The untold story of internal migration in Germany:

Patterns, developments, and the role of education

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Importance of internal mobility

- **Macro level**: important driver of economic growth and technological development
  - Both depend on workers willingness to reallocate to innovative and productive labor markets (e.g., Caselli & Coleman, 2001; Amior & Manning, 2018)
  - Regional mobility leads to a more efficient match between workers and firms (e.g., Dauth et al., 2022)
- **Micro level**:
  - Tool to improve individuals' economic situation and well-being (e.g., Briggs & Kuhn, 2008; Deryugina et al., 2018; Groen et al., 2020)
  - Disruptive event - might yield unintended consequences (e.g., Nassal & Paul 2022)
- Ongoing attention in research to patterns, trends, and determinants of internal mobility, esp. in the US
  - Fundamental to the American narrative (e.g., Zimran, 2022)
  - Declining rates of mobility over time in the US (e.g., Jia et al, 2023)

Limited evidence for Germany

- Severe data limitations (e.g., no information on individual's place of birth in the Censuses)
- Basic time series based on aggregate data from Residents' Registration Offices
  - Short-term (annual) mobility rates
  - Widespread conjecture of "generally low" or "negligible" mobility in Germany
- Exception: Migration across the former East-West German border after the fall of the Berlin Wall (e.g., Burda, 1993; Werding, 2002; Fuchs-Schündeln & Schündeln, 2009; Sander, 2014; Stawarz et al, 2020; Riphahn & Sauer, 2024)
- Missing evidence on the extent and patterns of long-run mobility, esp. over the life cycle and across various socio-economic groups

In a nutshell

This paper

- uses unique survey data on residential biographies
- provides a comprehensive and detailed analysis of internal mobility in Germany
  - describes the patterns and trends from the life-cycle perspective
  - finds substantial differences along the life cycle and across groups, especially by education
  - abolishes the myth of "negligible mobility" in Germany
- zooms into the education-mobility gradient
  - by using two sources of (arguably) exogenous variation
  - at different margins of educational distribution
- finds no causal link between education and regional mobility

Contribution to the literature

- Research on **internal mobility patterns** in the US and other countries (e.g., Molloy et al., 2011; Jia et al., 2022; Zimran, 2022; Peri & Zaiour, 2023)

  → Add a comprehensive and detailed analysis of across the entire life-cycle from a lower mobility context

- Causal evidence on **determinants of internal mobility**, especially the impact of education (e.g., Machin et al. 2012; Weiss, 2015; Aparicio Fenoll & Kuehn, 2017)

  → Extend by using two sources of exogenous variation at different margins of the educational distribution
  - Compulsory schooling extensions and school entry cutoffs
  - German setting ideal: no mechanical link between the two

- Research on German data **assigning earlier treatments based on current location** (e.g., Pischke, 2007; Cygan-Rehm & Maeder, 2013; Jürges, 2013; Akbulut-Yüksel, 2014; Bach et al., 2019; Dehos & Paul, 2023)

  → Provide evidence on the extent of measurement error

  → Draw attention to a unique source of data allowing to test the potential endogeneity issues due to regional mobility

Outline

The National Educational Panel Study – Starting Cohort Adults (NEPS–SC6)

