Intergenerational educational mobility and completed fertility

Zuzanna **Brzozowska**

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Abstract

This paper investigates the role of intergenerational social mobility in completed fertility of women born between 1948 and 1972 in Poland. It examines the hypothesis of acculturation, which implies that fertility of the mobiles will be in between that seen in their parents' (origin) and their new (destination) stratum. Using a 2013 large-scale survey I employ diagonal mobility models and explore the interplay between completed fertility and woman's education, her parents' education, educational mobility and the sibship size. I compare birth cohorts whose reproductive careers took place before and after the collapse of communism. The results suggest that educational mobility was very stable over time, oscillating around 70%; nine out of ten mobiles moved up. Fertility exhibited a strictly negative educational gradient; fertility of the upward and downward movers tended to be lower and higher, respectively, than that of the non-movers. Except for daughters of at least one highly educated parent, the destination stratum played a much more important role in the achieved family size than the origin.

Keywords: completed fertility, social mobility, educational mobility, intergenerational mobility, fertility and education, Poland

JEL codes: J13, J62, I24, I21

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Contents

Introduction

Polish sociology has a long tradition of studies on intergenerational social mobility (Ossowski 1968, Sarapata 1965, Słomczyński 1972, Janicka 1976, Pohoski and Mach 1986, Domański 2000, Mach 2005, Domański et al. 2008, Sawiński 2008), but its effect on fertility has drawn little attention. For over half a century Poland has been experiencing profound changes in the educational structure. Under state socialism educational attainment was rising massively, shifting millions of people up to the basic vocational and secondary educational levels. After 1989 another *educational revolution* has come, i.e. a rapidly expanding proportion of young people with university diploma: the tertiary gross enrolment ratio soared from 20% in 1989 to 73% in 2012 (World Bank 2013).

The educational expansion has been accompanied by a persistent decline in completed fertility rate (CFR), from 2.8 to 2.0 among women born in 1930 and 1965, respectively (Kotowska et al. 2008). For the 1930-1959 birth cohorts it has been shown that the achieved family size exhibited a strong negative educational gradient, and that the fall in fertility was entirely driven by the changing educational structure, as within most educational groups fertility actually slightly increased (Brzozowska 2014). The reasons behind these rises have not been examined and this paper helps to understand them, drawing on the existing research on the interplay between fertility and intergenerational transmission of fertility and education. More specifically, I investigate the link between female completed fertility and education of women and their parents, when controlled for the number siblings which has been found to positively affect the preferred and completed family size (Johnson and Stokes 1976, Anderton et al. 1987, Murphy 1999, Murphy and Knudsen 2002). In addition, I test whether experiencing intergenerational mobility influences completed fertility.

The structure of the article is as follows. I start with discussing the theoretical perspectives of the association between fertility of women and intergenerational social mobility, which is defined as movement in educational status occurring from one generation to the next. I also briefly describe the trends in cohort completed fertility and social mobility in Poland. Further, I briefly review theories on the role of education and parents' education in the achieved family size. This is followed by a section on data and methods. Finally, the results of the descriptive and multivariate analysis are presented and discussed. The final section concludes.

Background

INTERGENERATIONAL SOCIAL MOBILITY AND FERTILITY

Theories on the effect of intergenerational social mobility (i.e. movement in socioeconomic position occurring from one generation to the next) on fertility create contradictory expectations (Kasarda and Billy 1985). The social isolation approach predicts that people who have changed their socioeconomic status compared to their parents will have more children than the non-movers because they try to compensate the loss of social ties by forming bigger families (Stuckert 1963, Boyd 1973). However, stress and disorientation resulting from moving to a new social environment might as well inhibit fertility. Couples who have moved down might reduce their preferred family size to boost their or their progeny's chances for regaining the lost social position or at least stopping further social decline (Bean and Swicegood 1979, Stevens 1981). On the other hand, those who have moved up might act exactly in the same way to be able to invest sufficient resources in the *quality* (mostly education) of

their offspring (Casterline 2001, Haaga 2001). This kind of motivation is often called status anxiety (Dalla-Zuanna 2007) and arises from past experience of the upward mobiles: they must have put more effort in achieving their social position than those who inherited it. Consequently, they are usually more career- and success-oriented, and determined to equip their children with everything needed for a good start in life. They themselves are also more likely to come from small families who preferred to invest resources in the human capital of their few offspring rather than diluting them among many children (Blake 1989 p.306). Hence, those who have climbed up the social ladder might have also *inherited* a preference for a small family.

Duncan and Sobel studied the differences between fertility of upward and downward movers more closely and tested the hypothesis of acculturation to a new stratum (Duncan 1966, Blau and Duncan 1967, Sobel 1981, 1985). The hypothesis predicts that the mobiles will partially conform to the norms and values of their new strata, including those concerning family formation. So, fertility of the newcomers is expected to be in between that seen in their parents' (origin) and their new (destination) stratum. Using the *Occupational Changes in a Generation* study conducted in the US in 1962, Blau and Duncan (1967) examined the completed fertility of married couples when controlled for the intergenerational mobility of the husband (his occupational status was compared to that of his father). They found not only that fertility of the mobiles *lies intermediate between that prevailing in their origin and that prevailing in their destination stratum*, but also that long distance mobility slightly reduces fertility (Blau and Duncan 1967 p.397). Applying a more statistically refined technique, the *diagonal models*, and including some covariates, Sobel (1985) repeated Blau and Duncan's analysis and confirmed their first conclusion, but not the second: his results supported the hypothesis of acculturation to a new stratum, but they did not suggest any mobility effects on completed fertility. What he did find, however, was that the relative effects of origin and destination statuses varied by origin status.

Examining the connection between intergenerational social mobility and fertility has a great potential for understanding demographic changes in Poland. The reasons for the CFR increases within the educational groups in the birth cohorts 1930-1955 have not been explained, but the mechanism described by the acculturation hypothesis might be one of them. As education expanded, more and more women moved up the social ladder, partially adapting the family formation patterns of their new stratum, but partially *transplanting* norms of their origin stratum. This study answers the question of how big the *inheritance* (origin) and the *acculturation* (destination) effects have been and if they have varied in time and by parents' education.

Studies for the period between 1982 and 2004 show that as many as 60-70% of people achieved different occupational status than their father (Domański 2007 p.301). For women such estimates are undoubtedly highly biased, as the occupational structure of women substantially differs from that of men, and thus the status inheritance tends to be much weaker for daughters than for sons. On the other hand, referring to mothers' occupational status is hardly possible because of the difficulties with defining women's social status by occupation, especially in the older generations such as those of mothers of women aged 40 and more today (Domański 2007 chap.9.5, 14.4). In view of these problems I do not include occupation in the analysis and focus solely on education, whose close link to female completed fertility is well documented in the literature (e.g. Blossfeld and Huinink 1991, Kravdal and Rindfuss 2008, Kreyenfeld and Konietzka 2008, Van Bavel 2014) and briefly reviewed in the next section.

