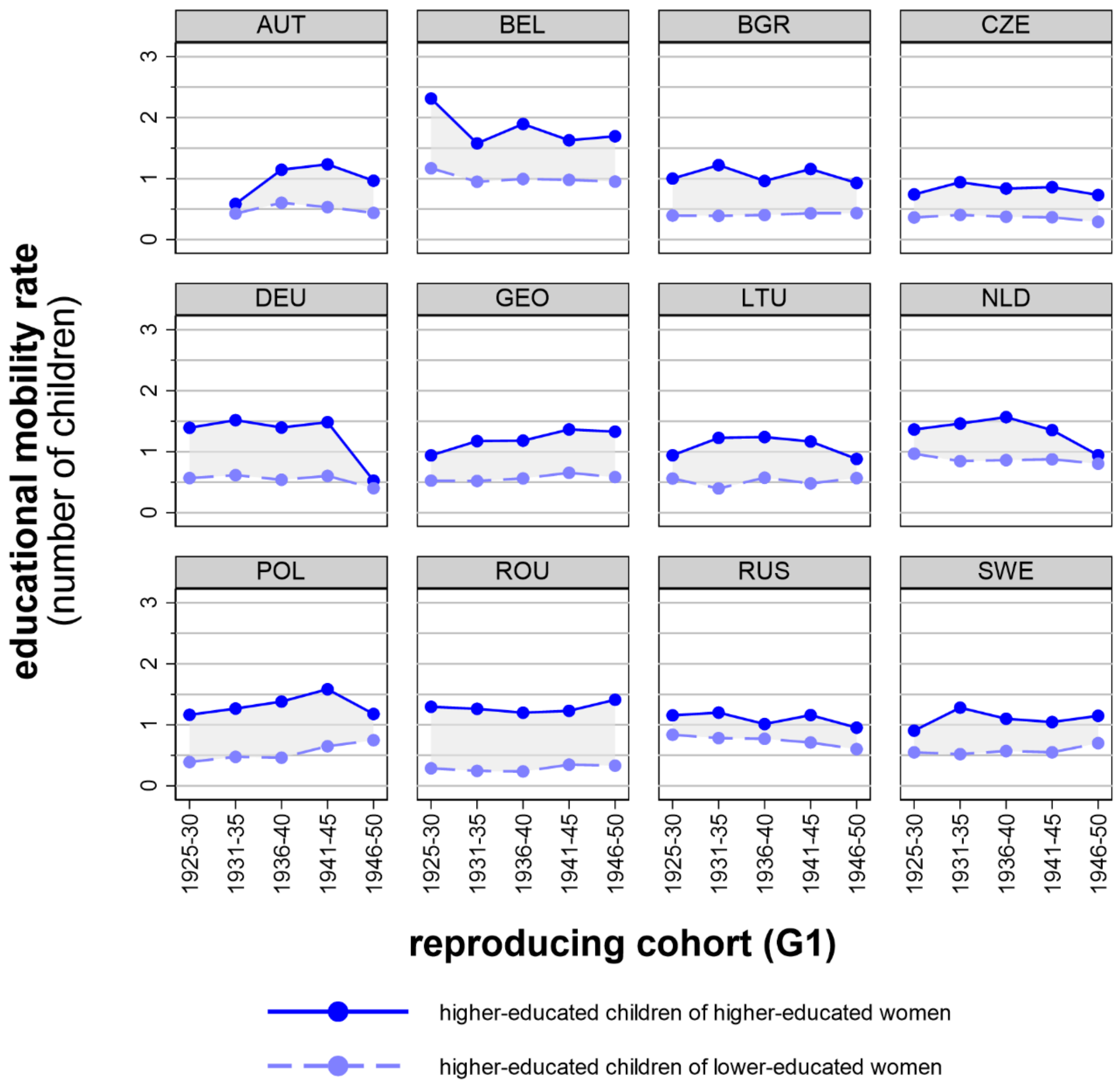
2.6 Findings

2.6.1 Differences in prospective educational mobility rates

First, we present the estimated quantities r_{ji} in Fig. 2-2 and Fig. 2-3. In these figures, we thus compare the educational mobility rates of higher- and lower-educated women (G1) in terms of educational production rates of higher (Fig. 2-2) and lower (Fig. 2-3) educated children (G2). The quantities r_{ji} are calculated using estimates $\pi_{j|i,f}$ and $\pi_{f|i}$ (Eq. 2-1) obtained from GGS and the pooled prospective dataset, respectively. The tables with estimates can be found in Appendix A2-3 and A2-4.

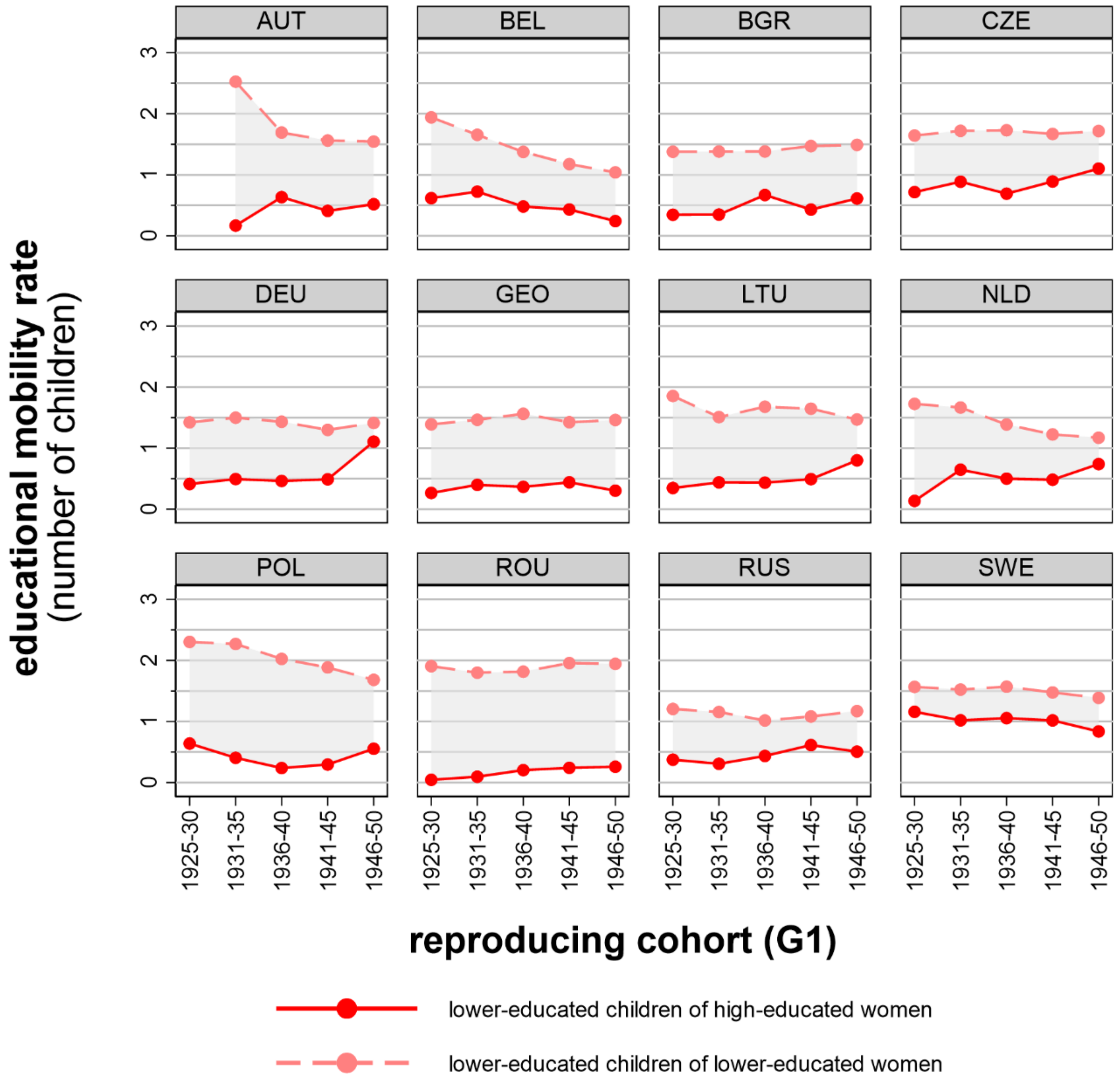
Let us first examine Fig. 2-2 displaying the rates of production of higher-educated children. In mobility terms, the figure thus compares the reproduction rates of higher-educated women to upward mobility rates of lower-educated women. One consistent pattern emerging from this figure is that higher-educated women yield a higher rate of higher-educated offspring compared to lower-educated women: across the sample of all 12 countries and all 5 cohorts, the average estimate for higher-educated women is 1.2 (r_{HH}), which is almost the double of the one for the lower-educated women which is .58 (r_{HL}). However, the magnitude of this difference shows some variation across countries. The largest differences are observed in Romania (average r_{HH} vs r_{HL} over 5 cohorts: 1.28 vs .29), Germany (1.26 vs .55), and Poland (1.32 vs .55). The smallest differences, on the other hand, are found in Russia (average r_{HH} vs r_{HL} over 5 cohorts: 1.1 vs .74), Sweden (1.1 vs .58) and the Czech Republic (.82 vs .36).

Figure 2-2: Prospective educational mobility rates of higher- and lower-educated women in terms of production of *higher-educated children* ($\boldsymbol{r_{HH}}$ and $\boldsymbol{r_{HL}}$).



As far as temporal variation is concerned, stylized trends are difficult to discern. However, it appears that the differences have been consistently expanding only in Georgia (from .415 in the oldest to .746 in the most recent cohort), yet declining in most other countries, including Belgium (from 1.143 to .743), Bulgaria (.605 to .493), Lithuania (.381 to .313), the Netherlands (.397 to .139), and Sweden (from .762 [for the cohort born 1931–35] to .448), with the declining trend showing more consistency in the more recent cohorts. In the remaining countries, the difference remains either stable or shows less consistent patterns. We also note that the difference in the most recent cohort in Germany and Poland appears unusually small. This may be due to the right censoring issue: the children of the most recent may not have had enough time to accomplish education by the time of GGS data collection. This would also explain why in Germany the educational production rate of higher-educated children curves downward for both higher- and lower-educated women. Besides, we relate to the findings of S&L who do not find such a sharp convergence among the most recent cohort (1946-1950) neither in West nor in East Germany[7] using a measure of educational achievement that is less prone to the right-censoring issue.[8] With these reservations in mind, we would qualify Poland and Germany as exhibiting rather stable differences overall (together with Romania).

Figure 2-3: Prospective educational mobility rates of higher- and lower-educated women in terms of production of *lower-educated children* ($\boldsymbol{r_{LH}}$ and $\boldsymbol{r_{LL}}$).



[7] S&L analyze each part of Germany separately, whereas we analyze Germany as a single entity here.

[8] S&L define the higher-educated as holders of Abitur, i.e., a qualification that is typically earned at the end of upper secondary education and serves as the primary requirement for admission to higher education.

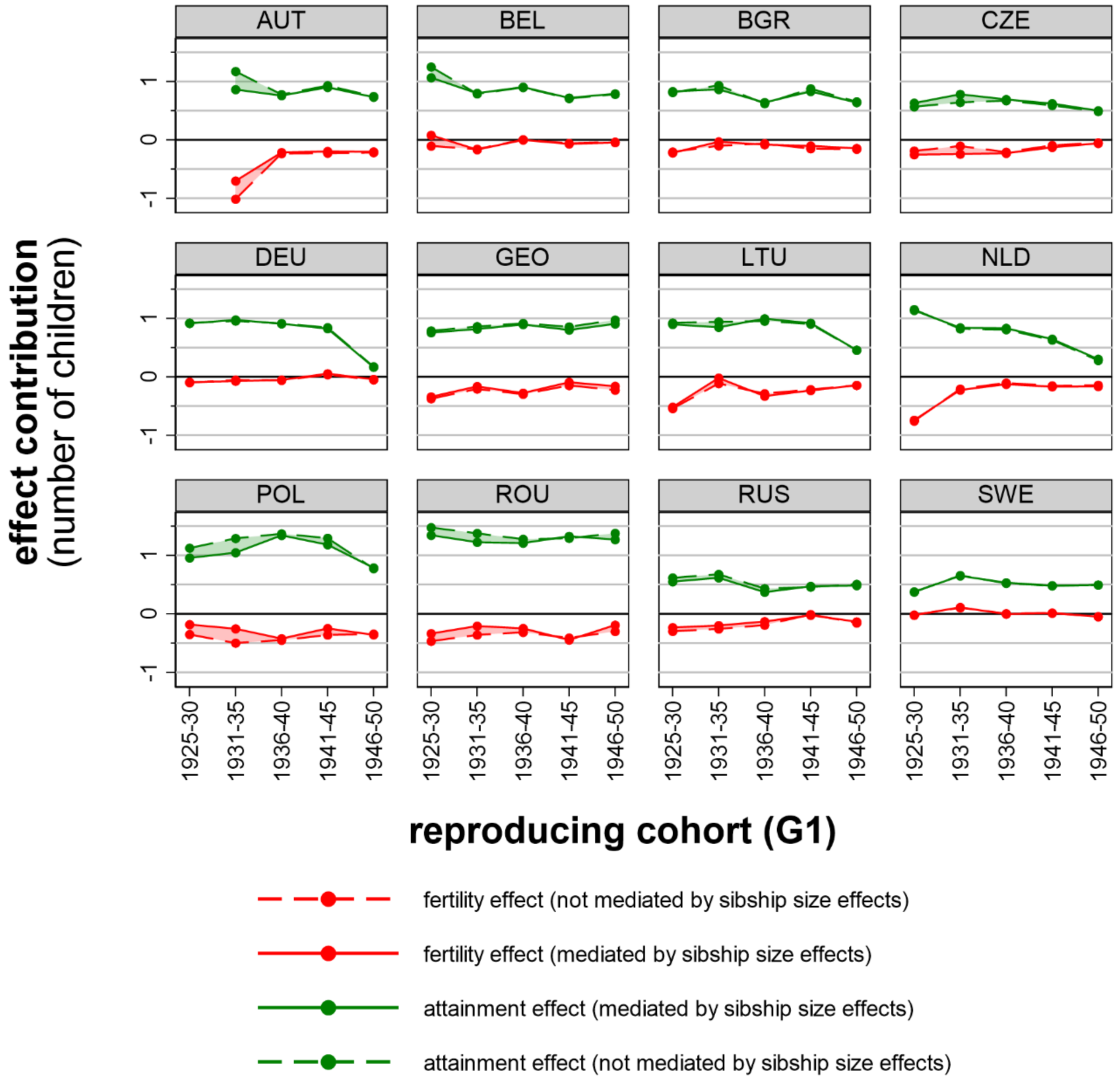
The differences in the rates of production of lower-educated children (Fig. 2-3) somewhat mirror the patterns observed in Fig. 2-2 (comparing, in mobility terms, the reproduction rates of lower-educated women to downward mobility rates of higher-educated women). Again, consistently across the entire range of countries and cohorts we find that lower-educated women outrate higher-educated women in terms of production of lower-educated offspring, with r_{LL} and r_{LH} amounting, on average, to 1.57 and .53 children respectively. The differences are also generally much larger in absolute magnitude than those observed in Fig. 2-2. The cross-national variation is similar, with the smallest differences observed in Sweden (1.51 vs 1.02) and Russia (1.13 vs .45), and the largest ones – in Poland (2.03 vs .43) and Romania (1.89 vs .17). A consistent decline in the differences over cohorts is observed only in the Netherlands (from 1.589 to .432) and, with a slightly weaker tendency, in Austria (2.358 to 1.025), the Czech Republic (.927 to .615), Belgium (1.323 to .798), Lithuania (1.507 to .669) (the decline in Belgium is less apparent and rather reflects the overall decline in the rates of production of lower-educated children). In other countries, the difference remains stable and/or shows no consistent pattern.

Overall, Sweden and Russia stand out as the countries with the lowest inequality in the rates of prospective educational mobility. Poland and Romania, on the other hand, represent the other end of the spectrum. A universal temporal trend is not so obvious to discern, although in most countries the inequalities appear to be shrinking over time, even if showing only modest and not very consistent declines.

2.6.2 Decomposition of Differences

We now decompose the differences in educational mobility rates to examine the extent to which they are driven by the differences in fertility and attainment rates. We remind that the logic of decomposition consists in successive swapping of the fertility distributions and the probabilities of children's educational attainment between educational groups in G1 (Eq. 2-3). In this step, we also implement our modification of S&L's approach to quantify the amount of the difference due to sibship size effects on educational attainment (i.e., quantities defined by Eq. 2-4 and Eq. 2-5).

Figure 2-4: Decomposition of differences in educational production rates of higher-educated children ($\boldsymbol{\Delta_H}$).



In Fig. 2-4, we decompose the difference in the production of higher-educated children between higher- and lower-educated women, i.e., $\Delta_H = r_{HH} - r_{HL}$ (Δ_H corresponds to the shaded area in Fig. 2-2). The green lines correspond to the differences due to the attainment aspect, i.e., due to inequality in educational attainment rates between the children of higher- and lower-educated mothers. The red lines correspond to the differences due to the fertility aspect, i.e., due to the differences in fertility rates between higher- and lower-educated women. Values above and below zero signify a positive and a negative contribution to the difference Δ_H respectively. The solid and the dashed lines mark different kinds of estimates: i.e., those that embed and those that do not embed sibship size effects. Accordingly, the difference between the solid and the dashed lines corresponds to $\overline{\Delta}_H$ (Eq. 2-5), i.e., the amount mediated by the sibship size effects pathway, and is represented by the shaded area in-between.

The green lines in Fig. 2-4 lie above zero in all countries and for all cohorts, thus signifying that the attainment aspect positively contributes to the difference Δ_H. It is also a universal pattern, meaning that the inequality of educational opportunity between children of higher- and lower-educated women is the primary driver of unequal prospective mobility rates into higher education. On average across all countries and cohorts, the effect amounts to a difference of .82 higher-educated children per woman.

However, there is also some variation that largely overlaps with the high- and low-inequality contexts as identified above in Fig. 2-2. The strongest effect is observed in Poland and Romania (on average 1.06 and 1.28), whereas the smallest one is found in Russia (.5) and Sweden (.51). Notably, there is also some overlap with the temporal variations: e.g., it appears that the declining inequality in prospective mobility rates in the Netherlands and the Czech Republic appears to be driven largely by the declining inheritance of higher educational attainment. While appropriate cross-national comparisons involving all 12 countries are hard to come by, this finding maps well to existing research. For instance, Breen et al. (2009), investigating social background inequality in educational attainment, also locate Sweden and Poland as the cases of lowest and highest inequality, and note the tendency of this inequality to decline in most countries over time (also confirmed by Barone and Ruggera (2018)).

In contrast, the contribution of fertility differences, depicted by the red lines in Fig. 2-4, is much smaller in absolute magnitude compared to the contribution due to inequality of educational opportunity. The average across all countries and cohorts amounts to –.18 higher-educated children per woman. Noteworthy, the contribution of fertility differences, where present, is negative: i.e., it offsets the inequality in prospective mobility rates generated by inequality of educational opportunity. This aligns well with previous prospective analyses, which found that conditional estimates of educational reproduction (i.e., those not considering fertility) tend to overstate the degree of reproduction, as they are partially counterbalanced by the negative fertility gradient (Breen et al. 2019; Breen and Ermisch 2017; Hillmert 2013; Kye and Mare 2012; Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Skopek and Leopold 2020; Song and Mare 2015, 2017).

However, we also note some variability in the contribution of fertility differences to the reproduction of educational inequality both across countries and over time, revealing that the degree of such “overstatement” can vary across countries and over time. It is absolutely small in Belgium, Germany, Sweden, Bulgaria, and Czech Republic, and, in several countries where larger differences are observed, i.e., Austria, Netherlands, Georgia, Lithuania and Russia, its effect appears to be declining in more recent cohorts. The largest and most persistent offsetting effects of the negative fertility gradient (even if largely outweighed by the differences in attainment rates) are observed in Poland and Romania (on average –.29 over all cohorts in each country). This aligns well with other cross-national research on educational fertility gradients: for instance, Nisén et al. (2021), albeit focusing on a single cohort of 1965-1970, also rank Romania among the countries with the highest fertility differences between lower and higher-educated women, Western European – among the countries with the smallest differences, and East European countries ranking in-between.[9] A similar divide between Western European and Eastern European is reported by Merz and Liefbroer (2017). We also note that the declining effect of fertility differences in some countries in Figure 2-4 is in line with the evidence on declining (and sometimes even reversing) educational fertility gradients in some countries (Vasireddy et al. 2023).

What of the sibship size effects? Fig. 2-4 evidently reveals that the amount mediated by the corresponding pathway is negligibly small. In the few cases where it deviates from zero (e.g., the older cohorts in Poland, Bulgaria, Austria, and Belgium), the direction indicates that ignoring sibship size effects slightly overstates the contributions of both the attainment and the fertility aspects to the inequality in educational mobility rates. In other words, one could say that the reason higher-educated women tend to produce more higher-educated children than lower-educated women is partly due to them having more compact families, which confers certain advantages in terms of children's educational success. However, this does not translate to a large absolute difference in terms of educational mobility rates, and the intuition behind this is related to two facts. First, the impact of sibship size on the probability of higher educational attainment is generally not very pronounced. In our sample of countries and cohorts, every additional sibling decreases the respective probability by just 3.7 percentage points on average, which is generally in line with other studies (Choi et al. 2020).[10] Second, there is only a minor fertility difference between the higher- and the lower-educated, standing at an average of .4 children. Consequently, the differences in the probability of higher

[9] We refer to Table 2 of their analysis, in which Eastern European countries are represented only by Belarus, Hungary, Lithuania, and Romania, and Western European countries – by Austria, Belgium, Finland, France, Germany, Ireland, the Netherlands, Norway, Spain and Sweden.

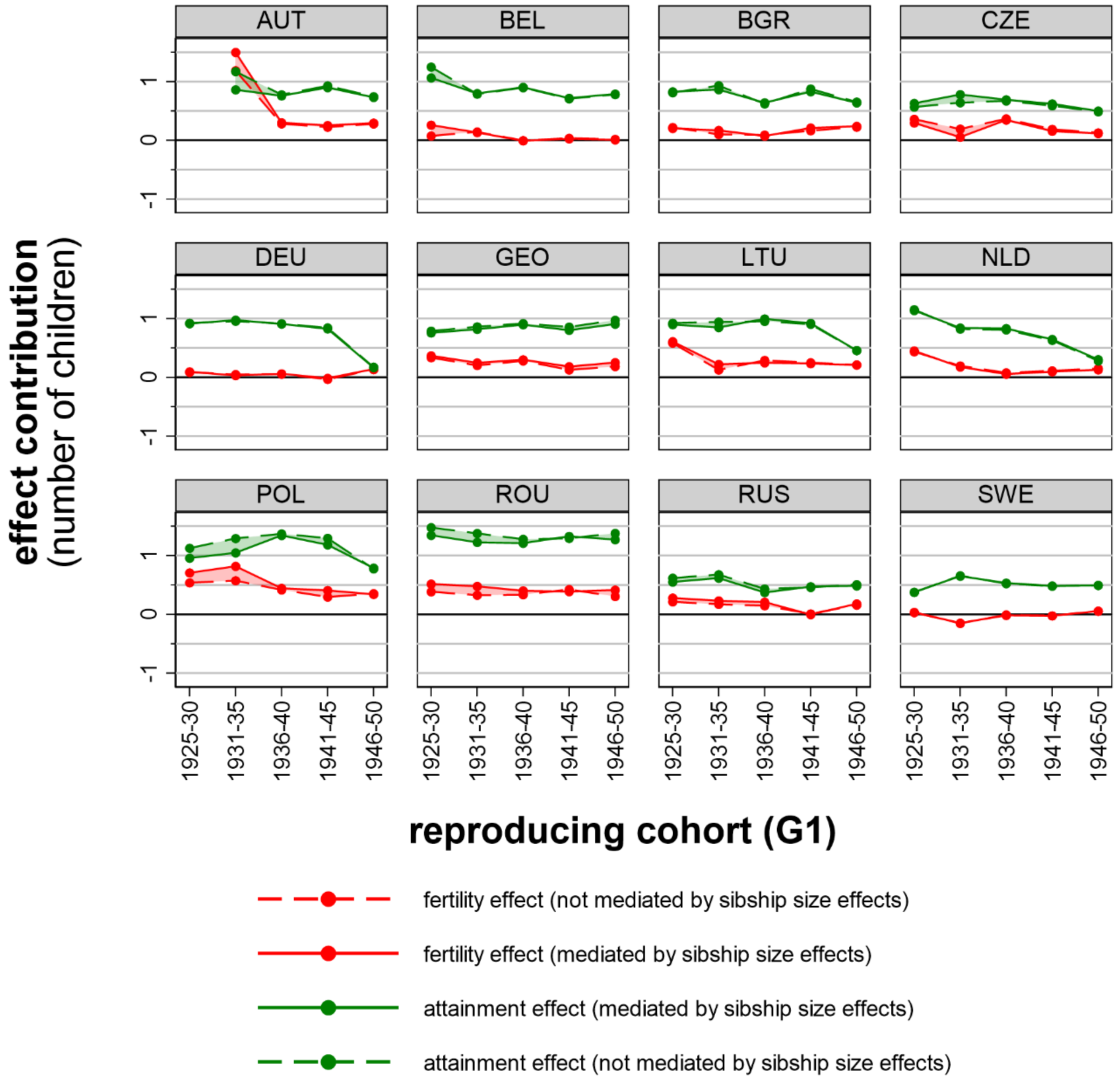
[10] Choi et al. (2020) report effect sizes concentrating within the range between –.2 to around –.4 years of schooling per additional sibling. Although not directly comparable to our estimates, we find these effects rather small-sized.

educational attainment between children of higher- and lower-educated women due to sibship size effects amount to roughly 1.5 percentage points (3.7 × .4).

In Fig. 2-5, we also present the decomposition of the difference in the production rates of lower-educated children, i.e., of the quantity $\Delta_L = r_{LL} - r_{LH}$. The patterns observed here largely mirror the ones observed in Fig. 2-4. In fact, the quantities presented in both figures are strictly related, such that $\Delta_L^A = \Delta_H^A$ and $\Delta_L^F = F_L - F_H + \Delta_H^F$ (see Appendix B2-1 for a formal proof; a proof using a slightly different approach is also provided by S&L in the supplement to their original paper), and accordingly for the counterfactual decompositions ignoring sibship size effects, i.e., $\overline{\Delta}_L^A$ and $\overline{\Delta}_L^F$. The former implies that the differences due to sibship size effects are also equivalent.[11] In other words, the effects due to attainment differences are equivalent, regardless of whether the differences in the rates of production of higher- or lower-educated children are concerned. In turn, the effects due to fertility differences deviate only by the amount these differences. It is therefore only Δ_L^F and $\overline{\Delta}_L^F$ that convey new information relative to Fig. 2-4.

[11] $\overline{\Delta}_L = \Delta_L^{QL} - {\overline{\Delta}_L}^{QL} = \Delta_H^{QL} - \overline{\Delta}_H^{QL} = \Delta_L^{QN} - \overline{\Delta}_L^{QN} = \Delta_H^{QN} - \overline{\Delta}_H^{QN}$

Figure 2-5: Decomposition of differences in educational production rates of lower-educated children ($\boldsymbol{\Delta}_L$).



Two qualifications stand out. First, although somewhat similar to the small magnitudes reported in Fig. 2-4, the fertility component in Fig. 2-5 is slightly more pronounced in its absolute magnitude, averaging to .24 across all countries and cohorts (cf. –.18 for the difference in the production of higher-educated children reported above). This is particularly visible in Poland in the earlier born cohorts. Second, where not entirely negligible, the contribution of fertility differences is positive rather than negative (as in Fig. 2-4), meaning that fertility differences between lower- and higher-educated women reinforce (!) rather than suppress inequality in mobility rates into lower education. The inequality is reinforced because of the negative educational fertility gradient, whereby higher-educated women produce fewer lower-educated children not simply because their offspring are more likely to inherit the educational attainment of their mothers, but also because such women, on average, produce fewer children in general (and, accordingly, the reverse being true for lower-educated women). This qualification somewhat challenges the wisdom that conventional estimates of educational reproduction, i.e., the estimates that condition on parenthood or, more generally, neglect the socially stratified fertility, tend to “overstate the degree of educational reproduction”. When it comes to the reproduction of lower educational attainment, the truth may as well be the opposite.

2.6.3 Cross-validation

In this section, we compare the parameters of the model that can be identified with both prospective and retrospective datasets, i.e., the fertility rates among higher- and lower-educated parents. We present the results in Figure 2-6 (supporting table can be found in Appendix A2-5 and A2-6). The figure juxtaposes the estimates from prospective data measured on the horizontal axis to those from the retrospective data measured on the vertical axis. Each dot represents a specific combination of cohort and education. The diagonal line on the graphs marks the area of perfect correspondence: the closer the dots are to the line, the more closely the prospective and the retrospective estimates match each other. Accordingly, the dots lying to the right and below the diagonal indicate that prospective estimates are larger than the retrospective ones, and vice versa for the dots lying to the left and above the diagonal. The dashed lines around the diagonal mark the area, within which the discrepancy between retrospective to prospective estimates (and vice versa) does not exceed 10%.

Figure 2-6: Prospective vs. retrospective estimates of conditional fertility rates ($F_{H|f>0}$ and $F_{L|f>0}$).

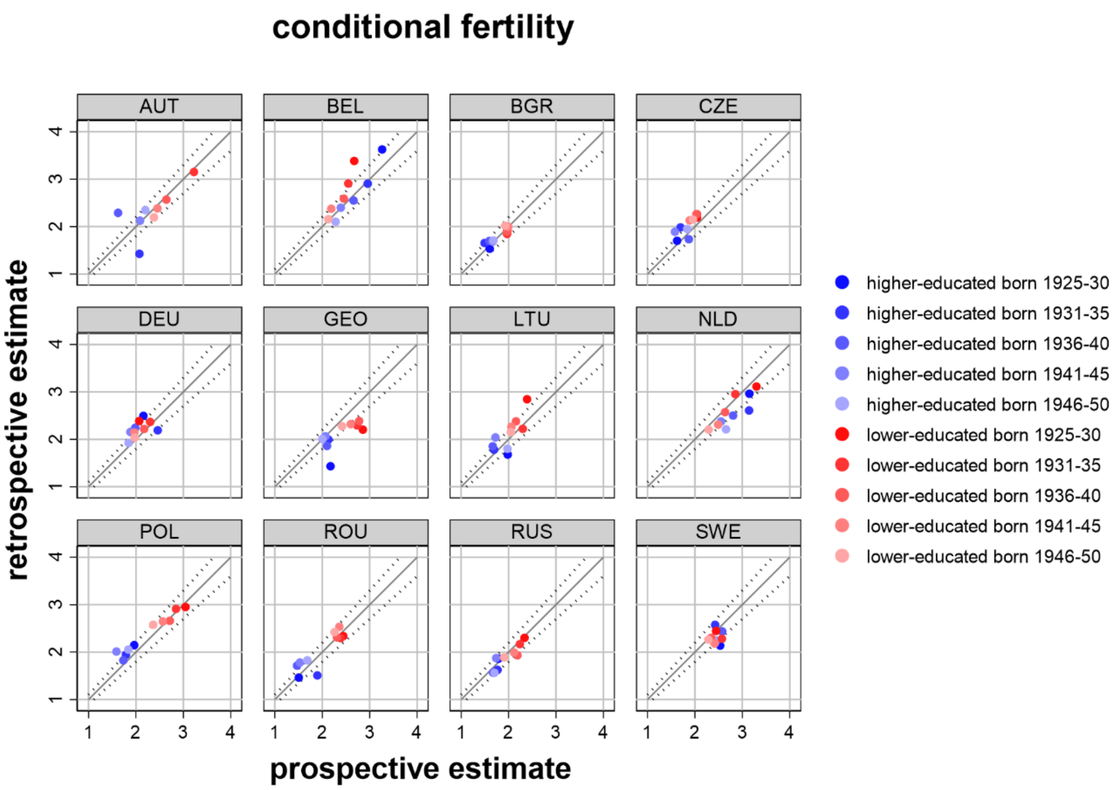


Fig. 2-6 reveals that the alternative estimates of conditional fertility are reasonably well aligned. They correspond most consistently for Russia, Poland, Bulgaria, and the Czech Republic. However, the alignment is not perfect, and some discrepancies stand out, most notably in the oldest cohorts. These discrepancies are especially pronounced in countries such as Austria, Belgium, Georgia, and Lithuania, with some falling well beyond the 10% difference.

In Fig. 2-7, we provide a further comparison of the performances of prospective versus retrospective estimates. Here, we use cohort completed fertility rates from the Human Fertility Database (HFD), i.e., yet another external source of data, as a benchmark. To this end, we used HFD data to calculate average cohort completed fertility rates for the ranges of birth cohorts we employed in our analysis. Unfortunately, HFD data is available only for a limited set of cohorts in some countries. The rates obtained from HFD are represented by the green area.

The prospective fertility estimates are calculated as education-specific fertility rates weighted by proportions of higher- and lower-educated women obtained from the prospective data. The retrospective estimates are estimated in a similar way, except that education-specific fertility rates are obtained as conditional fertility estimates from the retrospective data weighted by the inverse of education-specific childlessness rates obtained from the prospective data. The two types of estimates are arranged in columns and are represented by the black lines.

Figure 2-7: Comparison of prospective and retrospective estimates of (unconditional) completed cohort fertility rate to Human Fertility Database data.

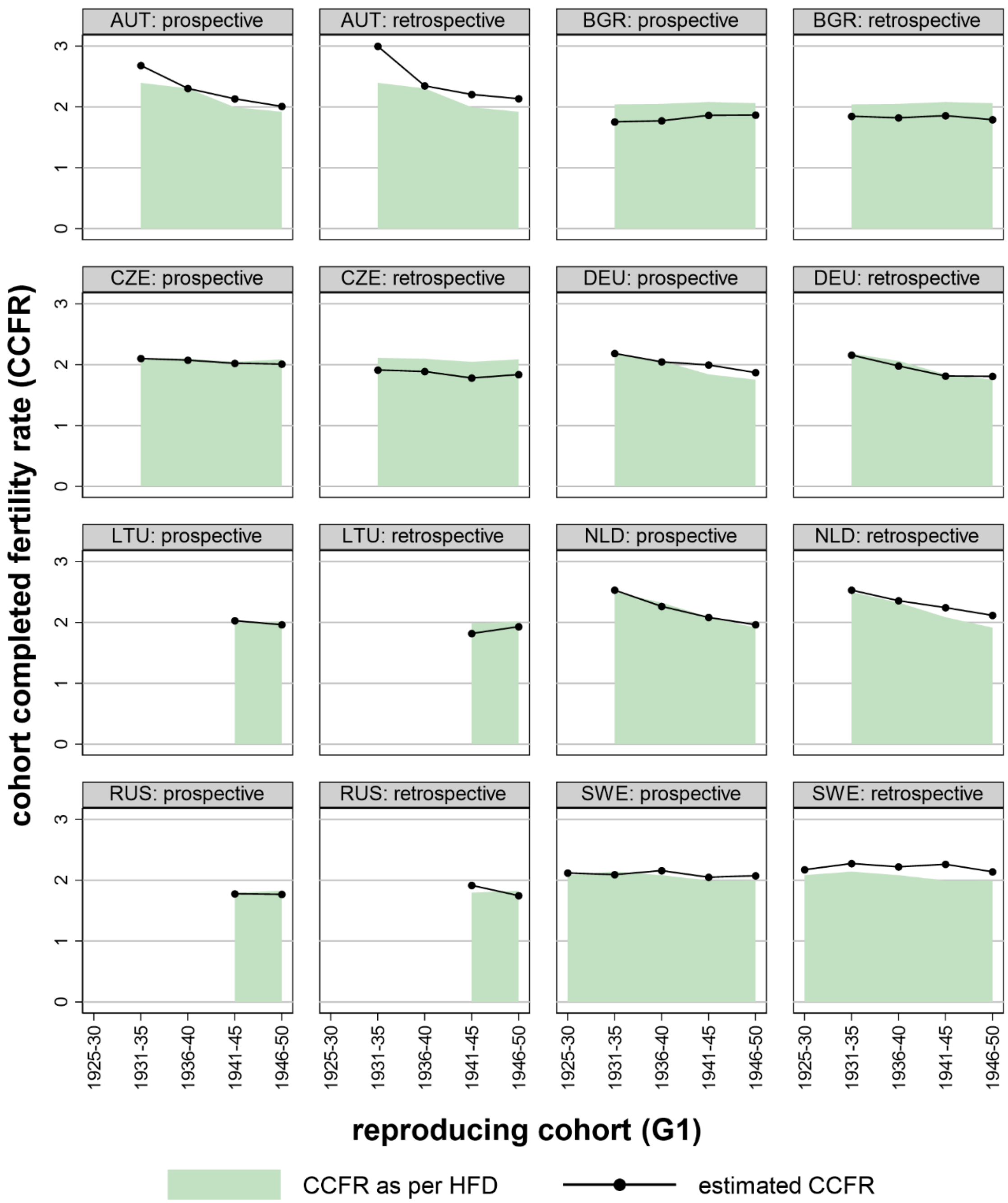


Fig. 2-7 reveals that the estimates obtained using prospective data in most cases show a better match with HFD data (supporting table can be found in the Appendix A2-6). In some cases, the match is nearly perfect: e.g., Czech Republic, Lithuania, the Netherlands, Russia, and Sweden.

This is less often the case for the estimates employing retrospective data. In fact, the match is perfect for Germany only, where these estimates seem to perform slightly better than the ones from the prospective data. Also, in Bulgaria, both types of estimates underestimate the fertility rates as per HFD.

Precise reasons for why the mismatches between the prospective and retrospective estimates occur are hard to pinpoint. Statistical errors are natural to expect, given both types of estimates come from probability samples. However, this does not explain why the discrepancies appear to be systematic in some cases (e.g., as with the oldest cohorts). As was already mentioned, the reasons for this systematic bias are numerous, including selective migration and mortality of both G1 and G2, as well as selective response and recall bias of G2. Besides, the educational attainment of G1 as reported by G2 in retrospective data can differ from the educational attainment reported by G2 in prospective data because both are measurements relevant to different time periods and because parents may still change education after having children. Thus, the use retrospective estimates in place of prospective ones must be exercised with caution, in particular, when it comes to inference about the older generations, and the prospective ones must be preferred, if available.

2.7 Discussion and Conclusion

In this study, we leveraged the inferential method developed by S&M and advanced by S&L to conduct a prospective analysis of intergenerational educational mobility in 12 countries for the generations born between 1925 and 1950. By integrating high-quality sample-rich GGS data with the battery of supplementary prospective data our study contributes some new knowledge.

First, by reconstructing and comparing prospective intergenerational educational mobility rates for the selected countries and cohorts, we can address the question opening the article. Indeed, an average higher-educated woman contributes more higher-educated offspring than a lower-educated one, and, vice versa, a lower-educated woman contributes more lower-educated offspring than a higher-educated one. This observation consistently applies across all the countries and cohorts we analyzed. However, our cross-country and cross-cohort analysis also reveals some notable variations. In terms of country differences, we find that the inequalities are largest in Poland and Romania, and lowest in Russia and Sweden. In terms of cohort changes, a stylized trend is harder to identify, although in most countries we find signs of modest (even if not very consistent) declines over time. These findings, pertaining to prospective mobility rates, generally align with the findings of conventional intergenerational social mobility research. For instance, that Sweden and Poland appeared in our findings as the cases displaying one of the smallest and the highest inequality in mobility rates respectively is not very different from how these countries are frequently ranked in social mobility literature (Breen and Jonsson 2005; Breen et al. 2009; Katrňák et al. 2012; OECD 2018). The evidence of a declining trend in these inequalities, at least in some countries, also conforms to some of the existing knowledge (Breen et al. 2009). In that sense, a prospective angle on intergenerational educational mobility does not yield any stunning or paradigm-changing results. Furthermore, this seems to align with the intuition that the inequalities in prospective mobility rates are largely due to different educational chances of children of lower- and higher-educated mothers, i.e., due to inequality of educational opportunity, and are not substantially offset by a possible negative educational gradient in fertility.

However, saying that fertility does not matter is also not entirely correct. While our counterfactual decomposition analysis indeed revealed that the contribution of fertility to mobility is generally rather small – in fact, substantially smaller than the effect of the intergenerational inheritance of advantage – this applies to different countries and cohorts to a different extent. We found the effect of educational fertility differences to be most strongly pronounced in Poland and Romania, and in some other countries (Austria, the Netherlands, Georgia, Lithuania, and Russia) it has seen a more or less consistent decline in the more recent cohorts. Some of these patterns also appear to be in line with existing research, suggesting that the steepness of the negative educational fertility gradients relates to countries' economic development level (Nisén et al. 2021; Vasireddy et al. 2023) and varies by geographic region (Klesment et al. 2014). Accordingly, this is corroborated by the fact that post-socialist countries in our analysis are overrepresented among those where the role of the gradient is most pronounced.

Furthermore, our analysis revealed that fertility differences, where strong enough, indeed partly offset the inequality in production rates of higher-educated children. This is because a higher ability to pass educational advantage to children among higher-educated women meets their generally lower levels of fertility. This seems consistent with the findings from prospective mobility literature, claiming that the intergenerational transmission of educational attainment is usually overstated in the analyses that condition on parenthood (Mare and Maralani 2006; Kye and Mare 2012; Maralani 2013; Song and Mare 2015; Lawrence and Breen 2016; Breen and Ermisch 2017; Song and Mare 2017; Breen et al. 2019). However, by looking at the inequality in production rates of lower-educated children we also found a completely different pattern, with fertility differences reinforcing rather than counterbalancing the inequality.

Moreover, this inequality-reinforcing effect appears even more pronounced than the effect of fertility on the inequality in production rates of higher-educated children, especially in contexts where the educational fertility gradient is particularly strong. Thus, the overall effect of fertility on the intergenerational reproduction of educational inequality can be rather ambiguous.

We also evaluated the role of sibship size effects as a peculiar pathway shaping prospective educational mobility rates. According to S&L "analyses that omit family size would […] overestimate educational reproduction of parents that have a higher number of children" (p.1259). Indeed, a higher fertility of lower-educated women is what potentially explains why they produce fewer higher-educated offspring compared to higher-educated women (Choi et al. 2020; Kalmijn and Werfhorst 2016; Steelman et al. 2002). While this intuition certainly has merit, our analysis showed that it is a negligible factor in shaping prospective mobility rates. This is explained simply by the fact that the educational fertility differences we found are mostly small (and often non-existent) to account for any sizeable differences in educational attainment rates between the children of higher- and lower-educated women that may be due to sibship size effects. Thus, the concern raised by S&L seems exaggerated, at least in the contexts where educational fertility gradients are weakly pronounced.