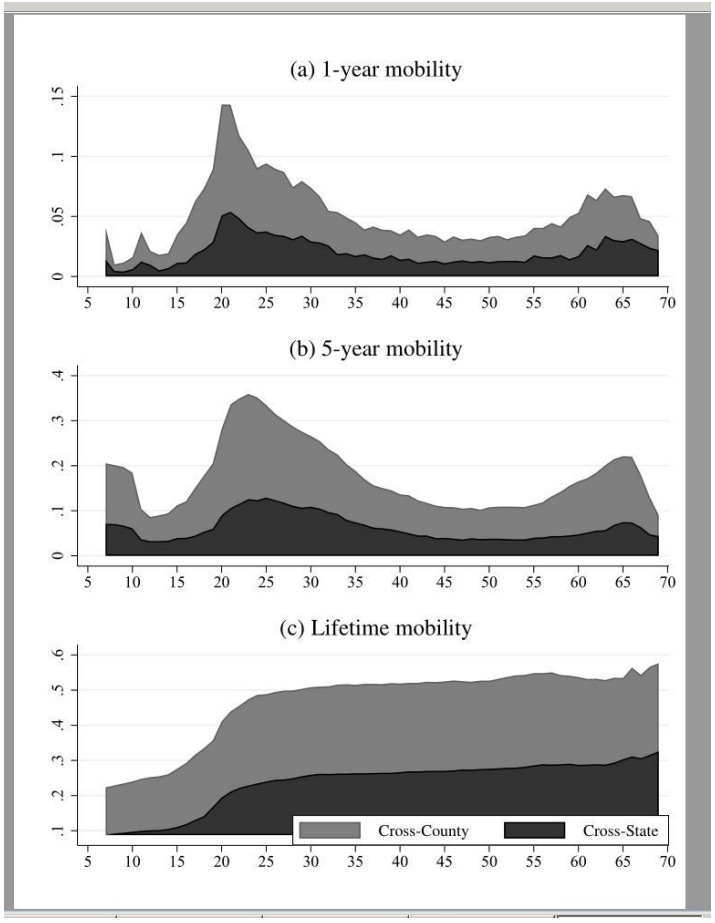
- Sample of individuals born 1944–1986, interviews 2007–2020
- Unique source of **regional information across the life cycle**
  - Place of birth
  - Residential biographies (retrospective, updated)
  - Location of educational institutions (retrospective, updated)
  - Place of employment (retrospective, updated)
  - Geocodes
- Follow of a given individual across space **in monthly intervals** (starting from birth until the most recent interview)
- Residential biographies at the **state and county level** details
- Focus on individuals born in Germany → approx. 13,000 descriptives

Measures of internal mobility

1. **Time dimension**
   - 1-year mobility (0/1): location in a given month vs. 12 months ago
   - 5-year mobility (0/1): location in a given month vs. 60 months ago
   - Lifetime mobility (0/1): location in a given month vs. at birth

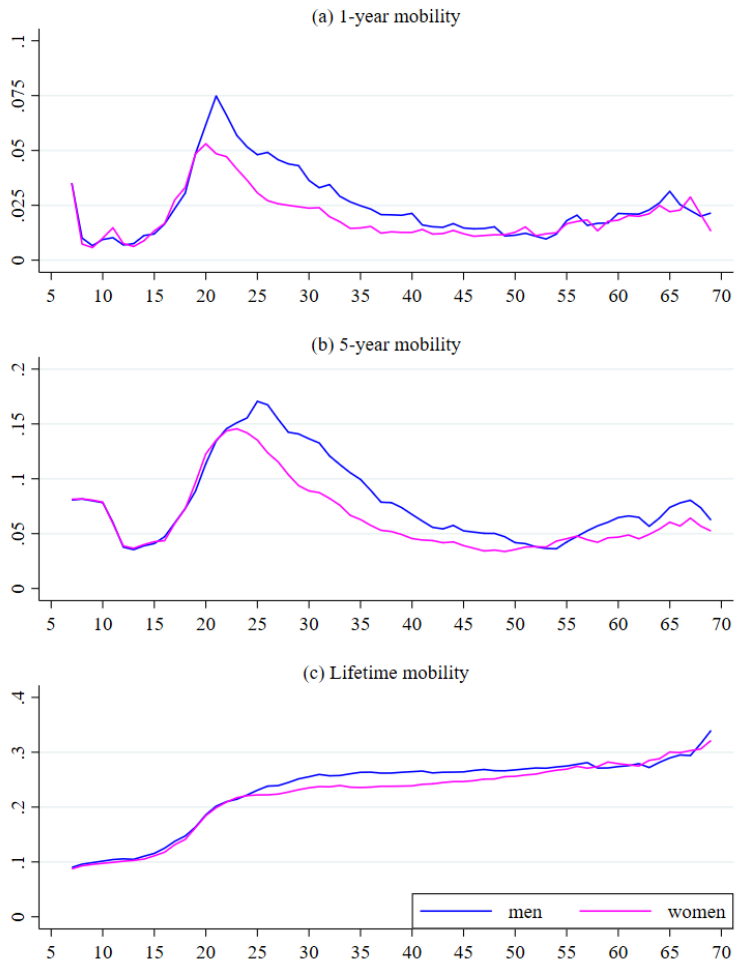
2. **Geographical unit**
   - state
   - county
   - municipality
   - geocodes (binary outcomes $\rightarrow$ distances in km)