EDUCATION AND FERTILITY

In most societies the correlation between education and fertility of women is negative (Mare and Maralani 2006), although some highly gender equal countries have recently seen its reversal (Andersson et al. 2009). Several explanations of this complex relationship have been offered by different theoretical perspectives. The most straightforward one stresses the postponement of family formation caused by a longer education process (Ní Bhrolcháin and Beaujouan 2012). Being in education is usually perceived as incompatible with starting a family because of lacking economic resources. After finishing education one needs some time to build his or her career. Consequently, highly educated women postpone childbearing until their (late) 30s (Rindfuss et al. 1996, Rendall et al. 2005). Some of them recuperate delayed fertility (Neels and De Wachter 2010), but quite a few face biological limitations, i.e. sterility (Leridon and Slama 2008).

It is also argued that, in fact, the negative fertility-education relationship results from educational differences in intended and unintended fertility. Musick and her colleagues (2009) have shown for the US that while the preferred family size does not vary by education, the number of mistimed or unintended births does. Thus, the better educated simply make a more effective use of contraceptives, which has been documented also for other developed countries (Singh and Darroch 2000) and indicated by the absence of education-specific differences in intended family size among women aged 25-29 in low-fertility countries (Beaujouan et al. 2013). The negative educational gradient in using contraceptives might arise from economic barriers to buy them, but a US qualitative study has shown that this is rarely, if ever, the reason (Edin and Kefalas 2005). Hence, the differences lie in lifestyle or *life management* rather than in economic status.

It has been found that the better educated are more likely to work towards a long-term goal as they believe they have more control over their lives and are able to shape their fate (Mirowsky and Ross 2007). To poorly educated respondents of Edin and Kefalas (2005) pregnancies often simply *happened*, without being wanted or unwanted. To a certain extent this sort of apathy or indifference towards own life is probably driven by the feeling of having nothing or not much to lose. The perspective of the better educated is quite different: they usually have a more satisfying and a better-paid job, strive for achieving long-term goals, have some hobbies and the economic resources to indulge in them. In other words, they have plenty to lose by an unwanted or mistimed pregnancy. Their active lifestyle often competes with time needed to be devoted to raise children, so they are much more tempted to limit or even forgo fertility (Morgan 1991). Economists call the alternatives competing with childbearing *opportunity costs* (Joshi 1998, Liefbroer 2005). They are usually higher for better educated women.

The negative association between education and fertility can be also described with regard to the quality-quantity trade-off (Becker 1960, Hanushek 1992). It states that in meritocratic societies, i.e. in societies which value knowledge, well-educated parents are particularly determined to ensure their children at least as high socio-economic status as they have achieved. As it requires investments (in terms of money and time) in their offspring, they limit fertility: they prefer to have fewer children of *high quality* rather than many children of *low quality*. The other side of the coin is the negative relationship between the sibship size and educational attainment, suggested for Western societies by considerable evidence (Blake 1981, 1989, Kasarda and Billy 1985, Desai 1995, Downey 1995, Steelman et al. 2002). The economic theory of quality-quantity trade-off was developed in the 1960s, but the mechanism was observed already at the end of the ninetieth century e.g., by a sociologist Arsène Dumont (Dumont 1890, Dalla-Zuanna 2007), and, considering the inheritance of education and education-fertility relationship, it provides a direct link between parents' and children's fertility.

FERTILITY TRANSMISSION AND PARENTS' EDUCATION

Many studies have documented the intergenerational transmission of fertility, i.e. the positive association between the sibship size and the preferred and completed family size (Johnson and Stokes 1976, Anderton et al. 1987, Murphy 1999, Murphy and Knudsen 2002), but its causes are still equivocal. A century ago, genetic determinants seemed to be a perfect explanation (Pearson et al. 1899, Fisher 1930). Interest in this approach has again grown in the last decade as new studies and statistical powerful tools enabled sophisticated tests of genes' influence (Rodgers, Hughes, et al. 2001, Rodgers, Kohler, et al. 2001, Kohler et al. 2002, Kohler et al. 2006). Their findings suggest a significant effect of genes on fertility, but their usefulness for socio-economic analyses is still debatable. Maybe a recently launched project on genetic markers will come up with some new conclusions (Barban et al. 2014).

Social demography usually discusses two socioeconomic theories: childhood socialisation (Preston 1976, Anderton et al. 1987) and transmission of socioeconomic traits (Duncan et al. 1965, Barber 2001, Jennings and Leslie 2013). The former one states that parents pass on their values and ideals (including those related to reproductive behaviour), while the latter stresses the strong correlation of socioeconomic status between generations. In case of teenage fertility the results unambiguously suggest that its intergenerational transmission is mediated through socialisation (Furstenberg et al. 1990, Kahn and Anderson 1992). However, findings for completed fertility are mixed. Some claim that the observed correlation in family size between two (or more) successive generations is explained by the family formation norms passed on to children (Kolk 2014), but others have found more support for the transmission of socioeconomic status, especially education (Duncan et al. 1965, Thornton 1980, Barber 2001, Jennings and Leslie 2013).

Available evidence suggests that father's education always plays a more important role in child-rearing orientation (Slik et al. 2002), but there are hypotheses predicting that in heterogamic couples the better educated parent has more influence on child's education than the less educated one (e.g., the status-maximalisation hypothesis as proposed by De Graaf and Ganzeboom 1990). Moreover, models estimating the chances of completing secondary school and university in Poland have clearly shown the importance of information on mother's education: when included, the coefficients for fathers occupational status lost their significance (Domański and Tomescu-Dubrow 2008).

Data and Methods

DATA

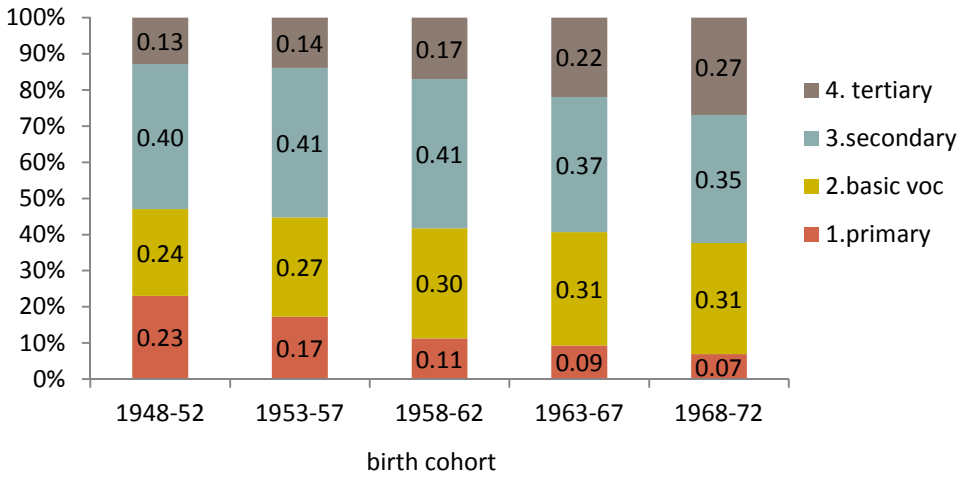
I used data from the first wave of the retrospective *Determinants of Educational Decisions Household Panel Survey* (*Uwarunkowania decyzji edukacyjnych, UDE*), conducted in 2013 by the Educational Research Institute (Rószkiewicz and Saczuk, 2014). From a representative sample of 60,589 men and women aged 16-65 I chose 18,096 women born between 1948 and 1972 (i.e. aged 40-65[2] at the time of the interview). Due to missing information on respondent's and/or parents' education 7.85% of the cases were excluded, so the analysed sample was reduced to 16,675 observations.