Taken together, our findings provide for yet another, less obvious generalization regarding the relationship between fertility and intergenerational educational mobility. We noted already that the role of fertility in moderating inequality in prospective mobility rates appears to be the highest in contexts also characterized by a non-trivial inequality in educational opportunities. Accordingly, it appears to be smallest in contexts where this inequality is low. This suggests that the relationship between the two is not coincidental, and it is, in fact, corroborated statistically. The correlation between the educational fertility gradient (defined as F_L/F_H) and the intergenerational educational persistence ($\ln(\frac{\pi_{H|H}/\pi_{L|H}}{\pi_{H|L}/\pi_{L|L}})$) across our entire sample of countries and cohorts is .449. Moreover, it holds not just between but also within countries (i.e., over cohorts), with the median correlation reaching .409 (although the correlation is negative in Belgium, Sweden, and Germany), thus ruling out time-invariant unobserved heterogeneity between countries. We recognize that this statistical relationship may as well be spurious and must be scrutinized more carefully, addressing all plausible confounders. However, although merely a speculation at this point, we believe it may also be an indication of a possible theoretical trade-off between fertility and social reproduction Dribe et al. (2012) faced, in particular, by higher-educated parents. In contexts, where their status maintenance objectives are more easily met (that is, in contexts characterized by a higher availability and accordingly equality of educational opportunities (Breen et al. 2009)) such parents might indeed be facing fewer constraints on having more children, i.e., on sacrificing quantity over quality, to warrant the transmission of educational advantage to their offspring. We admit that addressing this relationship in greater detail was beyond the scope of our study. Here, we merely reconstructed the inequalities in prospective educational mobility rates and explored the role of fertility in this process in the European context. However, we believe this intriguing relationship that has emerged out of our multi-country and multi-cohort analysis makes a stimulating conundrum for future research.

Finally, although we borrowed S&L's inferential method to reconstruct the prospective mobility process, we also argued that too extensive use of retrospective reports to recover the data on the reproducing generations may not be a good idea. On one hand, our cross-validation analysis revealed a reasonable match between prospective and retrospective estimates, thus underscoring the merits of the method. On the other hand, it also revealed some disparities. The use of prospective data, where available, should thus be maximized, and the use of retrospective data must be exercised only when necessary and only for the parameters that cannot be recovered from the available perspective data. Exploring the more precise reasons behind the disparities of the two kinds of estimates (e.g., addressing the role of various selection processes, such as mortality, migration and recall bias) is a possible new venue of research in this area.

Our study is not free from limitations, many of which are common to the existing prospective analyses of educational reproduction:

First and foremost, we admit that our analysis is descriptive in nature and does not make any causal claims. Relevant concerns – such as ambiguous causal status of education with respect to fertility, in particular among women – and the solutions for identification have been discussed elsewhere (Lawrence and Breen 2016; Breen and Ermisch 2017). Although our counterfactual decomposition analysis implicitly builds on the idea that fertility and the educational attainment of children is conditioned by women's education, the analysis itself is only a tool to elicit certain partial associations. This certainly limits the scope of our conclusions and their potential for policy implications.

Second, we mentioned that we deliberately focus our analysis on women in this study, because their completed fertility can be more accurately defined with prospective data due to existence of a physiological fertility limit (Menken et al. 1986) and because the accuracy of information on fathers is much lower than for mother in the retrospective GGS data. However, we did replicate our analysis for men using a similar sample selection process (as described in the data section) and present the findings in the Appendix (Figures A2-1 to A2-4 and Tables A2-7 and A2-8). In sum, the findings for men look similar, particularly regarding cross-country differences in educational production rates (i.e., with the highest found in Romania and Poland, and the lowest found – Russia and Sweden). The only notable difference concerns a slightly less pronounced role of the educational fertility gradient (cf. the contribution of –.02 and .12 children for the differences in educational production rates of higher- and lower-educated children respectively vs –.18 and .24 for women). In fact, the gradient even turns out slightly positive in Belgium and in the last two cohorts in Austria. Overall, this is consistent with the few studies that engage with the sex differences in educational fertility differentials (Kravdal and Rindfuss 2008; Lakomý 2017; Merz and Liefbroer 2017; Trimarchi and Van Bavel 2017; Van Bavel 2017). This is also consistent with what S&L find for Germany. Some research suggests that the gendered relationship between education and fertility might be mediated by partnership prospects and the patterns of assortative mating (Trimarchi and Van Bavel 2017; Nitsche et al. 2018), both of which could be considered in the future extensions of the model that we presented here.

Second, we consider only a very simple educational breakdown, by distinguishing between those who attain a tertiary degree (ISCED 5 and above) and those who do not. While considering more fine-grained distinctions makes a cross-national comparison potentially even more problematic (due to the institutional differences between the educational systems), such a rough distinction does not fully capture the degree of educational stratification and inequality. Indeed, there is an ongoing concern about how very crude measures of education easily can obscure levels and trends in educational mobility (Barone and Ruggera 2018; Furey 2021; Karlson 2021). While there is little we can do for refining the measure of educational attainment among the reproducing cohorts (i.e., “origins”), we do entertain the possibility of slightly redefining educational attainment among the offspring generation (i.e., “destinations”) by choosing different ISCED-level thresholds for higher educational attainment. Setting the threshold to ISCED-3 lead to model convergence problems for a very large number of country-cohort combinations. Setting the threshold to ISCED-4 was not as problematic for obtaining the estimates, but we also found that distinguishing ISCED-4 is primarily relevant in just four countries: Austria, Georgia, Lithuania, and Russia, where ISCED-4 level holders account for 15.4%, 22.32%, 21.6% and 16.6% of GGS samples respectively. For comparison, in all other countries, the proportion ranges from 0% (Bulgaria) to 7% (Sweden), thus corroborating the argument about substantial cross-national differences in educational systems below the tertiary – a concern also raised elsewhere (Schneider 2010). Accordingly, redefining the destinations only affects the findings for Austria, Georgia, Lithuania, and Russia, where the differences in educational reproduction rates between higher- and lower-educated women appear much smaller and this seems to be largely due to a much less pronounced effect of the attainment aspect of reproduction (see the Appendix Figures A2-5 to A2-8 and Tables A2-9 and A2-10). However, given the reasons above, one should be cautious to interpret these departures in a substantive way.

Finally, we do not account for the fact that the educational attainment can change over the life course, and thus cannot be always identified as "complete", especially among the more recent generations, for whom the paradigm of life-long learning becomes ever more relevant. Because of that, we admit that might be underestimating the level of educational attainment in the more recent generations, and notably more so among the offspring ones than the reproducing ones.

2.8 Acknowledgements

We acknowledge the producers and the distributors of data employed in our study. GGS Wave 1 data (doi:10.17026/dans-z5z-xn8g) were obtained from the GGS data providers (https://www.ggp-i.org/). EVS data (doi:10.4232/1.14021) were obtained from GESIS Data Archive (https://www.gesis.org/). WVS data (doi:10.14281/18241.17 and doi:10.14281/18241.18) were obtained from the WVS data providers (https://www.worldvaluessurvey.org/). ESS Waves 3 (doi:10.21338/NSD-ESS3-2006) and 9 (doi:10.21338/NSD-ESS9-2018) data were obtained from the ESS data providers (https://www.europeansocialsurvey.org/). SSEE data (doi:10.7910/DVN/XYUDDX) were obtained from Harvard Dataverse (https://dataverse.harvard.edu/). SHARE Wave 6 data (doi:10.6103/SHARE.w6.900) were obtained from the SHARE providers (https://share-eric.eu/)

2.9 Appendix

Dataset descriptions

Table A2-1: Description of GGS retrospective dataset samples.

Country	Share higher-educated G1 (conditional)	Share higher-educated G2	Mean fertility rate (conditional)	SD fertility rate (conditional)	Sample size	Average sample size per cohort
AUT	0.066	0.357	3.468	1.864	1952	500
BEL	0.165	0.471	3.263	1.791	2219	457
BGR	0.103	0.254	2.320	1.197	5384	1107
CZE	0.077	0.213	2.377	1.086	3408	690
GEO	0.323	0.609	3.245	1.596	4543	948
DEU	0.082	0.384	2.781	1.574	3230	675
LTU	0.270	0.559	2.759	1.475	3582	727
NLD	0.088	0.392	3.401	1.764	3032	621
POL	0.068	0.249	3.490	1.858	7074	1546
ROU	0.041	0.188	3.171	1.836	5352	1102
RUS	0.317	0.664	2.693	1.526	3119	671
SWE	0.312	0.490	2.889	1.269	2897	589

Table A2-2: Description of pooled prospective dataset samples.

Country	Share higher-educated	Share childless	Mean fertility rate	SD fertility rate	Pooled sample size	Average sample size per cohort	Surveys
AUT	0.140	0.113	2.201	1.459	3010	669	ESS(rd.3), ESS(rd.9), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), SHARE(2015)
BEL	0.240	0.101	2.239	1.541	3448	726	ESS(rd.3), ESS(rd.9), EVS(rd.1), EVS(rd.2), EVS(rd.3), EVS(rd.4), SHARE(2015)
BGR	0.162	0.052	1.815	0.900	3579	755	ESS(rd.3), ESS(rd.9), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), SSEE(1989), WVS(rd.3), WVS(rd.5)
CZE	0.092	0.071	1.976	1.044	5859	1254	ESS(rd.9), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), SHARE(2015), SSEE(1989), WVS(rd.2), WVS(rd.3), WVS(rd.7)
GEO	0.267	0.132	1.928	1.165	1199	289	EVS(rd.4), EVS(rd.5), WVS(rd.3), WVS(rd.5), WVS(rd.6)
DEU	0.154	0.136	1.893	1.223	4985	1062	ESS(rd.3), ESS(rd.9), EVS(rd.1), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), SHARE(2015), WVS(rd.3), WVS(rd.5), WVS(rd.6), WVS(rd.7)
LTU	0.207	0.090	2.021	1.201	1431	315	ESS(rd.9), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), WVS(rd.3)
NLD	0.209	0.129	2.155	1.335	2487	591	ESS(rd.3), ESS(rd.9), EVS(rd.1), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), WVS(rd.5), WVS(rd.6), WVS(rd.7)
POL	0.101	0.070	2.440	1.475	3388	712	ESS(rd.3), ESS(rd.9), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), SHARE(2015), SSEE(1989), WVS(rd.2), WVS(rd.3), WVS(rd.5), WVS(rd.6)
ROU	0.095	0.095	2.098	1.322	2163	477	ESS(rd.3), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), WVS(rd.3), WVS(rd.5), WVS(rd.6), WVS(rd.7)
RUS	0.196	0.096	1.741	1.030	4561	961	ESS(rd.3), EVS(rd.3), EVS(rd.4), EVS(rd.5), SSEE(1989), WVS(rd.2), WVS(rd.3), WVS(rd.5), WVS(rd.6), WVS(rd.7)
SWE	0.310	0.086	2.128	1.152	3544	804	ESS(rd.3), ESS(rd.9), EVS(rd.1), EVS(rd.2), EVS(rd.3), EVS(rd.4), EVS(rd.5), SHARE(2015), WVS(rd.3), WVS(rd.5), WVS(rd.6)

Model estimates for the reproduction and mobility of women

Table A2-3: Summary statistics for model estimates by country.

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
AUT	Mean	0.984	0.501	1.831	0.433	0.482	1.398	0.812	0.905	–0.330	–0.423	0.586	0.493
	SD	0.288	0.084	0.468	0.199	0.230	0.642	0.080	0.195	0.249	0.394	0.608	0.463
	Max	1.235	0.605	2.527	0.635	0.702	2.358	0.898	1.171	–0.197	–0.217	1.497	1.187
	Min	0.586	0.428	1.545	0.169	0.158	1.025	0.731	0.744	–0.703	–1.013	0.253	0.224
BEL	Mean	1.823	1.009	1.438	0.500	0.813	0.938	0.854	0.884	–0.041	–0.071	0.084	0.054
	SD	0.300	0.092	0.364	0.184	0.213	0.228	0.135	0.214	0.091	0.063	0.113	0.058
	Max	2.314	1.171	1.942	0.725	1.143	1.323	1.064	1.248	0.079	0.004	0.260	0.143
	Min	1.579	0.949	1.041	0.243	0.629	0.744	0.717	0.708	–0.168	–0.158	–0.008	–0.003
BGR	Mean	1.055	0.412	1.421	0.482	0.643	0.939	0.760	0.779	–0.117	–0.136	0.179	0.160
	SD	0.128	0.021	0.055	0.151	0.135	0.144	0.111	0.136	0.072	0.055	0.065	0.064
	Max	1.223	0.436	1.491	0.670	0.831	1.040	0.863	0.932	–0.032	–0.063	0.239	0.225
	Min	0.929	0.392	1.378	0.347	0.493	0.713	0.639	0.621	–0.222	–0.206	0.073	0.091
CZE	Mean	0.823	0.362	1.697	0.858	0.462	0.838	0.644	0.591	–0.183	–0.129	0.194	0.247
	SD	0.088	0.042	0.038	0.165	0.060	0.159	0.103	0.071	0.085	0.068	0.123	0.109
	Max	0.942	0.406	1.730	1.102	0.536	1.038	0.780	0.671	–0.060	–0.048	0.346	0.367
	Min	0.732	0.293	1.644	0.692	0.377	0.615	0.499	0.487	–0.252	–0.209	0.054	0.128
DEU	Mean	1.264	0.547	1.414	0.593	0.718	0.820	0.758	0.762	–0.040	–0.044	0.062	0.058
	SD	0.416	0.086	0.072	0.289	0.333	0.299	0.335	0.331	0.056	0.050	0.060	0.061
	Max	1.519	0.617	1.500	1.107	0.902	1.010	0.975	0.956	0.055	0.038	0.140	0.132
	Min	0.527	0.403	1.299	0.414	0.125	0.306	0.166	0.174	–0.090	–0.098	–0.016	–0.033
GEO	Mean	1.199	0.570	1.461	0.356	0.629	1.105	0.836	0.879	–0.207	–0.250	0.270	0.226
	SD	0.168	0.055	0.064	0.070	0.129	0.083	0.064	0.069	0.100	0.087	0.069	0.082

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\overline{\Delta}_H^A = \overline{\Delta}_L^A$	Δ_H^F	$\overline{\Delta}_H^F$	Δ_L^F	$\overline{\Delta}_L^F$
	Max	1.366	0.656	1.563	0.441	0.746	1.196	0.906	0.972	–0.092	–0.147	0.367	0.335
	Min	0.941	0.521	1.390	0.267	0.415	0.984	0.756	0.788	–0.341	–0.373	0.182	0.127
LTU	Mean	1.092	0.517	1.632	0.503	0.576	1.128	0.824	0.836	–0.249	–0.260	0.304	0.293
	SD	0.168	0.076	0.153	0.174	0.219	0.305	0.211	0.213	0.189	0.171	0.170	0.174
	Max	1.241	0.574	1.855	0.801	0.830	1.507	0.996	0.954	–0.019	–0.114	0.608	0.584
	Min	0.882	0.398	1.470	0.348	0.313	0.669	0.458	0.456	–0.518	–0.542	0.211	0.127
NLD	Mean	1.339	0.872	1.435	0.502	0.467	0.933	0.752	0.739	–0.285	–0.272	0.182	0.194
	SD	0.237	0.060	0.252	0.230	0.219	0.426	0.307	0.318	0.257	0.273	0.157	0.142
	Max	1.568	0.967	1.725	0.740	0.705	1.589	1.138	1.153	–0.126	–0.103	0.451	0.436
	Min	0.944	0.805	1.172	0.137	0.139	0.432	0.303	0.281	–0.740	–0.755	0.055	0.078
POL	Mean	1.315	0.545	2.034	0.426	0.770	1.607	1.064	1.172	–0.294	–0.401	0.543	0.435
	SD	0.173	0.148	0.262	0.170	0.203	0.288	0.212	0.239	0.096	0.070	0.207	0.119
	Max	1.584	0.748	2.303	0.640	0.935	1.865	1.344	1.371	–0.183	–0.345	0.818	0.574
	Min	1.165	0.391	1.682	0.238	0.430	1.128	0.788	0.775	–0.424	–0.499	0.340	0.296
ROU	Mean	1.280	0.290	1.885	0.169	0.990	1.716	1.276	1.361	–0.286	–0.371	0.439	0.355
	SD	0.082	0.050	0.073	0.094	0.073	0.091	0.060	0.080	0.105	0.070	0.055	0.048
	Max	1.412	0.348	1.957	0.259	1.080	1.861	1.345	1.477	–0.192	–0.300	0.516	0.422
	Min	1.200	0.237	1.800	0.045	0.882	1.613	1.211	1.278	–0.446	–0.468	0.388	0.306
RUS	Mean	1.097	0.741	1.126	0.448	0.356	0.678	0.500	0.538	–0.144	–0.183	0.179	0.140
	SD	0.107	0.090	0.076	0.118	0.082	0.162	0.092	0.104	0.080	0.111	0.108	0.077
	Max	1.201	0.838	1.205	0.614	0.449	0.848	0.617	0.676	–0.023	–0.010	0.278	0.214
	Min	0.953	0.603	1.017	0.307	0.242	0.469	0.372	0.433	–0.233	–0.298	–0.003	0.009
SWE	Mean	1.096	0.578	1.505	1.018	0.518	0.487	0.508	0.506	0.010	0.012	–0.021	–0.019
	SD	0.138	0.071	0.076	0.116	0.151	0.055	0.098	0.102	0.061	0.057	0.078	0.082
	Max	1.282	0.700	1.571	1.158	0.762	0.550	0.651	0.657	0.112	0.105	0.055	0.056

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
	Min	0.905	0.520	1.387	0.837	0.355	0.409	0.378	0.374	–0.047	–0.047	–0.148	–0.154
All countries	Mean	1.201	0.580	1.569	0.526	0.621	1.043	0.799	0.828	–0.178	–0.207	0.244	0.215
	SD	0.306	0.213	0.304	0.266	0.242	0.432	0.263	0.297	0.163	0.192	0.249	0.201
	Max	2.314	1.171	2.527	1.158	1.143	2.358	1.345	1.477	0.112	0.105	1.497	1.187
	Min	0.527	0.237	1.017	0.045	0.125	0.306	0.166	0.174	–0.740	–1.013	–0.148	–0.154

Table A2-4: Model estimates by country and cohort.

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
AUT	*1931–35*	0.586	0.428	2.527	0.169	0.158	2.358	0.861	1.171	–0.703	–1.013	1.497	1.187
	1936–40	1.147	0.605	1.693	0.635	0.542	1.058	0.758	0.776	–0.216	–0.234	0.300	0.282
	1941–45	1.235	0.534	1.562	0.410	0.702	1.152	0.898	0.928	–0.197	–0.226	0.253	0.224
	1946–50	0.966	0.439	1.545	0.519	0.527	1.025	0.731	0.744	–0.204	–0.217	0.294	0.281
BEL	*1925–30*	2.314	1.171	1.942	0.619	1.143	1.323	1.064	1.248	0.079	–0.105	0.260	0.075
	1931–35	1.579	0.949	1.656	0.725	0.629	0.931	0.797	0.788	–0.168	–0.158	0.134	0.143
	1936–40	1.896	0.995	1.376	0.481	0.901	0.895	0.903	0.897	–0.002	0.004	–0.008	–0.003
	1941–45	1.629	0.981	1.177	0.433	0.649	0.744	0.717	0.708	–0.068	–0.059	0.026	0.036
	1946–50	1.695	0.952	1.041	0.243	0.743	0.798	0.789	0.780	–0.046	–0.037	0.009	0.018
BGR	*1925–30*	1.001	0.396	1.378	0.347	0.605	1.032	0.828	0.811	–0.222	–0.206	0.204	0.220
	1931–35	1.223	0.392	1.382	0.350	0.831	1.032	0.863	0.932	–0.032	–0.101	0.169	0.101
	1936–40	0.963	0.405	1.383	0.670	0.559	0.713	0.640	0.621	–0.081	–0.063	0.073	0.091
	1941–45	1.158	0.433	1.471	0.431	0.725	1.040	0.829	0.876	–0.103	–0.150	0.211	0.164
	1946–50	0.929	0.436	1.491	0.613	0.493	0.878	0.639	0.653	–0.145	–0.159	0.239	0.225
CZE	*1925–30*	0.742	0.365	1.644	0.718	0.377	0.927	0.630	0.567	–0.252	–0.189	0.297	0.360
	1931–35	0.942	0.406	1.721	0.888	0.536	0.834	0.780	0.641	–0.244	–0.105	0.054	0.193

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\overline{\Delta}_H^A = \overline{\Delta}_L^A$	Δ_H^F	$\overline{\Delta}_H^F$	Δ_L^F	$\overline{\Delta}_L^F$
	1936–40	0.838	0.376	1.730	0.692	0.462	1.038	0.692	0.671	–0.230	–0.209	0.346	0.367
	1941–45	0.861	0.367	1.669	0.891	0.494	0.778	0.621	0.589	–0.127	–0.095	0.157	0.189
	1946–50	0.732	0.293	1.718	1.102	0.439	0.615	0.499	0.487	–0.060	–0.048	0.117	0.128
DEU	*1925–30*	1.393	0.569	1.423	0.414	0.825	1.010	0.914	0.922	–0.090	–0.098	0.096	0.087
	1931–35	1.519	0.617	1.500	0.494	0.902	1.006	0.975	0.956	–0.073	–0.054	0.031	0.049
	1936–40	1.397	0.542	1.433	0.463	0.856	0.970	0.908	0.914	–0.053	–0.058	0.061	0.056
	1941–45	1.485	0.604	1.299	0.489	0.881	0.810	0.826	0.843	0.055	0.038	–0.016	–0.033
	1946–50	0.527	0.403	1.413	1.107	0.125	0.306	0.166	0.174	–0.041	–0.050	0.140	0.132
GEO	*1925–30*	0.941	0.526	1.390	0.267	0.415	1.123	0.756	0.788	–0.341	–0.373	0.367	0.335
	1931–35	1.175	0.521	1.465	0.400	0.654	1.065	0.818	0.861	–0.164	–0.207	0.247	0.204
	1936–40	1.183	0.564	1.563	0.367	0.619	1.196	0.896	0.916	–0.277	–0.297	0.300	0.280
	1941–45	1.366	0.656	1.425	0.441	0.710	0.984	0.802	0.857	–0.092	–0.147	0.182	0.127
	1946–50	1.331	0.585	1.462	0.304	0.746	1.158	0.906	0.972	–0.160	–0.226	0.252	0.185
LTU	*1925–30*	0.942	0.562	1.855	0.348	0.381	1.507	0.898	0.923	–0.518	–0.542	0.608	0.584
	1931–35	1.228	0.398	1.509	0.439	0.830	1.070	0.848	0.943	–0.019	–0.114	0.221	0.127
	1936–40	1.241	0.574	1.678	0.435	0.667	1.243	0.996	0.954	–0.329	–0.287	0.247	0.289
	1941–45	1.168	0.481	1.646	0.492	0.687	1.154	0.920	0.904	–0.232	–0.217	0.234	0.250
	1946–50	0.882	0.569	1.470	0.801	0.313	0.669	0.458	0.456	–0.145	–0.143	0.211	0.213
NLD	*1925–30*	1.365	0.967	1.725	0.137	0.397	1.589	1.138	1.153	–0.740	–0.755	0.451	0.436
	1931–35	1.462	0.847	1.665	0.647	0.616	1.018	0.841	0.823	–0.225	–0.207	0.177	0.195
	1936–40	1.568	0.863	1.388	0.501	0.705	0.887	0.832	0.809	–0.126	–0.103	0.055	0.078
	1941–45	1.355	0.877	1.225	0.483	0.478	0.742	0.646	0.631	–0.168	–0.152	0.096	0.112
	1946–50	0.944	0.805	1.172	0.740	0.139	0.432	0.303	0.281	–0.164	–0.142	0.129	0.151
POL	*1925–30*	1.165	0.391	2.303	0.640	0.774	1.664	0.957	1.126	–0.183	–0.352	0.707	0.538
	1931–35	1.267	0.475	2.270	0.405	0.792	1.865	1.047	1.291	–0.255	–0.499	0.818	0.574

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
	1936–40	1.382	0.462	2.025	0.238	0.920	1.787	1.344	1.371	–0.424	–0.450	0.444	0.417
	1941–45	1.584	0.649	1.886	0.295	0.935	1.591	1.184	1.295	–0.249	–0.361	0.407	0.296
	1946–50	1.178	0.748	1.682	0.554	0.430	1.128	0.788	0.775	–0.358	–0.345	0.340	0.353
ROU	*1925–30*	1.296	0.287	1.906	0.045	1.009	1.861	1.345	1.477	–0.337	–0.468	0.516	0.385
	1931–35	1.263	0.246	1.800	0.096	1.017	1.704	1.226	1.377	–0.209	–0.360	0.478	0.326
	1936–40	1.200	0.237	1.816	0.204	0.963	1.613	1.211	1.278	–0.249	–0.315	0.401	0.335
	1941–45	1.230	0.348	1.957	0.241	0.882	1.716	1.328	1.294	–0.446	–0.412	0.388	0.422
	1946–50	1.412	0.332	1.944	0.259	1.080	1.685	1.272	1.379	–0.192	–0.300	0.413	0.306
RUS	*1925–30*	1.156	0.838	1.205	0.375	0.318	0.830	0.552	0.616	–0.233	–0.298	0.278	0.214
	1931–35	1.201	0.783	1.155	0.307	0.419	0.848	0.617	0.676	–0.199	–0.258	0.230	0.172
	1936–40	1.014	0.772	1.017	0.436	0.242	0.581	0.372	0.433	–0.131	–0.192	0.209	0.147
	1941–45	1.160	0.711	1.082	0.614	0.449	0.469	0.472	0.459	–0.023	–0.010	–0.003	0.009
	1946–50	0.953	0.603	1.171	0.506	0.351	0.665	0.485	0.507	–0.134	–0.156	0.179	0.158
SWE	*1925–30*	0.905	0.550	1.567	1.158	0.355	0.409	0.378	0.374	–0.023	–0.019	0.031	0.035
	1931–35	1.282	0.520	1.523	1.019	0.762	0.503	0.651	0.657	0.112	0.105	–0.148	–0.154
	1936–40	1.100	0.571	1.571	1.055	0.529	0.516	0.533	0.524	–0.004	0.005	–0.018	–0.008
	1941–45	1.046	0.550	1.477	1.018	0.496	0.458	0.483	0.481	0.013	0.015	–0.025	–0.023
	1946–50	1.148	0.700	1.387	0.837	0.448	0.550	0.495	0.495	–0.047	–0.047	0.055	0.056

Cross-validation estimates

Table A2-5: Cross-validation estimates of education-specific conditional fertility.

Country	Cohort	$F^{PRO}_{f>0\|H}$	$F^{RETRO}_{f>0\|H}$	$F^{PRO}_{f>0\|H} - F^{RETRO}_{f>0\|H}$	$\frac{\left\|F^{PRO}_{f>0\|H} - F^{RETRO}_{f>0\|H}\right\|}{\min\left(F^{PRO}_{f>0\|H}, F^{RETRO}_{f>0\|H}\right)}$	$F^{PRO}_{f>0\|L}$	$F^{RETRO}_{f>0\|L}$	$F^{PRO}_{f>0\|L} - F^{RETRO}_{f>0\|L}$	$\frac{\left\|F^{PRO}_{f>0\|L} - F^{RETRO}_{f>0\|L}\right\|}{\min\left(F^{PRO}_{f>0\|L}, F^{RETRO}_{f>0\|L}\right)}$
AUT	*1931–35*	1.427	2.073	–0.646	45.3%	3.152	3.224	–0.072	2.3%
	1936–40	2.290	1.623	0.668	41.1%	2.570	2.642	–0.072	2.8%
	1941–45	2.126	2.088	0.037	1.8%	2.384	2.455	–0.071	3%
	1946–50	2.347	2.198	0.149	6.8%	2.195	2.380	–0.184	8.4%
BEL	*1925–30*	3.628	3.263	0.365	11.2%	3.386	2.674	0.712	26.6%
	1931–35	2.907	2.958	–0.051	1.8%	2.909	2.548	0.360	14.1%
	1936–40	2.550	2.661	–0.111	4.4%	2.590	2.456	0.134	5.5%
	1941–45	2.399	2.390	0.010	.4%	2.377	2.188	0.189	8.6%
	1946–50	2.104	2.281	–0.177	8.4%	2.157	2.128	0.029	1.4%
BGR	*1925–30*	1.535	1.601	–0.066	4.3%	1.927	1.976	–0.049	2.5%
	1931–35	1.655	1.493	0.162	10.9%	1.846	1.969	–0.123	6.7%
	1936–40	1.697	1.593	0.104	6.5%	1.895	1.968	–0.073	3.9%
	1941–45	1.683	1.665	0.018	1.1%	1.996	1.993	0.003	.2%
	1946–50	1.709	1.680	0.029	1.7%	2.019	1.929	0.089	4.6%
CZE	*1925–30*	1.702	1.625	0.077	4.7%	2.191	2.043	0.148	7.3%
	1931–35	1.984	1.697	0.287	16.9%	2.262	2.043	0.219	10.7%
	1936–40	1.734	1.873	–0.139	8%	2.264	2.033	0.231	11.4%
	1941–45	1.891	1.578	0.313	19.8%	2.132	1.889	0.243	12.9%
	1946–50	1.951	1.837	0.114	6.2%	2.151	1.961	0.191	9.7%
DEU	*1925–30*	2.495	2.157	0.338	15.7%	2.387	2.068	0.319	15.4%
	1931–35	2.192	2.460	–0.269	12.3%	2.368	2.301	0.067	2.9%

Country	**Cohort**	$F^{\mathrm{PRO}}_{f>0\mid H}$	$F^{\mathrm{RETRO}}_{f>0\mid H}$	$F^{\mathrm{PRO}}_{f>0\mid H} - F^{\mathrm{RETRO}}_{f>0\mid H}$	$\frac{\left\lvert F^{\mathrm{PRO}}_{f>0\mid H} - F^{\mathrm{RETRO}}_{f>0\mid H}\right\rvert}{\min\left(F^{\mathrm{PRO}}_{f>0\mid H}, F^{\mathrm{RETRO}}_{f>0\mid H}\right)}$	$F^{\mathrm{PRO}}_{f>0\mid L}$	$F^{\mathrm{RETRO}}_{f>0\mid L}$	$F^{\mathrm{PRO}}_{f>0\mid L} - F^{\mathrm{RETRO}}_{f>0\mid L}$	$\frac{\left\lvert F^{\mathrm{PRO}}_{f>0\mid L} - F^{\mathrm{RETRO}}_{f>0\mid L}\right\rvert}{\min\left(F^{\mathrm{PRO}}_{f>0\mid L}, F^{\mathrm{RETRO}}_{f>0\mid L}\right)}$
	1936–40	2.244	1.985	0.259	13.1%	2.220	2.173	0.047	2.1%
	1941–45	2.155	1.884	0.272	14.4%	2.146	1.967	0.179	9.1%
	1946–50	1.926	1.845	0.080	4.4%	2.039	1.975	0.064	3.2%
GEO	*1925–30*	1.433	2.174	–0.740	51.7%	2.205	2.857	–0.652	29.6%
	1931–35	1.995	2.130	–0.135	6.8%	2.294	2.737	–0.443	19.3%
	1936–40	1.862	2.100	–0.238	12.8%	2.386	2.779	–0.393	16.5%
	1941–45	2.066	2.067	–0.001	0%	2.321	2.601	–0.280	12%
	1946–50	2.007	2.004	0.003	.2%	2.278	2.418	–0.140	6.1%
LTU	*1925–30*	1.679	1.982	–0.303	18%	2.846	2.389	0.457	19.1%
	1931–35	1.782	1.693	0.089	5.3%	2.222	2.299	–0.077	3.5%
	1936–40	1.854	1.665	0.189	11.3%	2.381	2.156	0.224	10.4%
	1941–45	2.041	1.722	0.318	18.5%	2.266	2.060	0.207	10%
	1946–50	1.801	1.977	–0.175	9.7%	2.154	2.048	0.106	5.2%
NLD	*1925–30*	2.963	3.148	–0.185	6.3%	3.114	3.299	–0.185	5.9%
	1931–35	2.610	3.143	–0.533	20.4%	2.953	2.854	0.099	3.5%
	1936–40	2.502	2.806	–0.304	12.1%	2.573	2.637	–0.064	2.5%
	1941–45	2.378	2.552	–0.174	7.3%	2.312	2.491	–0.179	7.7%
	1946–50	2.212	2.657	–0.445	20.1%	2.205	2.291	–0.086	3.9%
POL	*1925–30*	2.147	1.965	0.182	9.3%	2.951	3.045	–0.094	3.2%
	1931–35	1.944	1.788	0.156	8.7%	2.911	2.845	0.067	2.3%
	1936–40	1.826	1.733	0.093	5.3%	2.660	2.715	–0.055	2.1%
	1941–45	2.012	1.589	0.423	26.7%	2.646	2.568	0.078	3%
	1946–50	2.055	1.841	0.214	11.6%	2.575	2.363	0.212	9%
ROU	*1925–30*	1.462	1.505	–0.043	3%	2.339	2.443	–0.104	4.4%

Country	Cohort	$F^{\mathrm{PRO}}_{f>0\|H}$	$F^{\mathrm{RETRO}}_{f>0\|H}$	$F^{\mathrm{PRO}}_{f>0\|H} - F^{\mathrm{RETRO}}_{f>0\|H}$	$\frac{\left\|F^{\mathrm{PRO}}_{f>0\|H} - F^{\mathrm{RETRO}}_{f>0\|H}\right\|}{\min\left(F^{\mathrm{PRO}}_{f>0\|H}, F^{\mathrm{RETRO}}_{f>0\|H}\right)}$	$F^{\mathrm{PRO}}_{f>0\|L}$	$F^{\mathrm{RETRO}}_{f>0\|L}$	$F^{\mathrm{PRO}}_{f>0\|L} - F^{\mathrm{RETRO}}_{f>0\|L}$	$\frac{\left\|F^{\mathrm{PRO}}_{f>0\|L} - F^{\mathrm{RETRO}}_{f>0\|L}\right\|}{\min\left(F^{\mathrm{PRO}}_{f>0\|L}, F^{\mathrm{RETRO}}_{f>0\|L}\right)}$
	1931–35	1.508	1.896	–0.388	25.7%	2.296	2.387	–0.091	4%
	1936–40	1.714	1.469	0.245	16.7%	2.311	2.309	0.002	.1%
	1941–45	1.780	1.527	0.252	16.5%	2.533	2.360	0.173	7.3%
	1946–50	1.826	1.685	0.141	8.4%	2.422	2.260	0.162	7.2%
RUS	*1925–30*	1.862	1.787	0.075	4.2%	2.302	2.337	–0.035	1.5%
	1931–35	1.624	1.767	–0.143	8.8%	2.167	2.239	–0.071	3.3%
	1936–40	1.570	1.671	–0.101	6.4%	1.932	2.187	–0.255	13.2%
	1941–45	1.873	1.736	0.137	7.9%	1.990	2.119	–0.129	6.5%
	1946–50	1.565	1.702	–0.138	8.8%	1.889	1.905	–0.016	.9%
SWE	*1925–30*	2.138	2.533	–0.396	18.5%	2.447	2.447	0.000	0%
	1931–35	2.573	2.426	0.148	6.1%	2.282	2.570	–0.288	12.6%
	1936–40	2.436	2.576	–0.140	5.7%	2.302	2.343	–0.041	1.8%
	1941–45	2.241	2.450	–0.209	9.3%	2.182	2.418	–0.236	10.8%
	1946–50	2.246	2.408	–0.162	7.2%	2.265	2.285	–0.020	.9%

Table A2-6: Cross-validation estimates of cohort completed fertility.

Country	Cohort	F^{PRO}	F^{RETRO}	F^{HFD}	$\Delta F^{PRO} = F^{PRO} - F^{HFD}$	$\Delta F^{RETRO} = F^{RETRO} - F^{HFD}$	$\|\Delta F^{PRO}\| - \|\Delta F^{RETRO}\|$
AUT	*1931-35*	2.777	2.867	2.397	0.381	0.471	0.090
	1936-40	2.249	2.259	2.304	–0.055	–0.044	–0.010
	1941-45	2.044	2.096	1.995	0.049	0.100	0.052
	1946-50	1.898	2.020	1.921	–0.023	0.099	0.076
BGR	*1931-35*	1.754	1.845	2.042	–0.288	–0.197	–0.091
	1936-40	1.769	1.818	2.050	–0.281	–0.232	–0.049

Country	Cohort	F^{PRO}	F^{RETRO}	F^{HFD}	$\Delta F^{PRO} = F^{PRO} - F^{HFD}$	$\Delta F^{RETRO} = F^{RETRO} - F^{HFD}$	$\lvert\Delta F^{PRO}\rvert - \lvert\Delta F^{RETRO}\rvert$
	1941-45	1.856	1.851	2.082	–0.226	–0.231	0.005
	1946-50	1.859	1.784	2.062	–0.203	–0.278	0.075
CZE	*1931-35*	2.107	1.898	2.113	–0.006	–0.215	0.210
	1936-40	2.066	1.874	2.096	–0.030	–0.222	0.192
	1941-45	2.007	1.768	2.048	–0.041	–0.279	0.238
	1946-50	1.997	1.824	2.089	–0.091	–0.264	0.173
DEU	*1931-35*	2.104	2.080	2.183	–0.079	–0.103	0.024
	1936-40	1.960	1.896	2.063	–0.103	–0.166	0.063
	1941-45	1.916	1.741	1.841	0.075	–0.100	0.025
	1946-50	1.779	1.721	1.754	0.025	–0.034	0.008
LTU	*1941-45*	2.015	1.806	1.985	0.031	–0.179	0.148
	1946-50	1.948	1.915	2.017	–0.070	–0.103	0.033
NLD	*1931-35*	2.450	2.445	2.499	–0.049	–0.054	0.004
	1936-40	2.220	2.309	2.327	–0.108	–0.018	–0.089
	1941-45	2.054	2.211	2.087	–0.033	0.125	0.092
	1946-50	1.896	2.045	1.915	–0.018	0.130	0.112
RUS	*1941-45*	1.790	1.861	1.798	–0.008	0.063	0.055
	1946-50	1.718	1.753	1.826	–0.108	–0.073	–0.035
SWE	*1925-30*	2.109	2.164	2.085	0.025	0.079	0.055
	1931-35	2.095	2.273	2.141	–0.046	0.132	0.086
	1936-40	2.146	2.209	2.083	0.062	0.125	0.063
	1941-45	2.038	2.249	1.995	0.043	0.254	0.211
	1946-50	2.050	2.115	1.999	0.051	0.116	0.065

B2-1 Mathematical correspondence between counterfactual educational mobility rates

Proof that $\boldsymbol{\Delta_L^A = \Delta_H^A}$. Let's define the attainment aspect of the difference in educational production of higher-educated children as (see Eq. 2-2 in the main text):

$$\Delta_H^A = \frac{1}{2}\left(\left(r_{HH} - r_{HH}^{\pi_{j=H|i=L,f}}\right) + \left(r_{HL}^{\pi_{j=H|i=H,f}} - r_{HL}\right)\right)$$

Eq. A2-1

Accordingly, the attainment aspect of the difference in educational production rates of lower-educated children can be defined as:

$$\Delta_L^A = \frac{1}{2}\left(\left(r_{LL} - r_{LL}^{\pi_{j=L|i=H,f}}\right) + \left(r_{LH}^{\pi_{j=L|i=L,f}} - r_{LH}\right)\right)$$

Eq. A2-2

Using the fact that $\pi_{j=H|i=L,f} = 1 - \pi_{j=L|i=L,f}$, we can establish the correspondence between the following quantities that will be involved in the proof:

$$\begin{aligned} r_{LL} &= \sum_f \pi_{f|i=L}\, f \pi_{j=L|i=L,f} = \sum_f \pi_{f|i=L}\, f\left(1 - \pi_{j=H|i=L,f}\right) \\ &= \underbrace{\sum_f \pi_{f|i=L}\, f}_{F_L} - \underbrace{\sum_f \pi_{f|i=L}\, f \pi_{j=H|i=L,f}}_{r_{HL}} \end{aligned}$$

Eq. A2-3

$$\begin{aligned} r_{LH} &= \sum_f \pi_{f|i=H}\, f \pi_{j=L|i=H,f} = \sum_f \pi_{f|i=H}\, f\left(1 - \pi_{j=H|i=H,f}\right) \\ &= \underbrace{\sum_f \pi_{f|i=H}\, f}_{F_H} - \underbrace{\sum_f \pi_{f|i=H}\, f \pi_{j=H|i=L,f}}_{r_{HH}} \end{aligned}$$

Eq. A2-4

$$\begin{aligned} r_{LL}^{\pi_{j=L|i=H,f}} &= \sum_f \pi_{f|i=L}\, f \pi_{j=L|i=H,f} = \sum_f \pi_{f|i=L}\, f\left(1 - \pi_{j=H|i=H,f}\right) \\ &= \underbrace{\sum_f \pi_{f|i=L}\, f}_{F_L} - \underbrace{\sum_f \pi_{f|i=L}\, f \pi_{j=H|i=H,f}}_{r_{HL}^{\pi_{j=H|i=H,f}}} \end{aligned}$$

Eq. A2-5

$$\begin{aligned} r_{LH}^{\pi_{j=L|i=L,f}} &= \sum_f \pi_{f|i=H}\, f \pi_{j=L|i=L,f} = \sum_f \pi_{f|i=H}\, f\left(1 - \pi_{j=H|i=L,f}\right) \\ &= \underbrace{\sum_f \pi_{f|i=H}\, f}_{F_H} - \underbrace{\sum_f \pi_{f|i=H}\, f \pi_{j=H|i=L,f}}_{r_{HH}^{\pi_{j=H|i=L,f}}} \end{aligned}$$

Eq. A2-6

Using Eq. A2-3 through Eq. A2-6 above, the proof then boils down to the following transformation of Eq. A2-2 into Eq. A2-1:

$$\Delta_{QN}^{L} = \frac{1}{2}\left(\left(\underbrace{F_L - r_{HL}}_{r_{LL}}\underbrace{-F_L + r_{HL}^{\pi_{j=H|i=H,f}}}_{-r_{LL}^{\pi_{j=L|i=H,f}}}\right) + \left(\underbrace{F_H - r_{HH}^{\pi_{j=H|i=L,f}}}_{r_{LH}^{\pi_{j=L|i=L,f}}}\underbrace{-F_H + r_{HH}}_{-r_{LH}}\right)\right)$$
$$= \frac{1}{2}\left(\left(r_{HL}^{\pi_{j=H|i=H,f}} - r_{HL}\right) + \left(r_{HH} - r_{HH}^{\pi_{j=H|i=L,f}}\right)\right) = \Delta_{QN}^{H}$$

Eq. A2-7

Proof that $\boldsymbol{\Delta_L^F = F_L - F_H + \Delta_H^F}$. Let's define the fertility aspect of the difference in the educational production rates of higher-educated children as (see Eq. 2-2 in the main text):

$$\Delta_H^F = \frac{1}{2}\left(\left(r_{HH} - r_{HH}^{\pi_{f|i=L}}\right) + \left(r_{HL}^{\pi_{f|i=H}} - r_{HL}\right)\right)$$

Eq. A2-8

Accordingly, the fertility of the difference in the educational production rates of lower-educated children can be defined as:

$$\Delta_L^F = \frac{1}{2}\left(\left(r_{LL} - r_{LL}^{\pi_{f|i=H}}\right) + \left(r_{LH}^{\pi_{f|i=L}} - r_{LH}\right)\right)$$

Eq. A2-9

Using the fact that $\pi_{j=H|i=L,f} = 1 - \pi_{j=L|i=L,f}$, we can establish the correspondence between the following additional quantities that will be involved in the proof:

$$r_{LL}^{\pi_{f|i=H}} = \sum_f \pi_{f|i=H}\, f \pi_{j=L|i=L,f} = \sum_f \pi_{f|i=H}\, f\left(1 - \pi_{j=H|i=L,f}\right)$$
$$= \underbrace{\sum_f \pi_{f|i=H}\, f}_{F_H} - \underbrace{\sum_f \pi_{f|i=H}\, f \pi_{j=H|i=L,f}}_{r_{HL}^{\pi_{f|i=H}}}$$

Eq. A2-10

$$r_{LH}^{\pi_{f|i=L}} = \sum_f \pi_{f|i=L}\, f \pi_{j=L|i=H,f} = \sum_f \pi_{f|i=L}\, f\left(1 - \pi_{j=H|i=H,f}\right)$$
$$= \underbrace{\sum_f \pi_{f|i=L}\, f}_{F_L} - \underbrace{\sum_f \pi_{f|i=L}\, f \pi_{j=H|i=H,f}}_{r_{HH}^{\pi_{f|i=L}}}$$

Eq. A2-11

Using Eq. A2-3, Eq. A2-4, Eq. A2-10, and Eq. A2-11, the proof then boils down to the following transformation of Eq. A2-9 into Eq. A2-8:

$$\Delta_{QN}^{L} = \frac{1}{2}\left(\left(\underbrace{F_L - r_{HL}}_{r_{LL}} \underbrace{-F_H + r_{HL}^{\pi_{f|i=H}}}_{-r_{LL}^{\pi_{f|i=H}}}\right) + \left(\underbrace{F_L - r_{HH}^{\pi_{f|i=L}}}_{r_{LH}^{\pi_{f|i=L}}} \underbrace{-F_H + r_{HH}}_{-r_{LH}}\right)\right)$$

$$= \frac{1}{2}\left(2F_L - 2F_H + \left(r_{HL}^{\pi_{f|i=H}} - r_{HL}\right) + \left(r_{HH} - r_{HH}^{\pi_{f|i=L}}\right)\right) = F_L - F_H + \Delta_{QN}^{H}$$

Eq. A2-12

Model estimates for the reproduction and mobility of men

Figure A2-1: Prospective educational mobility rates of higher- and lower-educated men in terms of production of *higher-educated children* ($\boldsymbol{r_{HH}}$ and $\boldsymbol{r_{HL}}$).