Regional mobility peaks during times of important educational decisions

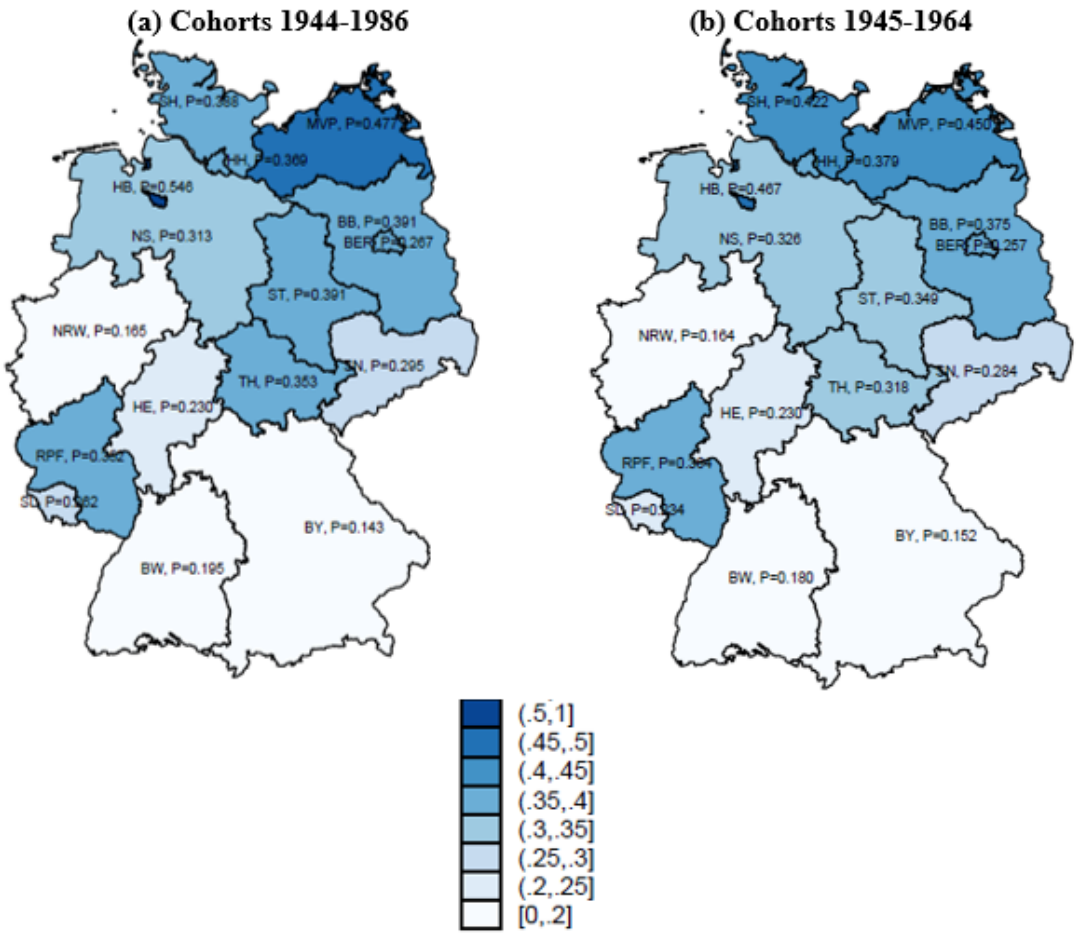


Note: The figure plots the age-specific migration rates of various mobility measures. All data use a cross-sectional survey weight calibrated to Micro Census 2011. *Source:* NEPS SC6:12.1.0.