[2] At age 40, the reproductive careers are not completed, but period data for the years 1990-2012 show that fertility of women aged 40 and more constitutes a stable share of 2% of the total fertility rate. (Eurostat 2014).

The highest achieved education of the respondents and their parents was coded as four categories, corresponding to the following levels of the 1997 International Standard Classification of Education (ISCED) given in brackets: primary (0-2), basic vocational (3C), secondary (3AB and 4) and tertiary (5A and 6). Primary (also called *low* in the text) education denotes respondents who finished at most the eight-year primary school[3] or who had no education all. Basic vocational school, lasting for three years, typically prepared its pupils to work as skilled workers, while the four- or five-year long secondary school ended with an exam that is required to go to university. Those who did not enter the tertiary level could continue their education in one- or two-year post-secondary schools (ISCED 4) to acquire additional qualifications and to be able to work for example as a nurse, secretary or technician. Due to the rareness of this track (6% of the respondents), the category was merged with secondary education. Tertiary education encompasses respondents with bachelor's, engineer's, master's, doctor's and professor's degree.

Figure 1 shows the educational structure of the respondents by five-year birth cohort. The low and highly educated groups changed their size most substantially. The former shrank from 23% to 7%, while the latter doubled, growing from 13% to 27% between the oldest and the youngest cohort. The share of women with basic vocational education increased and then stabilised at 30%. The secondary educated constituted the largest group of around 40% and 35% among women born before 1963 and afterwards, respectively.

Figure 1. Educational structure of population studied by five-year cohort.



SOURCE: OWN CALCULATIONS ON NON-WEIGHTED UDE DATA.

METHODS

I first examined trends in intergenerational social mobility and in cohort completed fertility by level of education of the respondents and their parents. I conducted most of the analyses on five-year cohorts (from the 1948-52 to the 1968-72 one), using completed fertility rate (CFR), i.e. the average number of children a woman gave birth to, as fertility indicator. The *origin* education was indicated by the

[3] As the youngest respondents were born in 1972, the education system described here refers to that before the 1999 school reform.

educational level of the better educated parent[4]. In view of the contradictive theoretical and empirical premises (see section 0) I compared the link between respondents' education and that of their parents, when measured jointly and separately for mothers and fathers, using Kendall's tau rank correlation coefficient. There was no statistically significant difference between the coefficient for mothers (0.37) and that for fathers (0.38); but they both were lower (in a statistically significant way) than the coefficient for joint education (given by the level of the better educated parent; 0.39)[5]. Thus, the theoretical assumptions (as made by the status-maximalisation hypothesis) were supported by the empirical tests.

In the second step, in order to assess the importance of respondents' and parents' education for completed fertility, I performed diagonal mobility models as specified by Sobel (1981, 1985). The number of children a woman had was the response variable, and I employed Poisson regression models estimated with the maximum-likelihood method. I tested two versions of the models, in both cases specifying two alternatives, with and without mobility effects. Thus, I examined the following four models:

$$y_{ijk} = p\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + r\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + \epsilon_{ijk} \quad (1a)$$

$$y_{ijk} = p\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + r\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + \sum_{w=1}^{W} \gamma_w M_{ijw} + \epsilon_{ijk} \quad (1b)$$

$$y_{ijk} = p_i\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + r_i\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + \epsilon_{ijk} \quad (2a)$$

$$y_{ijk} = p_i\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + r_i\left(\alpha + \sum_{l=1}^{L} \beta_l X_{ijkl}\right) + \sum_{w=1}^{W} \gamma_w M_{ijw} + \epsilon_{ijk} \quad (2b)$$

where:

y_{ijk} was the ultimate number of children (i.e. completed fertility) of person k from origin group i in destination group j;

p was the origin parameter, equal $1-r$ (interpreted as origin weight) and p_i was the origin parameter of origin group i, equal to $1-r_i$ (interpreted as weight of origin i);

r was the destination parameter, equal $1-p$ (interpreted as destination weight) and r_i was the destination parameter for a person from origin group i, equal to $1-p_i$ (interpreted as weight of destination i);

X_{ijkl} was the lth predictor taken by the kth observation of origin i and destination j;

α and β_l denoted intercept and coefficient for lth predictor;

M_{ijw} was the mobility variable w (mover-stayer contrasts, upward vs. downward contrasts, the number of steps moved through the mobility hierarchy);

γ_w was the mobility parameter for variable w;

ϵ_{ijk} was the error term.

[4] A common method of computing joined education level of two persons is multiplication of the years of schooling (e.g., Sobel 1985). It was not applicable for the data I used, however, because education was not given in years of schooling.

[5] The statistical significance of the differences between the correlations was examined using the t-test for dependent correlations (I used the paired.r() command in R).

The destination group was given by respondent's education, and the origin group was defined as parents' join education as explained above in this section. The difference between models (1) and (2) lies in the origin and destination weights: in models (1) they are equal for all educational groups, while in models (2) they vary by parents' education. To assess the role of mother's and father's education separately, I also estimated models, in which p (p_i) was split into p^m ($p^m{}_i$) (mother's weight) and p^f ($p^f{}_i$) (father's weight).

In the models, I tested respondent's birth cohort and education as predictors controlled for the number of respondent's siblings, parental education and heterogamy (as a binary variable: 0 for homogamy, 1 for heterogamy). I also added a binary variable, indicating if a respondent was born before 1962 or afterwards, and interacted it with the year of respondent's birth. Including this variable was purely data driven: the descriptive analysis showed that completed fertility had been rising until the 1961 birth cohort and consistently declining afterwards.

The mobility variables were tested stepwise. First, I included a binary variable *mobility*, indicating if a respondent had changed her educational status compared to that of her parents or not[6]. Then, I tested if the direction of the intergenerational mobility had any effect, using a three-category variable *mobility direction* with 0 for non-movers and -1 and 1 for those who had moved down- and upwards, respectively. Finally, with the variable *steps* I examined the role of the distance respondent had moved. With education coded as four categories, the maximum distance amounted to three steps. Thus, the variable ranged from -3 to +3, with zero for non-movers, and values below and above zero for those moving down and up, respectively.