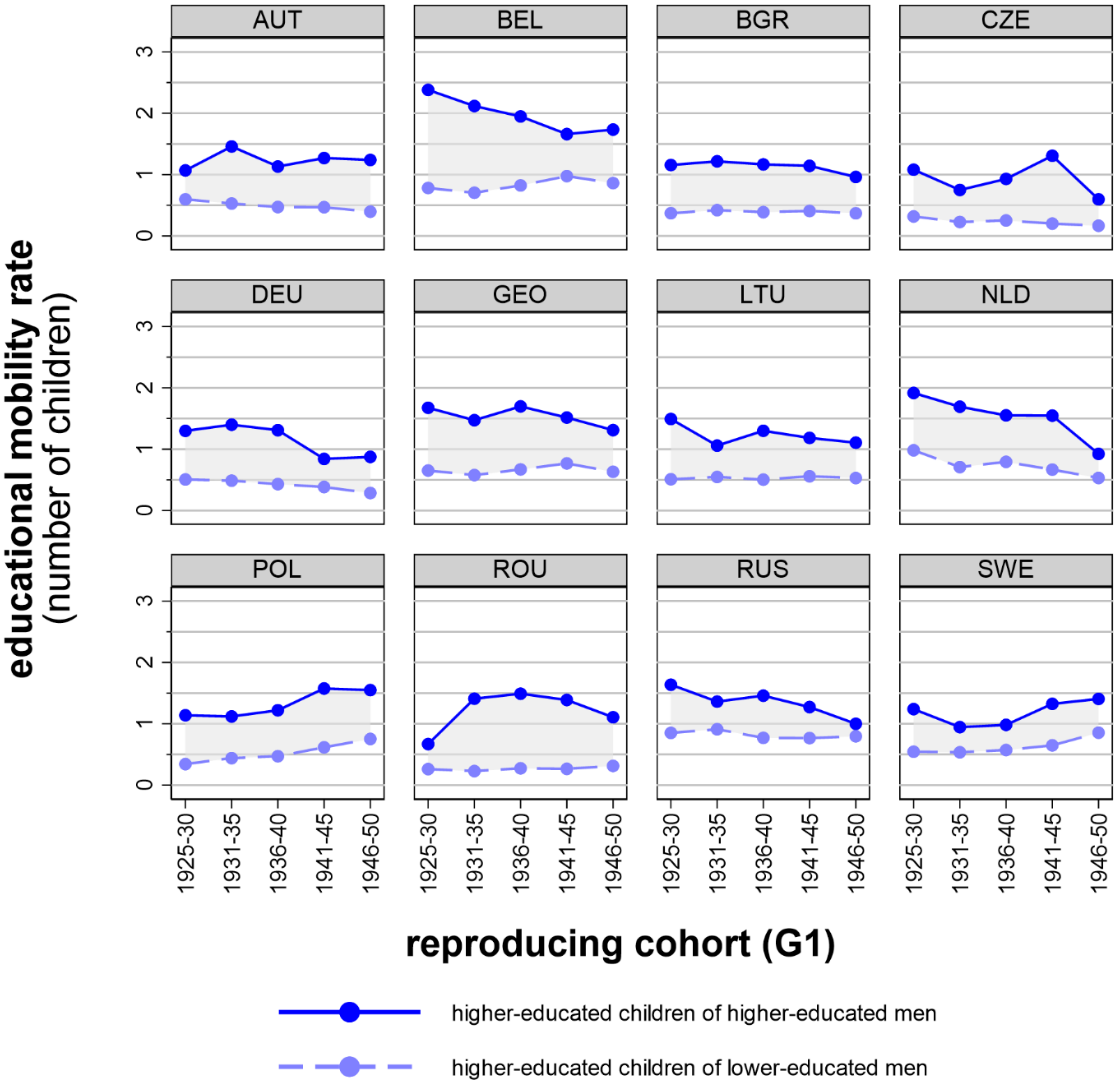


Figure A2-2: Prospective educational mobility rates of higher- and lower-educated men in terms of production of *lower-educated children* (r_{LH} and r_{LL}).

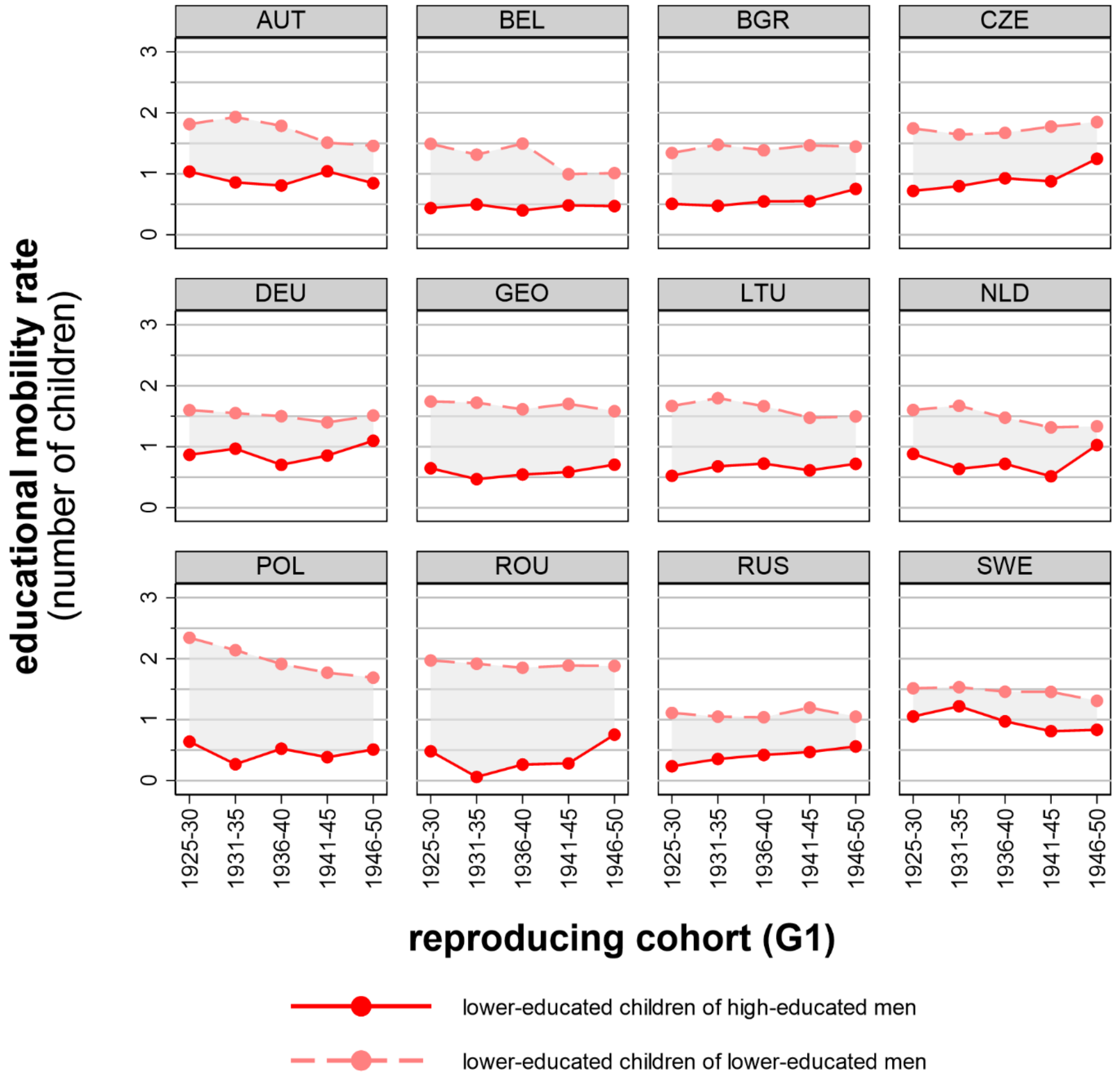


Figure A2-3: Decomposition of differences in educational production rates of higher-educated children ($\boldsymbol{\Delta}_H$) for men.

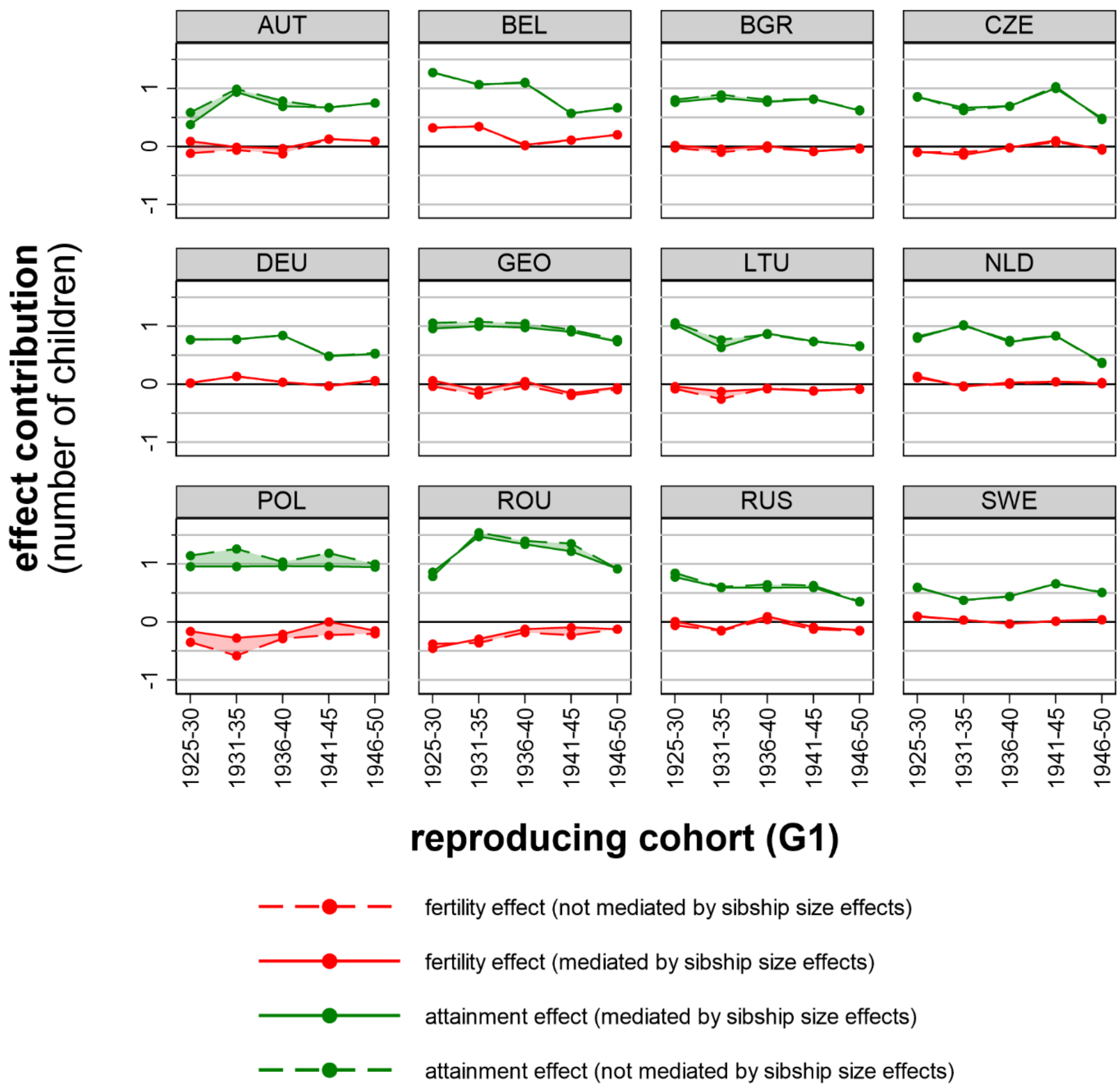


Figure A2-4: Decomposition of differences in educational production rates of lower-educated children ($\boldsymbol{\Delta}_L$) for men.

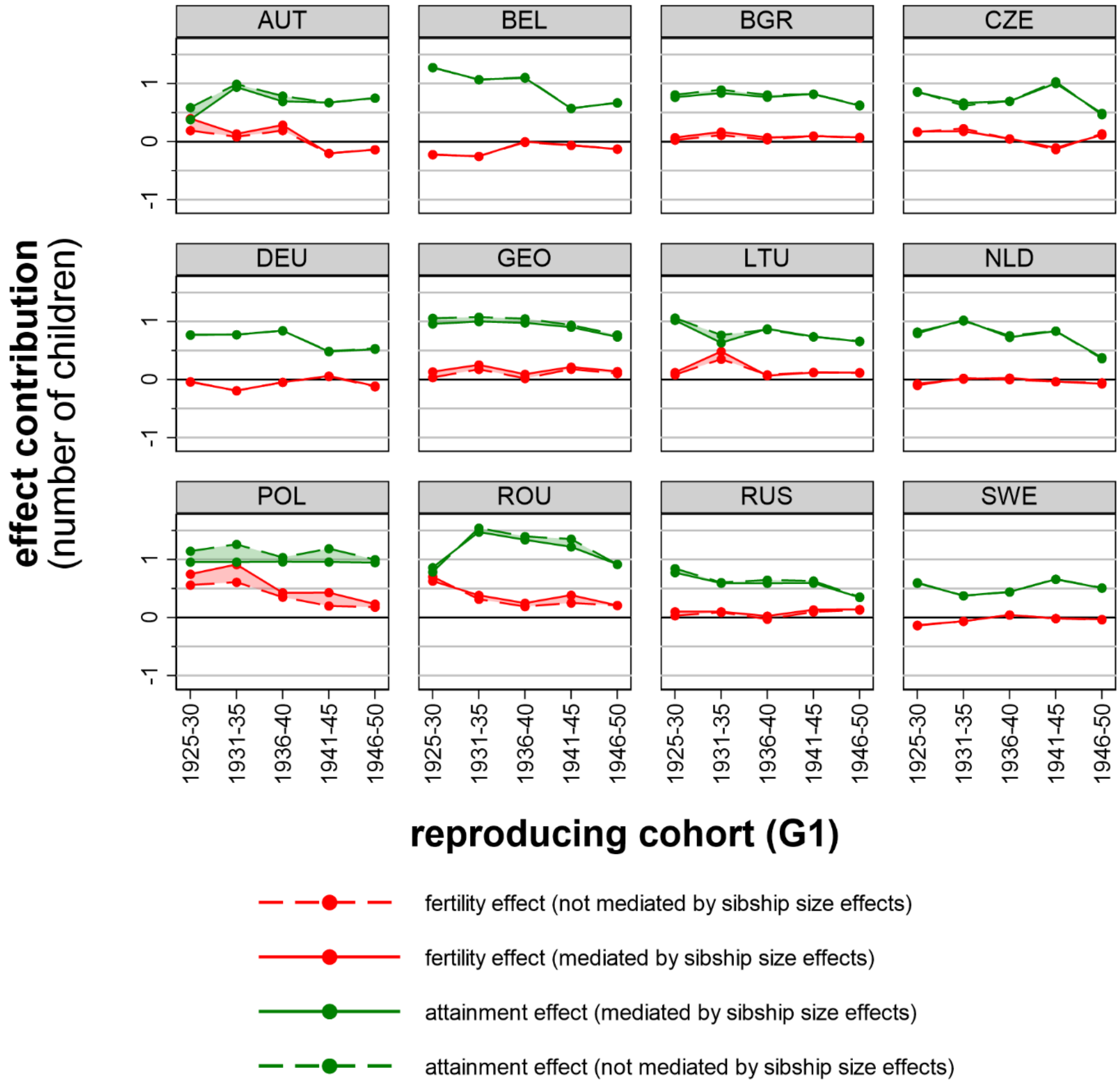


Table A2-7: Summary statistics for model estimates for men by country.

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
AUT	Mean	1.234	0.493	1.701	0.919	0.741	0.783	0.687	0.757	0.054	–0.016	0.095	0.026
	SD	0.150	0.075	0.205	0.112	0.179	0.250	0.201	0.151	0.070	0.120	0.261	0.185
	Max	1.459	0.598	1.932	1.042	0.929	1.073	0.939	0.990	0.128	0.130	0.398	0.192
	Min	1.069	0.396	1.460	0.809	0.471	0.470	0.381	0.587	–0.032	–0.126	–0.203	–0.201
BEL	Mean	1.969	0.830	1.262	0.458	1.139	0.804	0.937	0.939	0.202	0.201	–0.133	–0.134
	SD	0.293	0.101	0.247	0.039	0.376	0.275	0.301	0.302	0.135	0.140	0.107	0.102
	Max	2.382	0.976	1.496	0.499	1.600	1.096	1.278	1.276	0.345	0.346	–0.000	–0.012
	Min	1.661	0.705	0.995	0.400	0.685	0.512	0.572	0.575	0.029	0.017	–0.253	–0.251
BGR	Mean	1.129	0.392	1.424	0.567	0.738	0.857	0.762	0.791	–0.024	–0.053	0.095	0.066
	SD	0.098	0.022	0.058	0.108	0.085	0.114	0.086	0.097	0.044	0.034	0.041	0.038
	Max	1.217	0.421	1.479	0.753	0.796	1.004	0.838	0.894	0.022	–0.022	0.166	0.110
	Min	0.962	0.370	1.343	0.476	0.592	0.694	0.619	0.631	–0.086	–0.098	0.071	0.027
CZE	Mean	0.933	0.234	1.738	0.914	0.700	0.824	0.742	0.736	–0.042	–0.036	0.082	0.088
	SD	0.278	0.057	0.082	0.202	0.262	0.160	0.195	0.219	0.094	0.071	0.117	0.141
	Max	1.308	0.318	1.849	1.247	1.106	1.027	1.003	1.033	0.104	0.073	0.178	0.227
	Min	0.598	0.167	1.646	0.720	0.430	0.602	0.489	0.465	–0.147	–0.099	–0.105	–0.136
DEU	Mean	1.145	0.419	1.513	0.899	0.726	0.614	0.679	0.682	0.047	0.044	–0.065	–0.068
	SD	0.265	0.089	0.074	0.146	0.196	0.153	0.164	0.159	0.061	0.060	0.093	0.094
	Max	1.400	0.507	1.600	1.098	0.912	0.797	0.844	0.843	0.139	0.136	0.062	0.056
	Min	0.842	0.285	1.400	0.704	0.458	0.414	0.483	0.489	–0.025	–0.031	–0.190	–0.192
GEO	Mean	1.535	0.660	1.673	0.590	0.874	1.083	0.915	0.979	–0.041	–0.105	0.168	0.104
	SD	0.158	0.070	0.070	0.092	0.158	0.136	0.107	0.128	0.096	0.079	0.066	0.076
	Max	1.698	0.769	1.742	0.707	1.027	1.255	1.001	1.077	0.064	–0.023	0.254	0.180

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\overline{\Delta}_H^A = \overline{\Delta}_L^A$	Δ_H^F	$\overline{\Delta}_H^F$	Δ_L^F	$\overline{\Delta}_L^F$
	Min	1.312	0.578	1.583	0.468	0.679	0.877	0.735	0.772	–0.155	–0.192	0.093	0.021
LTU	Mean	1.229	0.530	1.621	0.652	0.698	0.969	0.785	0.818	–0.087	–0.119	0.184	0.152
	SD	0.174	0.023	0.134	0.084	0.191	0.160	0.162	0.153	0.034	0.078	0.170	0.113
	Max	1.493	0.559	1.798	0.724	0.983	1.145	1.022	1.062	–0.039	–0.064	0.484	0.352
	Min	1.059	0.505	1.475	0.524	0.511	0.778	0.635	0.664	–0.123	–0.256	0.069	0.083
NLD	Mean	1.527	0.737	1.481	0.756	0.790	0.725	0.753	0.757	0.037	0.032	–0.028	–0.032
	SD	0.369	0.167	0.158	0.202	0.238	0.264	0.236	0.241	0.066	0.053	0.046	0.048
	Max	1.917	0.983	1.672	1.028	0.984	1.036	1.026	1.011	0.139	0.113	0.028	0.025
	Min	0.924	0.532	1.318	0.516	0.392	0.308	0.380	0.360	–0.042	–0.027	–0.073	–0.099
POL	Mean	1.321	0.525	1.971	0.466	0.796	1.506	0.955	1.125	–0.159	–0.329	0.551	0.380
	SD	0.224	0.161	0.269	0.142	0.103	0.277	0.005	0.108	0.103	0.152	0.275	0.199
	Max	1.576	0.753	2.344	0.640	0.960	1.870	0.960	1.261	0.002	–0.203	0.914	0.609
	Min	1.120	0.343	1.689	0.269	0.680	1.179	0.946	0.999	–0.276	–0.581	0.233	0.180
ROU	Mean	1.213	0.269	1.902	0.369	0.944	1.533	1.162	1.199	–0.217	–0.254	0.371	0.334
	SD	0.337	0.030	0.045	0.262	0.344	0.264	0.266	0.328	0.153	0.111	0.164	0.212
	Max	1.491	0.313	1.972	0.754	1.217	1.857	1.474	1.541	–0.095	–0.123	0.629	0.704
	Min	0.669	0.229	1.852	0.060	0.408	1.127	0.861	0.786	–0.453	–0.378	0.209	0.189
RUS	Mean	1.346	0.819	1.090	0.409	0.527	0.681	0.580	0.616	–0.053	–0.089	0.101	0.065
	SD	0.236	0.061	0.067	0.122	0.225	0.143	0.152	0.174	0.104	0.083	0.045	0.063
	Max	1.637	0.910	1.198	0.561	0.785	0.876	0.774	0.844	0.096	0.042	0.141	0.132
	Min	1.001	0.767	1.040	0.236	0.204	0.488	0.347	0.356	–0.143	–0.152	0.026	–0.028
SWE	Mean	1.180	0.631	1.455	0.978	0.549	0.476	0.516	0.518	0.033	0.030	–0.039	–0.042
	SD	0.206	0.133	0.088	0.168	0.138	0.118	0.113	0.116	0.048	0.044	0.064	0.067
	Max	1.406	0.855	1.533	1.221	0.695	0.645	0.659	0.662	0.102	0.093	0.044	0.046
	Min	0.946	0.535	1.310	0.812	0.410	0.313	0.377	0.376	–0.032	–0.030	–0.130	–0.139

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
All countries	Mean	1.313	0.545	1.569	0.665	0.769	0.905	0.790	0.827	–0.021	–0.058	0.115	0.078
	SD	0.338	0.209	0.277	0.254	0.258	0.365	0.239	0.262	0.133	0.159	0.226	0.186
	Max	2.382	0.983	2.344	1.247	1.600	1.870	1.474	1.541	0.345	0.346	0.914	0.704
	Min	0.598	0.167	0.995	0.060	0.204	0.308	0.347	0.356	–0.453	–0.581	–0.253	–0.251

Table A2-8: Model estimates for men by country and cohort.

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
AUT	*1925–30*	1.069	0.598	1.815	1.037	0.471	0.779	0.381	0.587	0.091	–0.116	0.398	0.191
	1931–35	1.459	0.530	1.932	0.859	0.929	1.073	0.939	0.990	–0.009	–0.061	0.134	0.083
	1936–40	1.133	0.472	1.787	0.809	0.661	0.979	0.693	0.787	–0.032	–0.126	0.285	0.192
	1941–45	1.271	0.469	1.512	1.042	0.801	0.470	0.673	0.671	0.128	0.130	–0.203	–0.201
	1946–50	1.240	0.396	1.460	0.847	0.843	0.613	0.751	0.750	0.092	0.093	–0.138	–0.137
BEL	*1925–30*	2.382	0.782	1.492	0.438	1.600	1.055	1.278	1.276	0.321	0.324	–0.224	–0.221
	1931–35	2.119	0.705	1.315	0.499	1.414	0.817	1.069	1.068	0.345	0.346	–0.253	–0.251
	1936–40	1.949	0.824	1.496	0.400	1.125	1.096	1.096	1.108	0.029	0.017	–0.000	–0.012
	1941–45	1.661	0.976	0.995	0.483	0.685	0.512	0.572	0.575	0.112	0.110	–0.061	–0.063
	1946–50	1.735	0.862	1.012	0.471	0.873	0.542	0.671	0.666	0.201	0.206	–0.130	–0.125
BGR	*1925–30*	1.157	0.371	1.343	0.508	0.786	0.835	0.764	0.808	0.022	–0.022	0.071	0.027
	1931–35	1.217	0.421	1.479	0.476	0.796	1.004	0.838	0.894	–0.041	–0.098	0.166	0.110
	1936–40	1.167	0.388	1.386	0.548	0.779	0.839	0.767	0.806	0.012	–0.027	0.072	0.033
	1941–45	1.143	0.408	1.467	0.552	0.736	0.915	0.822	0.816	–0.086	–0.080	0.094	0.100
	1946–50	0.962	0.370	1.447	0.753	0.592	0.694	0.619	0.631	–0.027	–0.039	0.075	0.063
CZE	*1925–30*	1.081	0.318	1.746	0.720	0.763	1.027	0.854	0.863	–0.090	–0.099	0.173	0.164
	1931–35	0.750	0.228	1.646	0.799	0.522	0.847	0.669	0.620	–0.147	–0.099	0.178	0.227

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
AUT	*1925–30*	1.069	0.598	1.815	1.037	0.471	0.779	0.381	0.587	0.091	–0.116	0.398	0.191
	1936–40	0.930	0.253	1.672	0.927	0.677	0.745	0.696	0.699	–0.018	–0.021	0.049	0.046
	1941–45	1.308	0.202	1.775	0.878	1.106	0.898	1.003	1.033	0.104	0.073	–0.105	–0.136
	1946–50	0.598	0.167	1.849	1.247	0.430	0.602	0.489	0.465	–0.059	–0.035	0.113	0.137
DEU	*1925–30*	1.299	0.507	1.600	0.869	0.793	0.732	0.773	0.767	0.019	0.025	–0.041	–0.035
	1931–35	1.400	0.487	1.551	0.968	0.912	0.583	0.773	0.776	0.139	0.136	–0.190	–0.192
	1936–40	1.310	0.431	1.501	0.704	0.879	0.797	0.844	0.843	0.036	0.036	–0.047	–0.046
	1941–45	0.842	0.384	1.400	0.856	0.458	0.544	0.483	0.489	–0.025	–0.031	0.062	0.056
	1946–50	0.875	0.285	1.513	1.098	0.590	0.414	0.524	0.537	0.066	0.053	–0.109	–0.122
GEO	*1925–30*	1.676	0.652	1.742	0.647	1.024	1.094	0.960	1.059	0.064	–0.035	0.135	0.036
	1931–35	1.473	0.578	1.723	0.468	0.895	1.255	1.001	1.077	–0.106	–0.182	0.254	0.178
	1936–40	1.698	0.671	1.615	0.544	1.027	1.071	0.978	1.050	0.049	–0.023	0.093	0.021
	1941–45	1.516	0.769	1.704	0.585	0.747	1.119	0.902	0.939	–0.155	–0.192	0.217	0.180
	1946–50	1.312	0.632	1.583	0.707	0.679	0.877	0.735	0.772	–0.056	–0.092	0.142	0.105
LTU	*1925–30*	1.493	0.510	1.669	0.524	0.983	1.145	1.022	1.062	–0.039	–0.079	0.123	0.083
	1931–35	1.059	0.547	1.798	0.679	0.511	1.119	0.635	0.767	–0.123	–0.256	0.484	0.352
	1936–40	1.300	0.505	1.666	0.724	0.796	0.943	0.874	0.860	–0.078	–0.064	0.069	0.083
	1941–45	1.184	0.559	1.475	0.613	0.625	0.862	0.741	0.736	–0.116	–0.111	0.121	0.126
	1946–50	1.107	0.530	1.498	0.720	0.577	0.778	0.656	0.664	–0.079	–0.087	0.122	0.114
NLD	*1925–30*	1.917	0.983	1.604	0.882	0.934	0.722	0.795	0.821	0.139	0.113	–0.073	–0.099
	1931–35	1.693	0.709	1.672	0.636	0.984	1.036	1.026	1.011	–0.042	–0.027	0.010	0.025
	1936–40	1.552	0.794	1.477	0.720	0.758	0.757	0.729	0.757	0.029	0.000	0.028	–0.000
	1941–45	1.548	0.668	1.318	0.516	0.880	0.802	0.835	0.838	0.045	0.042	–0.033	–0.036
	1946–50	0.924	0.532	1.336	1.028	0.392	0.308	0.380	0.360	0.012	0.032	–0.073	–0.052
POL	*1925–30*	1.138	0.343	2.344	0.640	0.795	1.704	0.956	1.144	–0.161	–0.349	0.748	0.560

Country	**Cohort**	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
AUT	*1925–30*	1.069	0.598	1.815	1.037	0.471	0.779	0.381	0.587	0.091	–0.116	0.398	0.191
	1931–35	1.120	0.440	2.139	0.269	0.680	1.870	0.956	1.261	–0.276	–0.581	0.914	0.609
	1936–40	1.221	0.471	1.913	0.524	0.749	1.388	0.960	1.036	–0.211	–0.287	0.428	0.352
	1941–45	1.576	0.616	1.772	0.385	0.960	1.387	0.957	1.187	0.002	–0.227	0.430	0.200
	1946–50	1.549	0.753	1.689	0.510	0.796	1.179	0.946	0.999	–0.150	–0.203	0.233	0.180
ROU	*1925–30*	0.669	0.262	1.972	0.482	0.408	1.489	0.861	0.786	–0.453	–0.378	0.629	0.704
	1931–35	1.410	0.229	1.917	0.060	1.181	1.857	1.474	1.541	–0.293	–0.360	0.383	0.316
	1936–40	1.491	0.274	1.852	0.264	1.217	1.587	1.339	1.398	–0.123	–0.181	0.248	0.189
	1941–45	1.388	0.265	1.887	0.283	1.123	1.604	1.218	1.353	–0.095	–0.229	0.386	0.252
	1946–50	1.107	0.313	1.881	0.754	0.794	1.127	0.918	0.917	–0.124	–0.123	0.209	0.210
RUS	*1925–30*	1.637	0.852	1.111	0.236	0.785	0.876	0.774	0.844	0.011	–0.059	0.101	0.031
	1931–35	1.362	0.910	1.050	0.356	0.452	0.694	0.593	0.604	–0.141	–0.152	0.101	0.090
	1936–40	1.459	0.770	1.040	0.421	0.688	0.619	0.593	0.647	0.096	0.042	0.026	–0.028
	1941–45	1.273	0.767	1.198	0.469	0.506	0.728	0.594	0.631	–0.088	–0.125	0.134	0.098
	1946–50	1.001	0.797	1.049	0.561	0.204	0.488	0.347	0.356	–0.143	–0.152	0.141	0.132
SWE	*1925–30*	1.240	0.545	1.515	1.053	0.695	0.463	0.593	0.601	0.102	0.093	–0.130	–0.139
	1931–35	0.946	0.535	1.533	1.221	0.410	0.313	0.377	0.376	0.033	0.034	–0.064	–0.064
	1936–40	0.982	0.572	1.459	0.973	0.410	0.486	0.442	0.440	–0.032	–0.030	0.044	0.046
	1941–45	1.325	0.649	1.457	0.812	0.676	0.645	0.659	0.662	0.018	0.015	–0.014	–0.017
	1946–50	1.406	0.855	1.310	0.834	0.551	0.475	0.507	0.512	0.044	0.039	–0.032	–0.037

Model estimates for the reproduction and mobility of women, using an alternative definition of educational attainment in the offspring generation (ISCED4 and above instead of ISCED5 and above).

Figure A2-5: Prospective educational mobility rates of higher- and lower-educated women in terms of production of *higher-educated children* (r_{HH} and r_{HL}), using an alternative definition of educational attainment in the offspring generation (ISCED4 and above instead of ISCED5 and above).

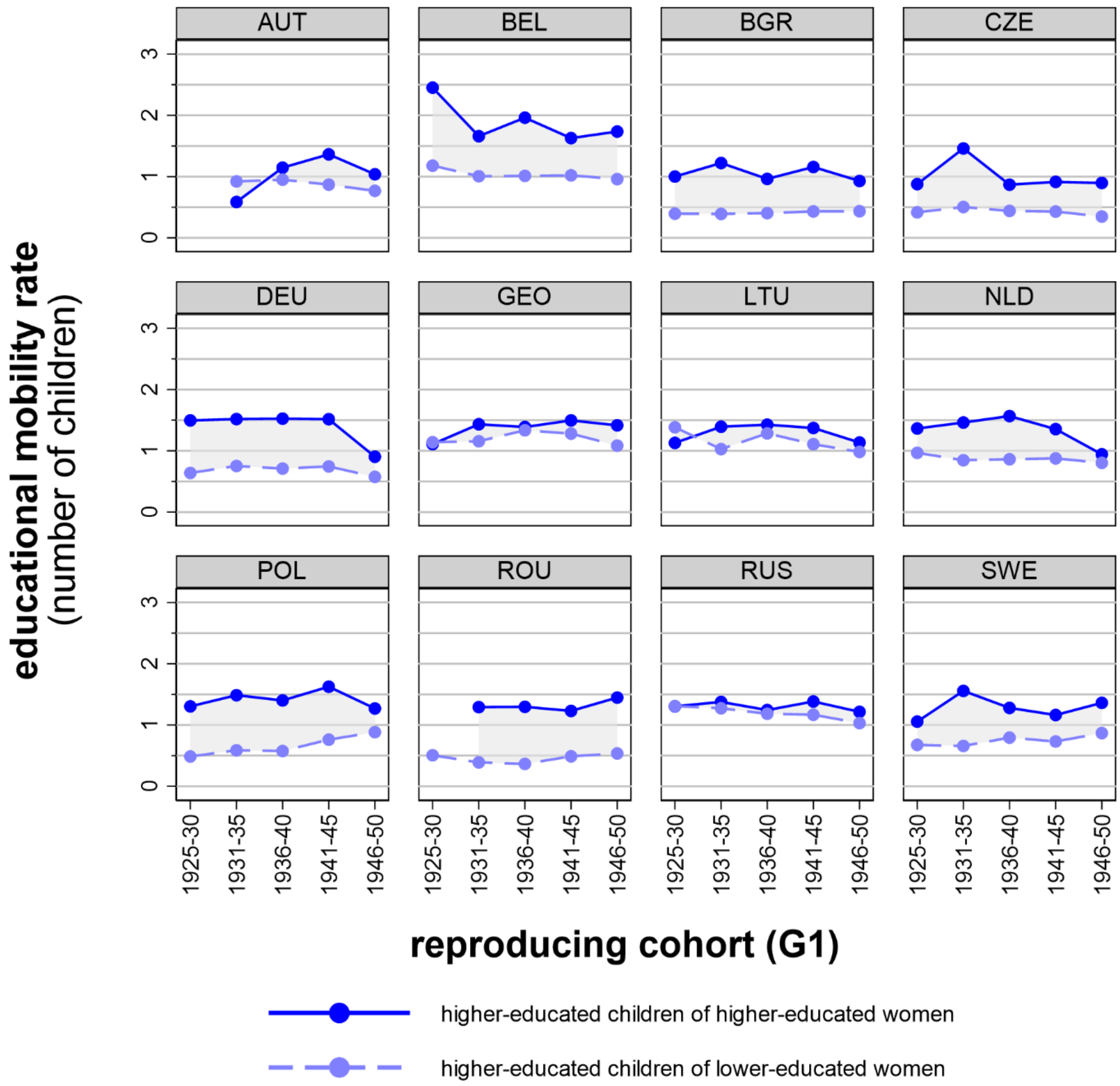


Figure A2-6: Prospective educational mobility rates of higher- and lower-educated women in terms of production of *lower-educated children* (r_{LH} and r_{LL}), using an alternative definition of educational attainment in the offspring generation (ISCED4 and above instead of ISCED5 and above).

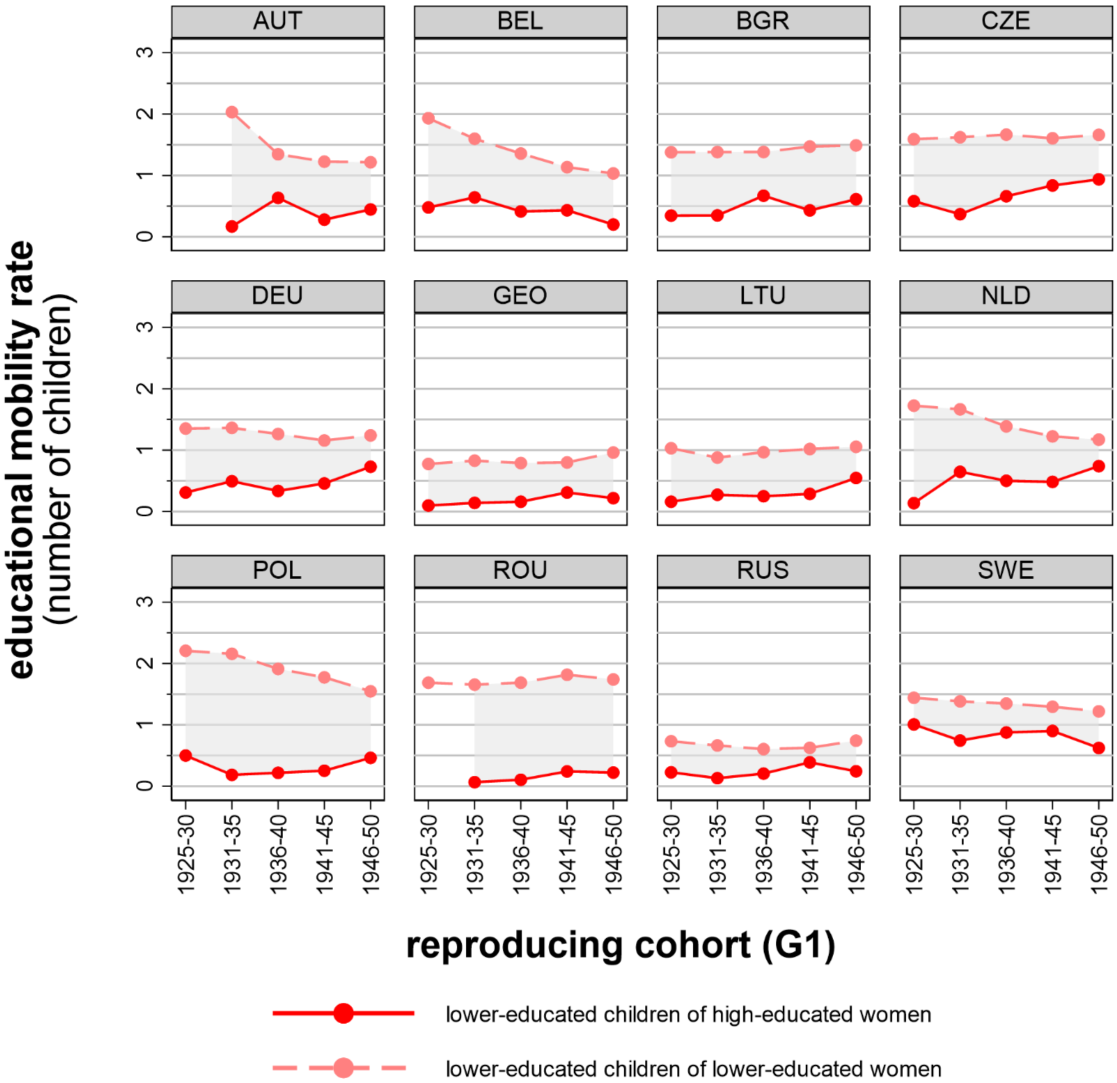


Figure A2-7: Decomposition of differences in educational production rates of higher-educated children ($\boldsymbol{\Delta}_H$), using an alternative definition of educational attainment in the offspring generation (ISCED4 and above instead of ISCED5 and above).