Young women are less mobile than men

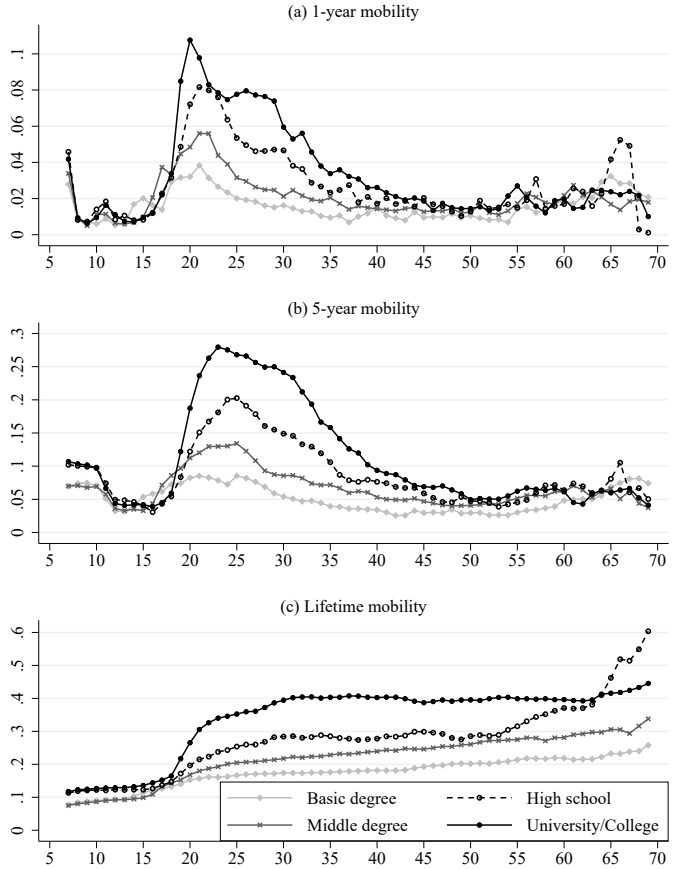


Substantial regional heterogeneity (ages 25−55)



Note: The figure shows the lifetime mobility rates averaged over ages 25-55 by the state of birth.

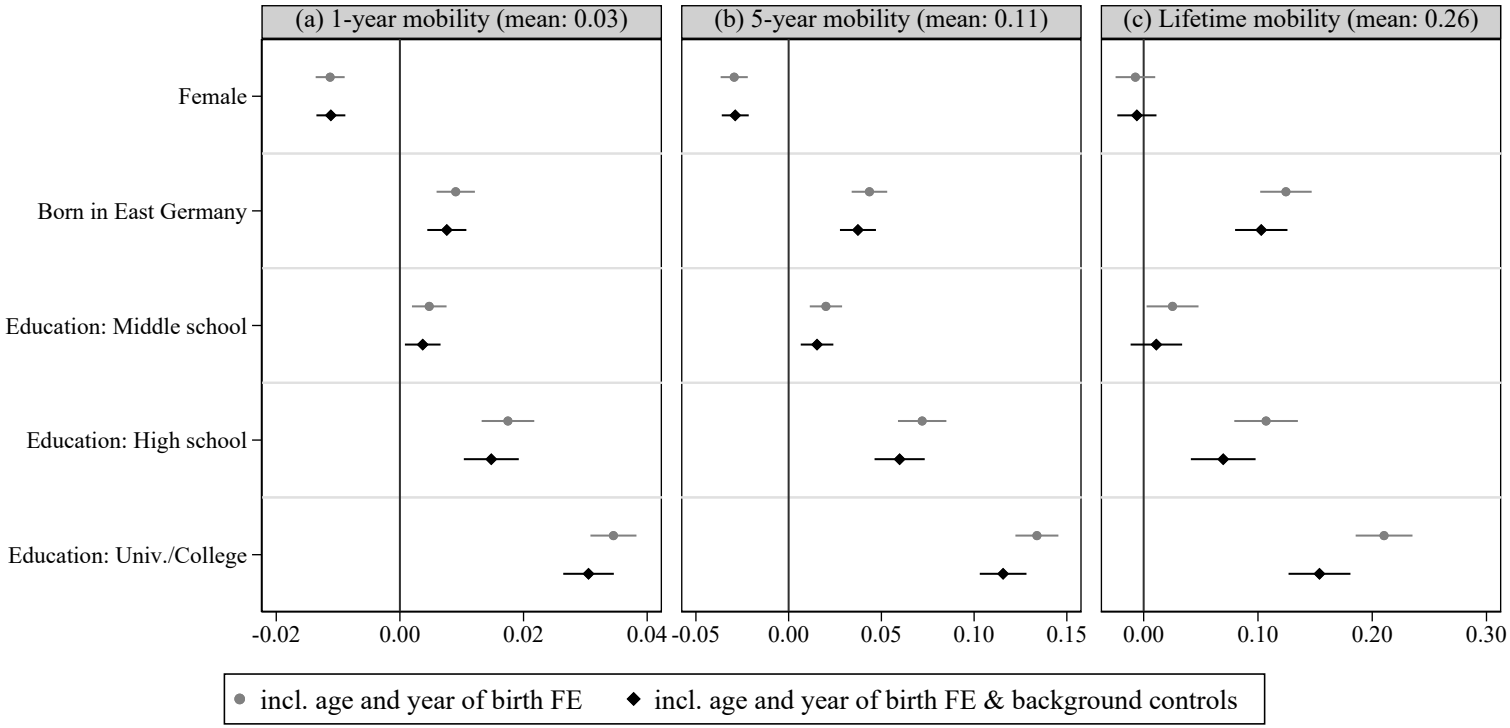
Better educated individuals are more mobile



