I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 18284

# Intergenerational Educational Mobility Among Immigrants and Descendants in Denmark: The Role of Sample Selectivity and Data Quality

Rasmus Landersø
Kristian B. Karlson

NOVEMBER 2025

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 18284

# Intergenerational Educational Mobility Among Immigrants and Descendants in Denmark: The Role of Sample Selectivity and Data Quality

**Rasmus Landersø**
*ROCKWOOL Foundation and IZA*

**Kristian B. Karlson**
*University of Copenhagen*

NOVEMBER 2025



ISSN: 2365-9793

**IZA – Institute of Labor Economics**

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

# ABSTRACT

# Intergenerational Educational Mobility Among Immigrants and Descendants in Denmark: The Role of Sample Selectivity and Data Quality*

This paper studies intergenerational educational mobility among immigrants and descendants in Denmark for cohorts born between 1965 and 1990. At first glance, the data suggests that immigrants experience higher mobility than native Danes, but this pattern is driven by low coverage and poor data quality of parental education information in administrative registers. Among immigrants with the most reliable data, mobility patterns closely resemble those of natives. Auxiliary analyses using representative survey data corroborate this finding. Moreover, including immigrants in population-wide mobility estimates—given their artificially high relative mobility—attenuates trends in estimated mobility, especially for cohorts bornin the 1980s.

**JEL Classification:** E43, E52
**Keywords:** educational mobility, native-immigrant gaps, data quality

**Corresponding author:**
Rasmus Landersø
Rockwool Foundation Research Unit
Ny Kongensgade 6
1472, Copenhagen
Denmark
E-mail: rl@rff.dk

* We would like to thank Karl B. Robak for excellent research assistance and Camilla Hvidtfeldt for comments. Forthcoming in the Danish Journal of Economics.

# 1. Introduction

Intergenerational educational mobility remains a central concern in debates about the welfare state's capacity to promote equal opportunities for children across social strata (Mogstad & Torsvik, 2023). Recent evidence indicates that educational mobility in Denmark has declined over the past 25 years, despite substantial expansion in higher education participation (Karlson & Landersø, 2025). At the same time, immigration—particularly from non-Western countries—has become a focal point in both academic and policy discussions, especially regarding the integration and assimilation of immigrant populations. As immigrants and their descendants constitute a growing share of the population in most European countries, understanding their patterns of social mobility is increasingly important. However, assessing intergenerational mobility among immigrants poses unique challenges. Because educational attainment—of both parents and, in some cases, children—may have been acquired in the country of origin, conventional measures may not accurately reflect the role of the host country's educational system and welfare institutions in the intergenerational transmission of human capital (Ichou, 2014) and may be more affected by data quality issues than among native populations.

This article contributes to the literature on intergenerational mobility among immigrants by offering a comprehensive analysis of the Danish context with particular attention to the use of administrative register data. Although Denmark's administrative records on educational attainment are generally high-quality and well-suited for mobility research, they are substantially less complete for immigrants and their descendants. Many immigrant parents obtained their education abroad, the available data are often error-prone, and parental education is only recorded for individuals who have resided in Denmark (whom we refer to as *parent-linked immigrants*). These limitations give rise to well-documented concerns about data reliability and sample selectivity, which must be taken into account when interpreting patterns of intergenerational mobility.

We examine how these data limitations affect both the levels and trends in intergenerational educational mobility among parent-linked immigrants and their descendants. To provide meaningful benchmarks, we compare register-based estimates to those derived from nationally representative survey data, which capture the full immigrant population rather than only parent-linked cases. We further supplement these comparisons with sibling correlations, which provide a summary measure of the overall influence of family background on educational attainment and, importantly, are not attenuated by measurement error in parental education. We report five main findings.

First, although approximately 11 percent of the Danish population consists of migrants—many of whom are labor migrants from Western countries, particularly within the EU (Statistics Denmark, 2022)—this composition changes markedly when we focus on educational mobility, which requires data on both parents'

and children's educational attainment (i.e., parent-linked immigrants). The sample then shrinks substantially and is dominated by refugees and family-reunified migrants from non-Western countries. As a result, register-based analyses of educational mobility among immigrants necessarily focus on a highly selected subgroup that is far from representative of the broader immigrant population.

Second, while the average educational attainment of all immigrants registered in Denmark is not markedly different from that of native Danes, there are substantial underlying differences. Labor migrants are on average well-educated, whereas refugees and family-reunified migrants—who constitute the majority of the sample used for educational mobility analyses—are very poorly educated on average.

Third, at face value, estimated relative intergenerational educational mobility appears higher for parent-linked immigrants than for native Danes. Among native Danes, parental education is a strong and increasingly important predictor of children's educational attainment. In contrast, this association is significantly weaker among parent-linked immigrants, particularly those from non-Western countries. Crucially, however, the apparent higher mobility among parent-linked immigrants is largely driven by a subset of cases where parental education is not directly observed but imputed by Statistics Denmark. Among these cases, parent-child associations in education are virtually zero, inflating overall mobility estimates for immigrants. As a result, the higher estimated mobility among immigrants is best understood as a byproduct of data limitations rather than a reflection of genuine differences in intergenerational mobility.

To validate this interpretation, we turn to nationally representative survey data from Denmark—specifically the European Social Survey and the European Values Study. These surveys include immigrants regardless of whether they are parent-linked in the registers and measure educational attainment in a consistent way across population groups. In contrast to the register-based results, the survey data show that relative mobility is considerably lower among immigrants and nearly identical to that of natives. This finding is reinforced by sibling correlations in educational attainment, which are similar across parent-linked immigrant and native families. Taken together, these results suggest that family background is just as influential for immigrants as for natives, but that parental education captured in the administrative registers is a poor proxy for parental human capital in immigrant families.

As educational mobility appears to be almost similar among native Danes and parent-linked immigrants while the mobility would take place at very different places in the overall schooling distribution (i.e., they regress to very different means), convergence between native Danes' and parent-linked immigrants' (where most have immigrated from non-Western countries) education appears to be slow (Becker & Tomes, 1979).

Fourth, in terms of *absolute* mobility—e.g., the share of children who attain a higher education than their parents—parent-linked immigrants do not differ greatly from native Danes. Part of the reason is that native Danes have experienced a similar increase in average educational attainment across generations as parent-linked immigrants, whose parental generation was educated in the origin country while the children's generation receives some or all of its education in Denmark. This similarity may be somewhat coincidental; if native Danes' educational attainment were more stable across generations, we would have seen differences in absolute mobility between the two groups.[1]

Fifth, including parent-linked immigrants in estimates of population-wide educational mobility can substantially affect both the levels and trends of estimated mobility in Denmark. Across a range of mobility measures, the observed decline in intergenerational mobility for cohorts born between 1965 and 1990 is attenuated when parent-linked immigrants are included in the analysis, as their disproportionately low-quality parental education data inflates estimated mobility. The extent of this distortion increases with the size of immigrant cohorts relative to native Danes and is therefore most pronounced for cohorts born in the 1980s. This finding underscores that including parent-linked immigrants in population-wide mobility estimates can substantially distort observed trends when underlying data quality is uneven. In our case, including all parent-linked immigrants in the analysis—without adjustment for data quality—reduces the estimated increase in the association between children's and parents' years of schooling by up to 20 percent. We therefore caution researchers to critically assess the reliability and representativeness of data on immigrant families—particularly with respect to parental education—before drawing conclusions about mobility patterns across groups or over time.

This paper contributes to a small but growing literature on intergenerational mobility among immigrants, which has largely focused on income mobility and primarily on immigrant populations in the United States. For example, Borjas (1993) emphasizes persistent ethnic differences in mobility, while more recent work by Abramitzky et al. (2021) documents long-run upward mobility among second-generation immigrants in the US. Other studies have examined mobility among immigrants in other developed countries (e.g., Connolly et al., 2019). A smaller number of studies more closely resemble the Danish context analyzed in this paper, including work by Yuksel (2009), Bratsberg et al. (2012), Zuccotti et al. (2017), and Bratu and Bolotnyy (2023). Most recently, Boustan et al. (2025) examine intergenerational absolute mobility in income across 15 countries, including Denmark. They find that while first-generation immigrants tend to have significant income rank gaps relative to natives, these gaps largely disappear in the second

[1] Another strategy focusses on how mobility varies as a function of the parents' educational attainment relative to the educational distribution in their origin country (Ichou, 2014). We do not follow this lead here.

generation. While nearly all of this literature focuses on income mobility, Ichou (2014) provides an important exception by showing that assessments of intergenerational mobility among immigrants can change substantially depending on whether parental education is evaluated relative to the origin-country or the host-country distribution (see also Feliciano & Lanuza, 2017). This insight is especially relevant to our study, which relies on administrative data that lack contextual information about where and how parental education was obtained.

We contribute to this literature by presenting, to our knowledge, the first comprehensive analysis of levels and trends in educational mobility among immigrants from predominantly non-Western countries in Denmark. Our analysis is supplemented by evidence and detailed discussion of how differences in data sources and data quality shape estimates of educational mobility and affect comparisons across population groups.

Our paper also contributes to the literature on immigrant integration in receiving countries. Prior research has shown that both reasons for migration and country of origin are key determinants of assimilation outcomes for adults and children alike (Brell et al., 2020; Card et al., 2000; Engzell & Ichou, 2020; Feliciano & Lanuza, 2017). Age at migration is also consistently highlighted as a critical factor influencing children's ability to integrate into the educational system (Bleakley & Chin, 2010; Böhlmark, 2008; Brell et al., 2020; Dustmann et al., 2024). Our findings support these patterns in the context of intergenerational educational mobility: both the quality and availability of data on parents, as well as the educational attainment and mobility of children, vary substantially by country of origin and age at immigration.

The paper proceeds as follows. Section 2 describes the data and presents sample descriptives. Section 3 outlines the broad trends in estimated educational mobility among immigrants, with particular attention to the role of data sources and data quality. Section 4 examines how the inclusion of immigrants in population-level analyses affects overall trends and levels of estimated educational mobility. Section 5 discusses our findings in relation to the existing literature on educational mobility and immigrant integration and outlines directions for future research. Section 6 concludes the paper.

## 2. Data

We examine full population data from Danish administrative registers, linking individuals across population and education records to construct parent–child pairs for cohorts born between 1965 and 1990. Educational attainment is measured as the highest level completed by age 30, either in years (using the expected duration of education as defined by Statistics Denmark) or in broad degree categories. Parental education is measured at child age 15. We assess intergenerational mobility using widely established metrics in the field, capturing both relative and absolute

mobility. In supplementary analyses, we also draw on Danish survey data—specifically the European Social Survey and the European Values Study. Unlike the administrative registers, these surveys include retrospective reports of parental education for all individuals, including immigrants. As such, they serve as a valuable benchmark for evaluating and comparing the validity and reliability of register-based estimates. Appendix B provides a detailed and complete description of the data sources and methods we use for analysis.

### 2.1. Age at migration, parental information, and education

Figure 1a shows a substantial increase in the number of immigrants in Denmark, from around 6,000 individuals in the 1965 birth cohort to approximately 17,000 in the 1990 cohort. In relative terms (Figure 1b), the share of each birth cohort made up of immigrants or their children also rose markedly—from about 1 percent to 8 percent over the same period. However, when the sample is restricted to include only parent-linked immigrants (i.e., effectively those who migrated with their parents), only about 15 percent of the immigrant population remains.[2] As shown in Figure 1c, the parent-linked immigrant sample is strongly negatively selected: their average educational attainment is much lower than that of the broader immigrant population or of native Danes.

Figures 2a and 2b further show that this subsample consists predominantly of individuals from non-Western countries, a group with particularly low education levels (see Appendix Figure A.2). Moreover, Figures 2c and 2d highlight the considerable heterogeneity in exposure to the Danish education system among parent-linked immigrants born in the 1980s: roughly one-third arrived after age 11, one-third between ages 6 and 11 (after school entry), and one-third before age 6.[3] This variation shows substantial heterogeneity in how much of their education was received within the Danish system.