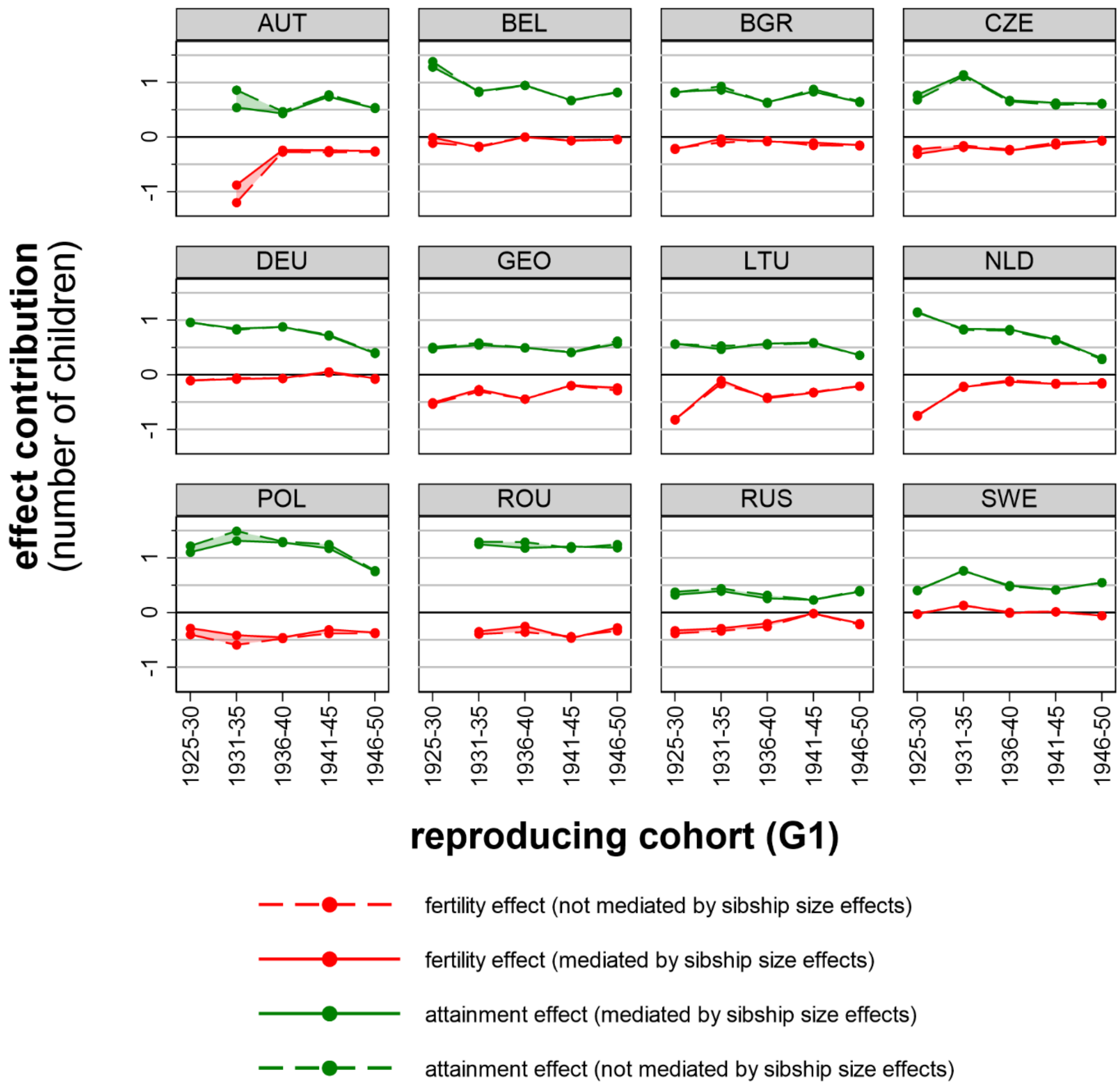


Figure A2-8: Decomposition of differences in educational production rates of lower-educated children ($\mathbf{\Delta}_L$), using an alternative definition of educational attainment in the offspring generation (ISCED4 and above instead of ISCED5 and above).

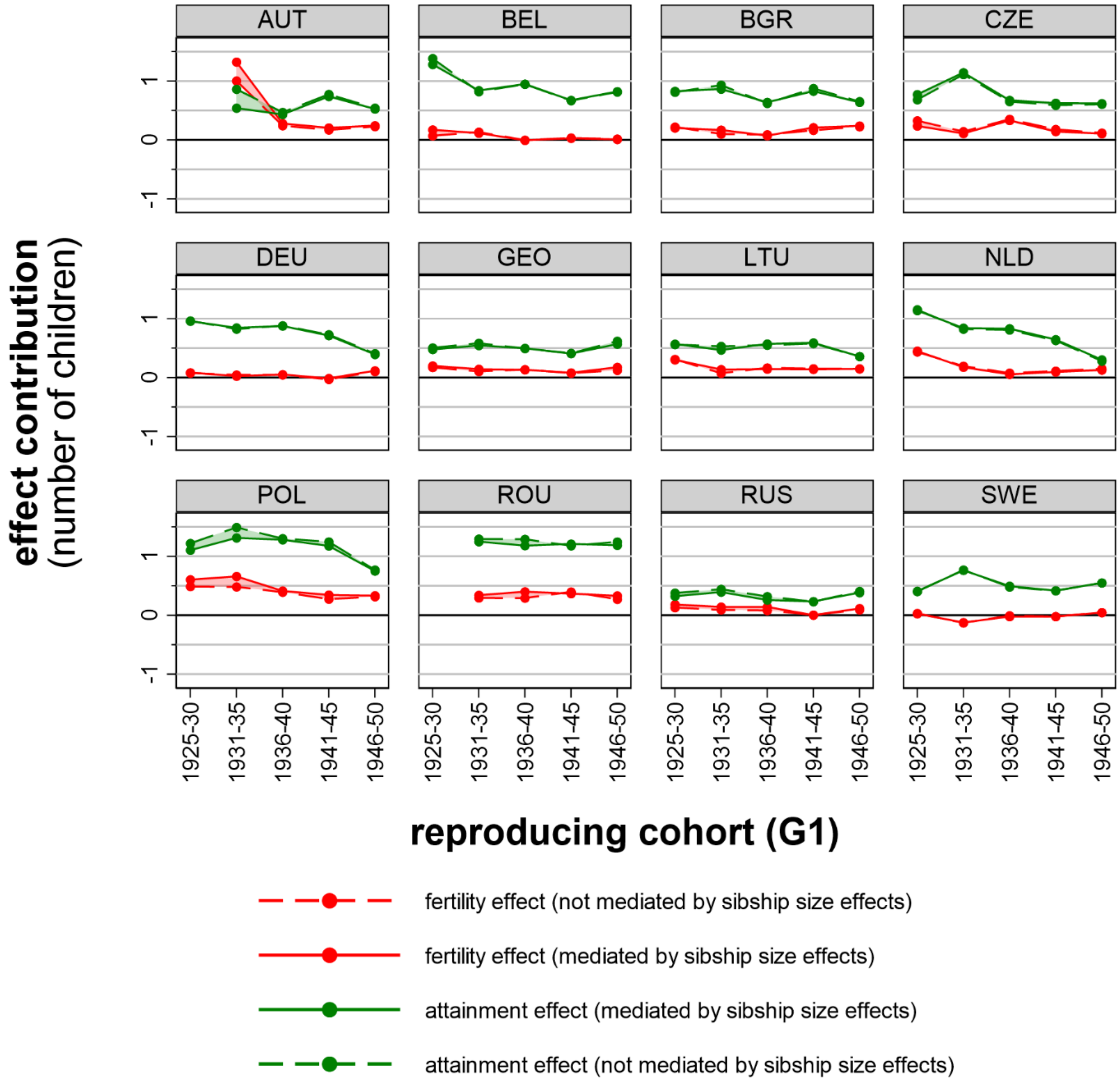


Table A2-9: Summary statistics for model estimates by country, using an alternative definition of educational attainment in the offspring generation (ISCED4 and above instead of ISCED5 and above).

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\overline{\Delta}_H^A = \overline{\Delta}_L^A$	Δ_H^F	$\overline{\Delta}_H^F$	Δ_L^F	$\overline{\Delta}_L^F$
AUT	Mean	1.034	0.878	1.455	0.383	0.156	1.073	0.559	0.662	–0.403	–0.505	0.513	0.411
	SD	0.328	0.080	0.390	0.203	0.352	0.537	0.129	0.186	0.316	0.461	0.541	0.396
	Max	1.365	0.951	2.033	0.635	0.495	1.864	0.738	0.861	–0.237	–0.271	1.323	1.003
	Min	0.586	0.768	1.216	0.169	–0.336	0.712	0.433	0.469	–0.877	–1.197	0.207	0.170
BEL	Mean	1.888	1.036	1.412	0.434	0.852	0.977	0.913	0.926	–0.061	–0.074	0.064	0.051
	SD	0.341	0.084	0.364	0.158	0.270	0.285	0.228	0.274	0.075	0.066	0.077	0.054
	Max	2.453	1.180	1.933	0.643	1.273	1.454	1.282	1.383	0.001	0.004	0.172	0.135
	Min	1.629	0.959	1.033	0.201	0.608	0.703	0.674	0.668	–0.185	–0.167	–0.006	–0.002
BGR	Mean	1.055	0.412	1.421	0.482	0.643	0.939	0.760	0.779	–0.117	–0.136	0.179	0.160
	SD	0.128	0.021	0.055	0.151	0.135	0.144	0.111	0.136	0.072	0.055	0.065	0.064
	Max	1.223	0.436	1.491	0.670	0.831	1.040	0.863	0.932	–0.032	–0.063	0.239	0.225
	Min	0.929	0.392	1.378	0.347	0.493	0.713	0.639	0.621	–0.222	–0.206	0.073	0.091
CZE	Mean	1.004	0.428	1.630	0.677	0.576	0.952	0.767	0.728	–0.191	–0.153	0.186	0.224
	SD	0.256	0.055	0.033	0.222	0.217	0.214	0.219	0.217	0.093	0.073	0.097	0.108
	Max	1.461	0.504	1.666	0.937	0.957	1.254	1.143	1.111	–0.071	–0.059	0.331	0.352
	Min	0.869	0.349	1.591	0.369	0.429	0.725	0.619	0.589	–0.311	–0.224	0.106	0.118
DEU	Mean	1.392	0.685	1.276	0.465	0.708	0.810	0.757	0.762	–0.049	–0.054	0.053	0.049
	SD	0.273	0.076	0.085	0.167	0.215	0.208	0.222	0.215	0.062	0.056	0.051	0.050
	Max	1.526	0.752	1.364	0.730	0.857	1.042	0.958	0.964	0.058	0.041	0.117	0.103
	Min	0.904	0.575	1.158	0.310	0.329	0.511	0.393	0.408	–0.100	–0.106	–0.013	–0.030
GEO	Mean	1.369	1.200	0.831	0.185	0.169	0.646	0.499	0.523	–0.330	–0.354	0.147	0.123
	SD	0.150	0.104	0.075	0.082	0.153	0.096	0.062	0.081	0.139	0.134	0.045	0.036
	Max	1.497	1.336	0.961	0.310	0.332	0.743	0.568	0.619	–0.192	–0.198	0.200	0.172

Country	**Statistic**	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
	Min	1.110	1.085	0.776	0.098	–0.031	0.490	0.408	0.414	–0.509	–0.537	0.082	0.076
LTU	Mean	1.292	1.158	0.990	0.303	0.134	0.687	0.512	0.516	–0.378	–0.382	0.175	0.171
	SD	0.147	0.172	0.070	0.145	0.236	0.137	0.098	0.090	0.278	0.261	0.071	0.086
	Max	1.427	1.385	1.055	0.547	0.366	0.871	0.591	0.579	–0.102	–0.165	0.302	0.310
	Min	1.130	0.983	0.880	0.160	–0.255	0.509	0.359	0.359	–0.824	–0.816	0.138	0.075
NLD	Mean	1.339	0.872	1.435	0.502	0.467	0.933	0.752	0.739	–0.285	–0.272	0.182	0.194
	SD	0.237	0.060	0.252	0.230	0.219	0.426	0.307	0.318	0.257	0.273	0.157	0.142
	Max	1.568	0.967	1.725	0.740	0.705	1.589	1.138	1.153	–0.126	–0.103	0.451	0.436
	Min	0.944	0.805	1.172	0.137	0.139	0.432	0.303	0.281	–0.740	–0.755	0.055	0.078
POL	Mean	1.418	0.659	1.920	0.324	0.759	1.596	1.125	1.206	–0.366	–0.447	0.471	0.390
	SD	0.144	0.160	0.274	0.146	0.211	0.328	0.225	0.266	0.070	0.090	0.151	0.096
	Max	1.626	0.884	2.208	0.500	0.899	1.973	1.313	1.491	–0.286	–0.383	0.659	0.488
	Min	1.270	0.487	1.547	0.185	0.386	1.084	0.751	0.769	–0.455	–0.592	0.333	0.274
ROU	Mean	1.317	0.457	1.718	0.159	0.872	1.566	1.207	1.252	–0.335	–0.380	0.359	0.314
	SD	0.093	0.075	0.063	0.086	0.088	0.033	0.030	0.054	0.098	0.045	0.031	0.056
	Max	1.448	0.536	1.817	0.241	0.932	1.589	1.249	1.294	–0.250	–0.334	0.400	0.397
	Min	1.230	0.366	1.655	0.067	0.741	1.518	1.182	1.179	–0.468	–0.437	0.331	0.272
RUS	Mean	1.305	1.193	0.674	0.239	0.112	0.435	0.319	0.355	–0.206	–0.243	0.116	0.080
	SD	0.076	0.108	0.062	0.094	0.090	0.122	0.072	0.083	0.120	0.142	0.068	0.046
	Max	1.384	1.310	0.742	0.389	0.216	0.534	0.393	0.441	–0.018	–0.014	0.183	0.130
	Min	1.215	1.031	0.605	0.131	–0.005	0.236	0.234	0.231	–0.329	–0.382	0.002	0.006
SWE	Mean	1.284	0.745	1.338	0.830	0.538	0.507	0.527	0.523	0.011	0.015	–0.020	–0.016
	SD	0.192	0.087	0.085	0.149	0.207	0.106	0.144	0.149	0.075	0.070	0.065	0.069
	Max	1.557	0.868	1.441	1.007	0.899	0.639	0.762	0.769	0.136	0.129	0.046	0.046
	Min	1.056	0.659	1.220	0.624	0.380	0.395	0.409	0.402	–0.057	–0.057	–0.123	–0.130

Country	Statistic	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
All countries	Mean	1.313	0.809	1.340	0.420	0.498	0.913	0.719	0.740	–0.221	–0.242	0.194	0.173
	SD	0.296	0.300	0.389	0.239	0.333	0.415	0.295	0.311	0.200	0.228	0.213	0.172
	Max	2.453	1.385	2.208	1.007	1.273	1.973	1.313	1.491	0.136	0.129	1.323	1.003
	Min	0.586	0.349	0.605	0.067	–0.336	0.236	0.234	0.231	–0.877	–1.197	–0.123	–0.130

Table A2-10: Model estimates by country and cohort, using an alternative definition of educational attainment in the offspring generation (ISCED4 and above instead of ISCED5 and above).

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\bar{\Delta}_H^A = \bar{\Delta}_L^A$	Δ_H^F	$\bar{\Delta}_H^F$	Δ_L^F	$\bar{\Delta}_L^F$
AUT	*1931–35*	0.586	0.922	2.033	0.169	–0.336	1.864	0.541	0.861	–0.877	–1.197	1.323	1.003
	1936–40	1.147	0.951	1.347	0.635	0.196	0.712	0.433	0.469	–0.237	–0.273	0.279	0.243
	1941–45	1.365	0.870	1.226	0.281	0.495	0.945	0.738	0.775	–0.244	–0.280	0.207	0.170
	1946–50	1.039	0.768	1.216	0.447	0.271	0.769	0.525	0.541	–0.254	–0.271	0.244	0.228
BEL	*1925–30*	2.453	1.180	1.933	0.479	1.273	1.454	1.282	1.383	–0.008	–0.110	0.172	0.071
	1931–35	1.661	1.007	1.598	0.643	0.654	0.955	0.839	0.821	–0.185	–0.167	0.116	0.135
	1936–40	1.963	1.013	1.358	0.415	0.950	0.943	0.949	0.946	0.001	0.004	–0.006	–0.002
	1941–45	1.629	1.022	1.136	0.433	0.608	0.703	0.674	0.668	–0.066	–0.060	0.029	0.035
	1946–50	1.737	0.959	1.033	0.201	0.777	0.832	0.822	0.815	–0.045	–0.038	0.009	0.017
BGR	*1925–30*	1.001	0.396	1.378	0.347	0.605	1.032	0.828	0.811	–0.222	–0.206	0.204	0.220
	1931–35	1.223	0.392	1.382	0.350	0.831	1.032	0.863	0.932	–0.032	–0.101	0.169	0.101
	1936–40	0.963	0.405	1.383	0.670	0.559	0.713	0.640	0.621	–0.081	–0.063	0.073	0.091
	1941–45	1.158	0.433	1.471	0.431	0.725	1.040	0.829	0.876	–0.103	–0.150	0.211	0.164
	1946–50	0.929	0.436	1.491	0.613	0.493	0.878	0.639	0.653	–0.145	–0.159	0.239	0.225
CZE	*1925–30*	0.878	0.418	1.591	0.581	0.461	1.010	0.772	0.683	–0.311	–0.222	0.238	0.327
	1931–35	1.461	0.504	1.623	0.369	0.957	1.254	1.143	1.111	–0.187	–0.154	0.111	0.144

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\overline{\Delta}_H^A = \overline{\Delta}_L^A$	Δ_H^F	$\overline{\Delta}_H^F$	Δ_L^F	$\overline{\Delta}_L^F$
	1936–40	0.869	0.441	1.666	0.661	0.429	1.004	0.674	0.652	–0.245	–0.224	0.331	0.352
	1941–45	0.915	0.430	1.606	0.837	0.485	0.769	0.626	0.589	–0.141	–0.104	0.144	0.180
	1946–50	0.897	0.349	1.662	0.937	0.548	0.725	0.619	0.607	–0.071	–0.059	0.106	0.118
DEU	*1925–30*	1.497	0.640	1.353	0.310	0.857	1.042	0.958	0.964	–0.100	–0.106	0.085	0.079
	1931–35	1.519	0.752	1.364	0.494	0.766	0.870	0.845	0.824	–0.079	–0.057	0.025	0.046
	1936–40	1.526	0.711	1.264	0.335	0.815	0.929	0.876	0.882	–0.061	–0.067	0.053	0.047
	1941–45	1.517	0.746	1.158	0.458	0.771	0.700	0.713	0.730	0.058	0.041	–0.013	–0.030
	1946–50	0.904	0.575	1.241	0.730	0.329	0.511	0.393	0.408	–0.064	–0.079	0.117	0.103
GEO	*1925–30*	1.110	1.141	0.776	0.098	–0.031	0.678	0.478	0.505	–0.509	–0.537	0.200	0.172
	1931–35	1.434	1.157	0.830	0.141	0.278	0.689	0.545	0.585	–0.268	–0.307	0.143	0.104
	1936–40	1.389	1.336	0.790	0.160	0.053	0.630	0.498	0.493	–0.444	–0.440	0.133	0.137
	1941–45	1.497	1.281	0.800	0.310	0.215	0.490	0.408	0.414	–0.192	–0.198	0.082	0.076
	1946–50	1.417	1.085	0.961	0.218	0.332	0.743	0.568	0.619	–0.236	–0.287	0.176	0.124
LTU	*1925–30*	1.130	1.385	1.031	0.160	–0.255	0.871	0.569	0.561	–0.824	–0.816	0.302	0.310
	1931–35	1.394	1.028	0.880	0.274	0.366	0.606	0.468	0.531	–0.102	–0.165	0.138	0.075
	1936–40	1.427	1.286	0.967	0.249	0.141	0.718	0.572	0.551	–0.431	–0.410	0.145	0.167
	1941–45	1.373	1.109	1.019	0.287	0.264	0.731	0.591	0.579	–0.326	–0.315	0.140	0.152
	1946–50	1.136	0.983	1.055	0.547	0.153	0.509	0.359	0.359	–0.206	–0.206	0.149	0.150
NLD	*1925–30*	1.365	0.967	1.725	0.137	0.397	1.589	1.138	1.153	–0.740	–0.755	0.451	0.436
	1931–35	1.462	0.847	1.665	0.647	0.616	1.018	0.841	0.823	–0.225	–0.207	0.177	0.195
	1936–40	1.568	0.863	1.388	0.501	0.705	0.887	0.832	0.809	–0.126	–0.103	0.055	0.078
	1941–45	1.355	0.877	1.225	0.483	0.478	0.742	0.646	0.631	–0.168	–0.152	0.096	0.112
	1946–50	0.944	0.805	1.172	0.740	0.139	0.432	0.303	0.281	–0.164	–0.142	0.129	0.151
POL	*1925–30*	1.305	0.487	2.208	0.500	0.818	1.708	1.104	1.220	–0.286	–0.402	0.604	0.488
	1931–35	1.487	0.588	2.158	0.185	0.899	1.973	1.313	1.491	–0.414	–0.592	0.659	0.481

Country	Cohort	r_{HH}	r_{HL}	r_{LH}	r_{LL}	Δ_H	Δ_L	$\Delta_H^A = \Delta_L^A$	$\overline{\Delta}_H^A = \overline{\Delta}_L^A$	Δ_H^F	$\overline{\Delta}_H^F$	Δ_L^F	$\overline{\Delta}_L^F$
	1936–40	1.401	0.575	1.912	0.219	0.826	1.693	1.281	1.301	–0.455	–0.475	0.412	0.392
	1941–45	1.626	0.761	1.774	0.253	0.864	1.521	1.176	1.247	–0.312	–0.383	0.345	0.274
	1946–50	1.270	0.884	1.547	0.463	0.386	1.084	0.751	0.769	–0.365	–0.383	0.333	0.315
ROU	*1931–35*	1.292	0.390	1.655	0.067	0.902	1.589	1.249	1.294	–0.346	–0.392	0.340	0.295
	1936–40	1.298	0.366	1.688	0.106	0.932	1.582	1.182	1.290	–0.250	–0.358	0.400	0.292
	1941–45	1.230	0.489	1.817	0.241	0.741	1.576	1.210	1.179	–0.468	–0.437	0.366	0.397
	1946–50	1.448	0.536	1.741	0.223	0.913	1.518	1.187	1.246	–0.275	–0.334	0.331	0.272
RUS	*1925–30*	1.305	1.310	0.733	0.227	–0.005	0.507	0.324	0.377	–0.329	–0.382	0.183	0.130
	1931–35	1.378	1.273	0.665	0.131	0.104	0.534	0.393	0.441	–0.289	–0.337	0.141	0.092
	1936–40	1.244	1.184	0.605	0.205	0.060	0.400	0.259	0.318	–0.198	–0.258	0.141	0.081
	1941–45	1.384	1.168	0.626	0.389	0.216	0.236	0.234	0.231	–0.018	–0.014	0.002	0.006
	1946–50	1.215	1.031	0.742	0.244	0.184	0.498	0.383	0.406	–0.199	–0.222	0.115	0.092
SWE	*1925–30*	1.056	0.676	1.441	1.007	0.380	0.434	0.409	0.402	–0.029	–0.022	0.025	0.032
	1931–35	1.557	0.659	1.384	0.744	0.899	0.639	0.762	0.769	0.136	0.129	–0.123	–0.130
	1936–40	1.280	0.794	1.348	0.876	0.486	0.472	0.495	0.479	–0.009	0.006	–0.023	–0.007
	1941–45	1.164	0.731	1.295	0.901	0.433	0.395	0.417	0.415	0.015	0.018	–0.023	–0.020
	1946–50	1.362	0.868	1.220	0.624	0.494	0.596	0.550	0.550	–0.057	–0.057	0.046	0.046

Chapter 3: Untangling the Role of Assortative Mating in Educational Reproduction in 12 European Countries

This chapter is based on the article "Untangling the Role of Assortative Mating in Educational Reproduction in 12 European Countries", originally published in Comparative Population Studies. Wittemann and Yastrebov 2024; DOI: 10.12765/CPoS-2024-15. The version included here is the accepted manuscript version.

3.1 Abstract

In this study, we explore how educational differences in demographic behaviour – in particular, mating patterns and fertility – mediate intergenerational reproduction of educational inequality in 12 European countries. Although the quest itself is not new, our contribution is underscored by adopting a prospective approach and scaling it to include multiple countries and cohorts. To this end, we leverage a series of complementary datasets and the inferential method developed by Song and Mare (2015) and advanced by Skopek and Leopold (2020) to estimate the components of a stylized educational reproduction model. We then employ a simple decomposition analysis to quantify the contributions of different pathways to prospective educational reproduction rates across educational backgrounds and explore the differences across cohorts and countries. We report several findings, but most notably 1) that intergenerational reproduction of educational inequality persists in all 12 countries and is barely offset by small (and declining) negative educational gradients in fertility, 2) that educational differences in selection into partnership are small and do not account for much inequality, and 3) that the role of assortative mating, where present, is ambiguous because it both reinforces inequality via its effects on resources within the family and offsets it via its effects on fertility.

Keywords: Education, assortative mating, fertility gradient, educational reproduction, prospective analysis

3.2 Introduction

Intergenerational reproduction of socioeconomic status characteristics and social inequality has been extensively studied in social sciences (Blau and Duncan 1967; Breen 2004; Breen and Jonsson 2005; Breen and Müller 2020; Erikson et al. 1992; Shavit and Blossfeld 1993). However, much of this research is retrospective in nature, in the sense that it looks at reproduction "backward" by comparing children to their parents. This limits the understanding of reproduction of inequality because such approach implicitly conditions on parenthood and thus dismisses individuals who never had children (Duncan 1966). The former, though, may be seen as contributing to social reproduction precisely by not being involved in the transmission of socioeconomic status characteristics to the next generation.

It is only recently that these limitations have become well recognized in research on intergenerational reproduction of social inequality, with ever more studies adopting an alternative prospective lens (Breen and Ermisch 2017; Corti and Scherer 2022; Hillmert 2013; Kye and Mare 2012; Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Skopek and Leopold 2020; Song and Mare 2015, 2017; Wittemann 2023). The advantage of prospective designs is that they allow a more holistic view of reproduction by explicitly recognizing childlessness as a pathway blocking status transmission. Not only this facilitates a more comprehensive account of fertility – itself an important aspect of the intergenerational reproduction of social inequality – but also enables a more detailed examination of other processes linked to childlessness, on the one hand, and potentially stratified by socioeconomic status, on the other. This includes, among other things, union formation and partner choice, which have been shown both to influence social status attainment (Breen and Andersen 2012; Breen and Salazar 2011; Eika et al. 2019; Fernández and Rogerson 2001; Grotti and Scherer 2016) and to be influenced by it (Domański and Przybysz 2007; Erát 2021; Kalmijn 1991; Schwartz and Mare 2005; J. Smits 1999).

To date, only a handful of studies investigated the role of mating patterns using a prospective design (Corti and Scherer 2022; Hillmert 2013; Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006; Song and Mare 2017). High data requirements and the scarcity of available data meeting these requirements are still limiting the use of the prospective approach, despite its apparent advantages. The challenge lies in obtaining data of sufficiently long span 1) to let individuals accomplish their fertility plans and 2) to let these individuals' children accomplish social status attainment – i.e., an observational span lasting roughly a lifetime of a single generation. In this study, we circumvent this challenge to scale our analysis to include 12 European countries and several cohorts of women in a single comparison by leveraging an inferential method developed by Song and Mare (2015) and advanced by Skopek and Leopold (2020). The method builds on estimating different components of a stylized reproduction model, which we identify using a mixture of complementary yet well-harmonizable datasets, including Generations and Gender Surveys, World and European Values Surveys, European Social Surveys, and several others. The model and its estimates are then used in a counterfactual analysis (Leesch and Skopek 2023; Skopek and Leopold 2020) to quantify the contributions of different pathways to prospective educational reproduction rates across educational backgrounds and explore the differences across cohorts and countries.

In our analysis, like previous research (Breen et al. 2019; Breen and Ermisch 2017; Corti and Scherer 2022; Hillmert 2013; Kye and Mare 2012; Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Skopek and Leopold 2020; Song and Mare 2017; Wittemann 2023) we focus on educational reproduction, admitting the ease of operationalization and measurement of education relative to other socioeconomic status characteristics, such as income, wealth, occupational status, or social class. Furthermore, we focus on women for the practical reasons of identifying their fertility span (Dudel and Klüsener 2021; Menken et al. 1986; Schoumaker 2019), which is critical to the identification of generations across datasets. More specifically, we investigate the educational reproduction of four cohorts of women born 1930-1950 in Austria, Belgium, Bulgaria, Czech Republic, Estonia, Georgia, Germany, the Netherlands, Poland, Romania, Russia, and Sweden.

With our analysis, we advance over previous research in several respects. First, we evaluate educational reproduction in quantities that do not simply correct for the educational differences in childlessness rates (Breen et al. 2019; Corti and Scherer 2022; Hillmert 2013; Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006; Song and Mare 2017) but reflect differences in complete fertility rates. We refer to them as educational production rates, which embed both qualitative (i.e., the education of children) and quantitative (i.e., the number of children) aspects of individuals' reproduction. Second, we present analyses that consider both sides of the coin – i.e., the inequality in the production of both higher- and lower-educated children – to show that different pathways may have ambiguous implications for inequality. Third, we evaluate the relative contribution of different pathways – of which we distinguish mating, fertility, and inheritance of educational attainment from mother to child – to the inequality in educational production rates. Finally, we contribute empirical knowledge on post-socialist countries of Central-Eastern and South-Eastern Europe, which have not been featured in prospective mobility research before. With our set of countries, we additionally represent several European welfare state regimes (Gosta Esping-Andersen 1990) as well as different educational and demographic contexts (H.-P. Blossfeld et al. 2016; Nisén et al. 2021; Pfeffer 2014b; Skirbekk 2008).

3.3 Background

In their analysis of educational reproduction in Germany, Skopek and Leopold (2020) introduced a simple model of educational reproduction integrating two pathways. The first pathway represents the intergenerational transmission of educational advantage per se—the focus of much classic (i.e., retrospective) research on intergenerational social mobility and reproduction of social inequality (Breen 2004; Breen and Jonsson 2005; Breen and Müller 2020; Erikson et al. 1992; Shavit and Blossfeld 1993). The second pathway integrates fertility – i.e., a demographic process, whereby the transmission of educational advantage becomes possible in the first place. The model thus integrates both qualitative (attainment) and quantitative (number of children) aspects of reproduction, with the latter aspect being the defining feature of a prospective view on reproduction (Breen and Ermisch 2017; Kye and Mare 2012; Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Skopek and Leopold 2020).

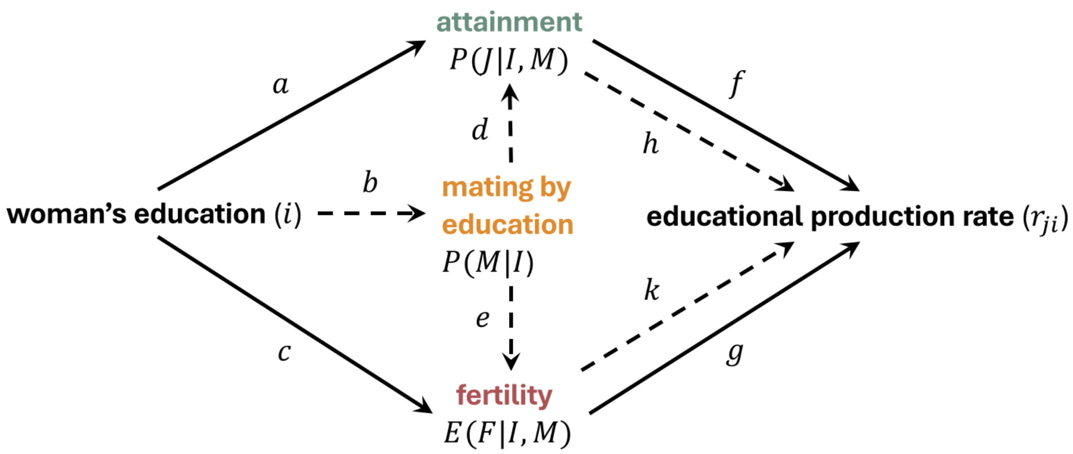
The focal quantity of the model is the so-called educational (re)production rate (r_{ji}), which refers to the expected number of children attaining education j produced by a woman with education i. Here, we extend the model to incorporate, in a highly stylized way, an additional mechanism mediating the effects of women's education on their educational reproduction rates – i.e., partner selection and assortative mating.

A graphical intuition of the model is presented in Figure 3-1. As described, a woman's education is assumed to affect the educational production rate – i.e., a quantity integrating the number and "quality" of children. The qualitative aspect is illustrated by two pathway sets running through the upper node "attainment", with the solid lines ($a - f$) referring to a more direct effect of woman's education on child's education and the dashed lines ($b - d - h$) referring to a less direct effect of woman' education affecting child's education through her partner's education. The quantitative aspect refers to the pathway sets running through the lower node "fertility" into r_{ji}. Accordingly, the dashed ($b - e - k$) and the solid ($c - g$) lines refer to the less and the more direct effects of woman's education on r_{ji}, i.e., those mediated and not mediated by partner's education.

The model thus incorporates three major pathway sets that link a woman's education to her educational production rate: 1) a more direct qualitative effect (pathway $a - f$), 2) a more direct quantitative effect (pathway $c - g$), and 3) a set of less direct effects operating through partnership status (pathways $b - d - h$ and $b - e - k$). A simpler representation of the same model could involve just three nodes, i.e., a woman's education (independent variable), her partnership status (a mediator), and her educational production rate (dependent variable). However, we present a more complete model here to emphasize that the effect of partners' education on the educational production rate also has both qualitative and quantitative aspects.

Below, we zoom in on the constitutive pathways and engage more closely with their theoretical and empirical underpinnings.

Figure 3-1: Educational reproduction model.



Inequality in educational reproduction

Let us first consider the first set of pathways $a - f$, referring to a more direct qualitative effect. We expect a woman's educational level to positively affect the educational production rate of higher-educated children (and, accordingly negatively—the production rate of lower-educated children) via these pathways.

The expectation is warranted by various theoretical perspectives, most prominently social reproduction theory, rational-choice theory, and human capital theory. According to the social reproduction theory, women with higher education levels are more likely to emphasize the value of education, create a conducive learning environment, and have the resources to support higher educational achievements in their children, thereby reducing the likelihood of lower educational outcomes (Bourdieu et al. 1977). Rational-choice theories stress that individuals make educational decisions based on a cost-benefit analysis: e.g., higher-educated women are more likely to better recognize the long-term benefits of investing in their children's education and can more easily tolerate the costs and risks associated with more challenging educational options for their children (Breen and Goldthorpe 1997; Esser 1999; Morgan 1998, 2002). Finally, human capital theory complements this by positing a link between education and women's financial and non-financial resources required to effectively support children's educational endeavors (Becker 1992).

Empirically, the intergenerational transmission of educational advantage has been widely investigated and constitutes one of the most robust facts in social sciences holding across temporal and national contexts (H.-P. Blossfeld et al. 2016; Breen et al. 2009; Breen and Jonsson 2005; Erikson et al. 1992; Shavit and Blossfeld 1993). In previous research, however, differences in the strength of the association between countries have been discussed (Breen 2004; Breen and Jonsson 2005; Hertz et al. 2008; Hout and DiPrete 2006; Lipset and Zetterberg 1956; Pfeffer 2008). Thereby, in the ranking of countries regarding their level of educational persistence, research is relatively unanimous with the Nordic countries showing least educational reproduction and the German speaking countries, Italy, France and Belgium representing societies with relatively high educational reproduction (Breen 2004; Breen and Jonsson 2005; Hertz et al. 2008; Pfeffer 2008).

Educational reproduction and fertility

Let us now turn to the second set of pathways $c - g$, referring to a more direct quantitative effect. Unlike the previous set of pathways, we expect the current one to transmit a negative effect woman's educational level on her educational production rate of higher-educated children (and, accordingly, a positive one on the production rate of lower-educated children).

First, women with higher education spend more time in educational institutions, which often results in delaying their fertility (Cigno and Ermisch 1989; Gustafsson et al. 2002; Kravdal and Rindfuss 2008; Neels and De Wachter 2010). Since the upper bound of the reproductive window, especially for women, is rather fixed biologically (Menken et al. 1986), they have less time to give birth than less educated women who can start earlier, and women rarely have children while they are still in education (Gustafsson et al. 2002). Second, higher-educated women might more often have other goals and ideals in life than traditional family formation (Lesthaeghe 2010; Van de Kaa 2002). Relating thereto, higher-educated women might also have stronger occupational aspirations that are in conflict with family formation and childcare (Becker 1960; Lappegård 2002; Lappegård and Rønsen 2005; Wood et al. 2014).

Empirical findings on educationally stratified fertility are more mixed and report different magnitudes and directions across countries (Gustafsson et al. 2002; Nitsche 2024; Osiewalska 2017; Skirbekk 2008; Wood et al. 2014). On average, however, higher-educated women exhibit a higher propensity for childlessness (Beaujouan et al. 2016; Van Bavel et al. 2018; Wood et al. 2014) and have a smaller number of children (Nisén et al. 2021; Osiewalska 2017; Wood et al. 2014).

Also, previous prospective research on educational reproduction investigated the effects of educationally stratified fertility (Breen and Ermisch 2017; Lawrence and Breen 2016; Skopek and Leopold 2020; Song and Mare 2015; Wittemann 2023). In sum, they consistently report that higher education is associated with reduced fertility rates (i.e., negative fertility gradient), which tempers the potential to transmit educational advantages among the higher-educated, as evidenced in various country-specific studies: Mare and Maralani (2006) for Indonesia, Kye and Mare (2012) for South Korea, by Hillmert (2013) and Skopek and Leopold (2020) for Germany, by Lawrence and Breen (2016), Maralani (2013), and Song and Mare (2017) for the USA and Breen and Ermisch (2017) for Great Britain.

Assortative mating and educational reproduction

Finally, let us consider the last set of pathways, $b - d - h$ and $b - e - k$, referring to a less direct effect linking woman's education to her educational production rate via her partnership status. First, a woman's education can influence the likelihood of finding a partner at all determining who gets the chance to reproduce in the first place (Kalmijn 2013). Additionally, we expect that people from the same educational category are more likely to form a couple and start a family than people with different educational levels (pathway b).

Individuals ambitions for status attainment tend to drive them to select partners with similar educational levels, as education increasingly shapes future socioeconomic status in industrialized societies (Mare 1991; Jeroen Smits et al. 1998) and serves an indicator of family background (Domański and Przybysz 2007; Mare 1991). Consequently, the extent of assortative mating is linked to the degree of educational mobility within a country (Katrňák et al. 2012). Another factor promoting educational homogamy is the structure of the marriage market, which is increasingly characterized by a growing number of highly educated individuals due to educational expansion (Ballarino et al. 2013). Furthermore, the pool of potential partners is significantly influenced by the educational institutions individuals encounter (Eckland 1968; Mare 1991).

Empirically, both selection into partnership (Kalmijn 2013) as well as the average educational level of partners (Domański and Przybysz 2007; Kalmijn 1991) are socially stratified. This leads to the prevalence of educationally homogamous relationships, characterized by both partners possessing equivalent levels of education.

Following pathway b, we expect assortative mating to reinforce the theoretical mechanisms of pathways $a - f$ and $c - g$.

Regarding the pathway ($b - d - h$) we expect partner's education to correlate positively with the production rate of higher-educated children. Partner's education further shapes educational resources within the family. When both partners possess high educational qualifications the family is endowed with a greater accumulation of resources, thereby enhancing the educational opportunities available to their children (P. N. Blossfeld et al. 2024; Corti and Scherer 2022; Mare and Maralani 2006; Schwartz 2013). This mechanism mirrors the previously discussed relationship between family size and educational reproduction, where the educational qualifications of parents endow them with specific resources (such as time, financial capability, and expertise) that can be allocated to their offspring. The higher the parent-child ratio and the more intellectual and economic resources each parent possesses, the more the child can profit from its parental resources (Coleman 1988; Downey 1995; Kalmijn and Werfhorst 2016).

Regarding the second of these pathways ($b - e - k$), we expect the partner's education to have a negative association with fertility choices. The observed educational disparities in the timing of births and the total number of offspring are expected to be modulated by the educational attainment of partners (Mare and Maralani 2006; Osiewalska 2017). Assuming a negative educational fertility gradient (Nisén et al. 2021), this dynamic operates counter to the mechanism of resource enhancement. Specifically, if couples in which both partners are highly educated (homogamous couples) exhibit lower fertility rates compared to their counterparts, this would inherently limit the number of children who could benefit from elevated parental resources initially. However, this limitation also means that the fewer children in highly educated families are likely to receive a disproportionately higher share of educational resources, amplifying their advantage (Choi et al. 2020; Downey 1995; Gibbs et al. 2016; Kalmijn and Werfhorst 2016). This scenario underscores the complex interplay between partner education, fertility decisions, and the subsequent availability of educational resources for offspring.

Prior prospective studies have investigated the impact of assortative mating on the dynamics of intergenerational educational reproduction (Corti and Scherer 2022; Hillmert 2013; Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006; Song and Mare 2017). These studies consistently indicate that educational assortative mating—where partners have similar educational levels—tends to magnify educational advantages for offspring of highly educated couples while exacerbating the disadvantages for children of less educated parents, thereby intensifying the educational inheritance across generations. Corti and Scherer (2022) also highlight the significance of spousal education by identifying the causal effect of spousal education on the probability to have a higher-educated child. They report that women with lower educational levels who have partners with higher education are more likely to have children who achieve higher educational status, suggesting that the educational level of a spouse plays a crucial role in enhancing the educational prospects of offspring.

Cross-national and temporal variations in educational reproduction

To date, the sole prospective cross-national investigation into educational reproduction is the study conducted by Breen et al. (2019), which focuses on the relationship between unconditional, prospective estimates of educational reproduction with conventional estimates that condition on fertility across 12 European countries. They find differences between countries with educational variation in the probability to have a higher-educated child are stronger in the South-East than in the North-West. Additionally, they find a universal distinction between the conventional estimates of educational reproduction (i.e., that condition on parenthood) and the prospective ones (i.e., that do not condition on parenthood). Furthermore, they find that the effect of partnership selection on inequality in the probability to have a higher-educated child runs primarily through fertility, and specifically selection into childlessness. However, the mechanisms underlying the differences in the gap between conventional and prospective estimates of educational reproduction remain unclear and are not part of the investigation. Additionally, rather than conducting a country-specific analysis, the study aggregates countries into regional clusters, possibly as a response to the constraints posed by the limited sample sizes available in the Survey of Health, Aging, and Retirement in Europe (SHARE) dataset. Another shortcoming of this data is that it only provides detailed information on up to four children.