All analyses were conducted in the statistical package R on non-weighted data.

Results

INTERGENERATIONAL MOBILITY OVER COHORTS

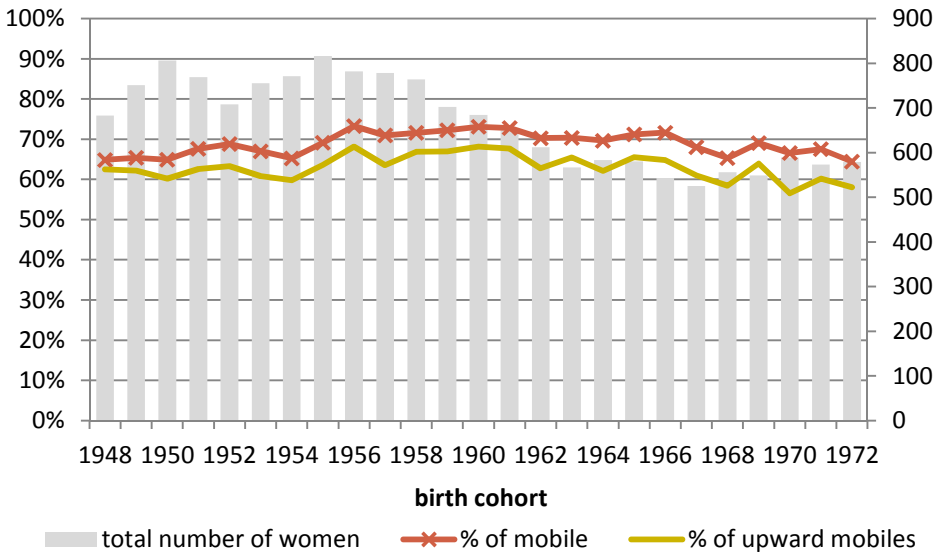
In the analysed cohorts, the trends in intergenerational mobility were surprisingly stable (Figure 2). The percentage of women who had achieved a different education level than their parents remained slightly above 70%, with somewhat lower values for women born before 1955 and after 1966. As expected, upward movements dominated almost entirely: the up-movers constituted around 90% of the mobile population. A look into the composition of the educational categories sheds light on these trends (Figure 3.a-d).

As seen on Figure 1 the group of highly educated more than doubled (when comparing the oldest with the youngest cohort). Only around 20% of them were born to families in which at least one parent had tertiary education, and this share did not change over time (Figure 3a). The rest came from a less educated background, mostly from families with secondary education (around 30% among women born before 1960 and around 40% among the younger ones). The proportion of those moving up two steps, from basic vocational to tertiary education, rose almost linearly from 10% to 20%. However, with time it was becoming less and less likely to meet a university graduate whose parents had primary education: while in the 1948-52 cohort four out of ten had such background, in the 1968-72

[6] Being intergenerationally mobile was defined here as attaining a different education level than that of the better educated parent. When defining mobility as having different education than one of the parents, the results stay pretty much the same (results not shown).

cohort it was true only for one in ten. Also in other educational groups the share of respondents with poorly educated parents shrank continuously over time, although the self-reproduction of the least educated substantially weakened with time (see Table 3 in Appendix). These trends reflect the fact that as education expanded fewer and fewer parents finished their education at the lowest level, and thus their proportion in the population declined.

Figure 2. The total number of women (right-hand axis), the percentage of mobile women and of those among mobile moving upwards (left-hand axis), by birth cohort

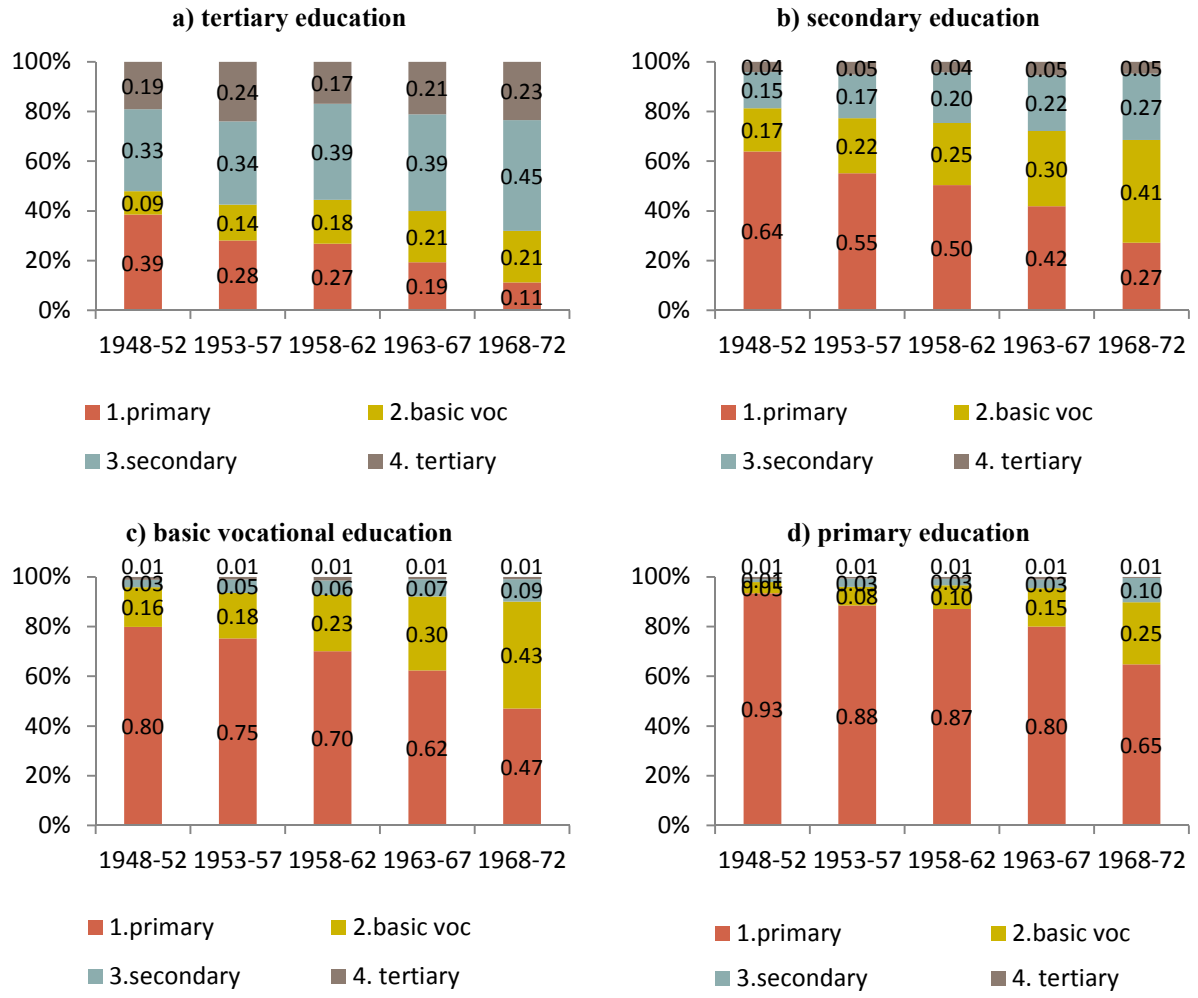


SOURCE: OWN CALCULATIONS ON NON-WEIGHTED UDE DATA.