### 2.2. Quality of immigrant educational information

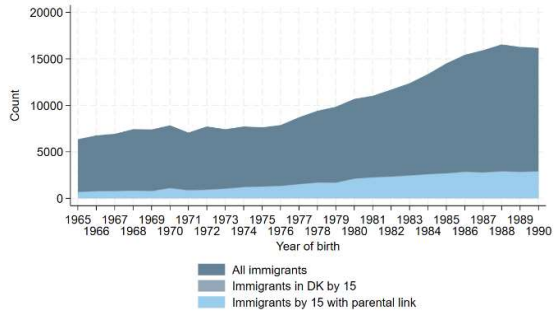
Statistics Denmark records immigrants' educational attainment in three main ways (Statistics Denmark, 2020). First, through standard register data, when an individual has completed a formal qualification within the Danish education system ("Register"). Second, through surveys administered to immigrants ("Survey"), although the design and implementation of these surveys vary across cohorts. Third,

[2] Figure A.1 shows that total number of immigrants by birth cohort, age at migration, Western / non-Western background, and with / without links to information on parents' education.

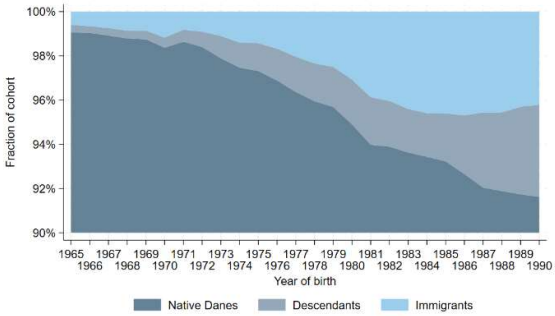
[3] We define age at migration as the age at which the immigrant first appears in the population registers—that is, their recorded age upon establishing residency in Denmark. This may differ from the actual age at migration from the country of origin due to travel duration and administrative processing times in Denmark, which can extend up to several years (Hvidtfeldt & Schultz-Nielsen, 2018).

*Figure 1: Immigrants by immigration age, type of residency, and country of origin*

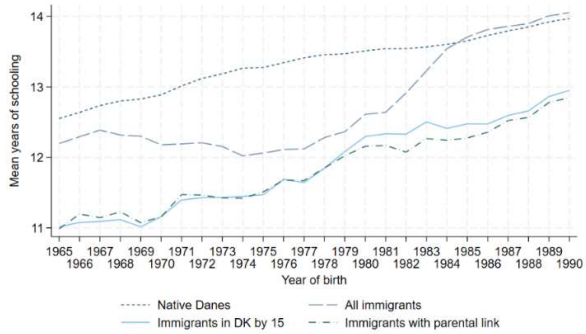
*a) Number of immigrants by whether they can be linked to parents' information*




*b) Percentage native Danes, immigrants, and descendants by birth year*



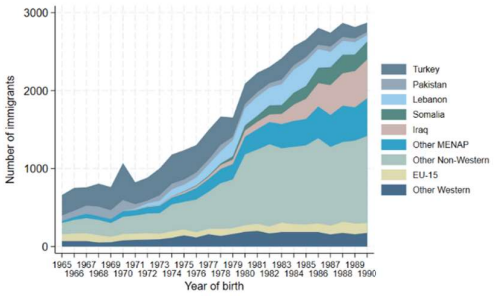

*c) Years of completed schooling by migration status and link to parents' information*



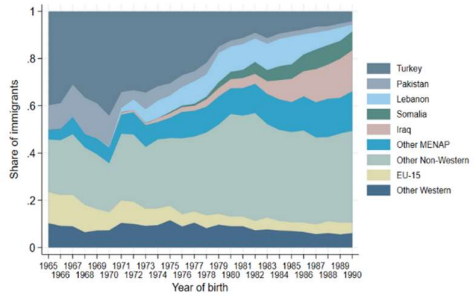

*Notes*: Fig. a) shows the number of immigrants in Denmark born between 1965 and 1990 stratified cumulatively by immigrants arriving in Denmark by age 15 with registered parents, immigrants arriving by age 15, and all immigrants. Fig. b) shows the percentages of native Danes, immigrants, and descendants in each cohort between 1965 and 1990. Fig. c) shows average years of schooling by birth cohort of native Danes, all immigrants, immigrants arriving in Denmark by age 15 with registered parents, and immigrants arriving by age 15.

*Fig. 2: Country of origin and age of migration by birth cohort and whether individuals can be linked to parents' information*

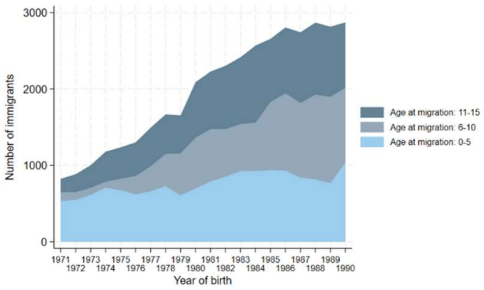
*a) Country of origin, number*



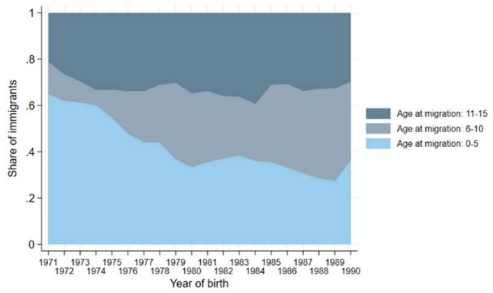

*b) Country of origin, share*




*c) Age at migration, number*




*d) Age at migration, share*




*Notes:* Figs. a) and b) show the composition of immigrants who arrive in Denmark by age 15 by country of origin from 1965 to 1990, as total number of immigrants and shares of the immigrant population respectively. Figures c) and d) show the composition of immigrants who arrive in Denmark by age 15 by age at migration from 1971 to 1990, as total number of immigrants and shares of the immigrant population respectively.

for individuals lacking direct education records, educational attainment is imputed based on gender, age, country of origin, occupational classification (ISCO code), industry, and gross income ("Imputed"). Statistics Denmark (2020) acknowledges the limitations of this imputation method, noting that it has very low reliability—even for relatively broad educational categories. We consider register-based information as the most reliable, followed by survey-based information, with imputed data considered least reliable. We focus on highest completed education but give precedence to educations completed in Denmark (which follows Statistics Denmark's official guidelines). This implies that, for example, an immigrant with a college degree from the country of origin and an upper secondary degree from Denmark after immigration is assigned with the latter educational level.

Table 1 summarizes the sources of educational information for immigrant parents, broken down by birth cohort, country of origin, and age at arrival among individuals who migrated to Denmark before age 15. Among those born in the 1970s, 28 percent have register-based parental education data, while 25 percent are based on surveys, 26 percent on imputation, and 21 percent are missing. For the 1980s cohorts, the corresponding shares are 13, 48, 31, and 8 percent, respectively—indicating a significant decline in data quality for younger cohorts.

Panel A of Table 1 shows some variation in data sources by country of origin. The share of register-based data among parents of the 1971-1980 birth-cohorts ranges from 3 percent for immigrants from Iraq and Somalia to 46 percent for immigrants from Turkey. For cohorts born in 1981-1990, the corresponding share ranges from 3 percent for immigrants from Somalia to 27 percent for immigrants from Western countries other than EU-15 countries. Panel B reveals a strong gradient by age at arrival: the younger the child at the time of migration, the more likely is it that their parents' education is recorded in registers. For example, among those who arrived after age 11, only 3 percent have register-based parental education, compared to 53 and 28 percent for those arriving before age 5 in the 1970s and 1980s cohorts, respectively.

Panel C reports average years of parental schooling by data source, showing substantial differences. For example, among parent-linked immigrants born in the 1970s, fathers with register-based education have on average 9.5 years of schooling, compared to 12.3 years among those with imputed education. For the 1980s cohort, mothers' schooling averages 12.5 years when based on registers, versus 10.9 years when based on survey data. While these differences likely reflect both measurement error and sample selectivity, they underscore the considerable variation in reported education levels depending on the source.[4] Panel D tests for differences

[4] Table A.1 shows the average years of schooling for children across birth cohorts and data source for parents' education. For younger cohorts, years of schooling among children whose parents' education information stem from register-based data substantially exceeds years of schooling among children whose parents' education information stem from imputations or surveys.

*Table 1: Descriptive characteristics by source of parental education information*

| | *Immigrants born 1971-1980* | | | | *Immigrants born 1981-90* | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Reg. | Surv. | Imp. | Mis. | Reg. | Surv. | Imp. | Mis. |
| *A: Country of origin:* | | | | | | | | |
| Turkey | 0.461 | 0.128 | 0.243 | 0.169 | 0.183 | 0.267 | 0.480 | 0.070 |
| Pakistan | 0.244 | 0.269 | 0.312 | 0.175 | 0.137 | 0.359 | 0.427 | 0.077 |
| Lebanon | 0.038 | 0.335 | 0.468 | 0.159 | 0.059 | 0.359 | 0.533 | 0.050 |
| Somalia | 0.028 | 0.146 | 0.319 | 0.507 | 0.031 | 0.390 | 0.431 | 0.148 |
| Iraq | 0.028 | 0.511 | 0.292 | 0.169 | 0.054 | 0.720 | 0.182 | 0.044 |
| Other-MENAP | 0.236 | 0.318 | 0.202 | 0.244 | 0.136 | 0.596 | 0.175 | 0.092 |
| Other Non-West. | 0.279 | 0.234 | 0.256 | 0.231 | 0.148 | 0.482 | 0.296 | 0.074 |
| EU-15 | 0.329 | 0.286 | 0.156 | 0.229 | 0.193 | 0.450 | 0.271 | 0.086 |
| Other Western | 0.215 | 0.375 | 0.250 | 0.160 | 0.265 | 0.437 | 0.226 | 0.073 |
| *B: Child's age at migration:* | | | | | | | | |
| 11-15 years | 0.034 | 0.333 | 0.310 | 0.322 | 0.028 | 0.617 | 0.250 | 0.105 |
| 6-10 years | 0.134 | 0.345 | 0.344 | 0.177 | 0.097 | 0.508 | 0.330 | 0.065 |
| 0-5 years | 0.530 | 0.145 | 0.193 | 0.132 | 0.277 | 0.321 | 0.343 | 0.060 |
| *C: Parental years of schooling* | | | | | | | | |
| Mothers' yrs. school. | 10.973 | 10.640 | 11.275 | – | 12.463 | 10.918 | 12.120 | – |
| Fathers' yrs. school. | 9.542 | 11.393 | 12.267 | – | 12.470 | 11.971 | 12.803 | – |
| Both parents present | 0.509 | 0.454 | 0.371 | – | 0.695 | 0.585 | 0.532 | – |
| *D: Parental years of schooling controlling for country of origin* | | | | | | | | |
| Mothers' yrs. school. | Ref. | 1.012*** | 0.226* | – | Ref. | -1.641*** | 0.051 | – |
| | | (0.106) | (0.106) | | | (0.070) | (0.073) | |
| Fathers' yrs. school. | Ref. | 1.031*** | 2.282*** | – | Ref. | -0.455*** | 0.794*** | – |
| | | (0.082) | (0.082) | | | (0.070) | (0.073) | |
| Observations | 3,930 | 3,442 | 3,642 | 2,838 | 3,562 | 12,967 | 8,227 | 2,062 |

*Notes*: Panel A: source of parental education information. Panel B: by age at arrival to Denmark, the source of parental education information. Panel C: parents' years of schooling of mothers and fathers and the share of immigrants with recorded educational information. Panel D: tests for differences in mothers' and fathers' schooling by source of education information (with register as reference) controlling for country of origin.
*: p<0.05; **: p<0.01; ***: p<0.001

in parents' years of schooling across data source conditional on country of origin illustrating substantial differences. For example, mothers whose education information stems from surveys hold on average 1-1.6 fewer years of schooling than mothers with education information from registers. However, these patterns should be interpreted with caution as it is unclear whether they stem from mismeasuring education or underlying differences between individuals across their type of education information.

# 3. Intergenerational Educational Mobility Among Immigrants

## 3.1. Relative Mobility by Immigrant Status

Figure 3 presents the linear relationship between parental and child years of schooling, broken down by birth cohort (1970–72 and 1988–90) and immigrant status. Among those born in 1970–72, the regression slopes are broadly similar across groups, though slightly steeper for native Danes and descendants than for parent-linked immigrants. However, parent-linked immigrants regress to a much lower mean level of education compared to both native Danes and descendants. This indicates that while the rate of intergenerational mobility (i.e., the slope) is similar, it occurs from very different starting points in the educational distribution. In contrast, for the 1988–90 cohort—where parental education data for immigrants is generally of lower quality—the regression slopes diverge more clearly. Native Danes show substantially steeper slopes, indicating stronger associations between parent and child education. By comparison, both descendants and parent-linked immigrants exhibit flatter slopes, suggesting higher relative mobility.