Although Breen et al. (2019) is now the only study investigating educational reproduction prospectively cross-nationally, studies have focused on cross-national differences and trends in processes relevant to educational reproduction: fertility, partnership selection, assortative mating, and educational persistence.

Recent investigations into the patterns of educational stratification of fertility across nations (Merz and Liefbroer 2017; Nisén et al. 2021; Skirbekk 2008; Wood et al. 2014) have consistently identified a negative educational fertility gradient as a dominant form of stratification of fertility. Despite this overarching trend, significant regional variations have been reported. Nisén et al. (2021) highlight an inverse relationship between the educational gradient in fertility and economic development. Thus, they find Romania to inhibit the strongest negative educational gradient of fertility, a finding that is corroborated by Wood et al. (2014). Both Wood et al. (2014) and Merz and Liefbroer (2017) observe that post-communist countries generally display stronger negative educational fertility gradients in comparison to other

European nations. In contrast, Belgium is distinguished as the sole country exhibiting a positive educational fertility gradient in the analyses conducted by Nisén et al. (2021) and Wood et al. (2014). Additionally, research on fertility stratification in Nordic countries reveals a consistently weak, albeit negative, educational fertility gradient (Nisén et al. 2021; Skirbekk 2008; Wood et al. 2014).

Prior research also has explored national variances and the temporal evolution of assortative mating patterns (Domański and Przybysz 2007; Erát 2021; Kalmijn 1991; Katrňák et al. 2006; Jeroen Smits et al. 1998; Uunk 2024). The theory posits that a societal shift from valuing ascriptive characteristics such as religion, ethnicity, and family background towards a greater emphasis on achieved attributes, notably educational attainment, for determining one's social standing should parallel a similar transformation in the attributes influencing homogamy in partner selection (Kalmijn 1991; Katrňák et al. 2012). Consequently, an increase in educational homogamy, coupled with a decline in homogamy based on social backgrounds, would be anticipated alongside educational expansion. Nevertheless, while an uptrend in educational homogamy is documented in the United States (Kalmijn 1991), the trends and patterns within Europe present a more complex picture, exhibiting distinct country-specific differences (Erát 2021; Katrňák et al. 2012; Jeroen Smits et al. 1998). Across these countries, however, a consistent decline in hypergamy across cohorts is observed, attributed to the rising educational achievements of women (Erát 2021).

Investigations have also identified cross-national variation in the level of educational assortative mating. Notably, post-communist countries exhibit stronger patterns of assortative mating relative to other European nations (Domański and Przybysz 2007; Uunk 2024). In contrast, Belgium and the Netherlands are distinguished by comparatively low rates of assortative mating in the studies conducted by Domański and Przybysz (2007) and Jeroen Smits et al. (1998). These cross-national disparities may also be linked to the differences in the timing and extent of educational expansion, which have varied significantly across European countries (Ballarino et al. 2013; P. N. Blossfeld et al. 2017; Breen 2010). Furthermore, Katrňák et al. (2012) identify a positive correlation between the level of educational reproduction and the degree of educational assortative mating. This suggests that in countries with greater equality in educational opportunities, there is a higher likelihood of choosing partners from different educational backgrounds.

Approaches to the prospective study of intergeneration reproduction

Several approaches to the prospective study of intergenerational reproduction exist. Most researchers have utilized extensive, long-term panel data to analyze the reproduction of generations prospectively (Breen and Ermisch 2017; Corti and Scherer 2022; Kye and Mare 2012; Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Song and Mare 2015) which offer the greatest advantage because they allow going beyond descriptive accounts of educational reproduction and permit causal investigation of the kind performed by Breen and Ermisch (2017), Corti and Scherer (2022) and Lawrence and Breen (2016).

Lawrence and Breen (2016) applied marginal structural models with inverse probability weighting. This method aims to discern the causal effect of obtaining a college degree on the likelihood of having a child who also achieves a college degree. By reweighting the observations within the sample of college degree holders, this technique ensures that the distribution of different outcomes remains unaffected by whether an individual belongs to the treatment group (those with a college degree) or the control group (those without a college degree). Breen and Ermisch (2017) applied this method to estimate not only the causal effect of possessing a college degree on parenthood but also on the likelihood of having a child who subsequently obtains a college degree. In a more recent study in Germany, Corti and Scherer (2022) recycled this approach, further extending it to incorporate considerations of assortative mating, thereby offering a more nuanced analysis of educational reproduction and its determinants.

Also, lacking data with such high requirements, it is still possible to study educational reproduction based on specific demographic (i.e., population renewal) models of the kind proposed by Mare and Maralani (2006). The virtue of these models is that they can be informed both by longitudinal and cross-sectional data and thus have fewer constraints. Usually, these studies involve different sorts of simulation and decomposition techniques to explore how changes in specific parameters of these models (e.g., pertaining to different aspects of reproduction) alter the make-up of offspring generations (Hillmert 2013; Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006; Song and Mare 2015).

Although Song and Mare (2015) used prospective panel data in their study, they also innovated a technique to recalibrate retrospective data, mitigating biases associated with retrospective sampling. By comparing estimates derived from prospective data with those adjusted from retrospective data, they demonstrated that their correction method effectively reconciled nearly all discrepancies between the two sets of estimates. Building on this, Skopek and Leopold

(2020) devised a comparable approach to generate prospective estimates without long-term panel data that was also applied by Wittemann (2023) as well as in this study. The method builds on estimating different components of a stylized reproduction model, which we identify using a mixture of complementary yet well-harmonizable datasets, including Generations and Gender Surveys, World and European Values Surveys, European Social Surveys, and several others. The model and its estimates are then used in a simple counterfactual analysis (Leesch and Skopek 2023; Skopek and Leopold 2020) to quantify the contributions of different pathways to prospective educational transmission rates across educational backgrounds and explore the differences across cohorts and countries. A more detailed description of the method is provided in the Data and Methods section.

3.4 Data and Method

3.4.1 Model

We now provide a mathematical formulation of the model illustrated in Figure 3-1 and introduced in the previous section. The main quantity of interest r_{ji}, the number of children attaining educational level j produced on average by a woman with educational level i, is assumed to expand as follows:

$$r_{ji} = \sum_{m} \left(P(M|I) \cdot E(F|I,M) \cdot P(J|I,M) \right)$$

Eq. 3-1

In the model, $P(M|I)$ is the probability of being in a partnership status M (with M taking values 0 “unpartnered”, 1 “partnered to a lower-educated man”, 2 “partnered to a higher-educated man”) for a woman of education I (with I taking values 0 “higher-educated” vs. 1 “lower-educated”). The distribution of $P(M|I)$ conditional on I corresponds to pathway b in Figure 3-1, and thus incorporates partner selection and assortative mating as a factor of educational reproduction.

$E(F|I,M)$ is the expected completed fertility rate given partnership status M and women’s education I. The distribution of $E(F|I,M)$ conditional on I and M corresponds to pathways c and e in Figure 3-1 respectively, and thus embeds the quantitative aspect of reproduction.

Finally, $P(J|I,M)$ is the probability that a child attains education J (with J taking values 0 “higher-educated” vs. 1 “lower-educated”) given mother’s education I and partnership status

M. The distribution of $P(J|I, M)$ conditional on I and M corresponds to pathways a and d in Figure 3-1 respectively, and thus embeds the qualitative aspect of reproduction.

Overall, woman's education I controls the distribution of r_{ji} more directly via the components $E(F|I, M)$ and $P(J|I, M)$ corresponding to pathways $c - g$ and $a - f$ in Figure 3-1 respectively, and less directly via $P(M|I)$ affecting $E(F|I, M)$ and $P(J|I, M)$ corresponding to pathways $b - e - k$ and $b - d - h$. The model thus embeds 1) a more direct qualitative effect (pathway $a - f$), 2) a more direct quantitative effect (pathway $c - g$), and 3) a set of less direct effects operating through partnership status (pathways $b - d - h$ and $b - e - k$).

To provide a better intuition behind equation above, consider the following fictive example. Let's assume that an average higher educated woman has a 10% probability to remain unpartnered ($P(M = 0|I = 1) = 0.1$), a 30% probability to have a lower-educated partner ($P(M = 1|I = 1) = 0.3$), and a 60% probability of have a higher-educated partner ($P(M = 2|I = 1) = 0.6$). The expected fertility rate for such a woman with a lower-educated partner is 2 ($E(F|I = 1, M = 1) = 2$), and 1 with a higher-educated partner ($E(F|I = 1, M = 2) = 1$). Women without partner can be safely assumed to have zero fertility rate ($P(M = 0|I = 1) = 0$). The probability that a child of a higher-educated mother attains higher education is 50% with father's lower education ($P(J = 1|I = 1, M = 1) = 0.5$) and 100% with father's higher education ($P(J = 1|I = 1, M = 2) = 1$). Given these quantities, r_{11}, i.e., the expected number of higher-educated children produced by a higher-educated women would thus be $r_{11} = 0.1 \cdot 0 + 0.3 \cdot 2 \cdot 0.5 + 0.6 \cdot 1 \cdot 1 = 0.9$.

Estimating all the constituent quantities of r_{ji} with a single data source poses a great challenge. As already mentioned, it lies in obtaining data of sufficiently long span 1) to let individuals accomplish their fertility plans and 2) to let these individuals' children accomplish status attainment. However, such data is not easily available and may not even exist yet for some countries. The good news is that different components of the educational reproduction model *do not have to* be estimated with a single data source, provided they are adequately linked to the populations they are intended to represent. For instance, quantity $E(F|I, M)$ requires relatively simple data on the number of children among women whose fertility is most likely to have been accomplished, i.e., those aged 40 and above, broken down by women's educational level. This is available in most sociological surveys. Accordingly, quantity $P(M|I)$ requires information about the presence of a partner and partner's education (also, broken down by women's educational level), which is also available widely. The data for the quantity $P(J|I, M)$

is perhaps most exotic, but it can be estimated using respondents' reports about their own and their parents' education, which is also not so difficult to come by.

For the approach above to work, however, all three quantities must be appropriately linked. The challenge is that $E(F|I, M)$, $P(M|I)$ are most likely to be estimated using data on respondents representing reproducing generations (G1), whereas $P(J|I, M)$ – using data on respondents representing the offspring generation (G2). Yet this can be easily overcome when parents' birth years are provided in the estimation of $P(J|I, M)$. Additionally, given that $P(J|I, M)$ is estimated from retrospective data that does not represent parents' generation (but rather the children's generation), certain transformations are needed to enable such representations. The issue has to do with the overrepresentation of higher-parity parents in retrospective data. The issue and a simple solution—i.e., inverse probability weighting using information on respondents' sibship size (also present in most datasets)—is well described by Song and Mare (2015) and Skopek and Leopold (2020).

3.4.2 Data

As described above, different sets of data can inform different components of the educational reproduction model, which is exactly the strategy we leverage here.

To obtain the distributions of mating patterns and fertility rates, we piece together several datasets that contain information on respondents' education, their year of birth, partnership status (including partner's education), and the number of children. Specifically, we pool together Integrated Values Survey (IVS) from 1981-2021, International Social Survey Programme (ISSP) from 1994, 2002, and 2012, European Social Survey (ESS) Wave 3 from 2006-2007, General Population Survey of Social Stratification in Eastern Europe After 1989 (SSEE) from 1993 and 1994, and Survey of Health, Aging and Retirement in Europe (SHARE) from 2015. The choice was dictated by availability of datasets, the relative ease of their harmonization, and a decent representation of countries and cohorts.

To obtain the distribution of educational attainment likelihood by parents' education, we use the first wave of the Generations and Gender Survey (GGS). GGS is an optimal source for this purpose for a variety of reasons. First, it contains information on respondents' education, gender, birth year, number of siblings, and parents' education and birth years. Second, GGS is perhaps the only source of this sort with readily harmonized data that provides a decent coverage of countries. Of the 16 countries that participated in GGS, we select 12, for which all necessary information is available: namely Austria, Belgium, Bulgaria, Czech Republic, Georgia, Germany, Lithuania, the Netherlands, Poland, Romania, Russian Federation, and Sweden. Third, with GGS we entertain relatively large sample sizes per country.

We chose to constrain our analysis to the reproduction of four G1 cohorts born 1) 1930-1935, 2) 1936-1940, 3) 1941-1945, and 4) 1946-1950. In this choice, we optimized between a reasonably wide representation of G1 cohorts in the pooled dataset and the representation of their G2 counterparts in the GGS data. Because we face the challenge of linking G1 data to G2 data, we only consider the reproduction of women. This is due to fertility age of women being more clearly defined due to existence of a physiological fertility limit (Menken et al. 1986). For instance, assuming a lower fertility age bound of 14 years old and an upper bound of 40 years old, we can define G2 cohorts for the above G1 cohorts as those born 1) 1944-1975, 2) 1950-1980, 3) 1955-1985, and 4) 1960-1990, and these cohorts are reasonably represented in GGS. Furthermore, the relatively narrow fertility age span of women also overcomes the right censoring problem when estimating G1's completed fertility using our prospective data (see below). In contrast, fertility age among men spans much longer (Dudel and Klüsener 2021; Schoumaker 2019), thus compromising the accuracy of male fertility estimates as well as making it problematic to establish the correspondence between G1 and G2 across the datasets.

In GGS, we restrict the sample to observations with no missing data on key variables (respondents' birth year, number of siblings, education and country of birth, and their mothers' birth year and parents' education). Given that we listwise delete observations, we admit that our results might be affected by patterns of non-response, especially if they vary by age, gender, or education. Vergauwen et al. (2015) analyze the implications of nonresponse within the Generations and Gender Survey (GGS) both at the unit and item levels. Their analysis suggests that specific demographic groups in GGS might be underrepresented, notably men, as well as people at extremes of age distribution. It also indicates a slight overrepresentation of higher-educated people. Consequently, listwise deletion of observations with missing information in our case may inadvertently result in a marginal overestimation of higher-educated women, particularly within the oldest cohort (1930-1935).

For the countries where we have information on parents' country of birth in GGS, we restrict the sample to those respondents whose mothers were born in the country. Although this excludes Georgia, Lithuania, and Poland, migration is unlikely to have had a major effect on G1 in these countries (Fassmann and Münz 1994; Wallace 2002). Additionally, we drop observations with an implausible age distance between the respondent and the mother (less than 14 years). Finally, we restrict the sample to those who possibly descend from women born between 1930-1950. For this, we apply a lower bound of fertility of 14 years and an upper bound of 40 years, thus keeping respondents born between 1944-1990. This leaves us with on average 2,850 cases per country, see Appendix table A3-1.

In the pooled prospective dataset, we also drop individuals with missing data on key variables (respondents' birth years, partnership status, partners' education, gender, education, and the number of children) and sub-select those born between 1930-1950 to represent our G1 cohorts. Here we entertain, on average, roughly 2,400 cases per country; see Appendix Table A3-2.

3.4.3 Estimation

In this study, we use a binary coding of education, with higher education being defined as having a tertiary degree (ISCED 1997 level 5 and above). More refined distinctions are complicated due to much heterogeneity in the coding of below-tertiary education across datasets. Also, in the case of Sweden, we had to reckon with the inability to distinguish between ISCED level 4 and 5 among parents in the GGS dataset (ISCED level 4 education accounts for a relatively small share in this country (Halldén 2008)). We apply the same coding to all education variables both for consistency and to adequately match G1 to G2. It is also critical to our decomposition procedure (described shortly below), which would otherwise become significantly less intuitive and much more complicated to conduct.

To estimate the distributions of $P(M|I)$, i.e., the probabilities of a given partnership status conditional on education, we use the pooled data and calculate the quantities for women, for each country and G1 cohort separately. We apply normalized survey weights in estimation, accounting for both the sampling design of each specific survey and the survey sample size in the pooled dataset. We distinguish between three categories of partnership status: "unpartnered", "having a lower-educated partner", "having a higher-educated partner". Thus, the information on partnership status comprises two variables: one derived from marital status information and the other from data regarding the educational level of the partner. Our measure includes married as well as cohabiting partners. However, it is just a snapshot in time not accounting for union dissolution and/or re-partnering and thus assumes stable partnerships over the life course. The limitations of these assumptions will be discussed in detail below.

We estimate the distributions of $E(F|I,M)$, i.e., average completed fertility rates by women's and their partners' education, we also use the pooled dataset and a similar weighting strategy. For each cohort, the completed fertility rates are calculated for women that have reached aged 44+, making the issue of right censoring redundant.

Finally, to estimate the distributions of $P(J|I,M)$, i.e., the probability of children attaining a given level of education by mother's and father's education, we use GGS, i.e., retrospective data provided by G2. To make this data representative of G1, in the estimation we account for the underrepresentation of lower-parity parents in the anchor sample by re-weighting it using the inverse of respondents' sibship size plus one (Skopek and Leopold 2020; Song and Mare 2015). These weights are then multiplied by GGS survey weights to account for GGS sampling designs in different countries. We could not estimate $P(J=1|I=1,M=1)$ for the earliest-born cohort of women in Romania due to a lack of cases and zero variance in several variables involved and therefore exclude it from our analysis.

3.4.4 Decomposition

To explain differences in educational production rates between higher- and lower-educated women, we employ a decomposition analysis of the kind previously employed by Skopek and Leopold (2020) and Leesch and Skopek (2023). The method builds on the intuition that these differences – i.e., $\Delta^1 = r_{11} - r_{10}$ and $\Delta^0 = r_{00} - r_{01}$ for the differences in the production rates of higher- and lower-educated children respectively – mathematically represent the sum of the average effect of swapping the distributions of $P(M|I)$, $E(F|I,M)$, and $P(J|I,M)$ and every combination of those between higher- and lower-educated women.

We provide a detailed mathematical proof of this decomposition and further details in Appendix section B3-1. Here, it suffices to explain the basic intuition. For example, to understand how much of the production rate of higher-educated children by higher-educated women is due to fertility, one could compare the factual production rate to the counterfactual one, in which these women are assumed to have the fertility rates of the lower-educated (all other things equal). Alternatively, an idea of how much of the production rate of higher-educated children by lower-educated women, is due to fertility, can be gained by comparing the factual production rate to the counterfactual one, in which these women are assumed to have the fertility rates of the higher-educated (again, all other things equal). In sum, both differences (factual vs counterfactual rates) provide an idea about the contribution of fertility. The logic can be extended to estimating the contribution of all other constituents of r_{ji}.

With only two constituents of r_{ji} involved, a counterfactual decomposition of this sort is relatively intuitive (Skopek and Leopold 2020; Wittemann 2023). A three-way decomposition, however, gets a bit more challenging but, nevertheless, follows the same logic.

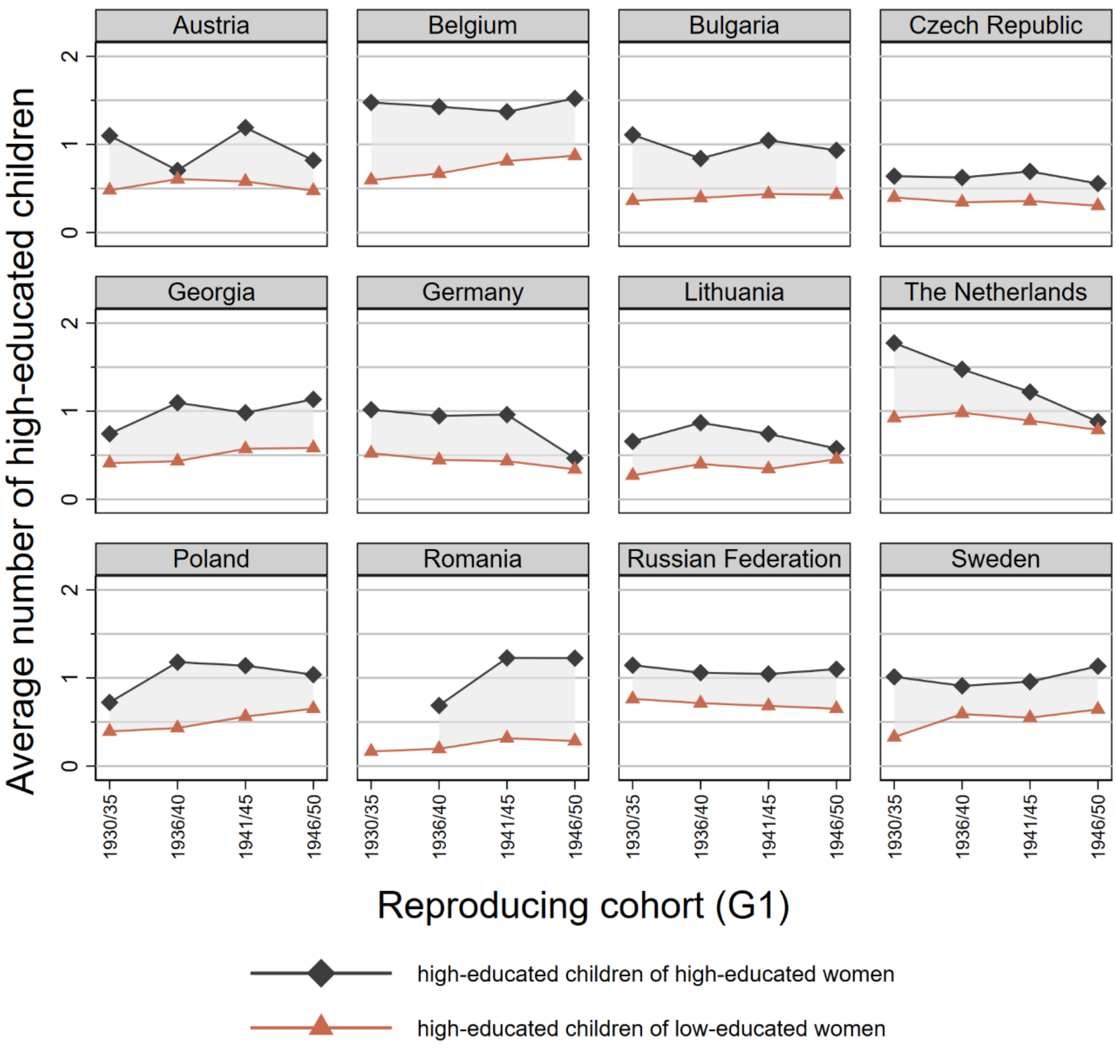
3.5 Findings

Following, we present and discuss educational production rates per se. Next, we discuss educational differences in fertility rates, partnership status, and mating patterns, i.e., the "ingredients" of our educational reproduction model. Finally, we present the results of their decomposition.

3.5.1 Educational production rates

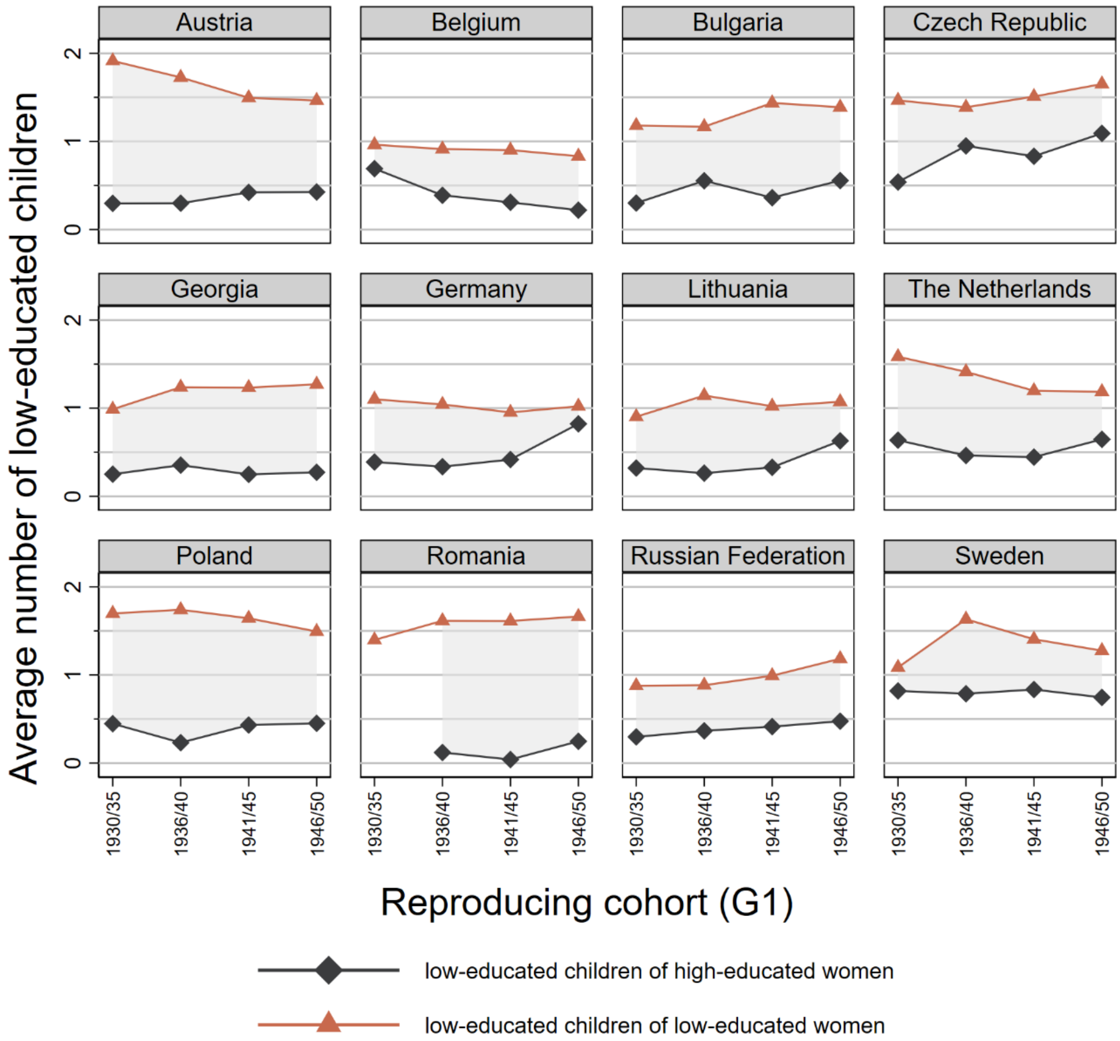
In Figure 3-2 and Figure 3-3, we plot the estimates for educational production rates of higher- and lower-educated offspring respectively. We remember that the rate refers to the average number of higher- or lower-educated children a woman with a certain level of education is expected to produce. Thus, the educational production rates do not represent any specific pathway specified in Figure 3-1, but rather Figure 3-1 as a whole.

Figure 3-2: Prospective educational production rates of higher- and lower-educated women in terms of production of higher-educated children.



Overall, we find clear and predictable educational differences in the production rates of higher-educated children, although countries vary in the magnitude of these differences. The smallest ones are observed in Lithuania, Russia, the Czech Republic, and Sweden and the largest ones – in Romania, Belgium, and Poland. Moreover, in Germany, Lithuania, The Netherlands, and Austria the educational production rates seem to converge in the most recent cohorts. We note, however, that this recent convergence may be due to the right censoring issue: the children of the most recent cohort of women may not have had enough time to accomplish education by the time of GGS data collection. Only in Poland and the Netherlands the rates for lower- and higher-educated women converge in cohorts born 1941-1945 whose offspring should be less affected by right censoring.

Figure 3-3: Prospective educational production rates of higher- and lower-educated women in terms of production of lower-educated children.



When looking at the production rates of lower-educated offspring, the educational difference is reversed but consistent across the entire range of countries: i.e., on average, lower-educated women produce more lower-educated offspring than higher-educated women. Notably, educational differences appear more pronounced in Figure 3-3 than in Figure 3-2. Cross-national variation is similar with lowest differences in Russia, Sweden, the Czech Republic, and Belgium, and largest in Austria, Poland, and Romania. In the Netherlands, educational differences consistently decline across cohorts, while in the other countries educational differences remain stable across cohorts. Although, for some countries, the stylized trends are difficult to discern, it seems that the differences have declined slightly also in Austria, Poland, and Lithuania. In Germany, a rise in the production rate of lower-educated children by higher-educated women is visible in the most recent cohort. As already mentioned, this is likely to result from right censoring and should thus be approached with caution.

In sum, Sweden, Russia, and the Czech Republic stand out as the countries with the lowest educational inequality in educational production rates. Conversely, Poland and Romania have the largest educational inequality. A temporal trend is not so obvious to discern, but a tendency towards convergence is slightly indicated in Poland, Austria, and Lithuania. Only in the Netherlands do educational inequalities in educational production rates seem to decrease noticeably across cohorts.

3.5.2 Educational differences in fertility rates, partnership status, and mating patterns

In this section, we summarize the actual (i.e., observed) distributions of the quantities of our educational reproduction model. Note that these quantities do not refer to the pathways visualized in Figure 3-1 but rather the fundamental demographic processes underlying.

Our analysis reveals substantial differences in educational fertility gradients across countries (detailed estimates in Table A-3 of the Appendix). The gradient is nearly absent in Sweden, Belgium, and Germany. In most other countries, we observe negative gradients (i.e., lower fertility rates among the higher-educated), however, of a range of magnitudes. While relatively small in Russia, we observe strong ones in Austria and Poland.

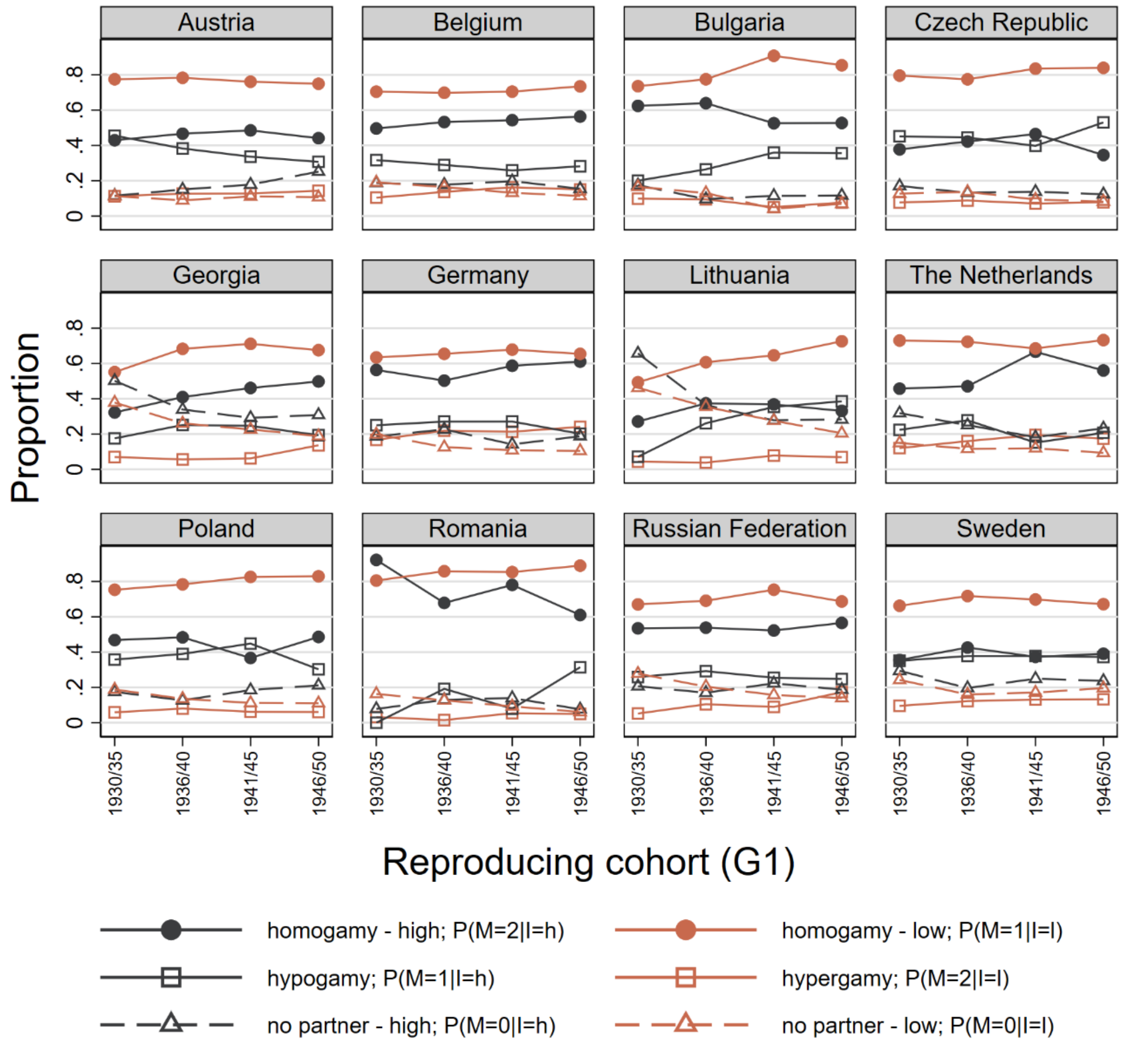
Figure 3-4 illustrates the distribution of mating patterns by education, countries, and cohorts. Specifically, we differentiate between unpartnered women, women in a homogamous relationship, and women in a heterogamous relationship (either hypogamy for higher-educated women or hypergamy for lower-educated women).

Educational differences in the chances of remaining unpartnered vary minimally across countries. Notable exceptions are Georgia and the Netherlands, where lower-educated women are marginally more likely to have a partner compared to higher-educated ones. In Austria, no significant differences by education were found among women born between 1930 and 1935, although this changes in more recently born cohorts, with lower-educated women getting more likely to have a partner. Small educational differences in the likelihood of selection into partnership already suggest its minimal impact on the inequality in educational reproduction rates. Notably, irrespective of educational differences, our estimates reveal a consistent downward trend in the likelihood of remaining without a partner over cohorts in post-socialist countries. However, we see this merely as an indication of generally lower male life expectancy in these countries (i.e., a widowhood effect) as compared to other European ones (Leon 2011; Mäki et al. 2013).

As far as patterns of assortative mating are concerned, we find that educational homogamy prevails in all 12 countries. The proportion of lower-educated homogamous couples typically outweighs the proportion of higher-educated couples, but this is largely a reflection of the underlying distribution of educational attainment (given our definition of higher- and lower-educated). On the contrary, both educational hypergamy and hypogamy among women is a rare occurrence. Assortative mating patterns also demonstrate remarkable stability across cohorts in most countries, although hypogamy diminishes over successive cohorts in Austria and within the latest cohort in Poland, while it demonstrates an increasing trend in Bulgaria and Lithuania.

Educational homogamy appears to be least widespread in Sweden, Georgia, and Lithuania. As prior research also explored, Romania exhibits a particularly high rate of educational homogamy (Domański and Przybysz 2007). Also, Poland and the Czech Republic expectedly are characterized by higher educational homogamy, especially in the lower-educated category.

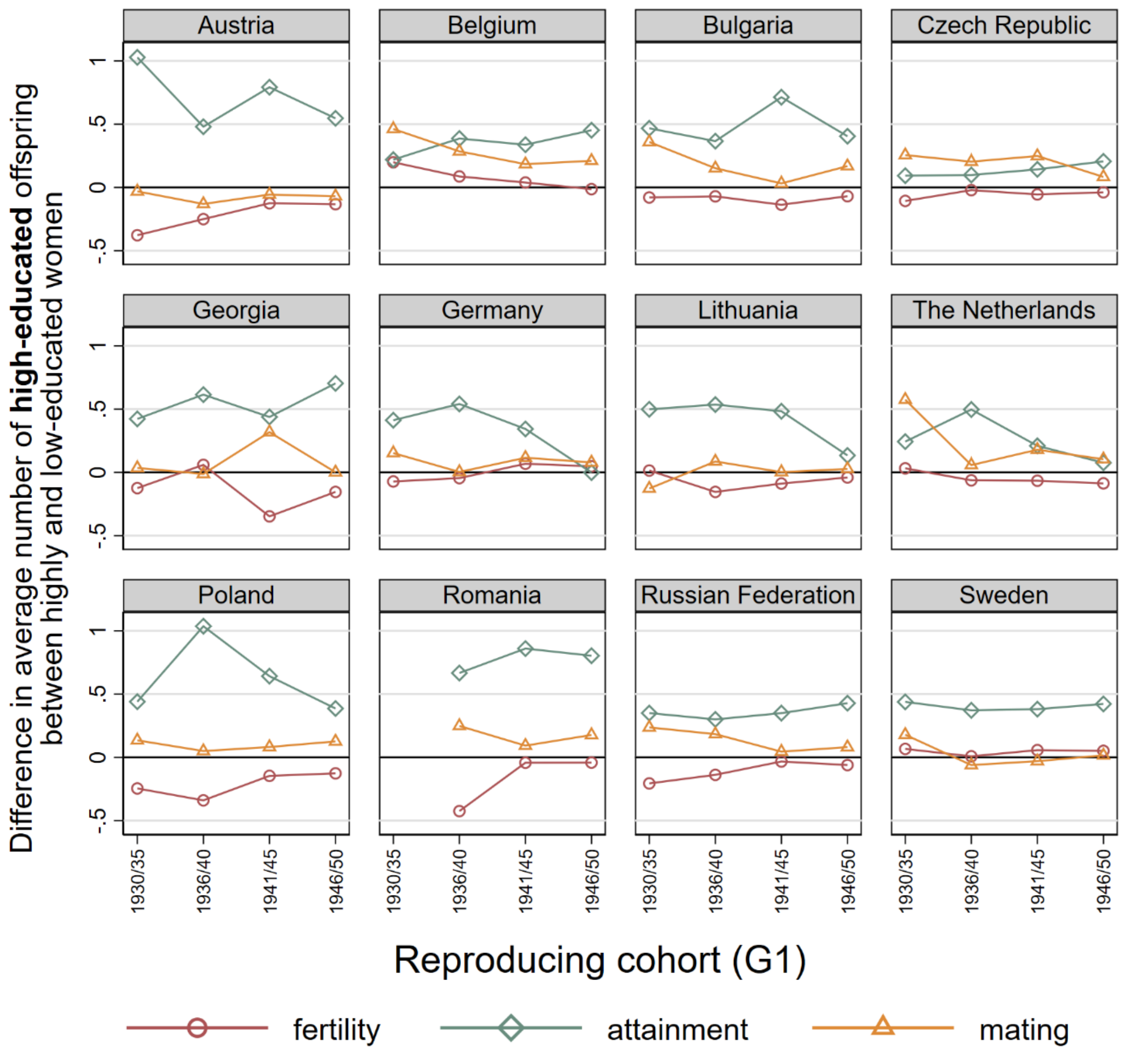
Figure 3-4: Proportion of women either having no partner, being in a homogamous relationship or being in a heterogamous relationship by education; (P(M|I)).



3.5.3 Decomposition

In Figure 3-5 and Figure 3-6, we decompose the differences in educational production rates of higher- and lower-educated children respectively as per decomposition technique described earlier (also, in Appendix, section B3-1). With this decomposition, we thus explicitly explore how much of these differences (i.e., represented by the shaded areas in Figure 3-2 and Figure 3-3) is attributable to the educational differences between women in terms of their mating patterns, fertility rates, and attainment per se, the pathways visualized in Figure 3-1. The colours used in Figure 3-5 and Figure 3-6 correspond to those in Figure 3-1.

Figure 3-5: Decomposition of differences in educational production rates of higher-educated children.



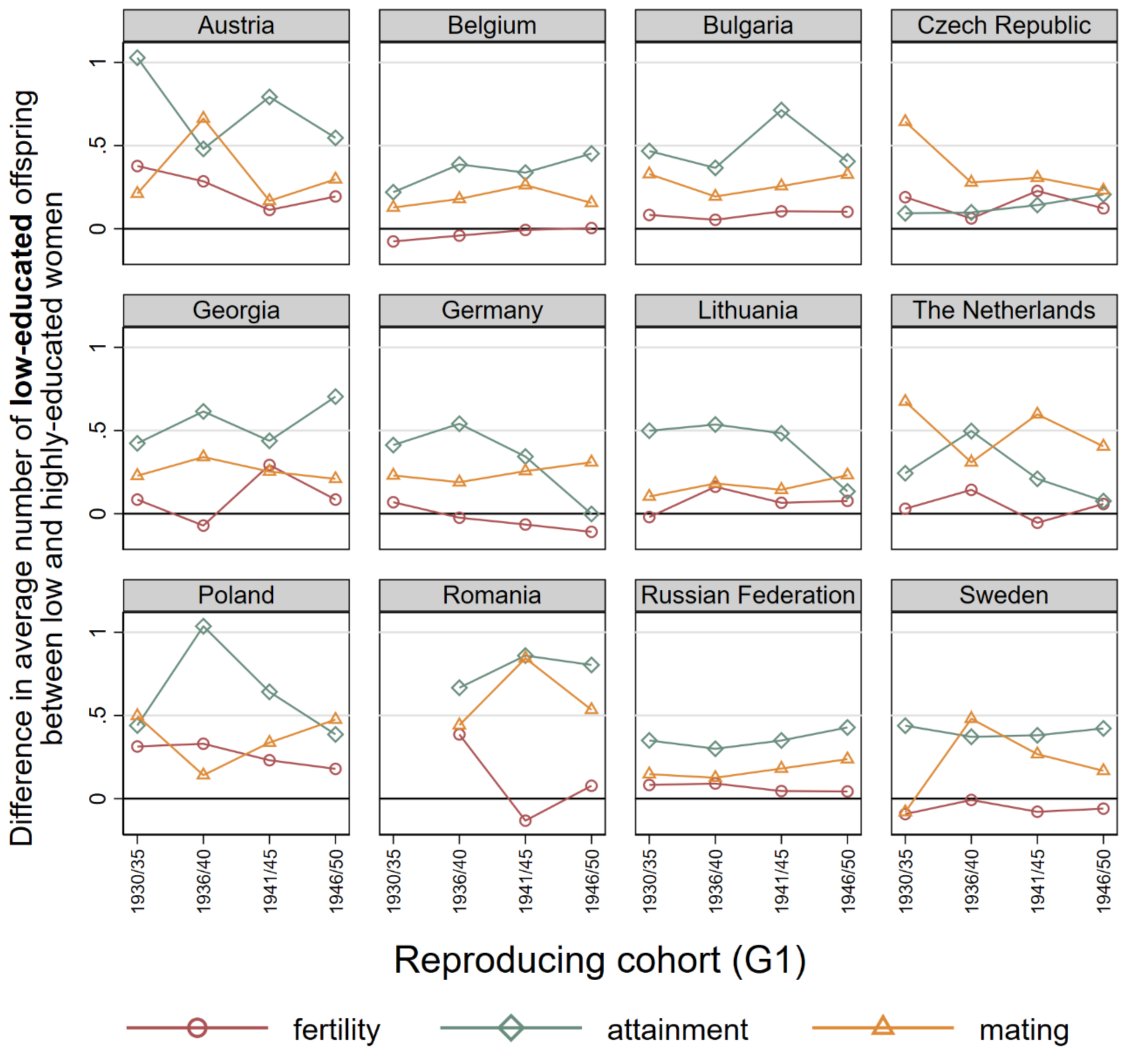
First, we focus on the decomposition of the differences in the production rates of **higher-educated offspring** (Figure 3-5). One common prominent pattern is that the differences are largely due to the attainment effects of mother's education (green lines in Figure 3-5 corresponding pathway $a - f$ in Figure 3-1). Moreover, considering the combination of all three pathways, we can identify a group of countries in which differences in educational production rates of higher-educated children are almost entirely due attainment effect: Georgia, Lithuania, Sweden, and Germany. There is also some variation that largely overlaps with the magnitude of differences in educational production rates as identified above: the effects appear strongest in Poland, Austria, and Romania and weakest in Sweden, Russia, and the Czech Republic.