With the expansion of university education, children of parents with tertiary education inherited the educational status more and more often: while in the oldest birth cohort half of them graduated from university, among the youngest women three-quarters went in their parents' footsteps (see Table 3 in Appendix). Throughout the analysed birth cohorts, the proportion of those moving down two or three steps (i.e. finishing their education at basic vocational or primary level) remained at a stable level of around one-eighth. The self-reproduction of the secondary educated declined with time as more and more of their children went to university. As a result, in the progeny generation born between 1948 and 1962 the group comprised mostly of people from the least educated background (over 60% in the oldest birth cohort) and from families of skilled workers (whose share increased over time from 15% to 40%).

Finally, women with only primary education came mainly from families with such education, but their dominance weakened with time (from over 90% to over 60%; Figure 3d), mostly in favour of skilled workers' daughters. Whatever their composition, however, the least educated became a very selective group in the youngest birth cohorts: they constituted only 7% of the female population born between 1968 and 1972. In that five-year cohort, almost half of women from the least educated background finished basic vocational school and almost one-third got secondary education (Table 5 in the Appendix).

Figure 3. Parents' (origin) education of respondents by educational attainment of respondents



SOURCE: OWN CALCULATIONS ON NON-WEIGHTED UDE DATA.

Overall, the trends in the composition of the educational groups reflect increasing educational attainment. The educational strata consisted mostly of people from lower educational backgrounds. Downward movements, even the one-step ones, were very unusual. Education inheritance increased only among the university graduates and skilled workers; in the other two groups it weakened.

FERTILITY OF THE SOCIALLY (IM)MOBILE

The previous section has shown how heterogeneous respondents' educational groups were. This diversity was reflected in the completed fertility rates as Table 1 illustrates. The diagonal contains the average number of children of the non-mobile women, i.e. those who *inherited* their educational status from their parents. For all birth cohorts fertility is clearly inversely related to education: on average, women with primary education had 2.7 children, while women with university diploma gave birth to 1.5 children. This negative education-fertility relationship is also visible when comparing the non-movers with the newcomers: women from less educated background had usually more children than those who *inherited* their position from their parents. The bigger the distance between the origin and the destination categories, the bigger the difference. In contrast, women with lower education than that of their parents tended to have fewer children than the non-movers, but it is difficult to assess the

strength of this relationship as there were very few daughters of highly or secondary educated parents who finished only primary or basic vocational school. Generally, downward mobility was much less common than upward mobility, as shown in the previous section, and downward movements by more than one step were hardly seen.

Table 1. CFR by respondents' and their parents' education, respondents from all cohorts

		Parents' join education			
		primary	basic voc	secondary	tertiary
Respondents' education	primary	**2.7**	2.5	2.5*	1.1*
	basic voc	2.4	**2.1**	2.1	2.0*
	secondary	2.1	1.8	**1.8**	1.7
	tertiary	1.8	1.6	1.6	**1.5**

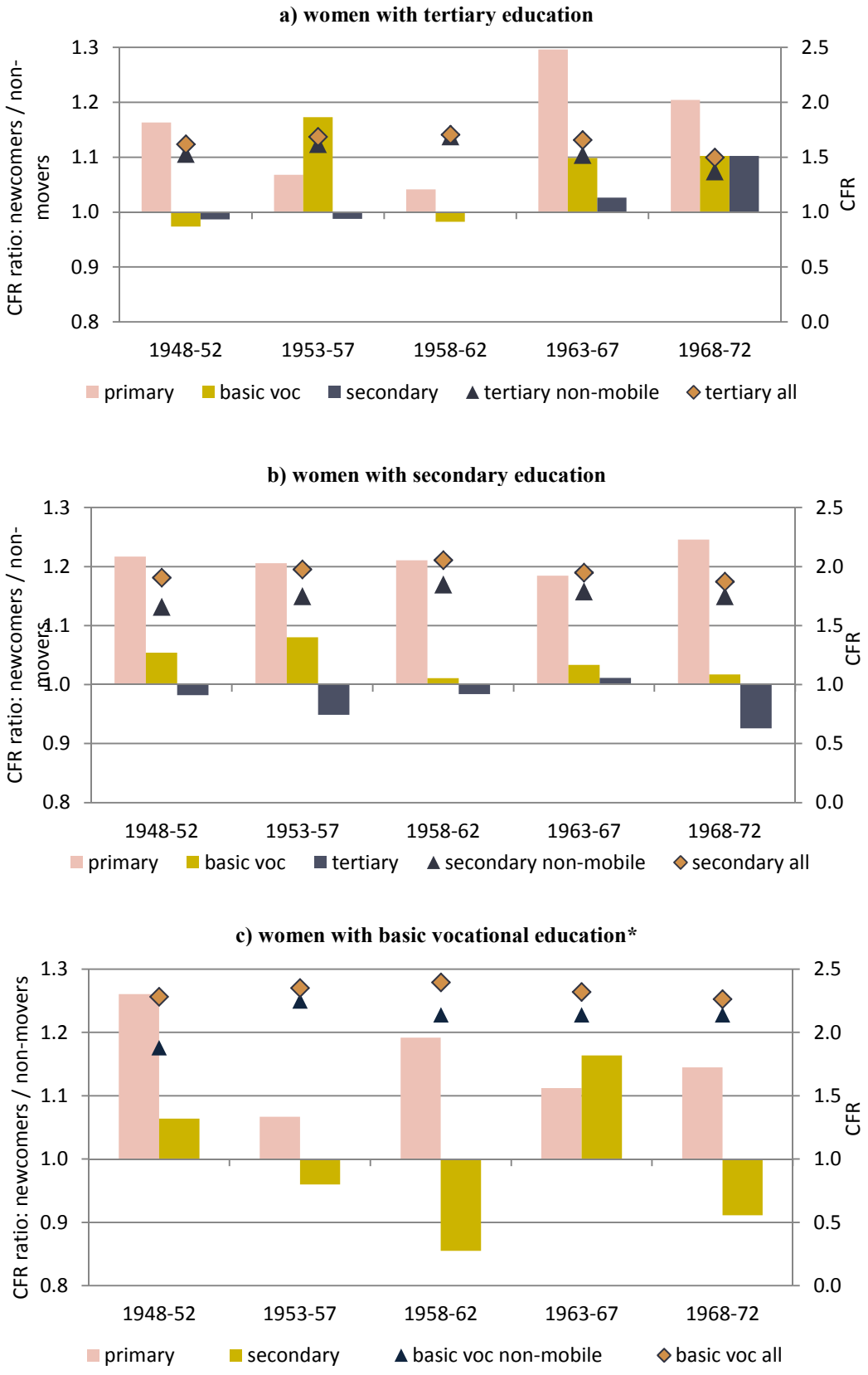
** not reliable because of very small numbers*
Source: own calculations on non-weighted UDE data.