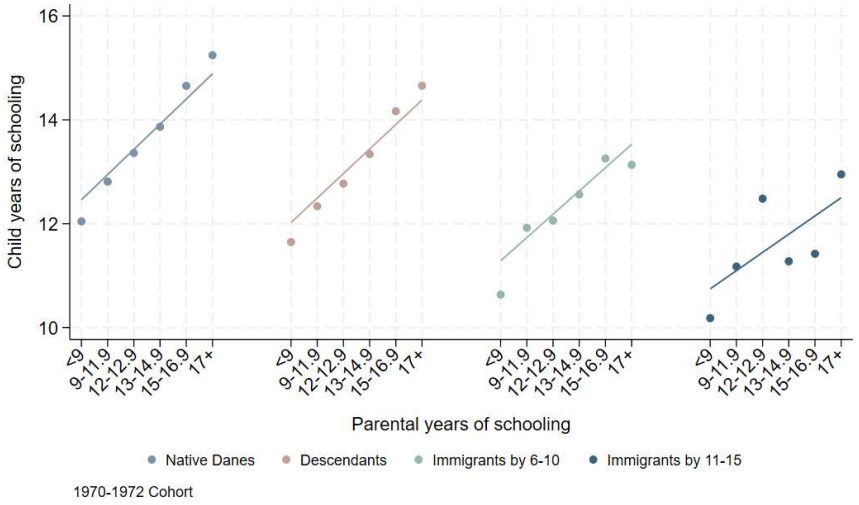
Panel A of Table 2, which presents the same regression coefficients as in Figure 3 but broken down into three large birth cohort groups spanning 1965 to 1990, largely confirms the patterns observed earlier. Among native Danes, there is a clear decline in relative mobility over time, with the intergenerational slope increasing from approximately 0.28 to 0.44 (as documented in Karlson and Landersø, 2025)—indicating a strengthening association between parents' and children's education. In contrast, among parent-linked immigrants, relative mobility appears to increase over the same period, with the slope declining from about 0.28 to 0.18. This suggests an exceptionally high degree of relative mobility among parent-linked immigrants born in the 1980s. A similar pattern is observed for descendants, whose mobility trends closely mirror those of parent-linked immigrants.

## 3.2. Estimated Mobility and Data Quality

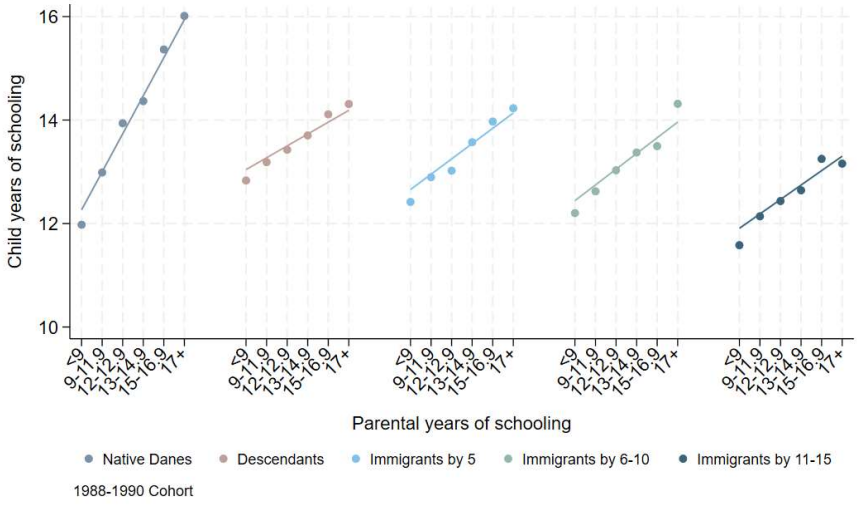
To further investigate the sources of the apparent increase and high levels of relative mobility among parent-linked immigrants and their descendants, Panel A of Table 3 presents regression coefficients disaggregated by the source of parental education information. The results reveal substantial variation across data sources.

*Figure 3: Years of schooling by birth cohort, parents' years of schooling and migration age*

*a) Birth cohorts 1970-72*




*b) Birth cohorts 1988-90*




*Notes*: The figure shows the mean years of schooling of native Danes, descendants of immigrants, immigrants arriving by age 5, immigrants arriving by age 10, and immigrants arriving by age 15, by average years of schooling of their parents. Fig. a) and b) show schooling for the 1970-1972 and 1988-1990 cohorts, respectively.

*Table 2: Mobility estimates by birth year and immigrant status*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Birth cohort:* | *1965-70* | *1971-80* | *1981-90* | *Difference (1)-(3)* |
| *A: Regression coefficient* | | | | |
| a) Native Danes | 0.280*** | 0.323*** | 0.442*** | 0.162*** |
| | (0.001) | (0.001) | (0.001) | (0.002) |
| b) Immigrants | 0.283*** | 0.203*** | 0.180*** | -0.103*** |
| | (0.014) | (0.008) | (0.007) | (0.016) |
| Difference a) vs. b) | 0.003 | -0.120*** | -0.262*** | |
| | (0.014) | (0.008) | (0.007) | |
| c) Descendants | 0.253*** | 0.199*** | 0.165*** | -0.088*** |
| | (0.022) | (0.009) | (0.008) | (0.023) |
| Difference a) vs. c) | -0.027 | -0.123*** | -0.277*** | |
| | (0.022) | (0.009) | (0.008) | |
| *B: Sibling correlation* | | | | |
| d) Native Danes | 0.405*** | 0.429*** | 0.437*** | 0.032*** |
| | (0.003) | (0.002) | (0.003) | (0.004) |
| e) Immigrants | 0.439*** | 0.436*** | 0.421*** | -0.018 |
| | (0.025) | (0.015) | (0.009) | (0.026) |
| Difference d) vs. e) | 0.034 | 0.007 | -0.015 | |
| | (0.026) | (0.015) | (0.010) | |
| f) Descendants | 0.480*** | 0.424*** | 0.365*** | -0.114* |
| | (0.049) | (0.018) | (0.012) | (0.049) |
| Difference d) vs. f) | 0.075 | -0.005 | -0.071*** | |
| | (0.045) | (0.018) | (0.012) | |
| Observations | 439,718 | 640,229 | 550,479 | |

*Notes*: Panel A shows regression coefficients of parental years of schooling on years of schooling of children by birth cohort and origin. Panel B shows intraclass correlation coefficients between years of schooling of siblings born within a three-year window by birth cohort and origin. Standard errors of sibling correlations and differences thereof are obtained by 1000 bootstrap replications. Sibling correlations are based on the sample on which regression coefficients are based.
*: p<0.05; **: p<0.01; ***: p<0.001

Estimates based on imputed education are below 0.10, indicating near-full mobility among both parent-linked immigrants and descendants. Survey-based estimates

are somewhat higher—approximately 0.20 for parent-linked immigrants and 0.15 for descendants—but still imply very high mobility. In contrast, estimates based on register data are considerably higher and, with some exceptions, more closely resemble those observed for native Danes. These findings clearly show that the source—and thus the reliability—of parental education data has a major influence on estimated mobility. The lower the reliability, the higher the apparent mobility, which is consistent with the well-known attenuating effect of random measurement error on regression coefficients as documented in the literature on intergenerational income mobility (e.g., Nybom & Stuhler, 2017; Solon, 1992). Panel A of Appendix Figure A.3, which reports separate results for mothers and fathers, confirms this pattern.[5] In addition, while we cannot test whether differences in estimates across the sources of parental education information partly reflect differences in parents' unobservable characteristics, we can test whether it reflects differences in their observable characteristics. In Table A.3, we compare estimates as presented in Table 3 to estimates where we re-weight the sample to same distribution of parental education as observed for parents with register-based education data. All conclusions remain unchanged, suggesting that the difference in mobility estimates across data source actually reflects differences in data quality.

How do these results compare to sibling correlations in education? Sibling correlations are usually interpreted as omnibus measures of the overall influence of family background and local community on educational attainment (or other labor market outcomes), capturing the combined effects of both observable and unobservable family characteristics (Solon, 1999). Importantly, because sibling correlations do not rely on parental education measures, they are not subject to the reliability of parental schooling.

Panel B of Table 3 reveals that sibling correlations tell a markedly different story from parent–child regression estimates. Among both native Danes and immigrants, sibling correlations exceed 40 percent and are virtually identical across groups. The same holds for descendants, although there is a decline in correlations across cohorts. Viewed together, these results indicate that family background matters just as much for immigrants as for native Danes. The discrepancy with the regression-based mobility estimates arises because parental education is a poor proxy for overall family background in immigrant families.[6]

[5] Table A.2 presents further estimates for immigrants and their descendants based on the subsample with register-based information. The table shows that controlling for country of origin lowers the estimated coefficients from regressions of children's years of schooling on their parents' years of schooling, particularly for older cohorts. Thus, part of the observed intergenerational association in education reflects differences in origin-country composition across cohorts. The table also shows that, once country of origin is accounted for, controlling for age at migration has little to no impact on our estimated regression coefficients.

[6] Appendix Table A.4 shows that the sibling correlations remain the same irrespective of whether the sample is restricted to those with valid parental education information. However, sibling

*Table 3. Mobility estimates by birth year, immigrant status, and source of parental education information*

| | *All* | | | *Imputed* | | | *Survey-Based* | | | *Register-Based* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| *Birth year* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* |
| *A: Regression coefficient* | | | | | | | | | | | | |
| a) Native Danes | 0.278*** | 0.320*** | 0.440*** | – | – | – | – | – | – | 0.278*** | 0.320*** | 0.440*** |
| | (0.001) | (0.001) | (0.001) | | | | | | | (0.001) | (0.001) | (0.001) |
| b) Immigrants | 0.268*** | 0.185*** | 0.168*** | 0.063* | 0.058*** | 0.035** | 0.174*** | 0.193*** | 0.224*** | 0.416*** | 0.389*** | 0.312*** |
| | (0.014) | (0.007) | (0.006) | (0.031) | (0.013) | (0.011) | (0.033) | (0.013) | (0.008) | (0.019) | (0.012) | (0.016) |
| c) Descendants | 0.240*** | 0.198*** | 0.167*** | -0.065 | 0.030 | 0.037** | -0.030 | 0.174*** | 0.141*** | 0.254*** | 0.268*** | 0.288*** |
| | (0.021) | (0.009) | (0.008) | (0.185) | (0.020) | (0.013) | (0.207) | (0.023) | (0.016) | (0.021) | (0.012) | (0.011) |
| *B: Upward mobility* | | | | | | | | | | | | |
| d) Native Danes | 0.639 | 0.571 | 0.512 | – | – | – | – | – | – | 0.639 | 0.571 | 0.512 |
| e) Immigrants | 0.661 | 0.511 | 0.452 | 0.379 | 0.345 | 0.333 | 0.485 | 0.492 | 0.512 | 0.767 | 0.680 | 0.510 |
| f) Descendants | 0.479 | 0.587 | 0.622 | 0.378 | 0.513 | 0.571 | 0.641 | 0.607 | 0.686 | 0.477 | 0.606 | 0.621 |
| *C: Share of sample* | | | | | | | | | | | | |
| g) Immigrants | – | – | – | 0.152 | 0.331 | 0.332 | 0.163 | 0.313 | 0.524 | 0.685 | 0.357 | 0.144 |
| h) Descendants | – | – | – | 0.023 | 0.200 | 0.291 | 0.025 | 0.210 | 0.232 | 0.952 | 0.590 | 0.477 |
| Observations | 437,782 | 636,665 | 553,179 | 651 | 5,381 | 12,769 | 796 | 5,703 | 16,764 | 436,335 | 625,581 | 523,646 |

Notes: Panel A shows regression coefficients of parental years of schooling on years of schooling of children by birth cohort of the child, source of educational information of the parents, for native Danes, immigrants, and children of immigrants respectively. Panel B shows the fraction of children who attain more years of schooling than that of the highest educated parent by birth cohort of the child, source of educational information of the parents, for native Danes, immigrants, and children of immigrants respectively. Panel C shows the share of each cohort of immigrants or descendants with parental education information from each of the three possible sources.

*: p<0.05; **: p<0.01; ***: p<0.001

correlations do require a parent to appear in the registers (to link siblings), and the sibling correlations are therefore in principle prone to the sample selectivity discussed earlier.