When interpreting the effects of fertility gradients on differences in educational production rates, it is important to keep in mind that we analyze the reproduction of cohorts born between 1930-1950. Thus, recently reported trends in a weakening of fertility gradients for example likely do not affect the cohorts in this study (Kravdal and Rindfuss (2008) cohorts 1940-1964, Nisén et al. (2021) cohorts 1965-1960, Wood et al. (2014) cohorts 1940-1961).

The contribution of fertility differences (red lines in Figure 3-5 corresponding to pathway $c - g$ in Figure 3-1) is much smaller in absolute magnitude compared to the attainment effect. Moreover, where it is present, it is more likely to remain negative, thus offsetting the difference in educational production rates of higher-educated children between higher- and lower-educated mothers (Figure 3-2). More precisely, in these countries, the lower fertility of highly-educated women compared to lower-educated women reduces their ability to transmit advantage simply because fewer children exist to whom the educational advantage could be passed on.

Here, we also find some cross-country variation. The role of fertility is negligible in Bulgaria, the Czech Republic, Georgia, Lithuania, the Netherlands, Sweden, and Germany. It is more prominent in Austria, Poland, Russia, and Romania, although this is more evident only for the earlier-born cohorts. Notably, Belgium stands out as the single country, in which educational fertility differences (albeit small) reinforce rather than diminish differences in educational production rates of higher-educated children (i.e., due to a positive rather than negative educational fertility gradient), although this is only attributable to the earlier-born cohorts.

Figure 3-6: Decomposition of differences in educational production rates of lower-educated children. Source: own calculation.



What of the role of educational differences in partnership status and partner choice (yellow line in Figure 3-5 corresponding to pathways $b-e-k$ and $b-d-h$ in Figure 3-1)? In Austria, Georgia (except for the single cohort), Germany, Lithuania, and Sweden its role is almost negligible. In all other countries, it appears to widen the gap in educational production rates and thus resonates with the effect of women's own education. Noteworthy, the effect is unlikely to be due to selection into partnership likelihood and most likely reflects the effects of assortative mating per se. Nevertheless, we underscore that the effect of assortative mating on educational production rates (including as it is calculated in Figure 3-5) represents a combination of both pathways illustrated in Figure 3-1. On the one hand, both partners pooled educational resources have an effect on the probability of a child's educational attainment (pathway $b-d-h$ in

Figure 3-1). On the other hand, the partner's education influences fertility and, thus, indirectly, the educational production rate of a woman (pathway $b - e - k$ in Figure 3-1). This possibly explains the overall small effect of assortative mating on the difference in educational production rates of lower-educated children: while enhancing the difference via effects through attainment (e.g., due to the pooling of resources relevant to children's educational success), it partly offsets them through fertility (e.g., a negative fertility gradient further enhanced by educational homogamy).

Notably, the effect of assortative mating, where present, is also declining across cohorts. Since we do not observe any notable changes in the patterns of assortative mating (Figure 3-4), the effect is unlikely to be compositional in nature and most likely reflects the change in the balance of both mechanisms (Figure 3-1) as just described.

We now move to the decomposition of differences in the production rates of lower-educated offspring (Figure 3-6). Concerning the effect of attainment (green lines), we observe a largely similar pattern as in Figure 3-5: it appears to be the main driver of the difference observed in Figure 3-2. Furthermore, it mirrors the country differences noted before, with Poland and Austria scoring highest in terms of the relevance of this effect and its contributions being the lowest in Czech Republic and Russia.

Similarly, the role of fertility (red lines) is small in most cases, except Poland and Austria. However, unlike in Figure 3-5, its effect on the differences is reversed. This underscores the ambiguous implications of a negative educational fertility gradient on the reproduction of educational inequality: whereas it increases the inequality in the production rates of higher-educated children, it also increases the inequality in the production rates of lower-educated children.

Educational differences in mating patterns (yellow lines) also resonate with the effect of attainment, and thus reinforce the inequality. However, we find that its effects are much more pronounced with respect to the difference in the production rates of lower-educated children (Figure 3-6) than with respect to the difference in the production rates of higher-educated children (Figure 3-5). This is in line with the explanation of the complex nature of mating effects described above. Since assortative mating might enhance (rather than reduce) the gap in fertility rates between higher- and lower-educated mothers (i.e., pathway $b - e - k$ in Figure 3-1), it also resonates with (rather than offsets) its effect on the pooling of educational resources affecting the likelihood of children's lower educational attainment. Simply put, if all women had similar chances in the marriage market, educational differences in the average number of lower-educated children would be reduced.

3.6 Discussion & Conclusion

In this paper, we analysed the inequality in educational production rates and its trends for women born 1930-1950 in 12 European countries. Furthermore, we investigated the mechanisms behind this inequality, distinguishing between three pathways – fertility, mating, and inheritance of educational attainment from mother to child.

Our first general and relatively trivial finding is that the inequality in educational production rates is material, and it persists across countries and cohorts. More specifically, an average higher-educated woman contributes more higher-educated offspring than a lower-educated one, and, vice versa, a lower-educated woman contributes more lower-educated offspring than a higher-educated one. However, our cross-country and cross-cohort analysis also reveals some notable variations. Regarding country differences, we find that the inequalities are largest in Poland, Romania, Belgium, and Austria, and lowest in Russia, Sweden, the Czech Republic, and Lithuania. In terms of cohort changes, a stylized trend is harder to identify, however, in most countries, the gaps remain stable over cohorts and only consistently decline in the Netherlands. These findings, pertaining to inequality in prospective educational production rates, generally align with the findings of conventional intergenerational social mobility research. For instance, Sweden and Poland appeared in our findings as the cases displaying one of the smallest and the highest inequality, respectively, is not very different from how these countries are frequently ranked in social mobility literature (Breen et al. 2009; Breen and Jonsson 2005; Katrňák et al. 2012; OECD 2018). In that sense, a prospective angle on educational reproduction does not yield any stunning or paradigm-changing results.

At the same time, we must acknowledge that our findings somewhat diverge from those of Breen et al. (2019), who also analyzed educational reproduction prospectively and focused on European countries. They report that the intergenerational association of educational attainment remains stronger in North-Western European countries than South-Eastern European countries, even when educational disparities in childlessness are considered (i.e., what they term unconditional estimates of educational reproduction). However, in our study, the extremes of inequality include countries from both geographic regions with post-socialist countries of Eastern Europe being particularly represented at these extremes. Nevertheless, we underscore that our studies are not directly comparable for a minimum of two reasons. First, Breen et al.

(2019) entertain relatively small sample sizes and compare regions rather than countries, whereby cross-country variation gets obscured. Second, their estimates of reproduction only correct for childlessness rather than fertility differences at large.

Furthermore, in our analysis, we go beyond our trivial finding establishing differences across Europe and reveal how much of these differences are due to the different pathways we outlined. Direct educational inheritance, i.e., the effect of a mother's education on that of her child, contributes most to the inequality in educational production rates. Although this is consistent with the findings of Skopek and Leopold (2020) in Germany and Wittemann (2023) in Sweden, here we confidently show that this is a more universal pattern.

However, the inequality in educational production rates is not shaped exclusively through direct educational inheritance. Although our analysis reveals only small educational differentials in fertility, they are still relatively pronounced in some countries, especially in earlier-born cohorts.

We find negative fertility gradients, particularly in Austria, Poland, Russia, and Romania. For the latter three nations, this observation aligns with prior research that identified post-communist countries as having notably strong negative fertility gradients in relation to education (Merz and Liefbroer 2017; Wood et al. 2014). Furthermore, our findings partially reflect another aspect of previous studies on the variation of educational stratification across countries: the positive educational fertility gradient observed in Belgium (Nisén et al. 2021; Wood et al. 2014). Specifically, Belgium emerges as the sole country in our analysis where higher fertility rates among highly-educated are observed. However, this pattern is only evident in cohorts born earlier.

Accordingly, a negative fertility gradient, where strong enough, partly offsets the inequality in production rates of higher-educated children. This is because a higher ability to pass educational advantage to children among higher-educated women meets their generally lower levels of fertility. This seems consistent with the findings from prospective mobility literature, claiming that the intergenerational transmission of educational attainment is usually overstated in the analyses that condition on parenthood (Mare and Maralani 2006; Kye and Mare 2012; Maralani 2013; Song and Mare 2015; Lawrence and Breen 2016; Breen and Ermisch 2017; Song and Mare 2017; Breen et al. 2019). However, by looking at the inequality in production rates of lower-educated children we also find a completely different pattern, with fertility differences reinforcing rather than counterbalancing the inequality. Moreover, this inequality-reinforcing effect appears even more pronounced than the effect of fertility on the inequality in production rates of higher-educated children, especially in contexts where the educational fertility gradient is particularly strong. Thus, the overall effect of the fertility pathway on the intergenerational reproduction of educational inequality can be rather ambiguous.

Social stratification of the selection into partnership can shape inequality in educational production rates simply by predetermining who produces offspring in the first place. However, we find no educational differences in the likelihood of having a partner in any country, a finding that Corti and Scherer (2022) also detected for Germany. However, Kalmijn (2013) reports varying educational gradients in marriage across Europe for cohorts born 1953-1971 using data from the Educational Social Survey (ESS). Our finding of an absence of social stratification in the selection into partnership may be influenced by our method of operationalizing partnership status, which is treated as a snapshot in time. This approach is shaped by data limitations, and an attempt to mitigate the impact of mortality by imposing an age cap of 70 years when estimating partnership status has been made. Nonetheless, we acknowledge that this strategy may introduce a bias in our results, particularly concerning the selection into partnership.

Assortative mating possibly shapes inequalities in educational production rates in two ways. First, through educational resources available in the family, and second, through its influence on fertility. Among individuals with a partner, educational homogamy is prevalent, corroborating prior research on educational assortative mating in Europe (Erát 2021; Esteve et al. 2016; Uunk 2024). However, our findings partially reflect the anticipated cross-country variations. Specifically, Romania exhibits a notably high proportion of assortative mating, followed by Poland and the Czech Republic, as expected based on previous studies (Domański and Przybysz 2007; Uunk 2024). In contrast, Belgium and the Netherlands do not exhibit notable distinctions in our analysis, despite being characterized by relatively low levels of educational assortative mating in the literature (Domański and Przybysz 2007; Jeroen Smits et al. 1998). Assortative mating patterns also demonstrate remarkable stability across cohorts in most countries of our study, which is in line with the findings of Uunk (2024). An increase in hypogamy across successive cohorts is observed only in Bulgaria and Lithuania, aligning with trends identified by Erát (2021) that span several countries, alongside a general decrease in hypergamy. Given that Erát (2021) focused on cohorts born between 1954 and 1980, it is plausible to infer that the trends he observes may predominantly emerge in cohorts beyond those we analyze.

We find mating to influence differences in educational production rates in all countries. However, in some countries, educational differences in the average number of higher-educated children are not influenced by differences in mating patterns. This is the case in Austria, Georgia, Germany, Lithuania, and Sweden. In countries where the educational stratification of mating patterns influences the educational stratification of reproduction, it widens the educational gap of both educational production rates. This works through two pathways depicted in Figure 3-1. First, higher-educated women are more likely to have a higher-educated partner than lower-educated women, which increases the likelihood of a dual educational advantage, which in turn increases the ability to transmit educational advantage to possible children (pathway $b - d - h$ in Figure 3-1). Analogously, the higher probability of lower-educated women finding a lower-educated partner increases the probability of lower-education for their possible offspring. However, this is only one pathway educational differences in mating patterns possibly shape educational reproduction. The other, way is through its influence on fertility (pathway $b - e - k$ in Figure 3-1). Thus, for couples where both partners are higher-lower educated, educational differences in fertility rates might be even more pronounced, which in turn increases the educational gaps between educational production rates of lower-educated offspring and decreases the educational gap in the production of higher-educated offspring.

Thus, our findings regarding the role of mating patterns in the reproduction of educational inequality are in line with those of previous prospective studies (Kye and Mare 2012; Maralani 2013; Mare and Maralani 2006). Corti and Scherer (2022) found that in Germany, from the perspective of women, spousal education matters for the probability of having an educated child and that this effect does not work through spousal influence on fertility but through direct educational inheritance. Our findings do not contrast those since we find that differences in mating patterns shape educational differences in the average number of lower-educated offspring.

This work is not free from limitations. First, our analysis is descriptive in nature and does not permit causal claims. Our counterfactual analysis is not “counterfactual” in the strict sense and only serves the purpose of decomposing differences in observed inequalities in educational production rates. Second, in measuring partnership status we make a strong assumption that it remains fairly stable throughout the life course. Furthermore, as we have already noted, the measurement of partnership status is also likely influenced by mortality, especially in earlier-born cohorts of women in post-socialist countries (Leon 2011; Mäki et al. 2013). Third, and partly related, we use women’s highest education degree and not their actual education when they met their (possible) partners and (possibly) produced and raised children. Fourth, we use a binary coding of education. Although dictated by reasons of convenience, harmonization across datasets, and the ease of cross-country comparison (and aligns with other work (e.g., (Breen et al. 2019; Corti and Scherer 2022), we recognize that may obscure important heterogeneity. In our coding, lower-educated include individuals both with incomplete and complete secondary education of a variety of degrees (i.e., up to ISCED level 4). Fifth, the selection of countries in this study is based on data availability, and thus, some European regions and countries like France, the UK, Spain, Italy, etc., are not represented limiting the generalisability of our findings to the entire European continent. Finally, fertility and assortative mating represent just a subset of the demographic factors that are socially stratified and, as a result, impact educational reproduction. Specifically, factors such as union stability, mortality, and the timing of childbirth are also likely to exhibit social stratification and, therefore, should be taken into account in future research on educational reproduction.

3.7 Acknowledgements

We acknowledge the producers and the distributors of data employed in our study. GGS Wave 1 data (doi:10.17026/dans-z5z-xn8g) were obtained from the GGS data providers (https://www.ggp-i.org/). EVS data (doi:10.4232/1.14021) were obtained from GESIS Data Archive (https://www.gesis.org/). WVS data (doi:10.14281/18241.17 and doi:10.14281/18241.18) were obtained from the WVS data providers (https://www.worldvaluessurvey.org/). ESS Waves 3 (doi:10.21338/NSD-ESS3-2006) and 9 (doi:10.21338/NSD-ESS9-2018) data were obtained from the ESS data providers (https://www.europeansocialsurvey.org/). SSEE data (doi:10.7910/DVN /XYUDDX) were obtained from Harvard Dataverse (https://dataverse.harvard.edu/). SHARE Wave 6 data (doi:10.6103/SHARE.w6.900) were obtained from the SHARE providers (https://share-eric.eu/).

3.8 Appendix

Table A3-1: Descriptive statistics for retrospective anchor sample (GGS).

		Respondent			**Retrospectove information on Mothers**	
Country samples		Birth Year	Number of Siblings	High-Educated	Birth Year	High-Educated
Austria	Mean	1970	2.4	.23	1942	.046
N=1,849	SD	5.2	1.8	.42	5.3	.21
Belgium	Mean	1966	2.1	.5	1939	.18
N=1,636	SD	7.2	1.6	.5	6.2	.39
Bulgaria	Mean	1966	1.3	.26	1941	.11
N=4,436	SD	7.1	1.2	.44	6	.31
Czech Republic	Mean	1965	1.4	.2	1941	.054
N=2,615	SD	7.9	1	.4	6.2	.23
Georgia	Mean	1966	2.2	.33	1939	.15
N= 3,414	SD	7.5	1.5	.47	6	.36
Germany	Mean	1965	1.8	.31	1939	.073
N=2,534	SD	6.8	1.5	.46	5.7	.26
Lithuania	Mean	1966	1.7	.28	1939	.1
N=2,429	SD	7.8	1.4	.45	6.1	.3
The Netherlands	Mean	1967	2.1	.41	1940	.099
N= 2,257	SD	6.3	1.5	.49	6	.3
Poland	Mean	1966	2.4	.23	1940	.062
N=4,858	SD	8.4	1.8	.42	6.5	.24
Romania	Mean	1964	2.1	.12	1939	.022
N=4,065	SD	7.7	1.8	.33	6.2	.15
Russia	Mean	1965	1.6	.48	1939	.25
N=1,962	SD	7.3	1.4	.5	6	.43
Sweden	Mean	1967	1.8	.43	1941	.35
N=2,126	SD	7.8	1.1	.5	6.1	.48
Total	Mean	1966	1.9	.29	1940	.11
N=34,181	SD	7.5	1.6	.45	6.2	.31

Table A3-2: Descriptive statistics for pooled fertility dataset.

Country samples		Birth Year	High-educated	childless	Number of children
Austria	Mean	1942	.16	.15	2.2
N= 1,832	SD	5.7	.37	.36	1.5
Belgium	Mean	1941	.24	.2	2
N= 2,607	SD	6	.42	.4	1.5
Bulgaria	Mean	1942	.17	.059	1.8
N=2,475	SD	5.9	.38	.24	.89
Czech Republic	Mean	1942	.092	.096	1.9
N=4,008	SD	5.8	.29	.29	1.1
Georgia	Mean	1942	.26	.23	1.8
N= 1,132	SD	5.8	.44	.42	1.4
Germany	Mean	1941	.17	.38	1.3
N=3,438	SD	5.8	.38	.49	1.4
Lithuania	Mean	1942	.17	.21	1.6
N=1,167	SD	5.5	.38	.41	1.3
The Netherlands	Mean	1942	.22	.17	2.2
N= 2,623	SD	5.7	.42	.37	1.4
Poland	Mean	1942	.12	.12	2.2
N=3,463	SD	6	.33	.32	1.5
Romania	Mean	1941	.062	.14	1.9
N=1,605	SD	6	.24	.35	1.4
Russia	Mean	1941	.38	.13	1.8
N=2,030	SD	6.1	.49	.33	1.1
Sweden	Mean	1942	.28	.096	2.3
N=2,617	SD	5.5	.45	.29	1.3
Total	Mean	1942	.19	.16	1.9
N=28,997	SD	5.9	.39	.37	1.3

Table A3-3: proportion of childless women and completed cohort fertility rate (CFR) of high- and low-educated women.

Country	Cohort	Proportion of childless		Cohort fertility rate	
		High-educated	Low-educated	High-educated	Low-educated
Austria	1930-1935	.16	.11	1.4	2.2
	1936-1940	.21	.13	1.2	2.1
	1041-1945	.24	.14	1.3	2
	1946-1950	.31	.11	.98	1.8
	total	.23	.12	1.2	2
Belgium	1930-1935	.3	.24	1.5	1.6
	1936-1940	.3	.21	1.3	1.5
	1041-1945	.18	.19	1.6	1.6
	1946-1950	.19	.17	1.5	1.6
	total	.24	.2	1.5	1.6
Bulgaria	1930-1935	.11	.047	1.2	1.7
	1936-1940	.17	.045	1.2	1.7
	1041-1945	.13	.025	1.3	1.9
	1946-1950	.13	.04	1.4	1.9
	total	.13	.039	1.3	1.8
Czech Republic	1930-1935	.26	.081	1	1.8
	1936-1940	.14	.12	1.4	1.6
	1041-1945	.13	.063	1.4	1.9
	1946-1950	.1	.068	1.6	1.9
	total	.16	.083	1.4	1.8
Georgia	1930-1935	.38	.29	.78	1.3
	1936-1940	.31	.23	1	1.5
	1041-1945	.29	.21	.93	1.6
	1946-1950	.29	.16	1	1.7
	total	.32	.22	.94	1.5
Germany	1930-1935	.32	.31	1	1.2
	1936-1940	.4	.3	.79	1.1
	1041-1945	.29	.33	1.1	.99
	1946-1950	.26	.27	1	1.1
	total	.32	.3	.98	1.1
Lithuania	1930-1935	.29	.39	.82	.73
	1936-1940	.25	.19	.95	1.4
	1041-1945	.26	.18	1	1.3
	1946-1950	.22	.12	1	1.6
	total	.26	.22	.95	1.3
The Netherlands	1930-1935	.29	.18	.28	2.2
	1936-1940	.23	.13	1.6	2
	1041-1945	.27	.098	1.2	2
	1946-1950	.28	.12	1.2	1.9
	total	.27	.13	1.4	2
Poland	1930-1935	.15	.11	1.5	2.3
	1936-1940	.14	.092	1.3	2.2
	1041-1945	.14	.077	1.4	2.2
	1946-1950	.22	.081	1.2	2.1
	total	.16	.091	1.4	2.2
Romania	1930-1935	.21	.17	.78	1.4
	1936-1940	.4	.13	.53	1.7
	1041-1945	.23	.12	1	1.9
	1946-1950	.13	.099	1.3	1.9
	total	.25	.13	.92	1.7
Russia	1930-1935	.12	.15	1.4	1.5
	1936-1940	.15	.094	1.3	1.7
	1041-1945	.12	.078	1.5	1.7
	1946-1950	.1	.062	1.6	1.9
	total	.12	.095	1.4	1.7

Sweden	1930-1935	.14	.12	2	2
	1936-1940	.15	.067	1.9	2.2
	1041-1945	.14	.098	1.9	2
	1946-1950	.11	.11	2	2
	total	.13	.1	1.9	2.1

Table A3-4: proportion of high- and low-educated women in a partnership.

Country	Cohort	Proportion of women with a partner		Country	Cohort	Proportion of women with a partner	
		High-educated	Low-educated			High-educated	Low-educated
Austria	1930-1935	.87	.77	Lithuania	1930-1935	.36	.54
	1936-1940	.79	.86		1936-1940	.62	.63
	1041-1945	.77	.85		1041-1945	.7	.72
	1946-1950	.72	.82		1946-1950	.71	.78
	total	.77	.83		total	.66	.68
Belgium	1930-1935	.8	.83	The Netherlands	1930-1935	.59	.81
	1936-1940	.81	.84		1936-1940	.73	.89
	1041-1945	.81	.88		1041-1945	.78	.87
	1946-1950	.83	.89		1946-1950	.76	.88
	total	.82	.86		total	.74	.87
Bulgaria	1930-1935	.75	.8	Poland	1930-1935	.8	.78
	1936-1940	.84	.85		1936-1940	.82	.83
	1041-1945	.85	.93		1041-1945	.77	.86
	1946-1950	.87	.93		1946-1950	.77	.87
	total	.84	.89		total	.78	.84
Czech Republic	1930-1935	.75	.85	Romania	1930-1935	.89	.8
	1936-1940	.83	.86		1936-1940	.86	.85
	1041-1945	.86	.89		1041-1945	.83	.9
	1946-1950	.86	.91		1946-1950	.91	.93
	total	.84	.88		total	.88	.88
Georgia	1930-1935	.51	.63	Russia	1930-1935	.67	.59
	1936-1940	.66	.75		1936-1940	.66	.65
	1041-1945	.7	.78		1041-1945	.7	.72
	1946-1950	.69	.82		1946-1950	.75	.78
	total	.66	.75		total	.7	.69
Germany	1930-1935	.6	.7	Sweden	1930-1935	.79	.81
	1936-1940	.72	.82		1936-1940	.84	.87
	1041-1945	.86	.86		1041-1945	.8	.86
	1946-1950	.83	.88		1946-1950	.83	.83
	total	.78	.82		total	.82	.85

Table A3-5: proportion of women across mating patterns.

Country	Cohort	No partner	Homogamous high	hypogamy	Homogamous low	hypergamy
Austria	1930-1935	.11	.062	.066	.66	.096
	1936-1940	.097	.058	.047	.69	.11
	1041-1945	.12	.089	.062	.62	.1
	1946-1950	.14	.085	.059	.6	.12
	total	.12	.073	.059	.64	.11
Belgium	1930-1935	.19	.08	.053	.59	.087
	1936-1940	.17	.11	.062	.55	.11
	1041-1945	.15	.14	.066	.53	.12
	1946-1950	.13	.16	.082	.52	.11
	total	.16	.12	.066	.55	.11
Bulgaria	1930-1935	.17	.067	.022	.66	.088
	1936-1940	.13	.092	.038	.66	.081
	1041-1945	.055	.095	.065	.74	.041
	1946-1950	.078	.1	.068	.69	.062
	total	.11	.089	.048	.69	.068
Czech Republic	1930-1935	.13	.02	.024	.024	.073
	1936-1940	.14	.037	.037	.71	.081
	1041-1945	.099	.058	.049	.73	.062
	1946-1950	.086	.033	.05	.76	.071
	total	.11	.037	.041	.74	.072
Georgia	1930-1935	.4	.068	.037	.44	.056
	1936-1940	.28	.088	.054	.54	.044
	1041-1945	.25	.13	.071	.51	.044
	1946-1950	.23	.16	.061	.46	.094
	total	.29	.11	.056	.49	.059
Germany	1930-1935	.2	.052	.023	.58	.15
	1936-1940	.14	.058	.031	.58	.19
	1041-1945	.12	.058	.055	.54	.17
	1946-1950	.12	.13	.042	.52	.19
	total	.14	.089	.038	.55	.18
Lithuania	1930-1935	.48	.019	.005	.46	.041
	1936-1940	.36	.055	.038	.52	.033
	1041-1945	.28	.079	.076	.51	.062
	1946-1950	.22	.065	.076	.58	.056
	total	.33	.054	.049	.52	.048
The Netherlands	1930-1935	.17	.066	.032	.62	.1
	1936-1940	.14	.084	.05	.59	.13
	1041-1945	.13	.14	.032	.54	.15
	1946-1950	.13	.14	.053	.55	.13
	total	.14	.11	.042	.58	.13
Poland	1930-1935	.19	.036	.027	.7	.054
	1936-1940	.13	.057	.046	.69	.071
	1041-1945	.12	.038	.047	.74	.056
	1946-1950	.12	.064	.04	.72	053
	total	.14	.049	.04	.71	.058
Romania	1930-1935	.16	.026	0	.78	.031
	1936-1940	.13	.034	.0096	.82	.014
	1041-1945	.096	.052	.0053	.8	.05
	1946-1950	.062	.052	.027	.81	.046
	total	.11	.041	.01	.8	.035
Russia	1930-1935	.26	.1	.049	.54	.042
	1936-1940	.19	.17	.092	.47	.072
	1041-1945	.18	.22	.11	.44	.052
	1946-1950	.16	.21	.094	.43	.11
	total	.2	.18	.085	.47	.069
Sweden	1930-1935	.25	.055	.054	.56	.081
	1936-1940	.17	.09	.08	.57	.096

	1041-1945	.19	.092	.093	.53	.099
	1946-1950	.21	.099	.094	.5	.099
	total	.2	.084	.08	.54	.094

Table A3-6: Educational production rate of high- and low-educated women producing high- and low-educated offspring.

Country	Cohort	Educational production rate of high-educated offspring		Educational production rate of low-educated offspring	
		High-educated women	Low-educated women	High-educated women	Low-educated women
Austria	1930-1935	1.1	.48	.3	1.9
	1936-1940	.71	.61	.3	1.7
	1041-1945	1.2	.58	.42	1.5
	1946-1950	.82	.47	.43	1.5
	total	.95	.54	.36	1.6
Belgium	1930-1935	1.5	.6	.69	.96
	1936-1940	1.4	.67	.39	.91
	1041-1945	1.4	.81	.31	.9
	1946-1950	1.5	.87	.22	.83
	total	1.4	.74	.4	.9
Bulgaria	1930-1935	1.1	.36	.3	1.2
	1936-1940	.84	.39	.55	1.2
	1041-1945	1	.44	.36	1.4
	1946-1950	.93	.43	.56	1.4
	total	.98	.41	.44	1.3
Czech Republic	1930-1935	.64	.4	.54	1.5
	1936-1940	.62	.34	.95	1.4
	1041-1945	.69	.36	.83	1.5
	1946-1950	.56	.3	1.1	1.7
	total	.63	.35	.85	1.5
Georgia	1930-1935	.74	.41	.25	.99
	1936-1940	1.1	.43	.35	1.2
	1041-1945	.98	.57	.25	1.2
	1946-1950	1.1	.58	.27	1.3
	total	.99	.5	.28	1.2
Germany	1930-1935	1	.52	.39	1.1
	1936-1940	.95	.45	.34	1
	1041-1945	.96	.43	.42	.95
	1946-1950	.47	.34	.82	1
	total	.85	.44	.49	1
Lithuania	1930-1935	.66	.27	.32	.9
	1936-1940	.87	.4	.26	1.1
	1041-1945	.74	.34	.33	1
	1946-1950	.58	.45	.63	1.1
	total	.71	.37	.39	1
The Netherlands	1930-1935	1.8	.92	.64	1.6
	1936-1940	1.5	.98	.46	1.4
	1041-1945	1.2	.89	.44	1.2
	1946-1950	.88	.79	.65	1.2
	total	1.3	.9	.55	1.3
Poland	1930-1935	.72	.39	.45	1.7
	1936-1940	1.2	.43	.23	1.7
	1041-1945	1.1	.56	.43	1.6
	1946-1950	1	.65	.45	1.5
	total	1	.51	.39	1.6
Romania	1930-1935		.17		1.4
	1936-1940	.69	.2	.12	1.6

	1041-1945	1.2	.32	.04	1.6
	1946-1950	1.2	.28	.25	1.7
	total	1	.24	.14	1.6
Russia	1930-1935	1.1	.76	.3	.88
	1936-1940	1.1	.71	.37	.88
	1041-1945	1	.68	.41	.99
	1946-1950	1.1	.65	.47	1.2
	total	1.1	.7	.39	.98
Sweden	1930-1935	1	.33	.82	1.1
	1936-1940	.91	.59	.79	1.6
	1041-1945	.96	.55	.83	1.4
	1946-1950	1.1	.64	.74	1.3
	total	1	.53	.8	1.3

Table A3-7: Decomposition of educational differences in rates of production.

Country	Cohort	Educational production rate of **high-educated** offspring			Educational production rate of **low-educated** offspring		
		fertility	Direct inheritance	mating	fertility	Direct inheritance	mating
Austria	1930-1935	-.38	1	-.031	.38	1	.21
	1936-1940	-.25	.48	-.13	.29	.48	.66
	1041-1945	-.12	.79	-.056	.11	.79	.17
	1946-1950	-.13	.55	-.07	.19	.55	.3
	total	-.22	.71	-.072	.24	.71	.33
Belgium	1930-1935	.2	.22	.46	-.076	.22	.13
	1936-1940	.087	.39	.29	-.041	.39	.18
	1041-1945	.039	.34	.18	-.0072	.34	.26
	1946-1950	-.013	.45	.21	.0042	.45	.16
	total	.078	.35	.29	-.03	.35	.18
Bulgaria	1930-1935	-.079	.47	.36	.083	.47	.33
	1936-1940	-.07	.37	.15	.054	.37	.19
	1041-1945	-.14	.71	.032	.11	.71	.26
	1946-1950	-.069	.4	.17	.1	.4	.33
	total	-.089	.49	.18	.086	.49	.28
Czech Republic	1930-1935	-.11	.093	.26	.19	.093	.64
	1936-1940	-.021	.098	.2	.062	.098	.28
	1041-1945	-.055	.14	.25	.23	.14	.31
	1946-1950	-.038	.21	.084	.12	.21	.23
	total	-.055	.14	.2	.15	.14	.36
Georgia	1930-1935	-.12	.42	.035	.085	.42	.23
	1936-1940	.06	.61	-.012	-.071	.61	.34
	1041-1945	-.35	.44	.44	.29	.44	.25
	1946-1950	-.15	.7	.0013	.085	.7	.21
	total	-.14	.54	.086	.098	.54	.26
Germany	1930-1935	-.071	.41	.15	.069	.069	.23
	1936-1940	-.045	.54	.0038	-.024	.54	.19
	1041-1945	.069	.34	.12	-.065	.34	.26
	1946-1950	.049	-.0014	.079	-.11	-.0014	.31
	total	.00017	.32	.088	-.032	.32	.25
Lithuania	1930-1935	.015	.5	-.13	-.02	.5	.1
	1936-1940	-.15	.54	.086	.16	.54	.18
	1041-1945	-.088	.48	.0028	.066	.48	.14
	1946-1950	-.04	.13	.028	.077	.13	.23
	total	-.067	.41	-.0027	.071	.41	.17
The Netherlands	1930-1935	.032	.24	.57	.03	.24	.67
	1936-1940	-.062	.5	.058	.14	.5	.31
	1041-1945	-.065	.21	.18	-.054	.21	.6
	1946-1950	-.087	.076	.1	.059	.076	.41
	total	-.045	.26	.23	.045	.26	.5

Poland	1930-1935	-.25	.44	.13	.31	.44	.5
	1936-1940	-.34	1	.05	.33	1	.14
	1041-1945	-.15	.64	.082	.23	.64	.34
	1946-1950	-.13	.39	.13	.18	.39	.48
	total	-.21	.63	.098	.26	.63	.36
Romania	1930-1935						
	1936-1940	-.42	.67	.25	.39	.67	.44
	1041-1945	-.042	.86	.093	-.13	.86	.84
	1946-1950	-.041	.8	.18	.078	.8	.53
	total	-.17	.78	.17	.11	.78	.61
Russia	1930-1935	-.21	.35	.35	.083	.35	.15
	1936-1940	-.14	.3	.18	.091	.3	.13
	1041-1945	-.033	.35	.045	.046	.35	.18
	1946-1950	-.061	.43	.081	.044	.43	.24
	total	-.11	.36	.14	.066	.36	.17
Sweden	1930-1935	.067	.44	.18	-.092	.44	-.08
	1936-1940	.0086	.37	-.061	-.0077	.37	.48
	1041-1945	.057	.38	-.03	-.078	.38	.27
	1946-1950	.052	.42	.016	-.06	-.06	.17
	total	.046	.4	.026	-.06	.4	.21

B3-1 Description of three-way counterfactual decomposition

In their analysis of inequality in educational production rates (EPRs) between higher- and lower-educated women Skopek and Leopold (2020) proposed a method to decompose the inequality into the effect of two components – fertility and attainment ("mobility effect" in the terms used by Skopek and Leopold). The method builds on the idea of calculating counterfactual EPRs, sequentially attributing the fertility and attainment rates of one educational group to the other. Specifically, assuming that EPR is a function of two effects – fertility (F) and attainment (A), the inequality in EPR of children attaining education j between women with education i and women with education i' can be decomposed as follows

$$\begin{aligned}\Delta^j = r_{ji} - r_{ji'} = r_j(F_i, A_i) - r_j(F_i, A_i) \\ = \underbrace{\frac{1}{2}\Big(r_j(F_i, A_i) - r_j(\boldsymbol{F_{i'}}, A_i) + r_j(\boldsymbol{F_i}, A_{i'}) - r_j(F_{i'}, A_{i'})\Big)}_{\Delta_F} \\ + \underbrace{\frac{1}{2}\Big(r_j(F_i, A_i) - r_j(F_i, \boldsymbol{A_{i'}}) + r_j(F_{i'}, \boldsymbol{A_i}) - r_j(F_{i'}, A_{i'})\Big)}_{\Delta_A} = \Delta_F + \Delta_A \qquad (A3-6)\end{aligned}$$

where $r_{ji} = r_j(F_i, A_i)$ and $r_{ji'} = r_j(F_{i'}, A_{i'})$ represent factual EPRs for women with education i and i' respectively, and terms $r_j(\boldsymbol{F_{i'}}, A_i)$, $r_j(\boldsymbol{F_i}, A_{i'})$, $r_j(F_i, \boldsymbol{A_{i'}})$, $r_j(F_{i'}, \boldsymbol{A_i})$ represent counterfactual quantities. In turn, Δ_F and Δ_A correspond to the average "effects" of swapping fertility and attainment rates for women in comparison ("effect" in this case meaning the difference between the factual EPR and the respective counterfactual one).

In the example above, however, only two aspects of EPR are accounted for, whereas in our extended model we consider three:

$$r_{ji} = \sum_{m} \left(\underbrace{P(M|I)}_{M} \cdot \underbrace{E(F|I,M)}_{F} \cdot \underbrace{P(J|I,M)}_{A} \right) = r(M,F,A) \qquad (A3-7)$$

In other words, we assume EPR to be a function of three aspects – mating, fertility, and attainment.

This makes decomposition a bit mor challenging making it three-fold instead of two-fold. It builds on similar logic (i.e., calculating differences using counterfactual states) but the unfolding involves several additional steps. First, we use the logic of Eq.A3-1 to decompose the difference Δ^j as follows:

$$\begin{aligned}
\Delta^j &= r_j(M_i, F_i, A_i) - r_j(M_{i'}, F_{i'}, A_{i'}) \\
&= \underbrace{\frac{1}{2}\Big(\big(r_j(M_i, F_i, A_i) - r_j(\boldsymbol{M_{i'}}, F_i, A_i)\big) + \big(r_j(\boldsymbol{M_i}, F_{i'}, A_{i'}) - r_j(M_{i'}, F_{i'}, A_{i'})\big)\Big)}_{\Delta_M} \\
&+ \underbrace{\frac{1}{2}\Big(\big(r_j(M_i, F_i, A_i) - r_j(M_i, \boldsymbol{F_{i'}}, \boldsymbol{A_{i'}})\big) + \big(r_j(M_{i'}, \boldsymbol{F_i}, \boldsymbol{A_i}) - r_j(M_{i'}, F_{i'}, A_{i'})\big)\Big)}_{\Delta_{FA}} \\
&= \Delta_M + \Delta_{FA} \qquad (A3-8)
\end{aligned}$$

In the equation above, Δ_M is the average of the effect assuming a counterfactual distribution of mating patterns for group i and i' keeping factual fertility and attainment rates. In turn, Δ_{FA} is the average of the effect of swapping both the fertility and attainment rates keeping factual mating patterns.

Using similar logic we obtain:

$$\Delta^j = \Delta_F + \Delta_{MA} \qquad (A3-9)$$
$$\Delta^j = \Delta_A + \Delta_{MF} \qquad (A3-10)$$

Accordingly, combining Eq. A3-3 through A3-5:

$$\Delta^j = \frac{1}{3}(\Delta_M + \Delta_F + \Delta_A + \Delta_{FA} + \Delta_{MA} + \Delta_{MF}) \qquad (A3-11)$$

The next step involves breaking the joint effects Δ_{FA}, Δ_{MA}, and Δ_{MF} into the fractions that represent single effects. This step exploits the idea that the joint effects can be redefined as the average of the differences in factual EPRs for different levels of the counterfactual variable. Using the case of Δ_{FA} as an example:

$$\begin{aligned}
\Delta_{FA} &= \frac{1}{2}\left(\underbrace{r_j(M_i, F_i, A_i) - r_j(M_i, F_{i'}, A_{i'})}_{\Delta_{|M_i}}\right) + \frac{1}{2}\left(\underbrace{r_j(M_{i'}, F_i, A_i) - r_j(M_{i'}, F_{i'}, A_{i'})}_{\Delta_{|M_{i'}}}\right) \\
&= \frac{1}{2}\Delta_{|M_i} + \frac{1}{2}\Delta_{|M_{i'}} \qquad (A3-12)
\end{aligned}$$

where $\Delta_{|M_i}$ and $\Delta_{|M_{i'}}$ can correspond to differences in EPRs between i and i' for counterfactual states assuming (i.e., holding constant) the mating pattern distribution of i and i' respectively.

In turn, the terms $\Delta_{|M_i}$ and $\Delta_{|M_{i'}}$ can be further decomposed using the logic of Eq. A3-2. Using $\Delta_{|M_i}$ as an example:

$$\begin{aligned}
\Delta_{|M_i} &= r_j(M_i, F_i, A_i) - r_j(M_i, F_{i'}, A_{i'}) \\
&= \underbrace{\frac{1}{2}\big(r(M_i, F_i, A_i) - r(M_i, F_i, \boldsymbol{A_{i'}}) + r(M_i, F_{i'}, \boldsymbol{A_i}) - r(M_i, F_{i'}, A_{i'})\big)}_{\Delta_{A|M_i}} \\
&+ \underbrace{\frac{1}{2}\big(r(M_i, F_i, A_i) - r(M_i, \boldsymbol{F_{i'}}, A_i) + r(M_i, \boldsymbol{F_i}, A_{i'}) - r(M_i, F_{i'}, A_{i'})\big)}_{\Delta_{F|M_i}} \\
&= \Delta_{A|M_i} + \Delta_{F|M_i} \qquad (A3-13)
\end{aligned}$$

where $\Delta_{A|M_i}$ is the effect of swapping just the attainment rates and $\Delta_{F|M_i}$ is the effect of swapping just the fertility rates, for the assumed mating distribution of women with education i. Accordingly:

$$\Delta_{FA} = \frac{1}{2}\left(\Delta_{F|M_i} + \Delta_{F|M_{i'}}\right) + \frac{1}{2}\left(\Delta_{A|M} + \Delta_{A|M_{i'}}\right) \qquad (A3-14)$$

$$\Delta_{MA} = \frac{1}{2}\left(\Delta_{M|F_i} + \Delta_{M|F_{i'}}\right) + \frac{1}{2}\left(\Delta_{A|F_i} + \Delta_{A|F_{i'}}\right) \qquad (A3-15)$$

$$\Delta_{MF} = \frac{1}{2}\left(\Delta_{M|A_i} + \Delta_{M|A_{i'}}\right) + \frac{1}{2}\left(\Delta_{F|A_i} + \Delta_{F|A_{i'}}\right) \qquad (A3-16)$$

Thus, the joint effect of any two components (e.g., fertility and attainment in the case of Δ_{FA}) can also be redefined as the average of its single constituent effects calculated for every counterfactual of the remaining component (i.e., mating patterns in the example used).