Figures 4a-c shed more light on the relationships presented in Table 1. For each five-year cohort and education level[7] the ratio of CFR of the newcomers and that of the non-movers is presented. Highly educated women whose parents had finished at most primary school had on average 20% higher fertility than women of which at least one parent held university diploma (Table 1). However, Figure 4a shows how this ratio changed over time (the light blue bars): in the older birth-cohorts it was declining, while among younger women it reached 30% (1963-67) and 20% (1968-72). For daughters of skilled worker(s) the ratio was very unstable, varying from values slightly below one (lower fertility than that of graduates' daughters) to 1.17 in the 1953-57 cohort. Among women born in the 1960s and the early 1970s it stabilised at 1.1. Women who had moved one step up (i.e. who had at least one parent with secondary education) had as many children as women who had inherited their educational status, except for the last cohort, where they seem to have had higher fertility by 10%. The dark-blue triangles and yellow diamonds on the figure represent the completed fertility of the non-movers and of all women with tertiary education, respectively. They both went slightly up in the first three cohorts and then down, starting from 1.5 and 1.6 and finishing at 1.5 and 1.4, respectively. The closeness of the diamonds and the triangles indicates that among the highly educated the overall differences in fertility between the newcomers and the non-movers were modest.

The results for women with secondary education are much more stable (Figure 4b). Throughout the analysed cohorts daughters of the least educated parents had about 20% more children than those whose parents had secondary education. Women coming from families of skilled workers and of graduates differed from the non-movers only little in their completed fertility, in plus and in minus, respectively. The trend in CFR resembled that seen among the highly educated (increasing in the three oldest cohorts and decreasing in the youngest ones), but the values were generally higher, between 1.7 and 2. Also, the overall differences in fertility of the newcomers and the non-movers were more pronounced, especially among older women. They were mostly due to the large share of women whose parents had only primary education: when it shrank below 50% in the youngest cohorts, the differences diminished as well.

[7] The results are not shown for women with primary education for two reasons: they were a very small group and the majority of them had inherited their educational status from their parents, and thus the share of newcomers was very low.

Figure 4. CFR of all women and of the non-mobile (points, right-hand axis) and the ratio of CFR of the movers and CFR of the non-movers (bars, left-hand axis) among:



*Note: * Figures for women with highly educated parent not shown because of a very small number of such cases.*

SOURCE: OWN CALCULATIONS ON NON-WEIGHTED UDE DATA.

For women with basic vocational education, i.e. skilled workers, the results are, again, unstable (Figure 4c). The share of daughters of medium educated parents was very low in this group, which explains to a certain extent the red bars swinging back and forth over cohorts. Fertility of those who had moved one step up was around 10-20% higher than that of non-movers. Completed fertility rate oscillated between 2.3 and 2.4 for all women with basic vocational education. It was higher than for the non-movers, in some cohorts substantially. Again, this was most likely a result of very high shares of women coming from poorly educated families and very low shares of those from better educated background.

Generally, the long-distance movers differed in their completed fertility from the non-movers more than those who moved only one step up or down. With time, as the share of the low educated shrank, CFR of movers and non-movers became more and more similar within the educational groups.

MULTIVARIATE ANALYSIS

The multivariate analysis suggests that the effect of parents' education on their daughters' completed fertility was constant over time and was not sensitive to the experience of educational mobility.

shows the estimates from models 8 and 14 (for details how these two models were chosen, see section A2 in Appendix). The former allows origin-destination weights to vary by mother's and father's education separately, while the latter assesses the effect of parents' join education. Apart from the weights, the estimated coefficients are almost identical. Up to the year 1961, birth cohort has a positive effect on the number of children born by a woman, but afterwards it turns into a negative one. The number of siblings pushes up fertility, but modestly: one brother or sister increases it by 3.5%, two by 7% and three by almost 11%. Women with ten siblings had on average 40% higher fertility than those without brothers or sisters. Education turns out to be a much stronger differentiating factor. An average woman with primary education whose parents also had primary education had almost one child more than a highly educated daughter of university diploma holders, ceteris paribus. However, the difference diminishes to 0.65 children when comparing the low educated woman with a graduate coming from low educated family ($e^{0.785} - e^{0.213*0.616+0.785*0.384}$). Generally, the role of the origin, i.e. of the family background, increases with parents' education with an exception of parents with primary education. Their effect on daughters' fertility is half as strong as that of highly educated parents, but clearly bigger than that of parents with basic vocational and secondary education (see Figure 5a). The origin weight exceeds the destination one only in case of highly educated family background.

The origin weights are somewhat higher (and thus the destination weights are smaller) when parents' education is included separately for mothers and fathers (Model 8 in Table 2 and Figure 5b). This is rather intuitive as not all couples in the sample were homogamous, so knowing education of both parents gives additional information to knowing only the level of education of the better educated parent. The impact of mothers' and fathers' education on daughters' fertility is equal in couples with at most vocational schooling, but among those with secondary education mothers seem to be more influential (0.24 to statistically non-significant 0.16). However, among tertiary graduates the fathers' education becomes more important than mothers' (0.53 to 0.47, see Figure 5b). The last figures indicate that when education of both parents is included, fertility of tertiary graduates' daughters is expected to be entirely independent of her own attained educational status.

Table 2 Estimates of the parameters of models 8 and 14

	Model 8	Model 14
birth cohort[8]	0.011*** (0.002)	0.011*** (0.002)
born after 1961 (binary)	0.234*** (0.055)	0.239*** (0.055)
birth cohort*born after 1961	-0.019*** (0.003)	-0.020*** (0.003)
number of siblings	0.034*** (0.003)	0.035*** (0.003)
Education of non-movers		
primary	0.785*** (0.020)	0.782*** (0.020)
basic vocational	0.587*** (0.022)	0.605*** (0.021)
secondary	0.397*** (0.023)	0.434*** (0.021)
tertiary	0.213*** (0.031)	0.280*** (0.026)
Weights (by parents' join education)		
Destination		
primary	0.558*** (0.034)	0.616*** (0.037)
basic voc	0.725*** (0.072)	0.850*** (0.087)
secondary	0.602*** (0.099)	0.784*** (0.127)
tertiary	0 (0)	0.332 (0.191)
Origin		
Parents' join education		
primary	-	0.384*** (0.037)
basic voc	-	0.150 (0.087)
secondary	-	0.216 (0.127)
tertiary	-	0.668*** (0.191)
Mother		
primary	0.222*** (0.044)	-
basic voc	0.129 (0.097)	-
secondary	0.241** (0.077)	-
tertiary	0.466*** (0.09)	-
Father		
primary	0.220*** (0.042)	-
basic voc	0.146 (0.115)	-
secondary	0.158 (0.084)	-
tertiary	0.534*** (0.090)	-

*Note: *** p<0.001, ** p<0.01, * p<0.05.*
Source: own calculations on non-weighted UDE data

[8] For including in the models, I transformed the birth cohort in the following way: cohort-1948, so that it started with 0 and went up to 24.