As a final instructive benchmark, we estimate intergenerational regression coefficients using the nationwide surveys described earlier. These surveys have two advantages: the inclusion of immigrants does not rely on parents being observed in the registers, and they measure education consistently across immigrant and native groups. As a result, any random measurement error should be identical in comparisons between the two groups. For this analysis, we focus on individuals born between 1975 and 1989 and restrict the comparison to immigrants and native Danes, as descendants cannot be separately identified in the survey data. The results are reported in Appendix Table A.5. Among immigrants, we estimate a parent–child regression coefficient of 0.49 (standard error = 0.037), while the corresponding estimate for native Danes is 0.39 (standard error = 0.025). The estimate for native Danes aligns closely with the average from register-based estimates for the same cohorts, suggesting that the surveys provide valid and reliable measures of intergenerational mobility. In contrast, the estimate for immigrants is not only somewhat higher than for Danes, but also about 2.5 times larger than the register-based estimate for immigrants. This substantial difference underscores the extent to which register-based estimates for (parent-linked) immigrants are downwardly biased due to issues of missing data and measurement error in parental education.

# 4. Intergenerational Educational Mobility at Population Level

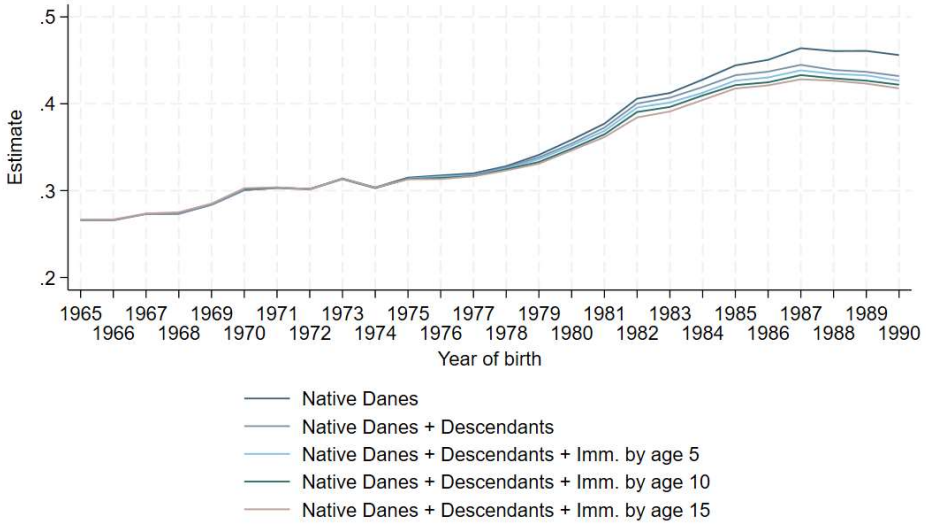
## 4.1. Relative Mobility at the Population Level

Because estimated mobility among parent-linked immigrants and descendants is substantially higher in the register data—especially for younger cohorts, and largely due to poor data quality—Figure 4 examines how including these groups affects the population-wide regression coefficient. The figure presents yearly trends in the intergenerational regression coefficient across samples that progressively add descendants and parent-linked immigrants to the native Danish population. The results show that their inclusion weakens the overall trend of declining educational mobility. The main effect is a noticeable attenuation of the trend for the 1980s birth cohorts, consistent with the findings in Table 3. In these cohorts, parent-linked immigrants and descendants exhibit artificially high relative mobility, regress to different mean levels of education, and represent a nontrivial share of the population—all of which serve to dampen the observed trend (Hertz, 2008).

In Appendix Figure A.4, we extend the analysis by examining five additional, widely used measures of relative mobility. These include two correlation-based metrics—the Pearson correlation and the Spearman rank correlation—and three association measures based on categorical education levels. The first is the polychoric correlation, which assumes an underlying bivariate normal distribution for parent and child education. The second is the Kruskal–Goodman gamma coefficient, an ordinal association measure based on the distribution of concordant and discordant pairs in the parent–child education contingency table. The third is the

unidiff phi-parameter, which can be interpreted as a weighted average of all pairwise odds ratios in the contingency table and requires only that the data be nominal, not ordinal.

*Figure 4: Coefficients from regressions of child on parent years of schooling by birth year and sample composition*




*Notes*: The figure shows coefficients from regressions of years of schooling of children on average years of schooling of their parents by birth year and additive origin groups, i.e., native Danes; native Danes, and descendants of immigrants; native Danes, descendants of immigrants, and immigrants arriving by age 5; native Danes, descendants of immigrants, and immigrants arriving by age 10; and native Danes, descendants of immigrants, and immigrants arriving by age 15.

Like the regression coefficient, the Pearson correlation shows an upward trend over the period studied. However, unlike the regression coefficient, its development is largely flat during the 1980s and even slightly declines when descendants and parent-linked immigrants are included in the estimation sample (Panel A). The pattern for the Spearman rank correlation is qualitatively similar (Panel B). For the polychoric correlation and the Kruskal–Goodman gamma coefficient, we observe a more noticeable upward trend in the 1980s, along with a more evident attenuating effect from including descendants and parent-linked immigrants in the sample (Panels C and D). The unidiff phi-parameter, which is

indexed to the 1965 cohort, tells a similar story but shows an even more pronounced dampening effect when these groups are included (Panel E).[7]

In sum, across all five alternative measures of relative mobility, we find consistent evidence that including parent-linked immigrants and descendants—who exhibit artificially high mobility in administrative data due to measurement limitations—flattens or dampens the overall upward trend in intergenerational persistence observed among native Danes. This effect is particularly pronounced in the 1980s cohorts, where poor-quality education data and the growing share of immigrants and descendants contribute to inflated mobility estimates. These findings reinforce our broader conclusion: apparent differences in intergenerational mobility across groups reflect data limitations rather than genuine variation in mobility.

### 4.2. Absolute Mobility

Social scientists are concerned not only with relative mobility—or "chance inequality"—but also with absolute mobility. Like relative educational mobility, absolute upward mobility—defined as the proportion of individuals who attain more education than their parents—has declined markedly in Denmark over the past 30 years (Karlson & Landersø, 2025). However, as Panel B of Table 3 shows, differences in absolute upward mobility by immigrant status are much smaller than those observed for relative mobility. Among native Danes, the share experiencing absolute upward mobility declines from 64 to 51 percent across the cohorts studied. Parent-linked immigrants experience an even steeper decline, from 66 to 45 percent, indicating that by the 1980s birth cohorts, parent-linked immigrants were somewhat less likely than natives to surpass their parents in educational attainment. In contrast, descendants show an increase in absolute upward mobility—from 48 to 62 percent—making them, by the 1980s, the group most likely to attain more education than their parents.

Nevertheless, Panel B of Table 3 also reveals substantial variation in absolute mobility depending on the source of parental education information. This again underscores the low reliability of these data and the importance of interpreting mobility estimates—particularly for parent-linked immigrants and descendants—with caution.

Figure 5 presents trends in population-wide estimates of the share experiencing absolute upward mobility, across samples that progressively include descendants and parent-linked immigrants (Table A.7 reports each point estimate). Both the overall level and the trend remain virtually unchanged with the inclusion of these groups (Panel A) with the different estimates being almost indistinguishable. Moreover, when we disaggregate the results by parental education—specifically comparing individuals whose parents are in the bottom 30 percent versus the

[7] Table A.6 reports estimated mobility and standard errors for three selected measures—regression coefficients, Pearson correlations, and Unidiff-phi parameters—across cohort bins ranging from the 1965–69 cohorts to the 1987–90 cohorts.

top 30 percent of the education distribution—the levels and trends in absolute upward mobility are again remarkably consistent across all estimation samples.

The reason for this stability lies in the substantial upward trend in educational attainment among native Danes, as documented by Karlson and Landersø (2025). Many children born in the 1970s and 1980s still have parents who completed only 7 or 9 years of schooling. As a result, the inclusion of parent-linked immigrants and descendants does not systematically shift the educational distribution in a way that affects the likelihood of surpassing parental education. Despite their growing share of the population, the educational trajectories of parent-linked immigrants and descendants—when defined relative to their parents—are broadly similar to those of native Danes in terms of absolute progress, even though their relative positions in the overall educational distribution differ substantially. Moreover, the measurement issues that bias estimates of relative mobility appear to have less influence on absolute mobility.

## 5. Discussion

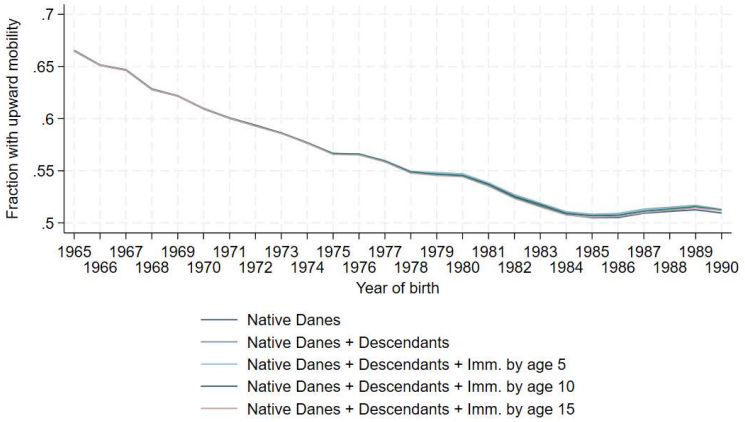
Our results point to several general considerations and future directions for studies of intergenerational mobility among immigrants and their assimilation in receiving countries, three of which we consider here.

First, our findings underscore the importance of measurement and data quality—an issue long emphasized in the literature on intergenerational income mobility (e.g., Eshaghnia et al., 2024; Haider & Solon, 2006; Nybom & Stuhler, 2017; Solon, 1992). The availability of high-quality register data in Denmark facilitates detailed analyses of educational attainment and mobility among native Danes. However, the considerably lower data quality for most immigrants—combined with the very limited and uneven coverage of their parents—can distort both the level and trend of key mobility estimates, leading to flawed conclusions. Our results call for greater scrutiny of data sources in future research on immigrants' intergenerational mobility and highlight the need for improved data collection on immigrants' educational backgrounds from origin countries.

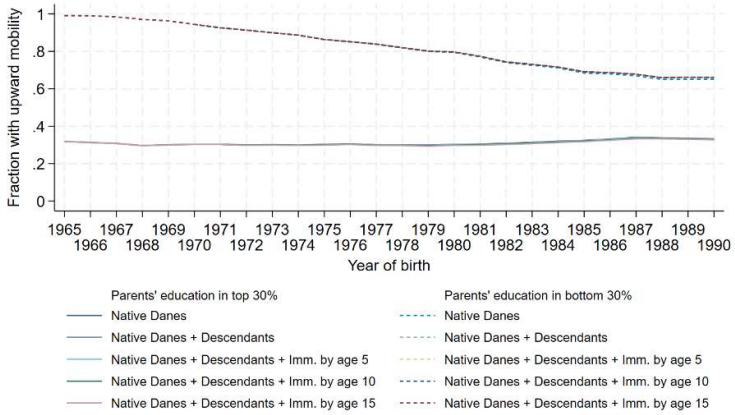
Second, our findings speak directly to a salient challenge in contemporary Danish society: the persistent educational gaps between native Danes and individuals of non-Western immigrant origin. Although our analyses show that relative and absolute educational mobility among immigrants can appear broadly similar to that of natives—once differences in data quality are taken into account—this apparent similarity masks substantial differences in levels of attainment. Non-Western immigrant parents typically have much lower levels of education than native parents, and despite progress across generations, full convergence remains elusive. These educational gaps have been widely documented across Western countries (Drouhot & Nee, 2019; Heath et al., 2008) and have been found particularly salient in Denmark (Birkelund, 2020; Cuzulan et al., 2025; Dustmann et al., 2024; Fallesen,

*Figure 5: Upward mobility by birth years and sample composition*

*a) Percentage of upwardly mobile by sample composition and birth year*




*b) Percentage of upwardly mobile by sample composition, parents' relative position in the educational distribution, and birth year*




*Notes*: Fig. a) shows the fraction of upwardly mobile children in each birth cohort, i.e., those with more years of schooling at age 30 than the maximum years of schooling obtained by either parent when the child was 15. Fractions are shown separately for native Danes; native Danes, and descendants of immigrants; native Danes, descendants of immigrants, and immigrants arriving by age 5; native Danes, descendants of immigrants, and immigrants arriving by age 10; and native Danes, descendants of immigrants, and immigrants arriving by age 15. Fig. b) shows the fraction of upwardly mobile children by cohort and origin groups, as in Fig. a), separately for children whose parents are in the top or bottom 30% of the distribution of parental years of schooling for the given birth cohort.