Finally, combining Eq. A3-6 and Eq. A3-9 through A3-11, the difference in factual EPRs can be shown to unfold as follows:

$$\begin{aligned}
\Delta^j &= \frac{1}{3}(\Delta_M + \Delta_F + \Delta_A + \Delta_{FA} + \Delta_{MA} + \Delta_{MF}) \\
&= \underbrace{\frac{1}{3}\left(\Delta_M + \Delta_{M|F_i} + \Delta_{M|F_{i'}} + \Delta_{M|A_i} + \Delta_{M|A_{i'}}\right)}_{\bar{\Delta}_M} + \underbrace{\frac{1}{3}\left(\Delta_F + \Delta_{F|M_i} + \Delta_{F|M_i'} + \Delta_{F|A_i} + \Delta_{F|A_{i'}}\right)}_{\bar{\Delta}_F} \\
&+ \underbrace{\frac{1}{3}\left(\Delta_A + \Delta_{A|M_i} + \Delta_{A|M_{i'}} + \Delta_{A|M_i} + \Delta_{A|F_{i'}}\right)}_{\bar{\Delta}_A} = \bar{\Delta}_M + \bar{\Delta}_F + \bar{\Delta}_A \qquad (A3-17)
\end{aligned}$$

where $\bar{\Delta}_M$, $\bar{\Delta}_F$, and $\bar{\Delta}_A$ represent the average effects of swapping mating patterns, fertility, and attainment rates respectively.

Chapter 4: Left, Right, and Reproduced: The Interplay of Political Orientation and Demographic Patterns Across Generations

4.1 Abstract

This study applies a prospective framework to examine how both social and demographic mechanisms contribute to the reproduction of political orientations across generations. Drawing on data from the German Socio-Economic Panel Study (SOEP), this study investigates how fertility differences by political orientation and the social transmission of political orientations jointly shape the distribution of political orientations in the offspring generation. Prospective reproduction rates confirm a significant intergenerational resemblance in political orientation, with centrism persisting as the most prevalent orientation among offspring. Population renewal models indicate that this outcome is primarily driven by the large proportion of politically centrist women in the reproducing generation. Despite minor fertility differences across political orientations, demographic simulations demonstrate that under current conditions, even substantial reproductive advantages among right-wing individuals would be insufficient to produce a mainly right-wing next generation. These findings highlight the stabilizing role of demographic structures in the German context and underline the importance of incorporating both social and demographic pathways when studying intergenerational transmission.

4.2 Introduction

A substantial body of research consistently shows that individuals often share political orientations with their parents (Dinas 2014; Durmuşoğlu et al. 2023; Hooghe and Boonen 2015; Jennings et al. 2009; Kroh and Selb 2009; Rico and Jennings 2016; Van Ditmars 2023; Ventura 2001). This pattern of intergenerational similarity has been documented across a range of national contexts, including Germany (Kroh and Selb 2009; Van Ditmars 2023), Switzerland (Van Ditmars 2023), the Netherlands (Durmuşoğlu et al. 2023), Belgium (Hooghe and Boonen 2015), Israel (Ventura 2001), and the United States (Dinas 2014; Jennings et al. 2009), which emphasises its robustness across countries. Moreover, the similarity spans multiple dimensions of political orientation: from party identification (Dinas 2014; Jennings et al. 2009; Jennings and Niemi 1968; Kroh and Selb 2009; Ojeda and Hatemi 2015) and voting intentions (Hooghe and Boonen 2015; Ventura 2001), to ideological self-placement on the left-right spectrum (Corbetta et al. 2013; Durmuşoğlu et al. 2023; Jennings 1984; Van Ditmars 2023) and issue-specific political attitudes (J. Fox et al. 2019; Verweij et al. 2008). The mechanisms behind the intergenerational association of political orientations are manifold. Previous research attributed the association to a combination of observational learning within the family (Bandura 1969) and shared structural factors such as religion, socioeconomic status, and personality traits.

However, all studies examine intergenerational political retrospectively, by comparing the political orientations of children to those of their parents. This backward-looking approach limits our understanding of how political orientations are actually transmitted across generations. Specifically, it implicitly conditions on parenthood, thereby restricting insights to individuals who have become parents. Individuals without children, though excluded from traditional models of intergenerational transmission, contribute to the political landscape by *not* passing on their orientations to the next generation. This non-transmission also contributes to the broader reproduction of political orientations across generations.

A more comprehensive understanding of the reproduction of political orientation requires attention not only to the degree of intergenerational transmission but also to demographic factors, such as fertility. When fertility patterns differ by political orientation, these demographic dynamics interact with transmission processes to shape the long-term reproduction of political orientations. Such a holistic perspective is possible using prospective data, and thus starting the analysis with the reproducing generation (G1), and modelling the reproduction from the view of this generation of potential parents. This approach offers several advantages: it acknowledges the role of childlessness as a way of blocking political transmission and facilitates the analysis of additional demographic mechanisms, such as differential fertility and assortative mating, that operate alongside social transmission. In contrast, conventional retrospective studies ignore these factors, thereby providing an incomplete account of how political orientations are reproduced across generations.

Differential fertility across political groups can influence the intergenerational transmission of political orientations by quantitatively influencing who contributes how many children to the next generation. Although there is little research on fertility differences across political orientations, this is likely the case since political orientation is closely linked to underlying values, norms, and social characteristics – such as religiosity, gender role attitudes, and educational attainment – that are themselves associated with fertility behaviour. Individuals with conservative or right-wing views tend to hold more traditional family values and higher religiosity, both of which are associated with higher fertility. In contrast, left-leaning individuals often prioritize autonomy and gender equality, factors linked to lower fertility rates and higher childlessness, particularly among women (Frejka and Westoff 2008; Furnham and Fenton-O’Creevy 2018; Piurko et al. 2011; Vasireddy et al. 2023).

In this study, I adopt a prospective approach to model the intergenerational reproduction of political orientations, explicitly incorporating fertility as a key demographic pathway. The analysis focuses on German women born between 1940 and 1960, allowing for a prospective perspective on political transmission that extends beyond conventional parent-child comparisons. This analysis focuses on the self-placement on the political left-right scale, as this indicator of political orientation best reflects the political orientation in a multi-party system like Germany (Durmuşoğlu et al. 2023; Neundorf 2009; Van Ditmars 2023).

This research advances the existing literature in several ways. First, it offers the first prospective analysis of the reproduction of political orientation, shifting the focus to the reproducing generation (G1) rather than their potential children. Second, by explicitly modelling fertility as a reproductive mechanism, it sheds light on the question of whether political orientations are associated with differential fertility patterns in Germany. Third, I introduce prospective reproduction rates, a measure derived from the study of educational transmission and social mobility (Skopek and Leopold 2020; Song and Mare 2015; Yastrebov and Wittemann 2024), which combines fertility differentials with conventional transmission rates. Fourth, I demonstrate how these dynamics shape the political composition of the offspring generation by modelling the population renewal of G1 in political terms. Finally, I assess the relative influence of various mechanisms by simulating hypothetical scenarios that isolate and manipulate specific components of the reproduction process.

In addition to its academic contributions, this study is of broader societal relevance. As political polarisation and demographic shifts increasingly shape the landscape of democratic societies, understanding how political orientations are reproduced across generations is crucial for anticipating long-term changes in public opinion, party support, and electoral dynamics. By analysing the demographic and social mechanisms underlying political transmission, this research contributes to a more nuanced understanding of how political majorities are sustained or reshaped—not through elections alone, but through the interplay of reproduction, socialization, and population structure.

4.3 Background

4.3.1 Intergenerational transmission of political orientation

The political orientation of children tends to resemble that of their parents (Dinas 2014; Durmuşoğlu et al. 2023; Hooghe and Boonen 2015; Jennings et al. 2009; Kroh and Selb 2009; Rico and Jennings 2016; Van Ditmars 2023; Ventura 2001). Several mechanisms may account for this resemblance. First, Social Learning Theory (Bandura 1969; Jennings and Niemi 1968) posits that individuals acquire behaviour and attitudes through observation and imitation of their social environment. For children, families serve as the primary agents of socialization, and thus, political attitudes and values are often learned from parents. Second, children typically share structural characteristics with their parents that are correlated with political orientation, including religion (Arpino and Mogi 2024; Rackin and Gibson-Davis 2024), socioeconomic position (Brown-Iannuzzi et al. 2017), and personality traits (Piurko et al. 2011). A third explanation involves the genetic transmission of predispositions related to political orientations (Alford et al. 2005; Klemmensen et al. 2012; Oskarsson et al. 2015). However, studies on genetic influences emphasize the importance of gene-environment interactions, meaning that the manifestation of genetic predispositions depends on environmental contexts like the family (Hatemi et al. 2009; Klemmensen et al. 2012; Oskarsson et al. 2015). In sum, the observed intergenerational similarity in political orientation likely results from an interplay of social learning within the family, shared structural factors, and, to some extent, genetic inheritance.

In addition, the literature identifies several factors that moderate the degree of parent-child similarity. Thus, frequent political exchanges within the family and parental political engagement strengthen the transmission of political orientation (Dinas 2014; Hooghe and Boonen 2015; Jennings et al. 2009). These findings support the view that political orientation is at least partly transmitted through socialization rather than being exclusively based on shared structural factors (Durmuşoğlu et al. 2023). The consistency of political cues provided by parents also plays a key role: children are more likely to adopt their parents' political orientations when these are clearly and consistently communicated (Jennings et al. 2009). Consequently, politically like-minded parents have a transmission advantage over politically heterogeneous couples (Hooghe and Boonen 2015; Van Ditmars 2023). The extent and form of political orientation transmission between parents and children are shaped by the broader party system. In two-party contexts, partisanship tends to dominate (Jennings and Niemi 1968), whereas in multi-party systems, ideological identification along the left–right axis is more salient (Durmuşoğlu et al. 2023; Ventura 2001).

4.3.2 Problematic bias of retrospective approaches to intergenerational transmission

While the studies cited above provide interesting findings about the intergenerational transmission of political orientation, they all share a common structural problem: they adopt retrospective study designs. These approaches analyse transmission from the perspective of the offspring generation (G2), linking their political orientation back to that of their parents (G1). However, this design implicitly conditions on parenthood, excluding individuals in the parent generation who remained childless. Moreover, retrospective studies tend to oversample large families, resulting in two types of sampling bias: the exclusion of childless individuals and the overrepresentation of those with many children (Lawrence and Breen 2016; Song and Mare 2015).

As a result, retrospective designs overlook key demographic processes relevant to intergenerational transmission, such as mating and fertility. First, childless individuals shape the distribution of political orientations in the next generation by explicitly not transmitting their political orientation. Second, mating patterns are critical, as the timing and formation of partnerships influence both the timing and number of children (Kuang et al. 2024). Furthermore, parents who share similar political orientations are more likely to transmit those orientations to their children (Van Ditmars 2023).

In contrast, prospective approaches adopt the perspective of the reproducing generation (G1), allowing for the simultaneous modelling of social transmission and demographic processes. This design explicitly enables the study of non-transmission and facilitates analysis of how demographic patterns influence intergenerational transmission. As such, prospective designs provide a more comprehensive understanding of the intergenerational reproduction of political orientation.

While the methodological limitations of retrospective designs – and the corresponding advantages of prospective approaches – are now widely acknowledged in the field of educational transmission, where prospective studies have proliferated over the past decade (Breen et al. 2019; Breen and Ermisch 2017; Corti and Scherer 2022; Kye and Mare 2012; Lawrence and Breen 2016; Maralani 2013; Mare and Maralani 2006; Skopek and Leopold 2020; Song and Mare 2015; Wittemann 2023; Wittemann and Yastrebov 2024; Yastrebov and Wittemann 2024), this shift has yet to occur in the study of political transmission.

4.3.3 Political orientation and demographic behaviour

As noted above, demographic patterns – such as fertility – contribute to the intergenerational transmission of political orientation and shape the resulting distribution of political orientations in the offspring generation (G2), particularly when demographic behaviour is stratified by political orientation. In other words, differential fertility across political groups has direct consequences for the intergenerational reproduction of political orientations.

However, research on fertility differences across political orientations remains sparse and inconclusive. To date, the only cross-national study examining actual fertility behaviour in relation to political orientation is by Fieder and Huber (2018). While they report no significant global association, their results indicate that, in Europe and the United States, individuals with right-wing or conservative orientations tend to exhibit higher fertility rates. These findings are consistent with Arpino and Mogi (2024), who show that individuals identifying with the extreme right report higher fertility intentions than the average population in Europe. Similarly, in the U.S. context, Rackin and Gibson-Davis (2024) found that Republicans express higher fertility intentions than Democrats, with these differences becoming more pronounced over time. Hudde and Friedrich (2019), focusing on Germany's political elite, report higher fertility rates among conservatives. However, the extent to which these findings can be generalized to the broader population remains unclear and thus, further research on fertility differences across political orientations is needed.

Although direct evidence on the relationship between fertility and political orientation remains limited, fertility research has identified several factors that shape both fertility intentions and actual reproductive behaviour (Frejka and Westoff 2008; Guetto et al. 2015; Vasireddy et al. 2023). These include socioeconomic conditions, personal values, personality traits, and religiosity – all of which are also associated with political orientation (Beyer and Schnabel 2019; Furnham and Fenton-O'Creevy 2018; Piurko et al. 2011; Rindermann et al. 2012; Werfhorst and Graaf 2004).

For instance, more religious individuals tend to have more children on average (Fieder and Huber 2018; Frejka and Westoff 2008; Guetto et al. 2015; Rackin and Gibson-Davis 2024; Vogl and Freese 2020) and are more likely to hold right-wing political views (Arpino and Mogi 2024; Beyer and Schnabel 2019; Furnham and Fenton-O'Creevy 2018) or, in the U.S. context, to identify as Republican (Rackin and Gibson-Davis 2024). Religiousness is also linked to more traditional gender roles and family norms (Guetto et al. 2015), which may simultaneously influence both political orientation and fertility behaviour.

Values and attitudes – particularly toward gender roles and individual autonomy – are considered as key drivers of the Second Demographic Transition (SDT) (Arpino and Mogi 2024; Guetto et al. 2015). Accordingly, the rejection of institutional control, coupled with an emphasis on personal autonomy and self-realization, has been associated with declining fertility rates (Arpino and Mogi 2024). Given that political orientation reflects value-based preferences about the organization of society (Arpino and Mogi 2024), a link between political orientation and fertility-related values is evident. Individuals who prioritize personal freedom, autonomy, universalism, and benevolence are more likely to identify with left-wing ideologies, whereas those who emphasize conformity, tradition, family, parenthood, and societal order tend to align with right-wing orientations (Arpino and Mogi 2024; Piurko et al. 2011).

Educational attainment – one of the primary indicators of socioeconomic status (SES) – has a complex relationship to fertility that differs across countries (Nisén et al. 2021; Osiewalska 2017; Skirbekk 2008; Vasireddy et al. 2023; Wood et al. 2014). On average, however – and in particular in Germany – women with higher levels of education are more likely to remain childless (Beaujouan et al. 2016; Van Bavel et al. 2018; Vasireddy et al. 2023; Wood et al. 2014) and tend to have fewer children overall (Nisén et al. 2021; Osiewalska 2017; Vasireddy et al. 2023; Wood et al. 2014). The association between education and political orientation is similarly nuanced. Although some findings link higher education to both ends of the ideological spectrum (Rindermann et al. 2012), other research suggests that higher-educated individuals, especially women, tend to lean left politically (Furnham and Fenton-O'Creevy 2018; Werfhorst and Graaf 2004).

In summary, while empirical research on the direct link between fertility and political orientation remains limited, the evidence suggests a pattern in which right-wing political orientations are associated with higher fertility rates and left-wing orientations with lower fertility rates.

4.3.4 The current study

In this study, I examine the intergenerational reproduction of political orientation using a prospective research design. This approach enables the simultaneous analysis of demographic pathways and social transmission processes of political orientations. I focus specifically on fertility as a key demographic mechanism influencing the intergenerational reproduction of political orientations. Importantly, I do not seek to disentangle the social transmission process into its individual components – such as social learning, shared structural factors, or genetic predispositions – but rather treat these as a combined "social pathway" of reproduction. The aim of this study is to describe and demonstrate the relevance of both the demographic and social pathways in the intergenerational reproduction of political orientation. The study addresses the following research questions: Do fertility patterns vary across political orientations? And how do fertility patterns, in conjunction with social transmission, shape the intergenerational reproduction of political orientation?

Empirically, I analyse the reproduction of political orientations of German women born 1940-1960. To account for differing political socialization contexts, I analyse women from former East and West Germany separately, as they were socialized under distinct political regimes that may continue to influence political orientations today (Dalton and Weldon 2010; Pickel and Pickel 2023; Van Ditmars 2023). Political orientation is measured through self-placement on the left-right ideological scale. This measure is particularly well suited to the German context for several reasons. First, the meaning and interpretation of the left-right spectrum varies across time and space (Bauer et al. 2017; Vries et al. 2013), making it especially suitable for studying intergenerational processes that unfold over decades. In the German case, this scale is advantageous because it is meaningful and widely understood in both East and West Germany, despite their historically divergent political systems (Inglehart and Klingemann 1976; Neundorf 2009). Finally, in multi-party systems such as Germany's, self-placement on the left-right scale provides a more informative heuristic than party identification (Durmuşoğlu et al. 2023).

The following sections introduce the prospective reproduction model and the dataset used in this study. I then describe the estimation strategy for the model's components, followed by a presentation of the results and a discussion of the findings.

4.4 Data and Methods

4.4.1 Model

This analysis is based on models derived from the prospective reproduction literature (Mare and Maralani 2006; Skopek and Leopold 2020; Song and Mare 2015; Yastrebov and Wittemann 2024). The central aim is to investigate how a population of women (G1) differing in political orientation contributes to the distribution of political orientations in the subsequent generation (G2). This demographic population renewal model unfolds as follows:

$$C_j = \sum_{i=1}^{3} r_{ji} * W_i \qquad \text{(4-13)}$$

Where C_j is the number of offspring in G2 with the political attitude j. This is a product of the number of women in G1 with political placement i (W_i) and the so-called reproduction rate r_{ji}. This rate expresses the average number of children with political attitude j, a woman with political attitude i, is expected to have.

The prospective reproduction rate r_{ji} is calculated as follows:

$$r_{ji} = f_i * p_{j|i} \tag{4-14}$$

Where, f_i is the expected number of children conditional on women's political orientation and $p_{j|i}$ is the probability that a child has the political orientation j, conditional on women's political orientation i. Political orientation is measured $i = 1, \ldots, 3$; $j = 1, \ldots, 3$, with 1 representing left-wing, 2 representing centre, and 3 representing right-wing orientation.

This model captures both the demographic component (fertility differentials across political orientations) and the social transmission component (the likelihood of transmitting a particular political orientation from mother to child). Together, these elements allow for a comprehensive assessment of how political orientations are reproduced across generations through both fertility and socialization processes. The method also allows for modelling hypothetical scenarios, which make it possible to understand more precisely how the individual components affect the population G2. Thus, certain components (W_i, f_i, $p_{j|i}$) are altered, keeping the others constant to get an insight into how the respective part influences the distribution of political orientations in the offspring generation (G2).

4.4.2 Data

To model the reproduction of political orientations as outlined above, I use data from the German Socio-Economic Panel (SOEP). This longitudinal household panel is well-suited to the study of intergenerational transmission, as it has been collected annually since 1984 and includes not only original respondents but also individuals who join their households – such as partners and children – who continue to be followed even after moving into new households. As a result, the SOEP provides rich, long-term data on individuals and their family structures, including detailed information on both parents and their children.

Political orientation is measured through self-placement on the left-right ideological scale, which was surveyed in 2005, 2009, 2014, and 2019. Respondents rated their political views on an 11-point scale ranging from 0 ("far left") to 10 ("far right"). Following Van Ditmars (2023), I recoded values from 0–4 as left-wing, 5 as centre, and 6–10 as right-wing. In cases where more than one measure of political orientation was available for an individual, I averaged the first and last available values to create a more stable indicator of their political orientation. Based on this averaged value, scores of 0–4 were coded as left-wing, 4.5–5.5 as centre, and 6–10 as right-wing.

Although, where available, political orientation was averaged across time points, the measure used in this study ultimately reflects a single point in time rather than a lifetime average. Thus, with this measurement, which is based on data availability, I assume the stability of political orientations over the life course. However, this assumption is both theoretically warranted and supported by empirical evidence. Theoretically, this stability is supported by the impressionable years hypothesis, which posits that political orientations, once formed during a brief but critical phase in early adulthood, remain largely stable thereafter (Alwin and Krosnick 1991; Osborne et al. 2011; Rekker et al. 2015). Empirical studies further support this perspective, showing that political party affiliation becomes increasingly stable with age (Alwin and Krosnick 1991; Osborne et al. 2011; Sears and Funk 1999), and that even major life transitions do not meaningfully alter political views (Keskintürk 2024). Furthermore, specific attitudes – such as political trust or opinions on immigration rights – are often well-established by early adolescence. For instance, Hooghe and Wilkenfeld (2008) show that such views are already formed by age 14 and tend to remain stable throughout adolescence and into adulthood. Since the children included in this analysis are at least 17 years old at the time they reported their political orientation, it is reasonable to assume that their political orientations are already meaningfully developed. This supports the assumption that relying on a single-time-point measure of political orientation does not significantly distort the study's results.

4.4.3 Estimation

To estimate the components of Equation 4-2, I draw on two distinct subsamples.

The *demographic sample* consists of women born between 1940 and 1960 (G1). This cohort selection serves two purposes: first, these women have completed their reproductive years, allowing for the full observation of their fertility histories; second, their children are old enough to have developed and reported political orientations by the time of measurement. I restrict the sample to women who were born in Germany, who have at least one valid measure of political orientation, and who were residing in Germany in 1989, with available information on their place of residence at that time, allowing me to distinguish between women socialized in former East and West Germany. This results in an analytical sample of 5,871 women. The sample includes information about the women, their political orientation, and their complete fertility histories. This sample is used to calculate the expected number of children given the political attitude f_i, using an OLS-regression model. An overview of the demographic sample is provided in Table 4-1. Additionally, I compared the calculated cohort fertility rates of the demographic sample with the official cohort fertility rates provided by the German Federal Statistical Office (Appendix Figure A4-1). In general, and especially for the earlier-born cohorts, the calculated fertility data match very well with official data. For later-born cohorts (born 1954-1960), the cohort fertility rates of the demographic sample are slightly higher, which may result in a slight overestimation of the average number of offspring for these birth cohorts.

To estimate the conditional transmission probabilities $p_{j|i}$, I utilize the so-called *transmission sample*, consisting of all adult offspring of the G1 women who did not refuse to answer the SOEP main questionnaire, resulting in a sample of n=4,511 children. I estimate these probabilities using a multinomial regression model with clustered standard errors to account for the nesting of siblings within families. An overview of the transmission sample is provided in Table 4-2.

The prospective reproduction rates r_{ji} and the resulting offspring distributions C_j are calculated separately for nearly equidistant five-year birth cohorts (1940-45, 1946-50, 1951-55, 1956-60) and for those who lived in East and West Germany in 1989. To obtain statistical inference, I bootstrapped standard errors for r_{ji} and C_j. Since I use survey data instead of population data, I calculate the relative population renewal (Equation 4-1), not using the absolute numbers of women with a certain political orientation in G1 (W_i) but the proportion. Thus, I arrive at the proportional contribution to the next generation's political composition (C_j).

Table 4-1: Cohort fertility rate (CFR), parent fertility rate (PFR), and political orientation by cohort and place of residence in 1989 (demographic sample).

Cohort		**Cohort fertility rate (CFR)**		**Parent fertility rate (PFR)**		**Political orientation (proportion)**		
West	n	mean	sd	mean	sd	left	centre	right
1940-45	963	1.86	1.1	2.12	.93	.22	.50	.28
1946-50	862	1.75	1.14	2.03	.97	.28	.53	.19
1951-55	1,035	1.72	1.15	2.05	.96	.30	.51	.19
1956-60	1,272	1.86	1.24	2.12	1.04	.36	.48	.16
East								
1940-45	420	1.92	1.03	2.04	.94	.44	.46	.10
1946-50	343	1.81	.92	1.9	.85	.45	.43	.12
1951-55	433	1.95	.98	2.07	.88	.41	.49	.10
1956-60	543	1.92	.96	2.01	.88	.47	.42	.11

Table 4-2: Gender, year of birth, and distribution of political orientation of the adult offspring of women born 1940-1960 by mother's birth cohort and mother's place of residence in 1989 (transmission sample).

Mother's cohort		**Gender**		**Year of birth**		**Political orientation (proportion)**		
West	n	male	female	mean	sd	left	centre	right
1940-45	418	227	191	1971	5.81	.34	.40	.25
1946-50	494	268	226	1977	6.20	.36	.44	.20
1951-55	894	473	421	1983	5.74	.38	.43	.19
1956-60	1,417	742	675	1989	5.89	.42	.41	.18
East								
1940-45	151	82	69	1972	5.44	.5	.31	.19
1946-50	190	106	84	1975	5.15	.34	.42	.24
1951-55	361	207	154	1979	4.80	.35	.46	.19
1956-60	586	305	281	1984	4.94	.35	.47	.18

4.5 Results

The results are presented in three analytical steps. First, I describe the distribution of political orientations within the reproducing generation, women born between 1940 and 1960. I also examine how fertility varies across differential political orientations within this cohort, highlighting the demographic dimension of political reproduction. Second, I present and discuss the prospective reproduction rates, which integrate both transmission and fertility patterns. Additionally, I use the population renewal model (as defined in Equation 4-1) to illustrate how the entire generation G1 reproduces in terms of political orientation. Finally, I explore four hypothetical scenarios in which one component of the reproduction process is altered while all others are held constant. These scenarios allow for a clearer understanding of the individual mechanisms contributing to the intergenerational transmission of political orientations.

4.5.1 Political orientation and fertility patterns in G1

Figure 4-1: Distribution of political orientations in the reproducing generation (women born 1940-1960).

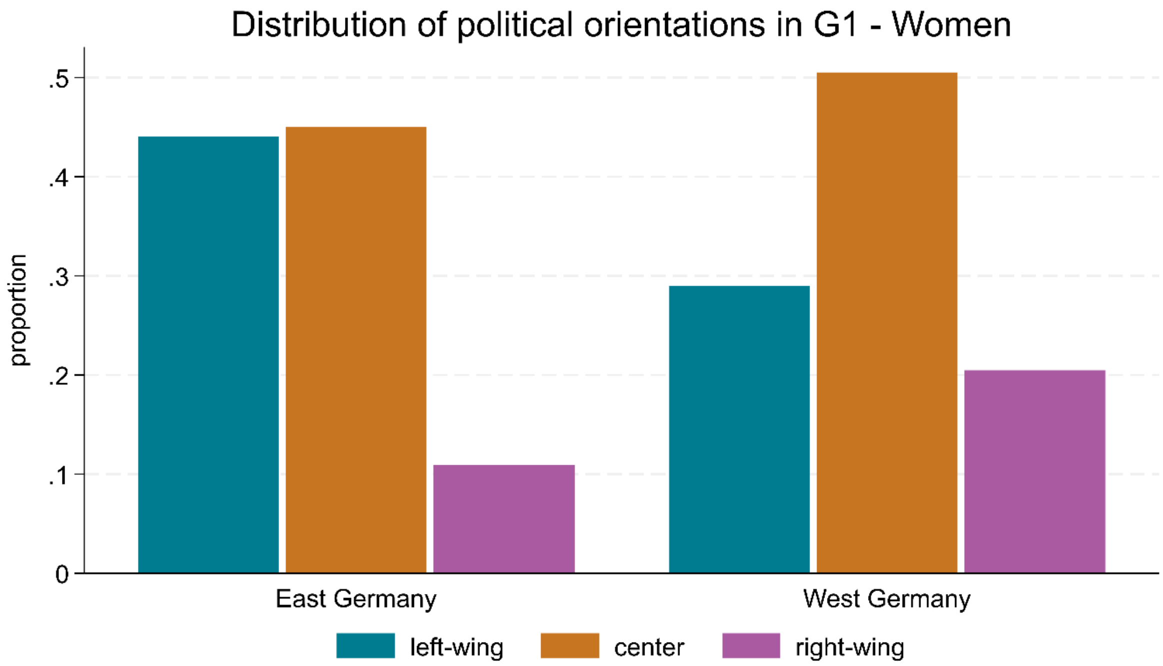
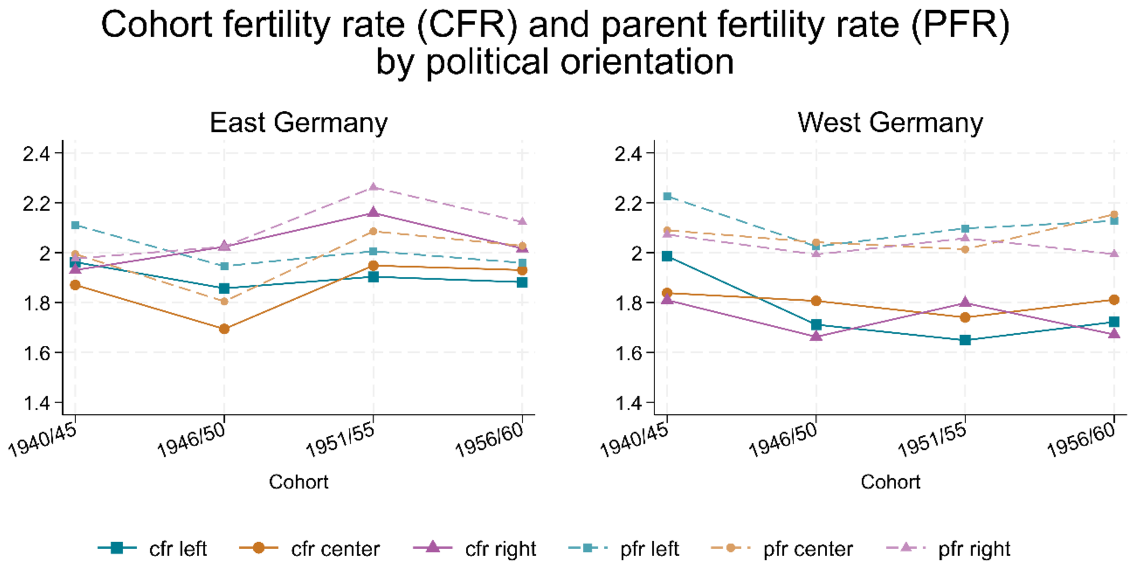


Figure 4-1 presents the distribution of political orientations among women born 1940-1960 distinguishing between those socialized in East and West Germany. In both regions, right-wing orientations are the least common. However, notable differences emerge: in East Germany, approximately one in ten women identifies as right-wing in 1989, whereas in West Germany, the proportion is twice as high, around one in five. Among women socialized in the former East, the distribution between left-wing (44%) and centrist (45%) orientations is nearly even (see Table A4-1 for exact values). In contrast, among their West German counterparts, political centrism dominates, with about half identifying as centrist, and only roughly 30% aligning with the left. These regional differences in political orientation stress the importance of analyzing East and West German cohorts separately.

Figure 4-2: Cohort fertility rate (CFR) and parent fertility rate (PFR) by political orientation.



Fertility patterns across political orientations further show regional distinctions between women socialized in former East and West Germany (Figure 4-2). The figure displays two key measures: the cohort fertility rate (CFR), representing the average number of children per woman, and the parent fertility rate (PFR), indicating the average number of children among mothers only. Among West German women, neither CFR nor PFR shows substantial variation across political orientations. However, PFR consistently exceeds CFR, indicating that a notable share of women remained childless. Importantly, rates of childlessness appear largely uniform across political orientations, suggesting that political orientation does not significantly influence the likelihood of becoming a parent in this cohort.

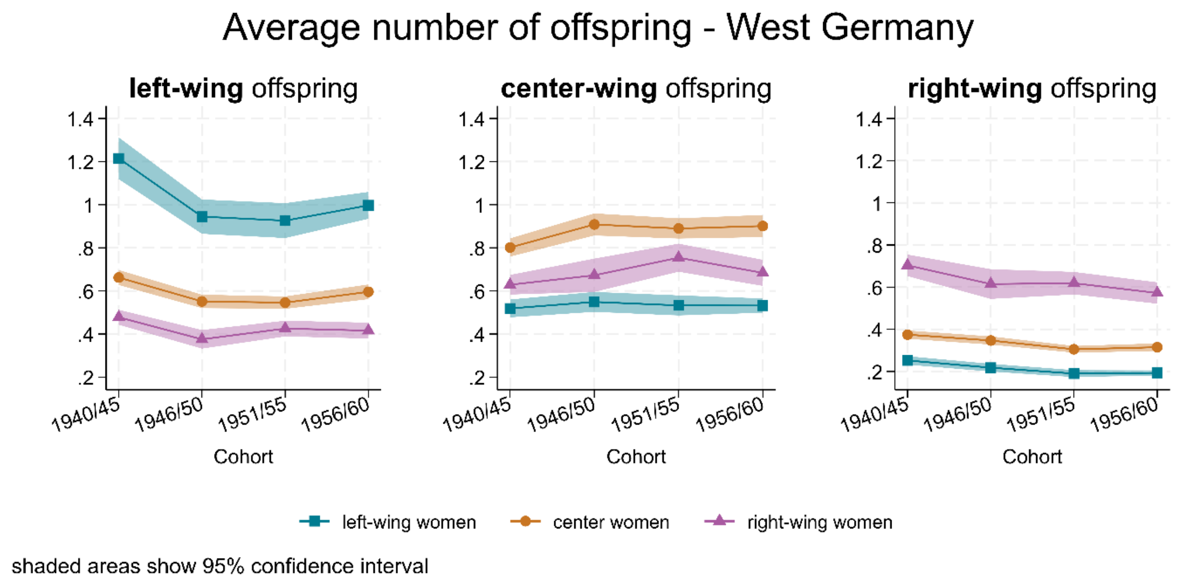
In contrast to their West German counterparts, women socialized in former East Germany exhibit a much smaller gap between CFR and PFR, indicating lower overall rates of childlessness, particularly among earlier-born cohorts with right-wing orientations (CFR=1.93, PFR=1.98). Moreover, fertility differences by political orientation are more pronounced in the East. Across cohorts, right-leaning women had the highest fertility (CFR= 2.03 across cohorts), followed by those identifying as left-wing (CFR=1.90 across cohorts) and centrist (CFR=1.86 across cohorts). These differences are especially marked among later-born cohorts.

Taken together, these findings highlight that fertility patterns differ substantially between East and West German women, while differences across political orientations remain relatively limited, except among East German women, where ideological variation in fertility is more evident.

4.5.2 Prospective reproduction of political orientation

Figure 4-3 and Figure 4-4 display the prospective reproduction rates (as defined in Equation 4-2) for women socialized in West and East Germany, respectively. Each figure is organized by the political orientation of the offspring: left-wing (left panel), centrist (middle panel), and right-wing (right panel). For example, in Figure 4-3, the blue squares in the left panel indicate the expected number of left-wing children born to a left-wing woman (r_{ll}). Shaded areas around the estimates represent 95% confidence intervals based on bootstrap resampling. Exact numerical values for all estimates visualized in Figure 4-3 and Figure 4-4 are available in Appendix A4-2 and A4-3.

Figure 4-3: Prospective reproduction rates of political orientation across cohorts of women who lived in West Germany 1089. Shaded areas show 95% confidence intervals calculated using bootstrap resampling.

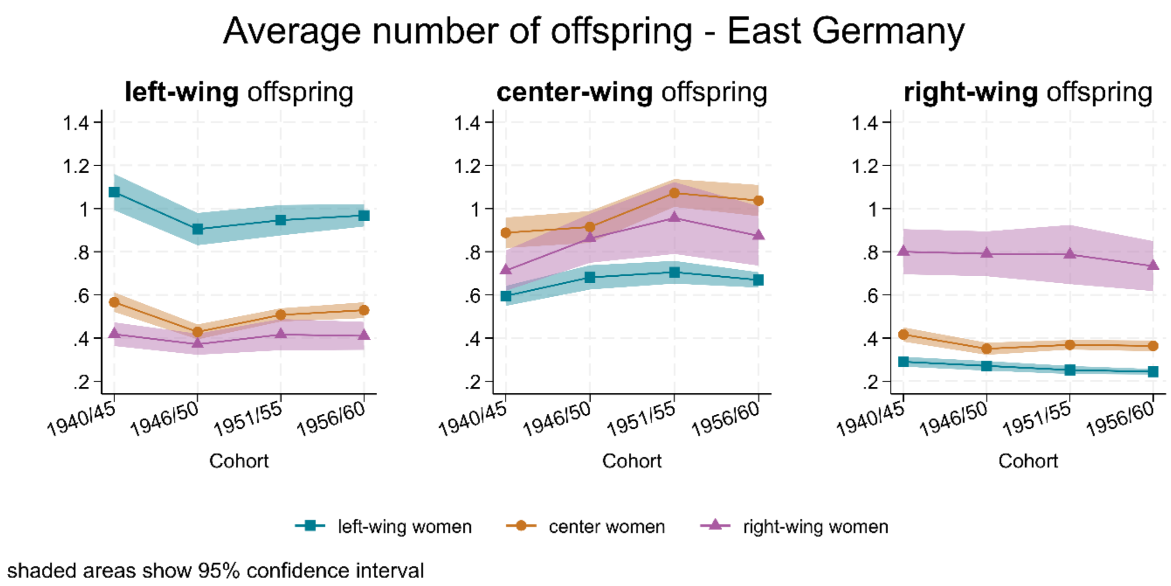


Among women who lived in West Germany in 1989 (Figure 4-3), a clear pattern of political self-reproduction is visible. Left-wing women tend to have significantly more left-wing offspring than their centrist or right-wing counterparts (left panel), centrist women most often reproduce centrist offspring (middle panel), and right-wing women more frequently reproduce right-wing offspring (right panel). This tendency is strongest in the reproduction of left-wing orientations and least pronounced for centrist orientations. For instance, left-wing women in the 1940-1945 cohort have, on average, 1.22 left-wing children, compared to just 0.48 among right-wing women in the same cohort. Conversely, right-wing women have a higher number of right-wing children, ranging from 0.57 (1956–1960) to 0.70 (1940–1945), compared to just 0.19 (1951-1955) to 0.25 (1940-1945) among left-wing women.

A similar pattern of political self-reproduction is observed among women who lived in East Germany in 1989 (Figure 4-4) Left- and right-wing women, in particular, tend to transmit their political orientation to their children. Left-wing women have, on average, between 0.90 (1946–1950) and 1.10 (1940–1945) left-oriented offspring, while right-wing women have significantly fewer, between 0.37 and 0.42 in the same cohorts, respectively. In terms of right-wing offspring (right panel), right-wing women in East Germany reproduce their orientation. On average, they have between 0.73 (1956-1960) and 0.80 (1940-1945) right-oriented children, compared to just 0.24 to 0.29 among left-wing women. Differences in the reproduction of centrist orientations are less pronounced, although left-wing women tend to have fewer children in this category than both centrist and right-wing women across most cohorts.

Across all cohorts, no consistent upward or downward trend in prospective reproduction rates is observable in East or West Germany. However, a comparison between the two regions suggests that in East Germany, both centrist and right-wing women appear to transmit their political orientations slightly more effectively than their West German counterparts.

Figure 4-4: Prospective reproduction rates of political orientation across cohorts of women who lived in East Germany 1089. Shaded areas show 95% confidence intervals calculated using bootstrap resampling.



4.5.3 Population renewal and scenario analysis

The reproduction of political orientations results from the interaction between fertility patterns and social transmission processes. To better understand the relative contribution of these components, I model the population renewal of generation G1. In addition to the observed renewal dynamics, I construct a series of hypothetical scenarios that aim to isolate the effects of different factors.

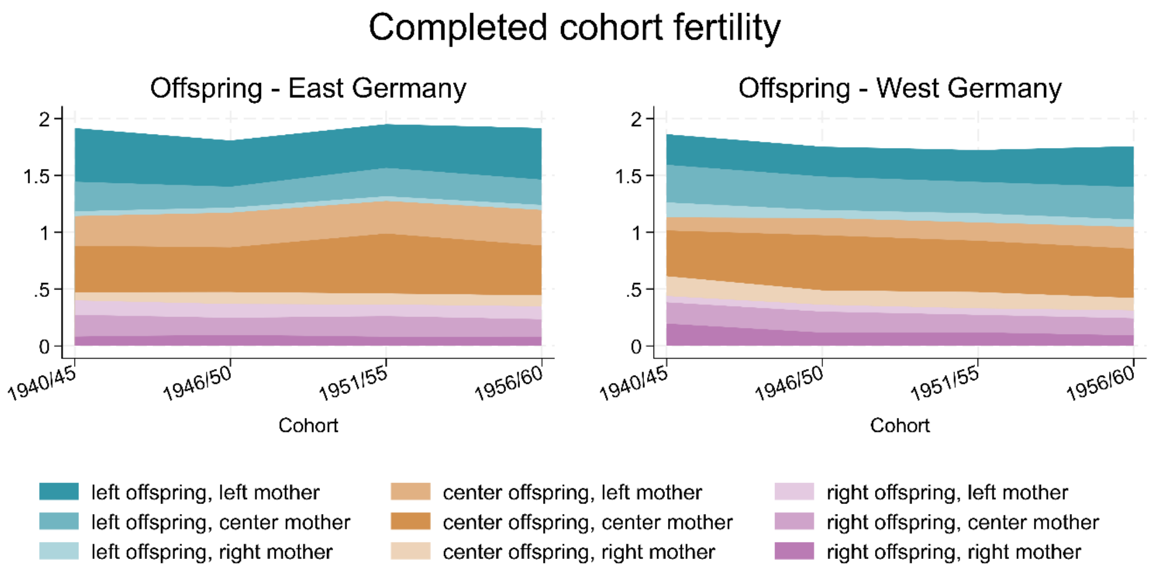
The first two scenarios explore how the initial political distribution in G1 affects the resulting composition in G2. In **Scenario 1**, women in G1 are evenly distributed across the three political categories – left, centre, and right – while keeping both the transmission probabilities $p_{j|i}$ and group-specific fertility rates f_i unchanged. In **Scenario 2**, the marginal groups (left- and right-oriented women) are each assigned a larger share (0.4), while the centrist group is reduced to 0.2, again holding other parameters constant.

The next two scenarios assess the impact of fertility differentials. In **Scenario 3**, the fertility of right-wing women is increased by a factor of 1.2, while that of left-wing women is reduced to 0.8 times their observed level. **Scenario 4** exaggerates these differences: right-wing fertility is multiplied by 1.5 and left-wing fertility by 0.5. All other model components remain unchanged in each case. The estimates of the scenario analyses are provided in Appendix A4-6 and A4-7.

Together, these scenarios allow for a clearer understanding of how ideological composition, transmission rates, and fertility interact in shaping the political profile of the next generation.