Figure 5a Origin weights by parents' join education (Model 8)

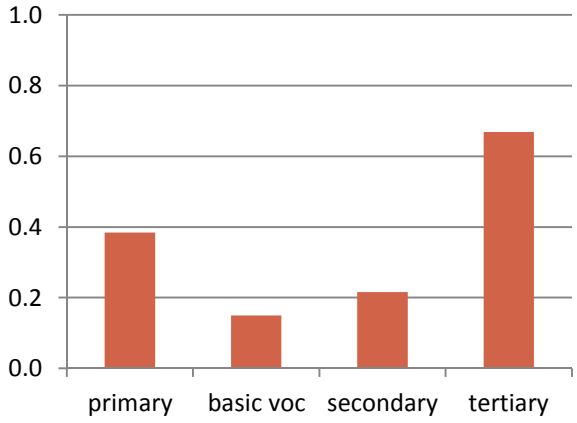
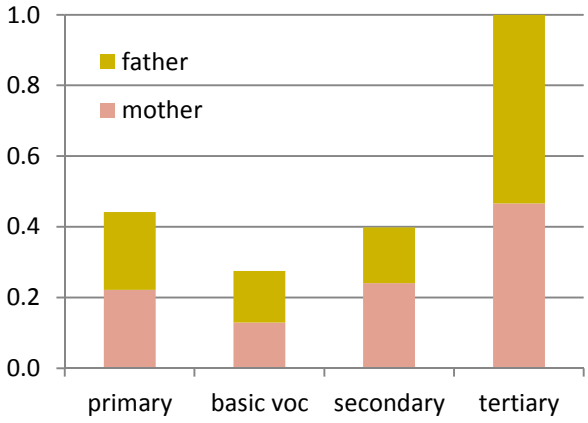


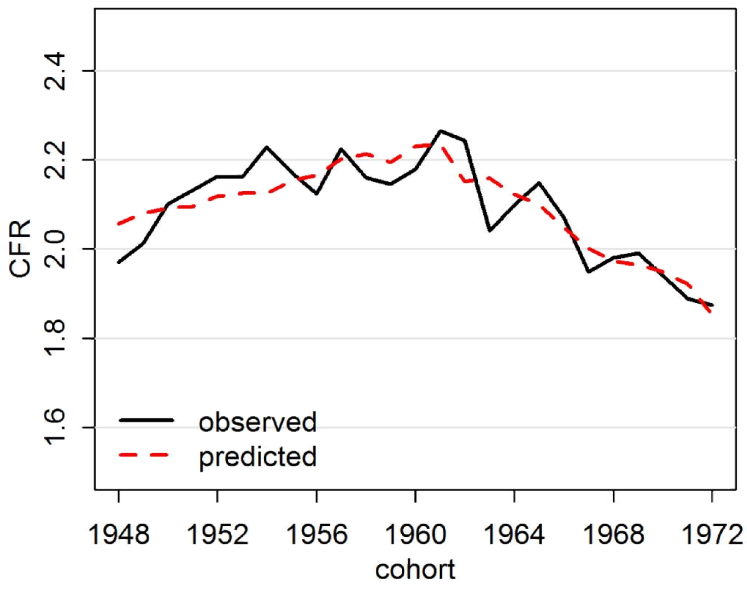
Figure 5b Origin weights by parent's join education decomposed into mother's and father's weights (Model 14)



Source: own calculations on non-weighted UDE data.

Finally, Figure 6 compares the observed completed fertility rate with the one predicted by model 8. The estimates capture the trend very well, but they miss the numerous spikes exhibited by the real data. Interestingly, the fitted values resemble the previous computations (taken from population data, i.e. registers and censuses) more than the observed ones (compare Kotowska et al. 2008).

Figure 6 The observed and predicted (model 8) completed fertility rate (CFR)



Source: own calculations on non-weighted UDE data and from model 8.

Conclusions

This study examined the role that the origin and destination education played in completed fertility of women in the context of high intergenerational social mobility. The results confirm strong and persistent negative educational gradient in fertility, present among women whose reproductive careers took place both before and after the collapse of communism. They also reflect the vast educational expansion that Poland has been experiencing for over half a century: women with secondary and tertiary education were mostly daughters of less educated parents. At the same time, however, the inheritance of the educational status among university graduates increased substantially. The access to this group did not become limited because of permanently growing educational enrolment, but for women who grew up in highly educated families the chances for a university diploma were rising faster than for those from less educated backgrounds. Experiencing mobility does not seem to have any effect on the origin-destination weights. Thus, the differences in fertility between the mobile and immobile resulted entirely from differences in parents' education.

Generally, the up- and down-movers tended to have more and fewer children, respectively, than the non-movers in the destination stratum, but fewer and more, respectively, than in the origin group. As the experience of social mobility did not affect the origin-destination weights, the hypotheses of status anxiety, social isolation or stress and disorientation find little support. The results clearly speak for the acculturation hypothesis, as destination group tended to matter more. Its importance weakened with origin's increasing education (when excluding the least educated parents). For women with at least one graduate parent the origin actually overrode the destination: its weight amounted to almost 0.7, and when both parents held a university diploma, it equalled to one. This means that destination did not count at all, which to a large extent reflects the fact that 70-80% of two graduates' daughters inherited their educational status. The origin weights for daughters of the least educated parents were smaller than the destination ones, but they far exceeded those for parents with basic vocational and secondary education. Thus, the lowest and the highest education groups seem to have been most specific, with relatively strong early socialisation patterns. For university graduates this finding is pretty intuitive: they represent the social stratum and norms that everybody aspires to. The small share of graduates' offspring who move down the social ladder mentally and culturally belong probably more to their parents' stratum than to their own. Those from the bottom of the social ladder form another distinctive group, whose way of life might very much differ from that of all the other strata, as Edin and Kefalas (2005) demonstrated. Growing up in such family might indeed impact the reproductive behaviour more than coming from a medium educated background.

Among couples with primary and secondary vocational education, there were no significant differences in the importance of mothers' and fathers' education. But among the secondary educated that of mothers was slightly more important, while among the highly educated it was that of fathers. It seems that highly educated fathers had a particularly strong influence on family size preferences of their daughters, which is in line with results of previous research (Slik et al. 2002). Possibly, such fathers were more likely to accept, or even support, the importance of other roles in their daughters' lives than that of mother.