2017; Foged et al., 2023). A key empirical question—explored in only a handful of studies to date (Becker, 2011; Zhao & Drouhot, 2024; Zorlu & van Gent, 2024)—is whether these disparities persist, narrow, or re-emerge in the third generation and beyond. Addressing this question is critical for understanding the long-term integration of immigrant-origin populations into the Danish education system and broader society.

Third, our study also underscores a deeper issue: interpreting immigrants' intergenerational social mobility as indicative of how educational and welfare policies shape mobility can be misleading. Without reference to the origin country's educational distribution, observed mobility among immigrants—and even their descendants—reflects selective migration patterns as much as social processes within the receiving country (Ichou, 2014). Future research would therefore benefit not only from improving the coverage and quality of immigrant educational information in the Danish administrative registers, but also from incorporating contextual data on the educational structures and distributions in immigrants' countries of origin. This would enable more accurate assessments of educational progress and the role of host-country institutions in shaping intergenerational outcomes.

## 6. Conclusion

This paper examines intergenerational educational mobility among immigrants and their descendants in Denmark for cohorts born between 1965 and 1990, with a particular focus on how data quality and sample selectivity affect estimates of mobility. At face value, administrative register data suggest that immigrants exhibit higher relative educational mobility than native Danes. However, we demonstrate that this finding is largely an artifact of data limitations—most notably the widespread use of imputed parental education information and the fact that only about 15 percent of immigrants can be linked to a parent with recorded education in the registers. Among those with more reliable data, mobility patterns closely resemble those of natives. Auxiliary analyses using nationally representative survey data and sibling correlations provide strong corroboration of this conclusion. We further show that including immigrants in population-wide mobility estimates—without accounting for these data limitations—flattens the observed trend of declining educational mobility over time, particularly for cohorts born in the 1980s. These findings highlight the need for greater caution and transparency when using administrative data to study intergenerational mobility in immigrant populations.

## References


Abramitzky, R., Boustan, L., Jácome, E., & Pérez, S. (2021). Intergenerational Mobility of Immigrants in the United States over Two Centuries. *American Economic Review, 111(2),* 580–608.

Becker, B. (2011). Cognitive and Language Skills of Turkish Children in Germany: A Comparison of the Second and Third Generation and Mixed Generational Groups. *International Migration Review, 45(2),* 426–459.

Becker, G. S., & Tomes, N. (1979). An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility. *Journal of Political Economy, 87(6),* 1153–1189.

Birkelund, J. F. (2020). Aiming High and Missing the Mark? Educational Choice, Dropout Risk, and Achievement in Upper Secondary Education among Children of Immigrants in Denmark. *European Sociological Review, 36(3),* 395–412.

Bleakley, H., & Chin, A. (2010). Age at Arrival, English Proficiency, and Social Assimilation among US Immigrants. *American Economic Journal: Applied Economics, 2(1),* 165-192.

Borjas, G. J. (1993). The Intergenerational Mobility of Immigrants. *Journal of Labor Economics, 11(1),* 113–135.

Boustan, L., Jensen, M. F., Abramitzky, R., Jácome, E., Manning, A., Pérez, S., Watley, A., Adermon, A., Arellano-Bover, J., Åslund, O., Connolly, M., Deutscher, N., Gielen, A., Giesing, Y., Govind, Y., Halla, M., Hangartner, D., Jiang, Y., Karmel, C., Karmel, C., Landaud, F., Macmillan, L., Martínez, I. Z., Polo, A., Poutvaara, P., Rapoport, H., Roman, S., Salvanes, K. G., San, S., Siegenthaler, M., Sirugue, L., Espín, J. S., Stuhler, J., Violante, G. L., Webbink, D., Weber, A., Zhang, J., Zheng, A., & Zohar, T. (2025). Intergenerational Mobility of Immigrants in 15 Destination Countries. NBER Working Paper No. 33558.

Bratu, C., & Bolotnyy, V. (2023). Immigrant intergenerational mobility: A focus on childhood environment. *European Economic Review, 151,* 104353.

Bratsberg, B, Raaum, O., & Røed, K. (2012). Educating Children of Immigrants: Closing the gap in Norwegian Schools. *Nordic Economic Policy Review, 1(2012).*

Brell, C., Dustmann, C., & Preston, I. (2020). The Labor Market Integration of Refugee Migrants in High-Income Countries. *Journal of Economic Perspectives, 34(1),* 94–121.

Böhlmark, A. (2008). Age at immigration and school performance: A siblings analysis using swedish register data. *Labour Economics, 15(6),* 1366-1387.

Card, D., DiNardo, J., & Estes, E. (2000). The More Things Change: Immigrants and the Children of Immigrants in the 1940s, the 1970s, and the 1990s. In G. J. Borjas (Ed.), Issues in the Economics of Immigration (pp. 227–270). University of Chicago Press.

Connolly, M., Corak, M., & Haeck, C. (2019). Intergenerational Mobility Between and Within Canada and the United States. *Journal of Labor Economics, 37(S2),* S595–S641.

Cuzulan, B., Schultz-Nielsen, M. L., & Fallesen, P. (2025). The Demographic and Socioeconomic Consequences of Restricting Access to Marriage for Young Immigrant Women in Denmark. *Demography, 62(1),* 87–112.

Drouhot, L. G., & Nee, V. (2019). Assimilation and the Second Generation in Europe and America: Blending and Segregating Social Dynamics Between Immigrants and Natives. *Annual Review of Sociology, 45(1),* 177–199.

Dustmann, C., Landersø, R., & Andersen, L. H. (2024). Unintended Consequences of Welfare Cuts on Children and Adolescents. *American Economic Journal: Applied Economics, 16(4),* 161–185.

Engzell, P., & Ichou, M. (2020). Status Loss: The Burden of Positively Selected Immigrants. *International Migration Review, 54(2),* 471–495.

Eshaghnia, S. S. M., Heckman, J., Landersø, R., & Qureshi, R. (2024). Transmission of Family Influence. NBER Working Paper No. 33023.

Fallesen, H. W. (2017). The educational performance of immigrant children: Examination of the native-immigrant education gap. *Politica, 49(3).*

Feliciano, C., & Lanuza, Y. R. (2017). An Immigrant Paradox? Contextual Attainment and Intergenerational Educational Mobility. *American Sociological Review, 82(1),* 211–241.

Foged, M., Hasager, L., Peri, G., Arendt, J. N., & Bolvig, I. (2023). Intergenerational spillover effects of language training for refugees. *Journal of Public Economics, 220,* 104840.

Haider, S., & Solon, G. (2006). Life-Cycle Variation in the Association between Current and Lifetime Earnings. *American Economic Review, 96(4),* 1308–1320.

Heath, A. F., Rothon, C., & Kilpi, E. (2008). The Second Generation in Western Europe: Education, Unemployment, and Occupational Attainment. *Annual Review of Sociology, 34(1),* 211–235.

Hertz, T. (2008). A group-specific measure of intergenerational persistence. *Economics Letters, 100(3),* 415–417.

Hvidtfeldt, C., & Schultz-Nielsen, M. L. (2018). "Refugees and Asylum Seekers in Denmark 1992–2016." Rockwool Fondens Forskningsenhed Arbejdspapir 133.

Ichou, M. (2014). Who They Were There: Immigrants' Educational Selectivity and Their Children's Educational Attainment. *European Sociological Review, 30(6),* 750–765.

Jann, B., & Seiler, S. (2019). udiff: Stata module to estimate the generalized unidiff model for individual-level data.

Karlson, K. B., & Landersø, R. (2025). The making and unmaking of opportunity: educational mobility in 20th-century Denmark. *The Scandinavian Journal of Economics, 127(1),* 178–212.

Mogstad, M., & Torsvik, G. (2023). Family background, neighborhoods, and intergenerational mobility. In Handbook of the Economics of the Family (Vol. 1, pp. 327–387). Elsevier.

Nybom, M., & Stuhler, J. (2017). Biases in Standard Measures of Intergenerational Income Dependence. *Journal of Human Resources, 52(3),* 800–825.

Solon, G. (1992). Intergenerational Income Mobility in the United States. *American Economic Review, 82(3),* 393–408. JSTOR.

Solon, G. (1999). Intergenerational Mobility in the Labor Market. In Handbook of Labor Economics (Vol. 3, pp. 1761–1800). Elsevier.

Statistics Denmark. (2020). Indvandrernes medbragte uddannelse. https://www.dst.dk/Site/Dst/SingleFiles/GetArchiveFile.aspx?fi=formid&fo=medbragt-udd--pdf&ext={2}

Statistics Denmark. (2022). Fakta om indvandrere og efterkommere i Danmark. https://www.dst.dk/da/Statistik/nyheder-analyser-publ/bagtal/2022/2022-08-18-fakta-om-indvandrere

Yuksel, M. (2009). Intergenerational Mobility of Immigrants in Germany: Moving with Natives or Stuck in their Neighborhoods? IZA Discussion Paper No. 4677.

Zhao, L., & Drouhot, L. G. (2024). The Grandchildren of Immigrants in Western Europe: Patterns of Assimilation Among the Emerging Third Generation. *Demography, 61(2),* 463–491.

Zorlu, A., & Van Gent, W. (2024). Economic Assimilation of the "Third Generation": An Intergenerational Mobility Perspective. *International Migration Review, 58(2)*, 734–763.

Zuccotti, C. V., Ganzeboom, H. B. G., & Guveli, A. (2017). Has Migration Been Beneficial for Migrants and Their Children?: Comparing Social Mobility of Turks in Western Europe, Turks in Turkey, and Western European Natives. *International Migration Review, 51(1)*, 97–126.

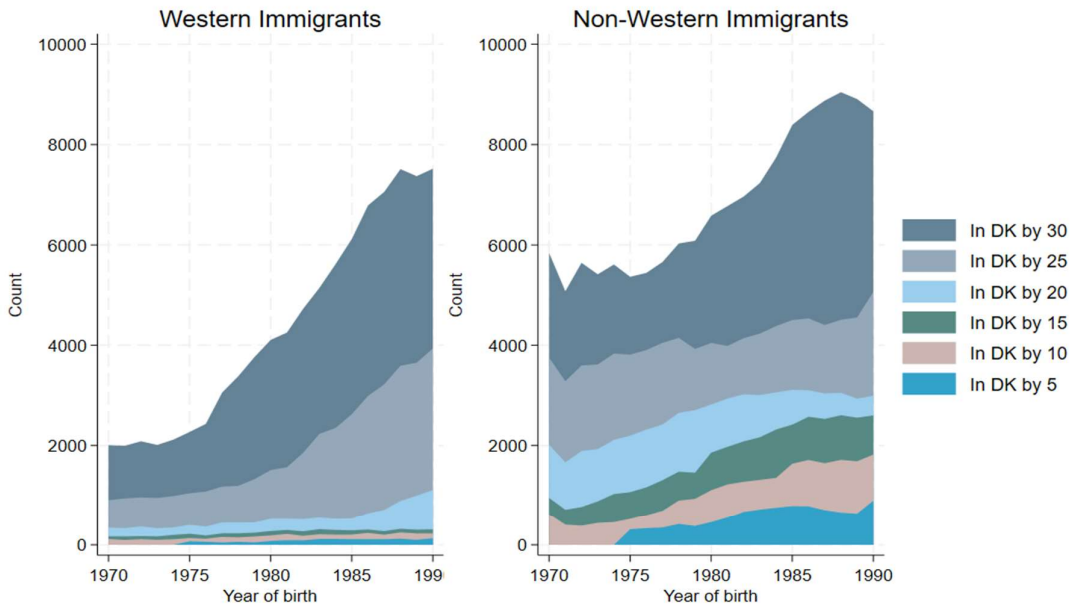
ONLINE APPENDIX:

# Intergenerational Educational Mobility among Immigrants and Descendants in Denmark: The Role of Sample Selectivity and Data Quality