Note: The figure plots the age-specific migration rates of various mobility measures by educational attainment. All data use a cross-sectional survey weight calibrated to Micro Census 2011. *Source:* NEPS SC6:12.1.0.

Determinants of lifetime mobility (cross-state)

county



Note: The figure plots the estimates from pooled OLS regressions of cross-state mobility on indicators for gender, being born in East German states, and educational attainment. All regressions include age and year of birth fixed effects (FE). The extended specification (black diamonds) additionally include individual background characteristics such as parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, and dummies for missing information on each covariate. All regressions use a cross-sectional survey weight calibrated to Micro Census 2011. Sample restricted to individuals born in Germany and age years 25-55. The estimation sample consists of 2,268,745 person-age year observations on 12,661 individuals. Standard errors clustered at the individual level.

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(1) **Compulsory schooling extensions**

- From 8 to 9 years in West-German states after World War II
- Increased schooling duration at the bottom of the educational distribution

(e.g., Pischke & von Waechter, 2008; Cygan-Rehm & Maeder, 2013; Bömmel & Heineck, 2022; Cygan-Rehm, 2023)

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(2) **School entry regulations**

- Cutoffs in birth date, which determine the timing of school start
- Affect secondary school track placement: ↑ probability of attending the academic track (i.e., shift at a higher level of the educ. distribution)

(e.g., Puhani & Weber 2008; Muhlenweg & Puhani 2010; Dustmann et al. 2017, Görlitz et al., 2022)

Educational system in West Germany after WWII

- **School enrollment**
  - Typically in the year of the 6^{th} birthday
  - Exact cutoff dates regulated at the state level
  - High compliance (at least 70%)

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  - Basic track (*Hauptschule*): 8 or 9 grades $\rightarrow$ blue-collar jobs
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- **Compulsory schooling** duration
  - Refers to min. years of attendance (*not* school-leaving age)
  - Extensions from 8 to 9 years during the 1940s – 1960s
  - Staggered implementation across West German states details

Empirical strategy (1): Compulsory schooling

Difference-in-Differences (DD) – TWFE design:

$$Y_{ist}^{a} = \alpha^{a}\text{Reform}_{st} + \pi_{s}^{a} + \pi_{t}^{a} + X_{ist}'\gamma^{a} + \varepsilon_{ist}^{a} \quad (1)$$

where

- Y_{ist}^{a} Mobility measure at age a (0/1)
- Reform_{st} Exposure to compulsory schooling reform (0/1)
- π_s, π_t State and birth cohort fixed effects
- X_{ist}' Controls (e.g., gender, birth order, kindergarten attendance, parental education and citizenship, maternal age at birth, policies)