The economic meaning of education changed considerably after the collapse of communism. Before 1989 education was not necessarily positively correlated with earnings: skilled workers often earned more than university diploma holders. Economic opportunity costs for women who had children existed only to a limited extent. When the transition started, tertiary education became a precondition for getting a well-paid job. Combining professional career and family became very difficult for

women. Yet both under state socialism and in capitalism, fertility of better educated women was lower than that of the poorer educated. The origin/destination weights did not change, either. Thus, it seems that fertility transmission was mediated through socialisation to certain lifestyles rather than through inheritance of the socioeconomic status (Johnson and Stokes 1976, Anderton et al. 1987, Kolk 2014). As pointed out above, however, heritage played a much smaller role in completed fertility than acculturation. Knowing that upward movements constituted 90% of social mobility, this finding can be interpreted as the dominance of own aspirations over the norms of the background.

This study reveals (and at the same time suffers from) a limitation imposed by the most widely used categorisation of education. In the analysed cohorts it is clearly visible that education has a contextual meaning. While among older women the proportions of those with low, medium and high education corresponded pretty closely to the classification names, embracing roughly 25%, 65% and 10% of the population, among the younger ones the categories lost much of their meaning. Among those born in the 1990s they are in fact misleading as around half than 50% get university diploma, i.e. at least a bachelor's degree (OECD 2014). Thus, providing information on the number of years of schooling in addition to the standard classifications would greatly facilitate social research, making more refine and precise analyses possible.

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Appendix

A1

Table 3 Respondents' (destination) education among those with at least one parent with:

a) high education

	primary	basic voc	secondary	tertiary	Sum
1948-52	5%	6%	36%	53%	100%
1953-57	2%	5%	37%	56%	100%
1958-62	2%	8%	34%	55%	100%
1963-67	2%	5%	29%	65%	100%
1968-72	0%	3%	20%	76%	100%

b) secondary education

	primary	basic voc	secondary	tertiary	Sum
1948-52	2%	6%	53%	38%	100%
1953-57	4%	11%	52%	34%	100%
1958-62	2%	10%	49%	39%	100%
1963-67	2%	11%	43%	44%	100%
1968-72	3%	11%	38%	48%	100%

c) basic vocational education

	primary	basic voc	secondary	tertiary	Sum
1948-52	8%	29%	53%	9%	100%
1953-57	7%	29%	52%	11%	100%
1958-62	5%	32%	48%	14%	100%
1963-67	5%	35%	43%	17%	100%
1968-72	5%	38%	42%	16%	100%

d) primary education

	primary	basic voc	secondary	tertiary	Sum
1948-52	30%	27%	36%	7%	100%
1953-57	24%	33%	36%	6%	100%
1958-62	17%	38%	37%	8%	100%
1963-67	16%	42%	33%	9%	100%
1968-72	14%	46%	30%	10%	100%

A2

Table 4 describes all estimated models and Table 5 compares them. Models 1-2 and 4-7 use two weights, one for assessing the impact of mother's education and one for father's (p), model 3 distinguishes only one weight for parents' join education (p'); in models 8-12 and 14 the weights vary by mother's and father's education (p_i) and by parents' join education (p_i'), respectively; in models 13 and 15 the weights estimate the role of parents' education (separately and jointly, respectively) by respondents' achieved education (p_j and p_j'). A comparison of model 1 and 2 (Table 5) indicated that including the covariate *heterogamy* does not improve the estimation, so it was excluded from all the subsequent models. Further, the weights do not seem to have changed over time, as models 4 and 9 are not more powerful than models 2 and 8, respectively. Mobility effects in any form have failed to be significant (models 5, 6, 7, 10, 11 and 12). Thus, the importance of origin and destination educational group for fertility does not seem have varied by the intergenerational mobility. However, the weights did vary by parents' education, as the comparison of models 2 and 8 shows (more on this below).

Models 3 and 13-15 are not nested in models 2 and 8, respectively, so they had to be compared by other measures than the likelihood ratio test (Table 5). In case of models with one common weight for all educational levels, treating parents' education separately (i.e. distinguishing between mother's and father's education) seems to have been a better strategy than treating it together (i.e. taking the educational level of the better educated parent; see the comparison between models 2 and 3 in Table 5). However, in case of origin-destination weights varying by education, no such straightforward conclusion could be drawn, as the Akaike's and Bayesian Information Criterion tests gave contradictory results (comparisons 8-14 and 8-15 in Table 5).

In Table 4, I compared the statistical power of models with origin-destination weights stratified by parents' join education with those varying by respondents' education (see comparisons 8-13 and 14-15), but the decision on which ones to choose should be a matter of research focus rather than statistical tests. Models more relevant for this study are those explaining how the origin-destination weights vary by parents' education. Thus, I present the estimates of models 8 and 14, which, apart from the origin-destination weights, are the same.

Table 4 Model descriptions

Model number	weights	covariates	Mobility effects	parameters estimated	Residual deviance	D.f.
1	p	all	none	12	14193	16581
2	p	without *heterogamy*	none	11	14193	16582
3	p'	without *heterogamy*	none	10	14206	16583
4	p*born after 1961	without *heterogamy*	none	14	14191	16580
5	p	without *heterogamy*	*mobility*	14	14192	16580
6	p	without *heterogamy*	*mobility direction*	17	14191	16578
7	p	without *heterogamy*	*steps*	29	14177	16573
8	p_i	without *heterogamy*	none	20	14177	16577
9	p_i*born after 1961	without *heterogamy*	none	32	14172	16572
10	p_i	without *heterogamy*	*mobility*	32	14182	16575
11	p_i	without *heterogamy*	*mobility direction*	44	14172	16568
12	p_i	without *heterogamy*	*steps*	-	-	-
13	p_j	without *heterogamy*	none	20	14179	16576
14	p_i'	without *heterogamy*	none	16	14195	16580
15	p_j'	without *heterogamy*	none	16	14197	16580

Notes:
1. p denotes calculating the weights separately for mother's and father's education, while p' stands for computing one weight for parents' joint education.
2. All covariates: birth cohort, birth cohort 1962 (binary, 0 for those born before 1962 and 1 for those born in 1962 or later), number of siblings, heterogamy (binary), education of the non-movers.
3. Model 12 turned out to be non-estimable.

Table 5 Model comparisons

Nested models compared	Difference in d.f.	Likelihood ratios χ^2 (p-value)	Non-nested models compared	Difference in d.f.	AIC difference	BIC difference
1-2	1	0.022 (0.882)	2-3	1	-11.399	-3.682
2-4	2	2.223 (0.329)	8-13	1	-4.750	-12.467
2-5	2	0.643 (0.725)	8-14	3	-12.760	10.390
2-6	4	1.905 (0.753)	8-15	3	-14.030	9.120
2-7	9	16.091 (0.065)	14-15	0	-1.269	-1.269
2-8	5	16.185 (0.006)				
8-9	5	4.379 (0.496)				
8-10	9	4.711 (0.859)				
8-11	8	4.711 (0.788)				

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