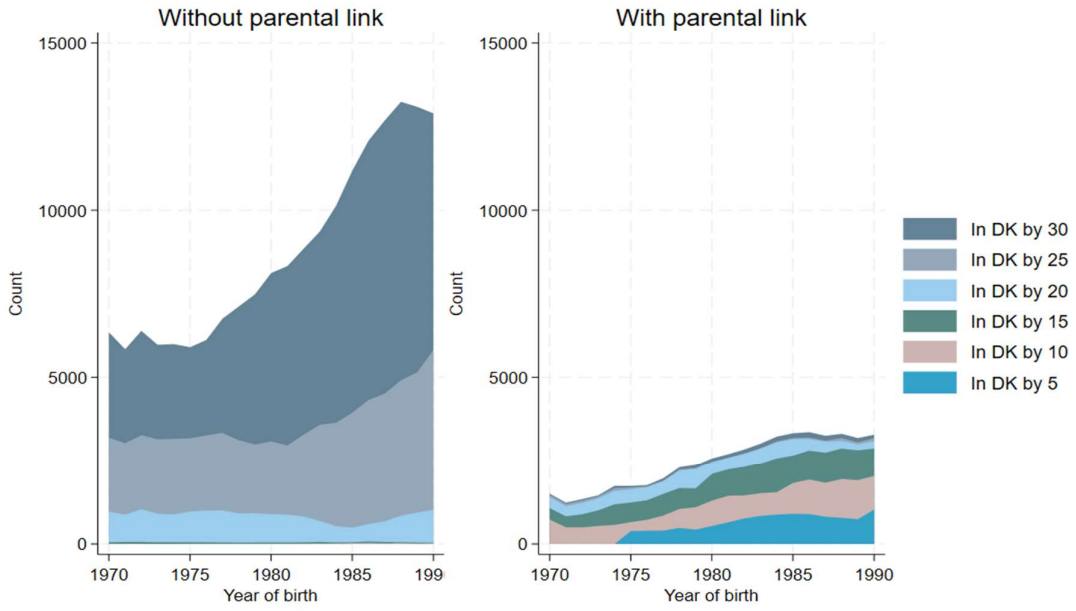
Rasmus Landersø, Kristian B. Karlson

*Figure A.1: Number of immigrants by birth cohort, age at migration, Western and non-Western background, and link to parents' information*

*a) Age at migration*



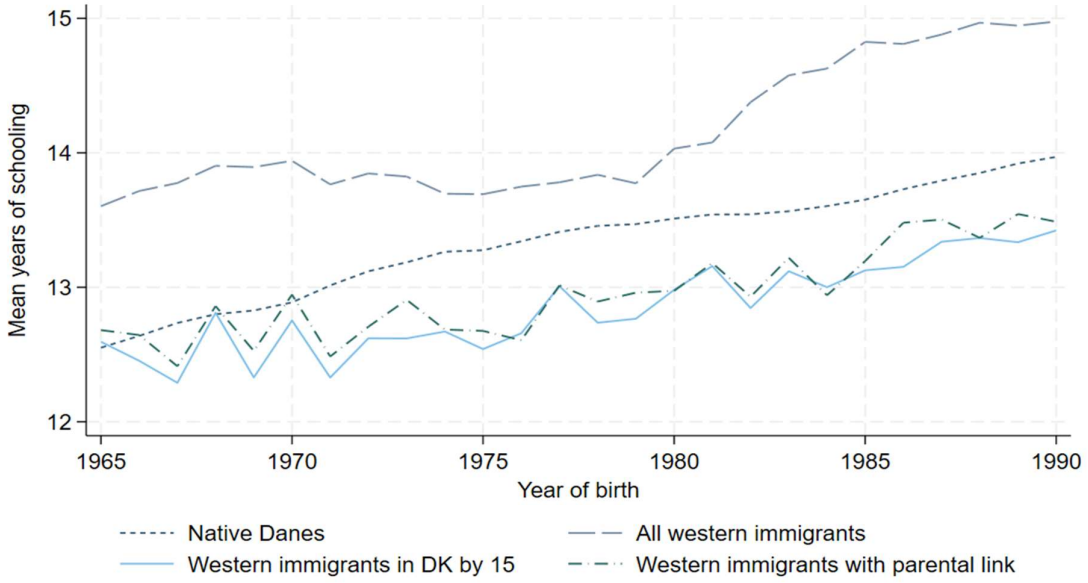

*b) Link to parents' information*



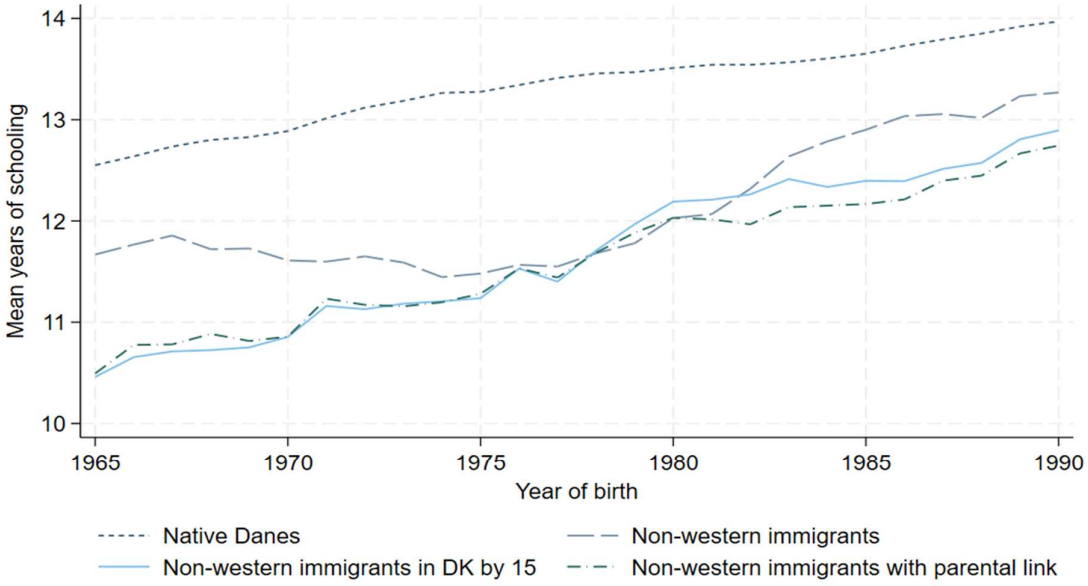

*Notes:* Fig. a) shows the number of immigrants in Denmark by birth year and age at migration. Western and Non-Western immigrants are counted separately. Fig. b) shows the number of immigrants in Denmark by birth year and age at migration. Immigrants with or without registered parents are counted separately.

*Figure A.2: Years of schooling by migration status and whether individuals can be linked to parents' information, Western and non-Western background*

*a) Danes and Western immigrants*



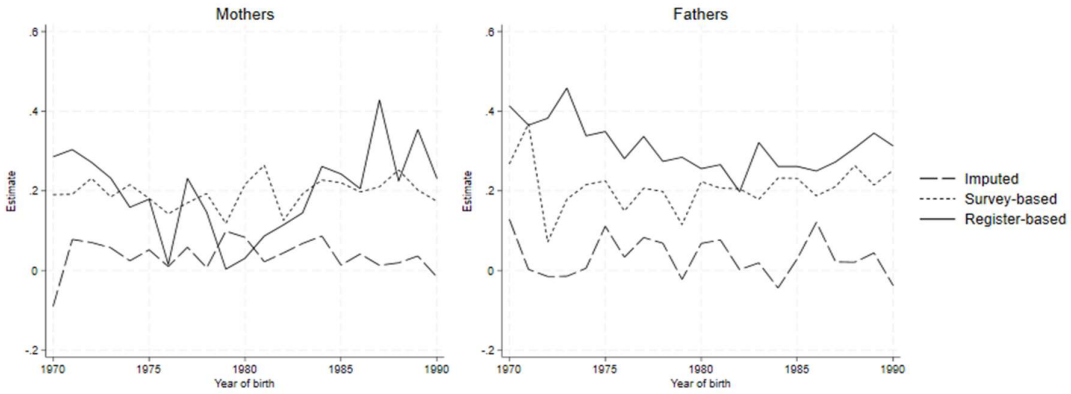

*b) Danes and non-Western immigrants*



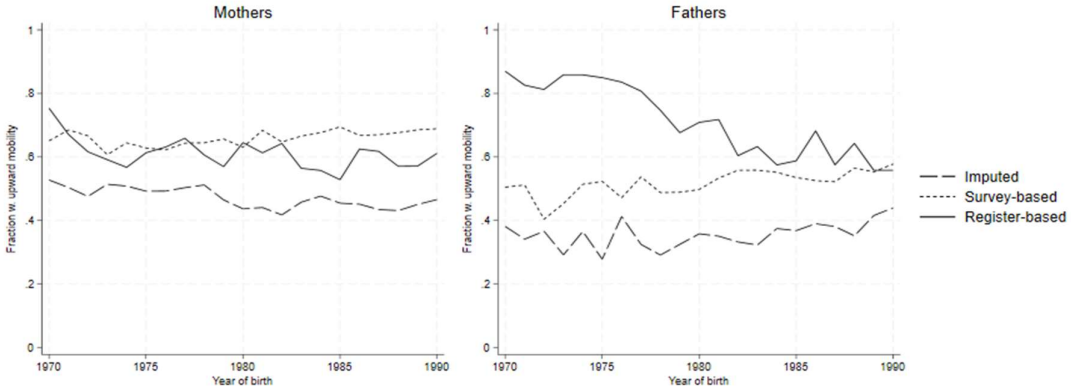

*Notes:* Figures a) and b) show the average years of schooling by birth year of native Danes, all immigrants, immigrants who arrive in Denmark by age 15, and immigrants with registered parents. Fig. a) compares native Danes and Western immigrants and Fig. b) compares native Danes and non-Western immigrants.

*Figure A.3: Mobility estimates by source of parent education information*

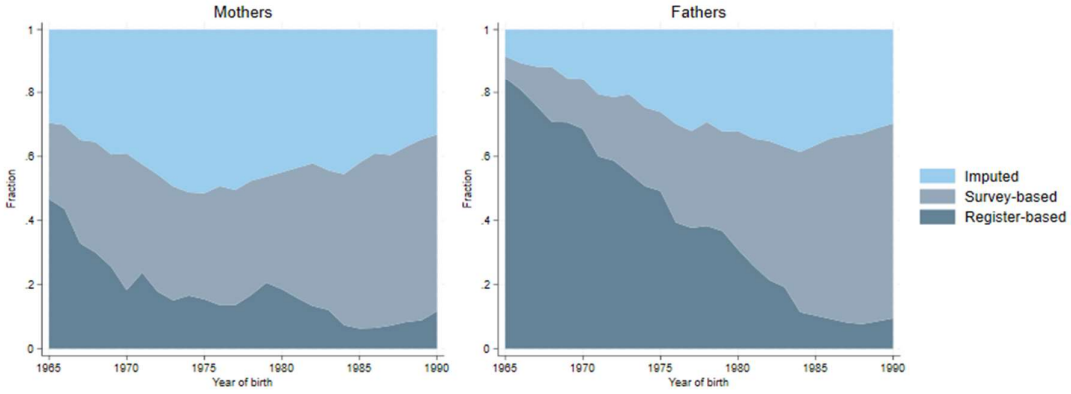
*a) Regression coefficients*




*b) Upward mobility*



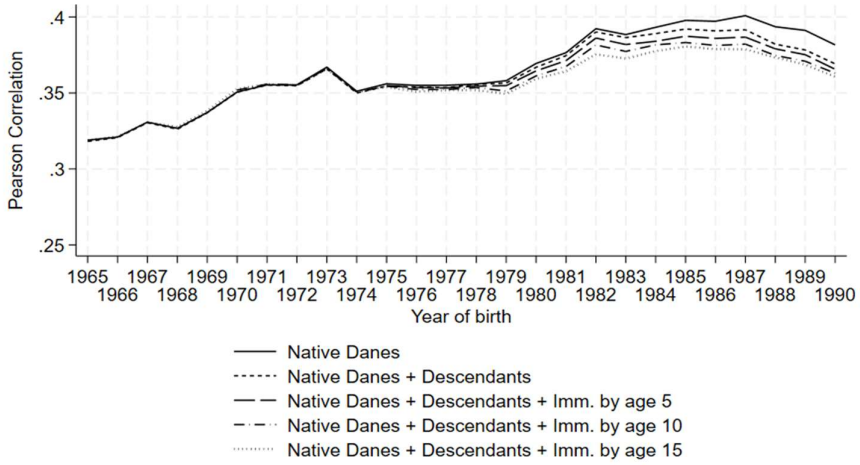

*c) Sources of parental education information*



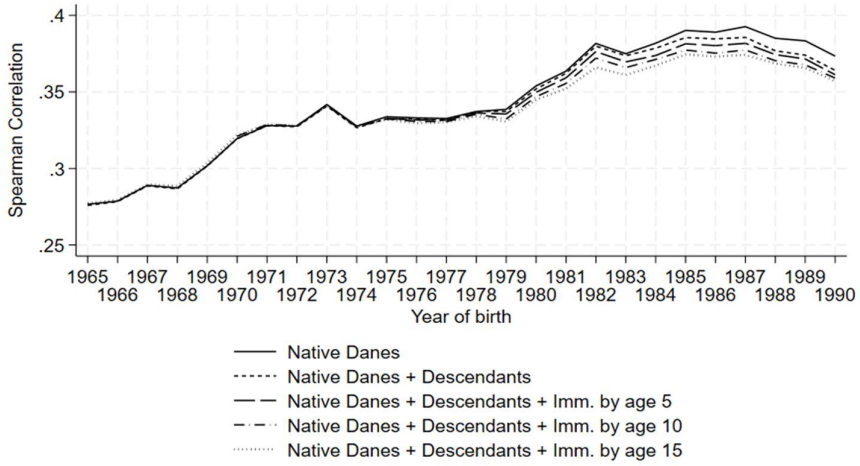

*Notes:* Fig. a) shows coefficients from regressions of years of schooling of immigrant children on average years of schooling of their mother and father separately by birth year and the source of parental education information. Fig. b) shows the share of upwardly mobile immigrant children compared to their mother and father separately by birth year and the source of parental education information. Fig. c) shows the source of education information for mothers and fathers by birth year.