Figure 4-5 visualizes the actual population renewal based on completed cohort fertility. The upper boundary of the shaded area represents the average number of children per woman in each cohort. Within this area, colour gradients indicate the political orientations of the offspring, while the intensity of each shade reflects the political orientation of the G1 women contributing to that portion of the next generation. Exact estimates and statistical inference are provided in Appendix A4-4 and A4-5. For intuitive interpretation, the completed cohort fertility can be scaled by a factor of 100, representing the reproductive outcomes of a hypothetical group of 100 randomly selected women in G1. Together, these 100 women would give birth to approximately 180 children, whose political orientations are distributed as shown in Figure 4-5 (multiplied by 100).

Figure 4-5: Completed cohort fertility rate (CFR) of women by political orientation of the offspring. Calculations based on Equation 4-1).



As shown in Figure 4-5, the average completed cohort fertility remains below two children per woman across all cohorts, regardless of region. Among East German women, it ranges from 1.80 (1946–1950) to 1.95 (1951–1955), while for West German women it is slightly lower, ranging from 1.72 (1951–1955) to 1.86 (1940–1945). Translating these figures into population-level terms, 100 representative G1 women from East Germany have, on average, 190 children. Of these, approximately 70 identify as left-wing, 83 as centrist, and 37 as right-wing (averaged across cohorts). In comparison, 100 West German women have around 177 children, distributed into 68 left-oriented, 73 centrist, and 36 right-oriented offspring. These figures highlight subtle but meaningful regional differences in both fertility and the resulting political composition of the next generation.

Across all reproducing cohorts, except for the earliest (1940–1945), the largest share of offspring identifies with a centrist political orientation, followed closely by left-wing orientations. In contrast, right-wing orientations consistently represent the smallest share among offspring across all cohorts.

In East Germany (left panel of Figure 4-5), a notable share of centre-oriented offspring is born to left-wing women, as indicated by the top orange-shaded area. Right-wing women contribute relatively little to the next generation's political makeup, not due to lower fertility, but because they constitute a small proportion of the G1 population (see Figure 4-1).

Among West German women (right panel), political reproduction patterns are broadly similar. However, the initial share of left-wing women is smaller, resulting in fewer left- or centre-oriented offspring from this group. Conversely, the higher proportion of right-wing women in West Germany leads to a greater overall number of right-oriented offspring, as well as more children with centrist orientations contributed by this group.

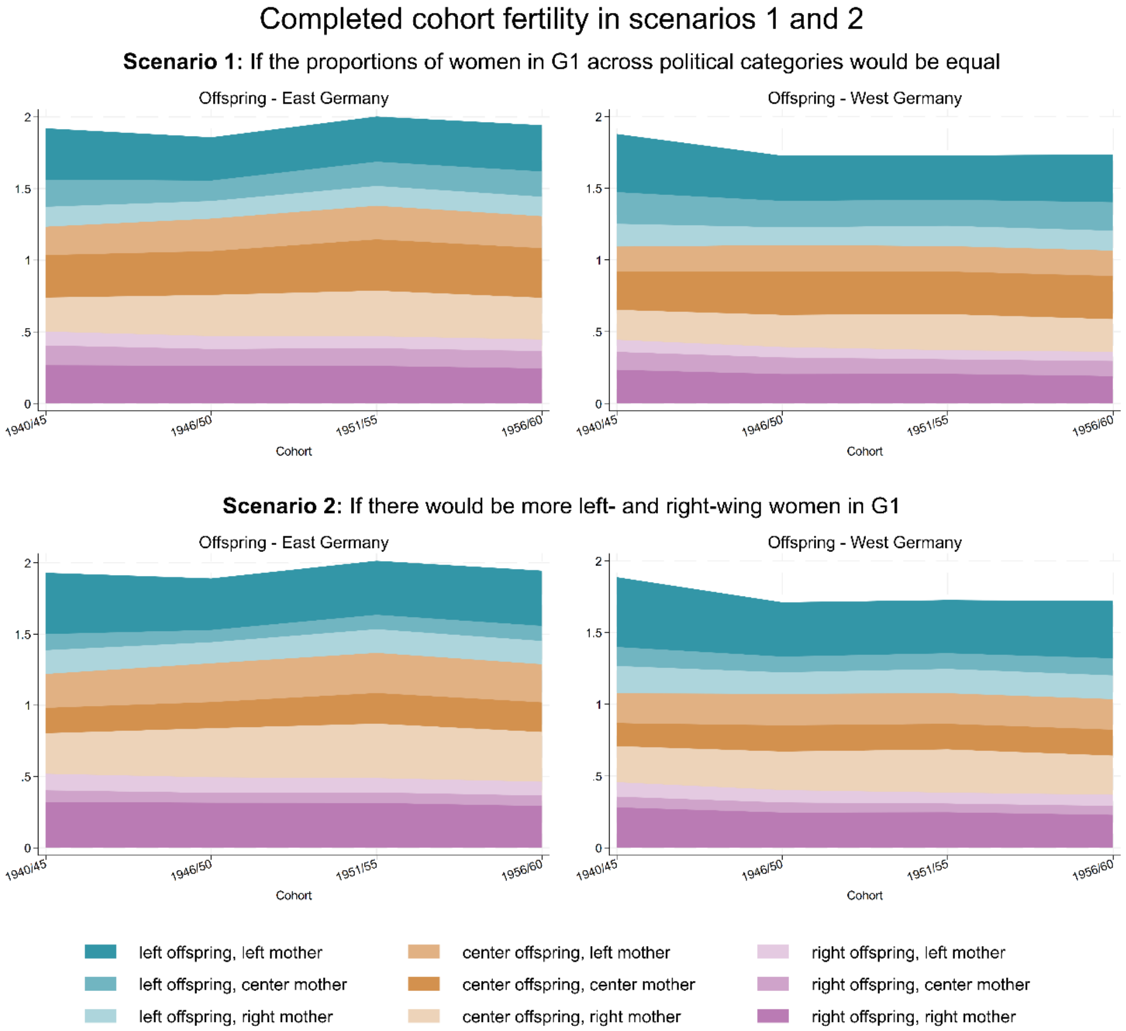
Taken together, these results reflect consistent regional patterns in political reproduction. However, no strong cohort trends emerge within either region, suggesting relative stability in transmission dynamics across the observed birth cohorts.

Figure 4-6 visualizes the outcomes of Scenarios 1 and 2, which examine how changes in the distribution of political orientations among G1 women affect political reproduction. These scenarios isolate the effect of political composition by altering group proportions while keeping fertility and transmission rates constant. Scenario 1 models a hypothetical G1 population in which all three political orientations—left, centre, and right—are equally represented. Scenario 2, by contrast, assumes a polarization of G1, with larger shares of left- and right-oriented women and a reduced centrist group. These comparisons highlight how initial ideological composition shapes the political landscape of the next generation, independent of transmission strength or fertility differentials.

Scenario 1 essentially reflects the prospective reproduction rates presented in Figures 4-3 and 4-4. This leads to an overall increase in cohort fertility among women socialized in East Germany. For this group, the average completed cohort fertility (CFR) increases to 1.93 across cohorts, reaching a high of 2.00 for the 1951–1955 cohort. This effect is primarily driven by the hypothetically larger share of right-wing women, who, as shown in Figure 4-2 (left panel), exhibit higher fertility rates than their left- or centre-oriented counterparts. In contrast, the average number of children among West German women changes only marginally under Scenario 1, averaging 1.77 across cohorts. This is because fertility differences across political orientations are far less pronounced in West Germany (Figure 4-2, right panel). Compared to the population renewal under observed conditions (Figure 4-5), this scenario results in greater offspring contributions from left-wing women and fewer from centrist women in West Germany, an outcome directly tied to their altered proportions in the hypothetical G1 population. The same pattern applies to right-wing women in both regions, whose actual representation in the real data is relatively low (see Figure 4-1). As already evident in the prospective reproduction rates (Figure 4-3 and Figure 4-4), Scenario 1 confirms that political self-reproduction is most pronounced across all orientations. This is clearly visualized in Figure 4-6, where thick, dark-coloured areas denote the strongest within-group reproduction patterns.

Scenario 2 explores a more polarized ideological distribution in G1, with both left- and right-oriented women each comprising 40% of the population, while the share of centrist women is reduced to 20%. This adjustment allows for the examination of how a politically polarized parent generation would shape the orientation of the next generation. As in Scenario 1, the completed cohort fertility of women socialized in East Germany increases under this configuration, reaching an average of 1.95 across cohorts. This effect is again driven by the higher fertility rates of right-wing women, whose proportion in the population is artificially increased. In contrast, fertility levels among West German women remain relatively stable, reflecting the minimal differences in fertility across political orientations in that region. In both East and West Germany, the reduced share of centrist women results in a visible decline in their contribution to the political distribution of the offspring generation. Among East German women in particular, the higher fertility of right-wing individuals becomes especially visible in their contribution to both right-wing and centrist offspring. Similarly, in West Germany, both left- and right-wing women contribute more offspring across all political orientations than in the actual data, driven by their increased representation in G1.

Figure 4-6: Completed cohort fertility rate (CFR) of women by political orientation of the offspring in the hypothetical scenarios 1 and 2.



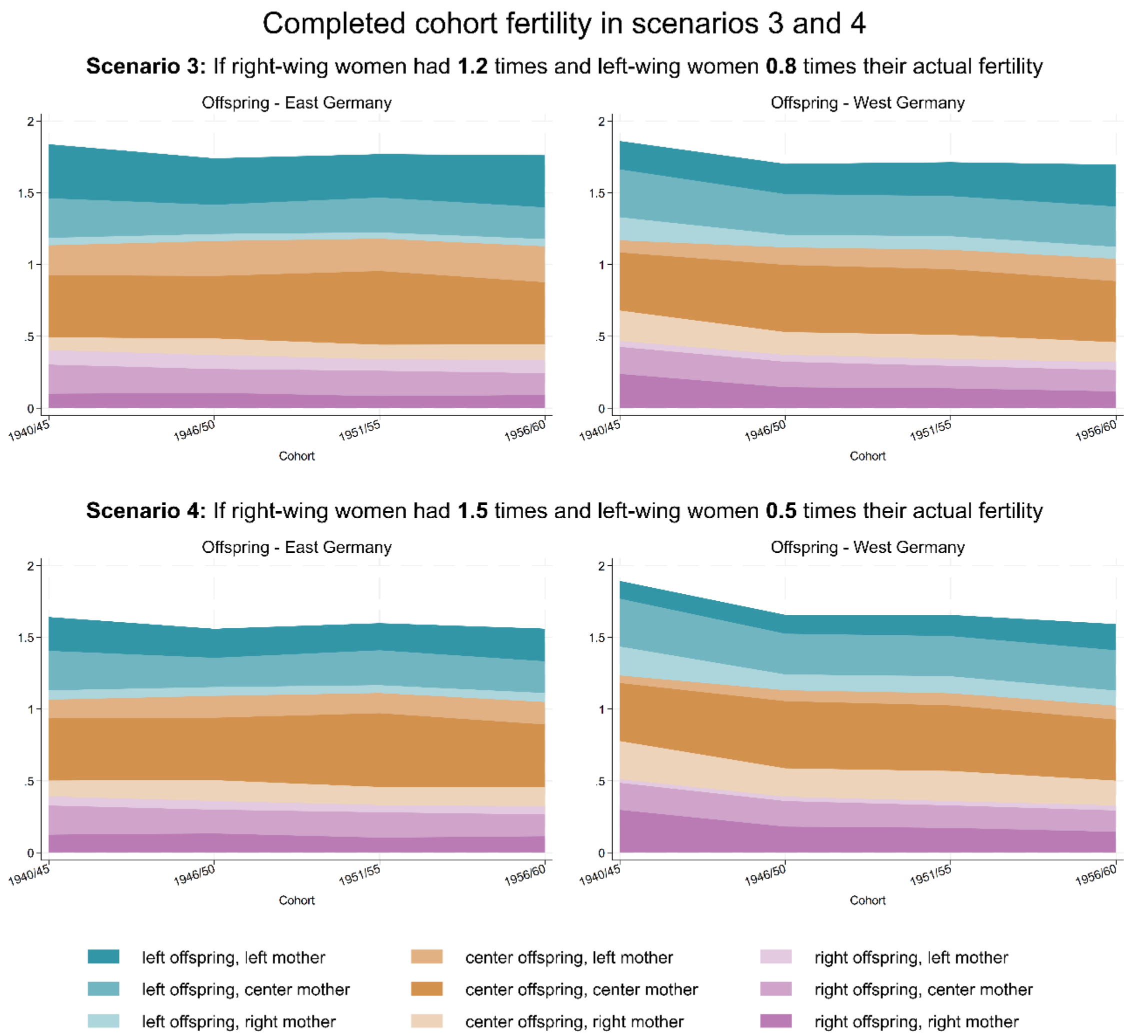
Scenarios 3 and 4 examine how differential fertility, independent of group size or transmission rates, shapes the reproduction of political orientations. In Scenario 3, the fertility of right-wing women is increased to 1.2 times its observed value, while that of left-wing women is reduced to 0.8 times. Scenario 4 applies a more extreme version of this manipulation: right-wing women are assigned 1.5 times their actual fertility, and left-wing women just 0.5 times. In both scenarios, all other model parameters—the distribution of political orientations in G1 and the conditional transmission probabilities—remain unchanged. This enables to assess how varying fertility levels affect the political composition of the next generation.

In **Scenario 3**, the average completed cohort fertility among women socialized in former East Germany declines to 1.78. This reduction is primarily driven by the lower fertility assigned to left-wing women, who comprise approximately 44% of the population (Figure 4-1). Despite the increased fertility of right-wing women, their contribution to the next generation remains limited due to their relatively small population share (around 11%). A similar but less pronounced pattern is observed among West German women. Since left-wing women constitute less than 30% of this population, the fertility reduction has a smaller overall effect. However, its impact becomes more visible in later cohorts, with average CFRs declining from 1.89 (1940–1945) to 1.70 (1956–1960). In contrast, the higher fertility of right-wing women begins to exert more influence in West Germany, where they represent roughly 20% of the population, nearly double their share in the East.

Scenario 4 amplifies the patterns observed in Scenario 3, reflecting the more extreme fertility differentials between left- and right-wing women. Among East German women, the average completed cohort fertility drops further to 1.60, with patterns remaining stable across cohorts. For West German women, the decline is again cohort-specific, falling from 1.89 (1940–1945) to 1.59 (1956–1960). In both regions, the reduced fertility of left-wing women leads to an even smaller contribution to the total number of offspring. However, due to their higher representation in G1 and relatively strong transmission rates, children with left-wing political orientations still outnumber those with right-wing orientations in G2.

These findings stress a central insight: demographic advantages alone are insufficient to shift the ideological makeup of the next generation. Political reproduction is primarily led by the interplay of social transmission and population structure, which constrain the transformative potential of fertility differentials.

Figure 4-7: Completed cohort fertility rate (CFR) of women by political orientation of the offspring in the hypothetical scenarios 3 and 4.



4.6 Discussion and Conclusion

This study has examined the intergenerational transmission of political orientations among women born between 1940 and 1960 in Germany. Using a prospective study design, it integrates both demographic pathways – specifically fertility patterns – and social transmission mechanisms to provide a more comprehensive understanding of political reproduction across generations.

A first rather basic finding is that only a minority of women in both East and West Germany identify with right-wing political orientations. However, the share of right-wing women socialized in former West Germany is approximately twice as high as among women socialized in the East. In contrast, East German women are more likely to hold left-wing orientations, with left- and centre-oriented women making up nearly equal proportions. In West Germany, by comparison, the centre dominates as the largest political group among women. These regional patterns align with the broader *gender voting gap* observed across many European countries, where women tend to lean more to the left than men in their political preferences (Abendschön and Steinmetz 2014). The especially high prevalence of left-wing orientations among East German women can also be understood in historical terms, as a likely legacy of political socialization during the GDR period (Dalton and Weldon 2010).

Addressing the first research question – whether fertility patterns vary across political orientations – I find no meaningful differences in either fertility rates or childlessness among West German women with different political orientations. In contrast, among East German women, those with right-wing orientations exhibit higher fertility rates than their left- and centre-oriented counterparts, particularly within the 1946–1950 and 1951–1955 cohorts. This pattern aligns with previous findings linking political orientation to fertility behaviour (Fieder and Huber 2018), and is consistent with broader literature on the associations between religiosity, educational attainment, value orientations, and fertility.

Furthermore, East German women, regardless of political orientation, have significantly lower rates of childlessness compared to West German women, emphasizing a distinct demographic profile between the two regions. This difference likely reflects the lasting influence of GDR-era family policies and social norms, which promoted near-universal motherhood through extensive childcare provision and strong institutional support for working mothers, conditions that were far less developed in West Germany during the same period.

Beyond descriptive fertility patterns, this study advances the analysis by calculating prospective transmission rates that jointly capture demographic and social pathways of political orientation reproduction. These rates reveal a clear pattern: women in both East and West Germany predominantly reproduce their own political orientation. This finding is consistent with earlier research on the intergenerational transmission of left–right ideology in Germany (Van Ditmars 2023). Notably, the transmission advantage is most pronounced among left-wing women in both regions. This pattern aligns with Van Ditmars (2023) and may reflect the so-called *gender-generation gap* in political transmission. Accordingly, left-wing parents have a general advantage in reproducing their political orientation compared to right-wing parents because the gender gap in political orientation, with women being more left-wing oriented than men, tends to intensify in younger generations. Since there are no major intergenerational differences in the political orientation of men, younger generations as a whole tend to be more left-wing than older generations (Van Ditmars 2023).

Analysis of the actual population renewal among women born between 1940 and 1960 reveals that, much like in the parent generation (G1), the majority of children (G2) identify with centrist political orientations. This outcome is unsurprising, given the large share of centrist women in G1 and their tendency to transmit their own political orientation. However, the transmission advantage of left-wing women becomes particularly evident among East German cohorts, where they represent a substantial portion of the population. Their relatively high fertility, combined with stronger within-group transmission, reinforces their contribution to the ideological composition of the next generation, resulting in a disproportionately large number of left-oriented offspring relative to group size.

To assess the relative importance of different components shaping population renewal, I modelled a series of hypothetical scenarios, each altering one parameter while holding others constant. Scenarios 1 and 2 demonstrate that even under conditions of ideological balance – whether all political orientations are equally represented (Scenario 1) or left- and right-wing groups dominate (Scenario 2) – the majority of offspring in both East and West Germany still adopt centrist political orientations. This suggests that the observed dominance of centrism in the next generation is not solely a reflection of its numerical strength in G1. Rather, it points to a structural tendency toward the political centre, likely reinforced by relatively stable transmission dynamics and moderate ideological shifts across generations.

Scenarios 3 and 4 simulate increasingly pronounced fertility advantages for right-wing women, modelling an extreme case of demographic influence. Yet even under these conditions, the ideological composition of the offspring generation remains remarkably similar to the observed distribution. This outcome reflects the structural limitation imposed by the small population share of right-wing women in the parent generation. In other words, when a political group represents a minority within a generation, even substantial fertility advantages and strong transmission rates are insufficient to significantly reshape the ideological balance of the next generation.

These results illustrate a broader principle of political demography: when group size is small, even sustained fertility advantages yield only gradual change, highlighting the slow-changing nature of intergenerational political reproduction.

Recent political developments prompt reflection on how ideological distributions observed between 2005 and 2019 may have developed since then. In the 2025 federal election, the right-wing party *Alternative für Deutschland* (AfD) received well over 30% of second votes across all former East German states (Bildung 2025), a marked increase that suggests a growing shift toward the political right. If this trend continues and is accompanied by persistently low levels of left-wing affiliation, as observed in the 2025 federal election, and comparatively higher fertility among right-wing individuals in the East, as indicated in this study, the long-standing dominance of centrist orientations may be challenged.

While left-wing individuals have historically demonstrated a transmission advantage (Van Ditmars 2023), it remains an open question whether this pattern will persist in the face of shifting political alignments and demographic changes. In regions where right-wing parties have gained substantial electoral ground and right-leaning individuals display comparatively higher fertility rates, the conditions for political reproduction may be undergoing a gradual transformation.

Whether the political centre in Germany will continue to be reinforced by demographic and social transmission dynamics, or whether it will give way to new regional patterns shaped by emerging political majorities, remains uncertain. This ambiguity stresses the importance of future research that closely monitors both ideological transmission and demographic change across generations and regions.

Future research could explore how the interplay between demographic behaviour and political transmission unfolds in other political contexts, such as the United States, where ideological divisions are more sharply structured along party lines. Such comparative perspectives may help clarify whether the patterns observed in Germany are context-specific or reflect broader dynamics of political reproduction. Furthermore, future studies should aim to incorporate additional demographic processes, such as assortative mating, into models of intergenerational transmission. Prior research suggests that politically homogeneous couples may have a transmission advantage (Van Ditmars 2023), making this a crucial factor for understanding how political orientations are maintained or altered across generations.

As with any study, several limitations should be acknowledged. Prospective datasets that link individuals' political orientations with those of their potential offspring remain rare, making it difficult to comprehensively examine the intersection of demographic patterns and intergenerational political transmission. The SOEP dataset offers a valuable exception, providing the necessary parent–child information to enable such an analysis. However, even this dataset has limitations. Political orientation, measured on a left–right scale from 0 to 10, is only available at four discrete time points, limiting temporal precision. For analytical clarity, I collapsed this scale into three broader categories (left, centre, right), which inevitably involves a loss of granularity, but was necessary to facilitate a structured and interpretable modelling framework. Moreover, this study focuses exclusively on women. This decision is motivated by the physiological constraints of female fertility, which are more clearly bounded in time (Menken et al. 1986), making it easier to define a completed generation (G1) for demographic analysis. Finally, it is important to note that the study is descriptive in nature. While the findings highlight meaningful patterns in political reproduction, they do not establish causal relationships. This descriptive approach, however, provides a crucial baseline for future studies, which can build on these findings by employing causal methods to further elucidate the mechanisms driving ideological transmission.

4.7 Acknowledgements

I acknowledge the producers and the distributors of data employed in this study: Socio-Economic Panel (SOEP), version 39, data for years 1984-2022 (SOEP-Core v39, EU Edition). 2024. DOI:10.5684/soep.core.v39eu.

4.8 Appendix

Table A4-1: Cohort fertility rate (CFR) and parent fertility rate (PFR) of women by political orientation, birth cohort, and residence in 1989.

Cohort	**Cohort fertility rate (CFR)**			**Parent fertility rate (PFR)**		
West	left	center	right	left	center	right
1940-45	1.98591549	1.83817427	1.80970149	2.22631574	2.08962274	2.07264948
1946-50	1.71129707	1.80652174	1.66257669	2.02475238	2.04176903	1.99264705
1951-55	1.6485623	1.74045802	1.7979798	2.09756088	2.01324511	2.05780339
1956-60	1.72210066	1.81178396	1.67156863	2.12702703	2.15369654	1.99415207
East						
1940-45	1.96195652	1.87046632	1.93023256	2.11111116	1.99447513	1.97619045
1946-50	1.85714286	1.69387755	2.02380952	1.94557822	1.80434787	2.02380943
1951-55	1.90340909	1.94835681	2.15909091	2.00598812	2.08542705	2.26190472
1956-60	1.88188976	1.930131	2.01666667	1.95901644	2.02752304	2.12280703

Table A4-2: Estimates and statistical inference of prospective reproduction rates, **East Germany**; (1=left, 2=center, 3=right).

Cohort	Prospective reproduction rates r_{ji}	estimate	p-value	95% Conf. Interval	
1940-45	r11	1.07635055	2.668e-139	.992385222	1.16031588
1940-45	r12	.566148985	7.091e-134	.521084916	.611213053
1940-45	r13	.417844667	1.6066e-50	.363057122	.472632212
1940-45	r21	.595301774	2.668e-139	.548862715	.641740832
1940-45	r22	.887801055	7.091e-134	.817134274	.958467837
1940-45	r23	.712439872	1.6066e-50	.61902518	.805854564
1940-45	r31	.29030414	2.668e-139	.267657725	.312950555
1940-45	r32	.416516281	7.091e-134	.383362608	.449669954
1940-45	r33	.799948048	1.6066e-50	.695059338	.904836758
1946-50	r11	.90466693	1.550e-124	.829963933	.979369928
1946-50	r12	.428515971	1.033e-130	.393990543	.4630414
1946-50	r13	.371350485	2.7771e-50	.322540059	.42016091
1946-50	r21	.681187123	1.550e-124	.624938003	.737436243
1946-50	r22	.914842229	1.033e-130	.841133613	.988550844
1946-50	r23	.862008656	2.7771e-50	.748705964	.975311348
1946-50	r31	.271288831	1.550e-124	.248887118	.293690545
1946-50	r32	.350519326	1.033e-130	.322278068	.378760584
1946-50	r33	.790450413	2.7771e-50	.686553358	.894347469
1951-55	r11	.946169391	1.352e-152	.875693217	1.01664557
1951-55	r12	.507408024	8.588e-232	.476814242	.538001806
1951-55	r13	.416102983	2.0210e-29	.343687236	.488518731
1951-55	r21	.705122247	1.352e-152	.652600659	.757643834
1951-55	r22	1.07214708	8.588e-232	1.00750278	1.13679137
1951-55	r23	.955974385	2.0210e-29	.789603072	1.1223457
1951-55	r31	.252117424	1.352e-152	.233338259	.270896589
1951-55	r32	.368801793	8.587e-232	.346565169	.391038417
1951-55	r33	.787013508	2.0210e-29	.650047003	.923980014
1956-60	r11	.968451952	5.028e-295	.916746076	1.02015783
1956-60	r12	.52921838	2.386e-175	.492477834	.565958926
1956-60	r13	.409908577	1.9989e-35	.345229689	.474587466
1956-60	r21	.669335051	5.029e-295	.633599095	.705071007
1956-60	r22	1.03705523	2.386e-175	.965058539	1.10905192
1956-60	r23	.873378276	1.9989e-35	.735569166	1.01118739
1956-60	r31	.244102733	5.028e-295	.231070031	.257135434
1956-60	r32	.363857395	2.386e-175	.338596899	.389117891
1956-60	r33	.733379814	1.9989e-35	.617660859	.849098768

Table A4-3: Estimates and statistical inference of prospective reproduction rates, **West Germany**; (1=left, 2=center, 3=right).

Cohort	Prospective reproduction rates r_{ji}	estimate	p-value	95% Conf. Interval	
1940-45	r11	1.21514683	2.844e-133	1.11820215	1.31209152
1940-45	r12	.66213714	1.730e-304	.627343189	.69693109
1940-45	r13	.477683258	9.352e-161	.443029346	.512337169
1940-45	r21	.518665633	2.844e-133	.477286372	.560044893
1940-45	r22	.801324047	1.730e-304	.759216108	.843431985
1940-45	r23	.628562764	9.352e-161	.582963177	.67416235
1940-45	r31	.252102967	2.844e-133	.231990136	.272215799
1940-45	r32	.374713115	1.730e-304	.355022708	.394403522
1940-45	r33	.703455471	9.352e-161	.652422733	.754488209
1946-50	r11	.944542322	1.106e-119	.864954892	1.02412975
1946-50	r12	.551303453	2.911e-264	.520189812	.582417093
1946-50	r13	.375402173	2.1396e-65	.332320656	.418483691
1946-50	r21	.548876245	1.106e-119	.502627761	.595124729
1946-50	r22	.908333322	2.911e-264	.857070161	.959596483
1946-50	r23	.67251149	2.1396e-65	.595333419	.749689561
1946-50	r31	.217878478	1.106e-119	.19951997	.236236987
1946-50	r32	.346884911	2.911e-264	.327307938	.366461884
1946-50	r33	.614663049	2.1396e-65	.544123721	.685202376
1951-55	r11	.92610492	1.470e-111	.845230525	1.00697932
1951-55	r12	.545634343	1.848e-302	.516865697	.57440299
1951-55	r13	.425261222	2.244e-114	.388592385	.46193006
1951-55	r21	.532636576	1.470e-111	.486122771	.579150381
1951-55	r22	.889762407	1.848e-302	.842849561	.936675253
1951-55	r23	.754008974	2.244e-114	.688993325	.819024623
1951-55	r31	.189820816	1.470e-111	.173244244	.206397388
1951-55	r32	.305061291	1.848e-302	.288976892	.32114569
1951-55	r33	.618709602	2.244e-114	.565360361	.672058842
1956-60	r11	.99700728	2.494e-216	.934761658	1.0592529
1956-60	r12	.595750028	9.380e-258	.561702635	.629797422
1956-60	r13	.415754301	6.751e-109	.378998403	.452510199
1956-60	r21	.531788655	2.494e-216	.498587777	.564989533
1956-60	r22	.900961717	9.380e-258	.849471336	.952452099
1956-60	r23	.683639951	6.751e-109	.62320089	.744079011
1956-60	r31	.19330476	2.494e-216	.181236266	.205373253
1956-60	r32	.315072188	9.381e-258	.297065665	.333078712
1956-60	r33	.572174401	6.751e-109	.521589756	.622759045

Table A4-4: Estimates and statistical inference of population renewal model (Equation 4-1) for **East Germany**.

Cohort	Population renewal c_{ji}	estimate	p-value	95% Conf. Interval	
1940-45	c11	.471544054	5.705e-138	.434579757	.508508351
1940-45	c12	.260158931	2.163e-116	.237924801	.282393061
1940-45	c13	.042779336	5.2013e-54	.037360813	.048197858
1940-45	c21	.260798874	5.706e-138	.240354871	.281242878
1940-45	c22	.407965712	2.163e-116	.373099474	.44283195
1940-45	c23	.072940274	5.2015e-54	.063701501	.082179046
1940-45	c31	.127180862	5.706e-138	.117211165	.13715056
1940-45	c32	.191399143	2.163e-116	.175041473	.207756813
1940-45	c33	.081899444	5.2014e-54	.071525884	.092273004
1946-50	c11	.406176984	3.459e-130	.373384495	.438969473
1946-50	c12	.183649704	1.143e-120	.168239697	.199059711
1946-50	c13	.045471488	3.2103e-75	.040615079	.050327898
1946-50	c21	.305839113	3.458e-130	.281147355	.33053087
1946-50	c22	.392075245	1.143e-120	.359176299	.424974191
1946-50	c23	.105552081	3.2104e-75	.094278991	.116825171
1946-50	c31	.121803147	3.458e-130	.111969434	.131636861
1946-50	c32	.15022257	1.143e-120	.137617428	.162827711
1946-50	c33	.096789847	3.2103e-75	.086452575	.10712712
1951-55	c11	.384586174	2.686e-157	.356377059	.412795289
1951-55	c12	.249602565	5.195e-159	.231394597	.267810533
1951-55	c13	.042282982	7.8264e-32	.035224731	.049341233
1951-55	c21	.286608581	2.686e-157	.26558605	.307631113
1951-55	c22	.527407229	5.195e-159	.488934011	.565880447
1951-55	c23	.097142894	7.8264e-32	.080926938	.11335885
1951-55	c31	.102477291	2.686e-157	.094960656	.109993925
1951-55	c32	.181419822	5.195e-159	.168185637	.194654006
1951-55	c33	.079973659	7.8263e-32	.066623746	.093323572
1956-60	c11	.453014367	2.575e-290	.428630978	.477397756
1956-60	c12	.223187857	6.914e-211	.209073233	.237302482
1956-60	c13	.045293765	7.4187e-28	.037179138	.053408392
1956-60	c21	.313095961	2.574e-290	.29624365	.329948272
1956-60	c22	.437358457	6.913e-211	.40969947	.465017444
1956-60	c23	.096505886	7.4187e-28	.079216325	.113795447
1956-60	c31	.114184338	2.574e-290	.108038394	.120330281
1956-60	c32	.153449985	6.912e-211	.143745655	.163154314
1956-60	c33	.081036443	7.4188e-28	.066518317	.095554568

Table A4-5: Estimates and statistical inference of population renewal model (Equation 4-1) for **West Germany.**

Cohort	Population renewal c_{ji}	estimate	p-value	95% Conf. Interval	
1940-45	c11	.268770802	6.841e-132	.247214508	.290327097
1940-45	c12	.331412362	0	.314267989	.348556735
1940-45	c13	.132937807	3.944e-149	.122919895	.142955719
1940-45	c21	.114720439	6.841e-132	.105519485	.123921393
1940-45	c22	.401078084	0	.380329818	.42182635
1940-45	c23	.174927117	3.944e-149	.161744978	.188109256
1940-45	c31	.055761094	6.841e-132	.051288872	.060233316
1940-45	c32	.187551115	0	.177848862	.197253367
1940-45	c33	.195769531	3.943e-149	.181016756	.210522307
1946-50	c11	.261885864	9.031e-140	.241491253	.282280476
1946-50	c12	.294199068	2.056e-227	.276288993	.312109143
1946-50	c13	.070986721	1.7873e-58	.06235681	.079616631
1946-50	c21	.152182625	9.031e-140	.140331259	.164033991
1946-50	c22	.484725455	2.056e-227	.455216628	.514234281
1946-50	c23	.127168644	1.7873e-58	.111708654	.142628634
1946-50	c31	.060409462	9.031e-140	.055705018	.065113906
1946-50	c32	.185112604	2.056e-227	.17384343	.196381778
1946-50	c33	.116229786	1.7873e-58	.102099641	.13035993
1951-55	c11	.280068446	3.096e-102	.254499125	.305637767
1951-55	c12	.276243856	0	.262293715	.290193996
1951-55	c13	.081354318	4.676e-131	.074808369	.087900267
1951-55	c21	.161077535	3.096e-102	.146371689	.175783382
1951-55	c22	.450469075	0	.427720674	.473217476
1951-55	c23	.14424519	4.676e-131	.1326389	.15585148
1951-55	c31	.057404749	3.096e-102	.052163887	.062645612
1951-55	c32	.154446486	0	.146647038	.162245934
1951-55	c33	.118361833	4.677e-131	.108838175	.12788549
1956-60	c11	.358201527	3.265e-233	.336670495	.379732559
1956-60	c12	.286166086	1.223e-303	.271107482	.301224691
1956-60	c13	.066677575	4.829e-107	.060730978	.072624171
1956-60	c21	.191059295	3.264e-233	.179574969	.202543621
1956-60	c22	.432773271	1.222e-303	.409999918	.455546624
1956-60	c23	.109640366	4.828e-107	.099862161	.119418571
1956-60	c31	.069449904	3.265e-233	.065275361	.073624448
1956-60	c32	.151343635	1.223e-303	.143379645	.159307626
1956-60	c33	.091763816	4.828e-107	.083579921	.099947711

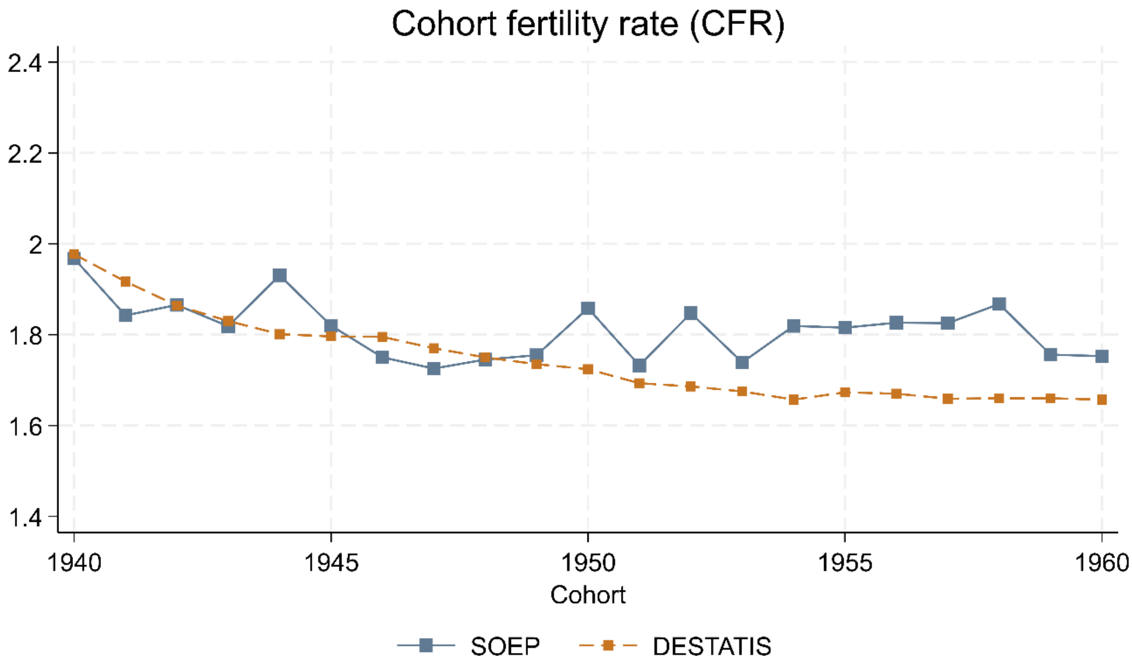
Table A4-6: Estimates of population renewal model under hypothetical **scenarios 1- 4**; **East Germany**. *(Scenario 1: If the proportions of women in G1 across political categories would be equal; Scenario 2: If there would be more left- and right-wing women in G1; Scenario 3: if right-wing women had 1.2 times and left-wing women 0.8 times their actual fertility; Scenario 4: If right-wing women had 1.5 times and left-wing women 0.5 times their actual fertility).*

Cohort	**Population renewal c_{ji}**	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**
1940-45	c11	.358783527	.430540226	.376201584	.235125983
1940-45	c12	.188716334	.113229799	.275797462	.275797462
1940-45	c13	.13928156	.167137869	.052302255	.065377822
1940-45	c21	.19843393	.238120713	.208067409	.130042127
1940-45	c22	.295933694	.177560214	.432489123	.432489123
1940-45	c23	.237479964	.284975953	.089177186	.111471489
1940-45	c31	.09676805	.116121658	.1014659	.063416186
1940-45	c32	.138838765	.083303257	.202904423	.202904423
1940-45	c33	.266649357	.319979224	.100130718	.125163405
1946-50	c11	.301555652	.361866778	.323422489	.202139049
1946-50	c12	.142838661	.085703196	.20326341	.20326341
1946-50	c13	.123783499	.148540196	.050108034	.062635043
1946-50	c21	.227062381	.272474853	.243527454	.152204654
1946-50	c22	.304947419	.182968448	.433948706	.433948706
1946-50	c23	.287336227	.344803468	.116314805	.145393507
1946-50	c31	.090429613	.108515534	.096986975	.060616857
1946-50	c32	.116839779	.070103866	.166266273	.166266273
1946-50	c33	.263483479	.31618017	.106659122	.133323902
1951-55	c11	.315389807	.378467762	.302203421	.188877135
1951-55	c12	.169136013	.101481606	.242884745	.242884745
1951-55	c13	.138700999	.166441196	.044171656	.055214571
1951-55	c21	.235040756	.282048903	.225213748	.14075859
1951-55	c22	.35738237	.214429419	.513212557	.513212557
1951-55	c23	.318658138	.38238976	.101482021	.126852529
1951-55	c31	.084039144	.100846971	.080525484	.050328427
1951-55	c32	.122933935	.07376036	.176537077	.176537077
1951-55	c33	.262337844	.314805408	.08354588	.104432352
1956-60	c11	.322817327	.387380787	.362885403	.226803381
1956-60	c12	.176406132	.105843678	.220937835	.220937835
1956-60	c13	.136636197	.163963433	.051056267	.063820334
1956-60	c21	.22311169	.267734024	.250804306	.156752694
1956-60	c22	.345685087	.207411049	.432949318	.432949318
1956-60	c23	.291126101	.349351316	.108783854	.135979817
1956-60	c31	.08136758	.097641094	.091466921	.057166827
1956-60	c32	.121285802	.07277148	.15190301	.15190301
1956-60	c33	.244459945	.29335193	.09134631	.114182887

Table A4-7: Estimates of population renewal model under hypothetical **scenarios 1- 4**; **West Germany**. *(Scenario 1: If the proportions of women in G1 across political categories would be equal; Scenario 2: If there would be more left- and right-wing women in G1; Scenario 3: if right-wing women had 1.2 times and left-wing women 0.8 times their actual fertility; Scenario 4: If right-wing women had 1.5 times and left-wing women 0.5 times their actual fertility).*

Cohort	Population renewal c_{ji}	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1940-45	c11	.405048957	.486058741	.197468196	.123417626
1940-45	c12	.220712386	.13242743	.333573063	.333573063
1940-45	c13	.159227757	.191073306	.161654074	.202067602
1940-45	c21	.172888549	.207466256	.084286083	.052678804
1940-45	c22	.267108024	.160264812	.403692982	.403692982
1940-45	c23	.209520927	.251425109	.212713613	.265892028
1940-45	c31	.084034325	.100841188	.04096815	.025605095
1940-45	c32	.124904375	.074942624	.188773887	.188773887
1940-45	c33	.234485164	.281382193	.238058255	.297572832
1946-50	c11	.31484745	.377816935	.210049739	.131281091
1946-50	c12	.183767823	.110260692	.28369776	.28369776
1946-50	c13	.125134061	.150160872	.088419804	.110524765
1946-50	c21	.182958754	.219550501	.122060504	.076287818
1946-50	c22	.302777783	.181666667	.467423389	.467423389
1946-50	c23	.224170503	.2690046	.158399014	.197998786
1946-50	c31	.072626162	.087151393	.048452373	.030282734
1946-50	c32	.115628307	.069376983	.178505089	.178505089
1946-50	c33	.204887689	.245865223	.144773766	.180967224
1951-55	c11	.308701649	.370441974	.236054169	.14753385
1951-55	c12	.18187812	.10912687	.279849381	.279849381
1951-55	c13	.141753745	.170104491	.094849843	.118562304
1951-55	c21	.177545531	.213054634	.135763326	.084852076
1951-55	c22	.296587478	.177952484	.456348582	.456348582
1951-55	c23	.251336332	.301603594	.168173417	.210216771
1951-55	c31	.063273607	.075928328	.048383281	.03023955
1951-55	c32	.1016871	.061012259	.156462317	.156462317
1951-55	c33	.20623654	.247483844	.137996378	.172495473
1956-60	c11	.33233577	.398802918	.291471026	.182169395
1956-60	c12	.198583349	.119150007	.280818728	.280818728
1956-60	c13	.138584771	.166301723	.084323596	.105404493
1956-60	c21	.17726289	.212715465	.155466252	.097166409
1956-60	c22	.300320581	.180192346	.42468638	.42468638
1956-60	c23	.22787999	.273455984	.138656363	.173320449
1956-60	c31	.064434922	.077321905	.056511861	.035319914
1956-60	c32	.105024066	.063014439	.148515597	.148515597
1956-60	c33	.190724806	.228869764	.116048837	.145061043

Figure A4-1: Cohort fertility rate (CFR) in the selected SOEP sample and from official data from the German federal statistical office (Statistisches Bundesamt).



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