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Identification assumption: In absence of the reform, all states would have followed similar trends in outcomes → **Parallel trends** (untestable)

Validity checks: ⏩ Balancing tests, ⏩ Extended spec. & ⏩ Treat. effect heterogeneity

Empirical strategy (2): School entry cutoffs

Regression Discontinuity Design (RDD)

$$Y_i^a = \beta^a \text{After}_i + f^a(w_i) + Z_i'\delta^a + \epsilon_i^a \quad (2)$$

where

- Y_i^a Mobility measure at age a (0/1)
- $After_i$ Born after the cutoff (0/1)
- w_i Week of birth (normalized to zero at the cutoff)
- Z_i' Controls (e.g., gender, birth order, kindergarten attendance, parental education and citizenship, maternal age at birth, policies)

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Identification assumption: in absence of the cutoff, the outcomes would develop smoothly along $w_i \rightarrow$ **Smoothness** (untestable)

Validity checks: ⏩ Density, ⏩ Balancing tests & ⏩ Local Lin. Reg.

Compulsory schooling: Compliance

	(1) Years of schooling (in grades)	(2) Duration of schooling (calend. time)	(3) More than 8 years of schooling	(4) School starting age (placebo)
Panel A: DD regressions without controls				
Reform	0.574 ***	0.586 ***	0.383 ***	-0.186
	(0.115)	(0.137)	(0.031)	(0.173)
Panel B: DD regressions with controls				
Reform	0.548 ***	0.704 ***	0.411 ***	-0.120
	(0.117)	(0.149)	(0.033)	(0.164)
Y-Mean	10.150	9.704	0.786	6.441
Obs./Indiv.	5,258	5,258	5,258	5,258

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are measured at individual level. Each cell is based on a separate linear regression of Equation (1) using a cross-sectional weight calibrated to Micro Census 2011. All regressions include state and birth date fixed effects. Controls comprise gender, parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, exposure to short school years, and dummies for missing information on each covariate. Robust standard errors in parentheses. *Source:* NEPS SC6:12.1.0.

Cutoff rules: Compliance and immediate effects on educational outcomes

figure

	(1) School starting age	(2) Old for grade (7 vs. 6)	(3) Academic track placement
Panel A: RDD regressions without controls			
After	0.392 ***	0.397 ***	0.057 *
	(0.054)	(0.039)	(0.031)
Panel B: RDD regressions with controls			
After	0.393 ***	0.390 ***	0.052 *
	(0.052)	(0.038)	(0.028)
Y-Mean	6.417	0.415	0.207
Obs./Indiv.	4,651	4,651	4,651

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are measured at the individual level. Each cell is based on a separate linear regression using a cross-sectional weight calibrated to Micro Census 2011. All regressions include linear trends in the running variable (week of birth) that are allowed to vary on both sides of the cutoff. Controls comprise gender, parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, exposure to short school years, and dummies for missing information on each covariate. Robust standard errors in parentheses. *Source:* NEPS SC6:12.1.0.

Compulsory schooling & long-run mobility

	(1)	(2)	(3)	(4)	(5)	(6)
	Cross-state mobility			Cross-county mobility		
	1-year	5-year	Lifetime	1-year	5-year	Lifetime
Panel A: DD regressions without controls						
Reform	0.000	-0.001	0.019	0.002	0.001	0.005
	(0.002)	(0.007)	(0.029)	(0.003)	(0.012)	(0.033)
Panel B: DD regressions with controls						
Reform	0.001	-0.003	0.017	0.003	-0.001	-0.023
	(0.002)	(0.008)	(0.031)	(0.003)	(0.012)	(0.036)
Y-Mean	0.018	0.068	0.236	0.043	0.168	0.561
Obs.			159,685			
Indiv.			5,259			

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are measured at ages from 25 through 55. Each cell is based on a separate linear regression of Equation (1) using a cross-sectional weight calibrated to Micro Census 2011. All regressions include state and birth date fixed effects. Controls comprise gender, parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, exposure to short school years, and dummies for missing information on each covariate. Standard errors in parentheses are clustered at the individual level. *Source:* NEPS SC6:12.1.0.