*Figure A.4: Intergenerational educational persistence by persistence metric, sample composition, and birth year*

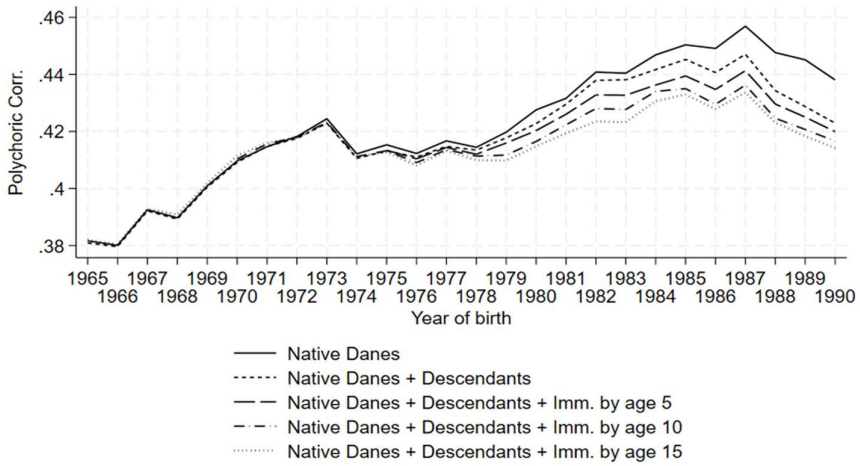
*a) Pearson Correlations*



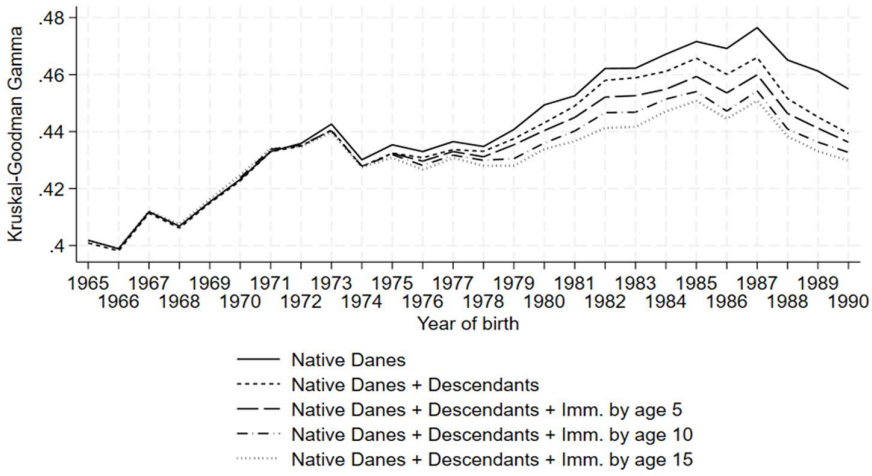

*b) Spearman Correlations*



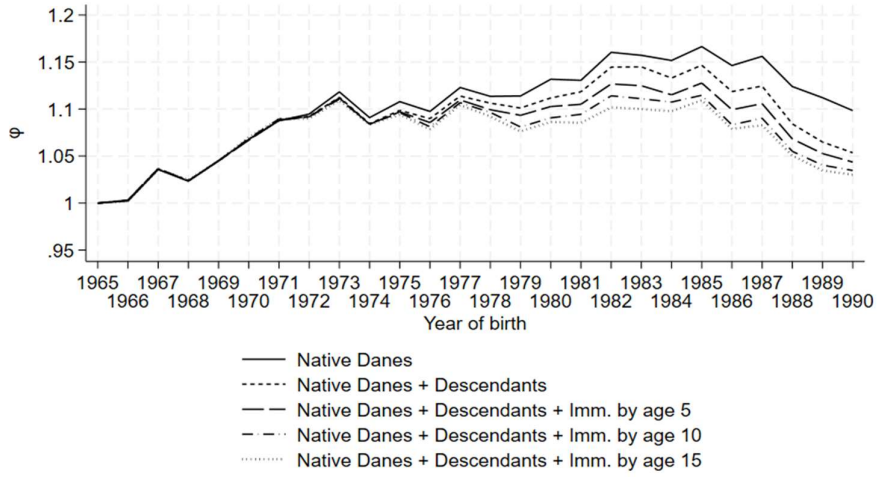

*c) Polychoric Correlations*



*d) Kruskal-Goodman Gamma Coefficients*




*e) Unidiff Phi Coefficients (Index 1965)*




*Notes:* Fig. a) shows Pearson correlation coefficients between average years of schooling of parents and years of schooling of children by birth cohort, origin, and age at migration. Fig. b) shows Spearman correlation coefficients between average years of schooling of parents and years of schooling of children by birth cohort, origin, and age at migration. Fig. c) shows polychoric correlation coefficients between the highest 6-group education level of parents and 5-group education level of children by birth cohort, origin, and age at migration. Fig. d) shows Kruskal-Goodman gamma coefficients between the highest 6-group education level of parents and 5-group education level of children by birth cohort, origin, and age at migration. Fig. e) shows phi-parameters from unidiff models of the highest 6-group education level of parents and 5-group education level of children separately by birth cohort and origin.

*Table A.1: Years of schooling by birth year, immigrant status, and source of parental education information*

| | *All* | | | *Imputed* | | | *Survey-Based* | | | *Register-Based* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| *Birth year* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* |
| *Years of schoooling* | | | | | | | | | | | | |
| a) Native Danes | 12.726 | 13.286 | 13.713 | – | – | – | – | – | – | 12.726 | 13.286 | 13.713 |
| | (2.262) | (2.315) | (2.525) | | | | | | | (2.262) | (2.315) | (2.525) |
| b) Immigrants | 11.086 | 11.754 | 12.573 | 10.861 | 11.255 | 12.008 | 11.944 | 12.172 | 12.739 | 10.896 | 12.026 | 13.630 |
| | (2.533) | (2.579) | (2.778) | (2.361) | (2.379) | (2.634) | (2.520) | (2.572) | (2.771) | (2.562) | (2.725) | (2.820) |
| c) Descendants | 12.678 | 12.456 | 12.985 | 12.007 | 11.987 | 12.620 | 13.315 | 12.761 | 13.199 | 12.704 | 12.634 | 13.222 |
| | (2.508) | (2.580) | (2.777) | (2.371) | (2.434) | (2.744) | (2.783) | (2.554) | (2.736) | (2.503) | (2.614) | (2.801) |
| Observations | 442,949 | 644,342 | 559,390 | 652 | 5,438 | 13,024 | 798 | 5,720 | 16,982 | 436,548 | 625,887 | 523,936 |

*Notes:* This table shows the average years of schooling at age 30 of groups defined by birth cohort (1965-1970, 1971-1980, and 1981-1990), origin (native Danes, immigrants, and descendants of immigrants), and source of parental education information (imputed, survey-based, and register-based). Standard deviations in parentheses.

*Table A.2: Mobility estimates by birth year, immigrant status, and controls*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| *Birth year* | *1965-70* | | *1971-80* | | | *1981-90* | |
| *Regression coefficient* | | | | | | | |
| b) Immigrants | 0.416*** | 0.186*** | 0.389*** | 0.229*** | 0.312*** | 0.278*** | 0.281*** |
| | (0.019) | (0.023) | (0.012) | (0.017) | (0.016) | (0.019) | (0.019) |
| c) Descendants | 0.254*** | 0.252*** | 0.268*** | 0.254*** | 0.288*** | 0.275*** | – |
| | (0.021) | (0.021) | (0.012) | (0.014) | (0.011) | (0.013) | |
| *Controls:* | | | | | | | |
| Country of origin | | X | | X | | X | X |
| Age at migration | | | | | | | X |

*Notes:* The table shows regression coefficients of parental years of schooling on years of schooling of children by birth cohort of the child for immigrants and descendants of immigrants with parents whose source of educational information is register-based corresponding to rows 10-12 of Table 3. Estimates in (1), (3), and (5) are obtained from regressions without any additional controls. Estimates in (2), (4), and (6) are obtained from regressions which control for country or region of origin (Turkey, Pakistan, Lebanon, Somalia, Iraq, other MENA, EU15, other Western, and other non-Western). Estimates in (7) are obtained from a regression with controls for country or region of origin and age at migration.
*: $p<0.05$; **: $p<0.01$; ***: $p<0.001$

*Table A.3: Mobility estimates by birth year, immigrant status, and source of parental education information*

| | *All* | | | *Imputed* | | | *Survey-Based* | | | *Register-Based* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| *Birth year* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* | *1965-70* | *1971-80* | *1981-90* |
| *A: Regression coefficient* | | | | | | | | | | | | |
| a) Native Danes | 0.278*** | 0.320*** | 0.440*** | – | – | – | – | – | – | 0.278*** | 0.320*** | 0.440*** |
| | (0.001) | (0.001) | (0.001) | | | | | | | (0.001) | (0.001) | (0.001) |
| b) Immigrants | 0.268*** | 0.185*** | 0.168*** | 0.141*** | 0.139*** | 0.039*** | 0.249*** | 0.152*** | 0.238*** | 0.416*** | 0.389*** | 0.312*** |
| | (0.014) | (0.007) | (0.006) | (0.042) | (0.012) | (0.011) | (0.042) | (0.015) | (0.009) | (0.019) | (0.012) | (0.016) |
| c) Descendants | 0.240*** | 0.198*** | 0.167*** | -0.268 | -0.001 | -0.003 | 0.236 | 0.075*** | 0.130*** | 0.254*** | 0.268*** | 0.288*** |
| | (0.021) | (0.009) | (0.008) | (0.161) | (0.020) | (0.015) | (0.292) | (0.020) | (0.017) | (0.021) | (0.012) | (0.011) |
| *B: Upward mobility* | | | | | | | | | | | | |
| d) Native Danes | 0.639 | 0.571 | 0.512 | – | – | – | – | – | – | 0.639 | 0.571 | 0.512 |
| e) Immigrants | 0.661 | 0.511 | 0.452 | 0.379 | 0.345 | 0.333 | 0.485 | 0.492 | 0.512 | 0.767 | 0.680 | 0.510 |
| f) Descendants | 0.479 | 0.587 | 0.622 | 0.378 | 0.513 | 0.571 | 0.641 | 0.607 | 0.686 | 0.477 | 0.606 | 0.621 |
| *C: Share of sample* | | | | | | | | | | | | |
| g) Immigrants | – | – | – | 0.152 | 0.331 | 0.332 | 0.163 | 0.313 | 0.524 | 0.685 | 0.357 | 0.144 |
| h) Descendants | – | – | – | 0.023 | 0.200 | 0.291 | 0.025 | 0.210 | 0.232 | 0.952 | 0.590 | 0.477 |
| Observations | 437,782 | 636,665 | 553,179 | 651 | 5,381 | 12,769 | 796 | 5,703 | 16,764 | 436,335 | 625,581 | 523,646 |

*Notes:* Panel A shows regression coefficients of parental years of schooling on years of schooling of children by birth cohort of the child, source of educational information of the parents, for native Danes, immigrants, and children of immigrants respectively. Estimates in (4)-(9) are from regressions in which samples are re-weighted to the distributions of parental education of parents with register-based education data. Panel B shows the fraction of children who attain more years of schooling than that of the highest educated parent by birth cohort of the child, source of educational information of the parents, for native Danes, immigrants, and children of immigrants respectively. Panel C shows the share of each cohort of immigrants or descendants with parental education information from each of the three possible sources.

*: p<0.05; **: p<0.01; ***: p<0.001

*Table A.4: Sibling correlations by sample type*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Birth cohort:* | *1965-70* | *1971-80* | *1981-90* | *Difference (3)-(1)* |
| *A: Full Sample* | | | | |
| a) Native Danes | 0.405*** | 0.429*** | 0.437*** | 0.032*** |
| | (0.003) | (0.002) | (0.003) | (0.004) |
| b) Immigrants | 0.439*** | 0.436*** | 0.421*** | -0.018 |
| | (0.025) | (0.015) | (0.009) | (0.026) |
| Difference a) vs. b) | 0.034 | 0.007 | -0.015 | |
| | (0.026) | (0.015) | (0.010) | |
| c) Descendants | 0.480*** | 0.424*** | 0.365*** | -0.114* |
| | (0.049) | (0.018) | (0.012) | (0.049) |
| Difference a) vs. c) | 0.075 | -0.005 | -0.071*** | |
| | (0.045) | (0.018) | (0.012) | |
| *B: Sample with valid parental information* | | | | |
| d) Native Danes | 0.405*** | 0.429*** | 0.436*** | 0.032*** |
| | (0.003) | (0.002) | (0.003) | (0.004) |
| e) Immigrants | 0.424*** | 0.436*** | 0.418*** | -0.018 |
| | (0.033) | (0.015) | (0.012) | (0.026) |
| Difference d) vs. e) | 0.019 | 0.022 | -0.018 | |
| | (0.032) | (0.020) | (0.012) | |
| f) Descendants | 0.500*** | 0.424*** | 0.382*** | -0.114* |
| | (0.047) | (0.018) | (0.015) | (0.049) |
| Difference d) vs. f) | 0.095* | 0.005 | -0.054** | |
| | (0.048) | (0.020) | (0.017) | |

*Notes:* Panel A shows intraclass correlations between years of schooling of the full sample of siblings born within a three-year window for groups defined by birth cohort (1965-1970, 1971-1980, and 1981-1990) and origin (native Danes, immigrants, and descendants of immigrants). Panel B shows sibling correlations for those with at least one parent for whom the source of education information is either administrative registers or the immigrant education survey. All standard errors are obtained by 1000 bootstraps.

*: p<0.05; **: p<0.01; ***: p<0.001

*Table A.5: Mobility estimates by immigrant status from survey data*

| | (1) Native Danes | (2) Immigrants | (3) Difference (ND-I) |
|---|---|---|---|
| *Panel A: Regression of Child Years of Schooling on Parent's Years of Schooling* | | | |
| Parental years of schooling | 0.394*** | 0.489*** | -0.095 |
| | (0.025) | (0.066) | (0.071) |
| Intercept | 8.950*** | 7.850*** | 1.100 |
| | (0.324) | (0.790) | (0.853) |
| *Panel B: Controlling for Age and Dataset* | | | |
| Parental years of schooling | 0.390*** | 0.485*** | -0.095 |
| | (0.025) | (0.094) | (0.097) |
| Intercept | 8.990*** | 7.861*** | 1.129 |
| | (0.325) | (0.777) | (0.842) |
| Age at interview | X | X | X |
| Dataset dummy (ESS vs ESS) | X | X | X |
| Observations | 1,422 | 192 | |

*Notes:* Estimates based on pooling respondents from the European Social Surveys and European Values Survey born 1975-1989. Restricted to those aged 28-49 at the time of the survey. Survey-specific sampling weights applied. Age at interview and dataset dummy in Panel B are mean-centered to yield comparable intercepts across the two panels.
*: p<0.05; **: p<0.01; ***: p<0.001

*Table A.6: Estimates of relative educational mobility by birth cohort and migration status*

| | A: Regression coefficient | | | B: Pearson correlation | | | C: Unidiff-phi | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | Danes | Immigrants | Descend. | Danes | Immigrants | Descend. | Danes | Immigrants | Descend. |
| 1965-69 | 0.274*** | 0.265*** | 0.228*** | 0.329*** | 0.314*** | 0.261*** | 1.000 | 0.754*** | 0.636*** |
| | (0.001) | (0.015) | (0.024) | (0.002) | (0.018) | (0.026) | (.) | (0.049) | (0.065) |
| 1970-72 | 0.303*** | 0.258*** | 0.295*** | 0.355*** | 0.324*** | 0.338*** | 1.061*** | 0.791** | 0.819* |
| | (0.002) | (0.017) | (0.024) | (0.002) | (0.021) | (0.027) | (0.008) | (0.056) | (0.069) |
| 1973-75 | 0.311*** | 0.193*** | 0.200*** | 0.358*** | 0.252*** | 0.228*** | 1.082*** | 0.567*** | 0.530*** |
| | (0.002) | (0.014) | (0.018) | (0.002) | (0.018) | (0.020) | (0.008) | (0.047) | (0.048) |
| 1976-78 | 0.322*** | 0.145*** | 0.200*** | 0.356*** | 0.188*** | 0.236*** | 1.088*** | 0.440*** | 0.602*** |
| | (0.002) | (0.013) | (0.015) | (0.002) | (0.016) | (0.019) | (0.009) | (0.037) | (0.043) |
| 1979-89 | 0.350*** | 0.159*** | 0.159*** | 0.364*** | 0.187*** | 0.181*** | 1.099*** | 0.405*** | 0.400*** |
| | (0.003) | (0.015) | (0.019) | (0.003) | (0.017) | (0.021) | (0.010) | (0.038) | (0.048) |
| 1981-83 | 0.398*** | 0.141*** | 0.201*** | 0.386*** | 0.154*** | 0.220*** | 1.126*** | 0.357*** | 0.587*** |
| | (0.003) | (0.011) | (0.016) | (0.002) | (0.013) | (0.017) | (0.009) | (0.028) | (0.042) |
| 1984-86 | 0.444*** | 0.168*** | 0.157*** | 0.396*** | 0.177*** | 0.161*** | 1.132*** | 0.427*** | 0.448*** |
| | (0.003) | (0.011) | (0.016) | (0.002) | (0.011) | (0.016) | (0.009) | (0.026) | (0.039) |
| 1987-90 | 0.467*** | 0.182*** | 0.147*** | 0.392*** | 0.180*** | 0.147*** | 1.100*** | 0.431*** | 0.360*** |
| | (0.002) | (0.010) | (0.010) | (0.002) | (0.009) | (0.010) | (0.008) | (0.021) | (0.023) |

*Notes:* Panel A shows coefficients from regressions of years of schooling of children on average years of schooling of their parents by birth cohort, separately for native Danes, immigrants, and descendants of immigrants. Panel B shows correlation coefficients between years of schooling of children and average parental years of schooling grouped as in Panel A. Standard errors of correlations are obtained from 1000 bootstraps. Panel C shows phi-paramters from a unidiff model of ordinal educational level of children on the highest ordinal education level of either parent, native Danes from the 1965-1969 cohort are the reference group.

*: p<0.05; **: p<0.01; ***: p<0.001

*Table A.7: Shares with upward mobility by birth cohort, migration status and parental education*

| | A: Bottom 30% | | | | | B: Top 30% | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | Danes | +Desc. | +Imm. by age 5 | +Imm. by age 10 | +Imm. by age 15 | Danes | +Desc. | +Imm. by age 5 | +Imm. by age 10 | +Imm. by age 15 |
| 1965 | 0.991 | 0.991 | – | – | 0.991 | 0.319 | 0.318 | – | – | 0.318 |
| 1966 | 0.991 | 0.991 | – | – | 0.990 | 0.313 | 0.313 | – | – | 0.312 |
| 1967 | 0.984 | 0.984 | – | – | 0.984 | 0.308 | 0.308 | – | – | 0.307 |
| 1968 | 0.971 | 0.971 | – | – | 0.971 | 0.297 | 0.296 | – | – | 0.296 |
| 1969 | 0.963 | 0.963 | – | – | 0.963 | 0.301 | 0.301 | – | – | 0.300 |
| 1970 | 0.944 | 0.944 | – | 0.944 | 0.944 | 0.303 | 0.303 | – | 0.303 | 0.302 |
| 1971 | 0.925 | 0.925 | – | 0.926 | 0.926 | 0.303 | 0.303 | – | 0.302 | 0.302 |
| 1972 | 0.914 | 0.914 | – | 0.914 | 0.914 | 0.300 | 0.299 | – | 0.299 | 0.298 |
| 1973 | 0.899 | 0.899 | – | 0.900 | 0.900 | 0.302 | 0.301 | – | 0.300 | 0.299 |
| 1974 | 0.886 | 0.886 | – | 0.887 | 0.887 | 0.299 | 0.299 | – | 0.298 | 0.297 |
| 1975 | 0.863 | 0.863 | 0.864 | 0.864 | 0.864 | 0.303 | 0.302 | 0.301 | 0.301 | 0.299 |
| 1976 | 0.850 | 0.851 | 0.852 | 0.852 | 0.852 | 0.306 | 0.305 | 0.304 | 0.304 | 0.302 |
| 1977 | 0.838 | 0.838 | 0.839 | 0.839 | 0.839 | 0.301 | 0.300 | 0.300 | 0.299 | 0.297 |
| 1978 | 0.818 | 0.819 | 0.820 | 0.820 | 0.819 | 0.300 | 0.300 | 0.299 | 0.298 | 0.297 |
| 1979 | 0.799 | 0.802 | 0.802 | 0.802 | 0.801 | 0.300 | 0.298 | 0.297 | 0.295 | 0.293 |
| 1980 | 0.794 | 0.797 | 0.797 | 0.797 | 0.796 | 0.302 | 0.302 | 0.301 | 0.299 | 0.298 |
| 1981 | 0.770 | 0.773 | 0.774 | 0.774 | 0.773 | 0.305 | 0.304 | 0.303 | 0.301 | 0.299 |
| 1982 | 0.740 | 0.744 | 0.744 | 0.744 | 0.744 | 0.309 | 0.309 | 0.307 | 0.305 | 0.302 |
| 1983 | 0.726 | 0.730 | 0.731 | 0.731 | 0.730 | 0.314 | 0.313 | 0.312 | 0.311 | 0.307 |
| 1984 | 0.709 | 0.713 | 0.715 | 0.714 | 0.714 | 0.320 | 0.319 | 0.317 | 0.315 | 0.312 |
| 1985 | 0.681 | 0.687 | 0.688 | 0.688 | 0.689 | 0.324 | 0.324 | 0.322 | 0.320 | 0.317 |
| 1986 | 0.675 | 0.682 | 0.682 | 0.683 | 0.682 | 0.331 | 0.330 | 0.329 | 0.327 | 0.325 |
| 1987 | 0.663 | 0.672 | 0.673 | 0.673 | 0.672 | 0.341 | 0.339 | 0.338 | 0.335 | 0.333 |
| 1988 | 0.646 | 0.655 | 0.655 | 0.655 | 0.655 | 0.337 | 0.337 | 0.336 | 0.335 | 0.332 |
| 1989 | 0.647 | 0.657 | 0.657 | 0.658 | 0.658 | 0.336 | 0.335 | 0.334 | 0.332 | 0.330 |
| 1990 | 0.647 | 0.655 | 0.656 | 0.657 | 0.658 | 0.333 | 0.331 | 0.330 | 0.329 | 0.327 |

*Notes:* The table shows the fraction of upwardly mobile children in each birth year, i.e., those with more years of schooling at age 30 than the maximum years of schooling obtained by either parent when the child was 15. Fractions are shown separately for native Danes; native Danes, and descendants of immigrants; native Danes, descendants of immigrants, and immigrants arriving by age 5; native Danes, descendants of immigrants, and immigrants arriving by age 10; and native Danes, descendants of immigrants, and immigrants arriving by age 15. Panel A and B show fractions separately for children whose parents are in the bottom or top 30% of the distribution of parental years of schooling for the given birth cohort, respectively.