Cutoff rules & long-run mobility

	(1)	(2)	(3)	(4)	(5)	(6)
	Cross-state mobility			Cross-county mobility		
	1-year	5-year	Lifetime	1-year	5-year	Lifetime
Panel A: RDD regressions without controls						
After	0.001	0.001	-0.018	-0.002	-0.015	-0.029
	(0.002)	(0.007)	(0.032)	(0.004)	(0.013)	(0.038)
Panel B: RDD regressions with controls						
After	0.000	-0.001	-0.020	-0.003	-0.017	-0.034
	(0.002)	(0.008)	(0.031)	(0.004)	(0.014)	(0.043)
Y-Mean	0.015	0.057	0.224	0.037	0.147	0.531
Obs.			140,383			
Indiv.			4,651			

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are measured at ages from 25 through 55. Each cell is based on a separate linear regression of Equation (2) using a cross-sectional weight calibrated to Micro Census 2011. All regressions include linear trends in the running variable (week of birth) that are allowed to vary on both sides of the cutoff. Controls comprise gender, parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, exposure to short school years, and dummies for missing information on each covariate. Standard errors in parentheses are clustered at the individual level. *Source:* NEPS SC6:12.1.0.

Robustness tests

- Unweighted regressions
- Compulsory schooling:
  - Control for state-specific trends in birth cohort
  - Control for state-specific changes in school quality (student-to-teacher ratio)
  - Borusyak et al. (2024) imputation estimator
  - Exclude always-treated states
  - Excluding single states
  - Placebo reforms (randomly assigned)
- School entry cutoffs:
  - Quadratic trends
  - Without the donut-hole
  - Control for early-enrollment exception
  - Smaller bandwidths
  - Nonparametric approach with optimal bandwidths
  - Placebo cutoffs (move each cutoff 3 months back and forth)

Preliminary conclusions

- Evidence on regional mobility in Germany over the life cycle
- Main descriptive findings:
  - substantial differences across the life course
  - regional mobility coincides with important educational decisions
  - mobility remains relatively low and stable at prime ages
  - substantial educational gradient in mobility
- Is there a causal element in the education-mobility gradient?
  - two sources of exogenous variation that induce a shift towards better education at different margins
  - the initial educational benefits do not translate into increased regional mobility
  - likely due to no effect on educational credentials (important in German context)

mechanisms

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mechanisms

Thank you!

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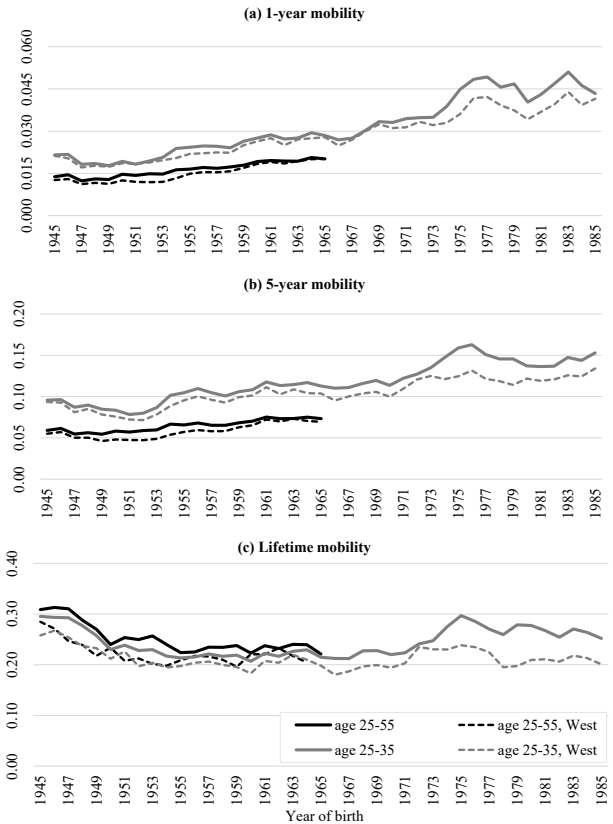
Slightly increasing trends over time

Figure A.4 Trends in cross-state mobility over time

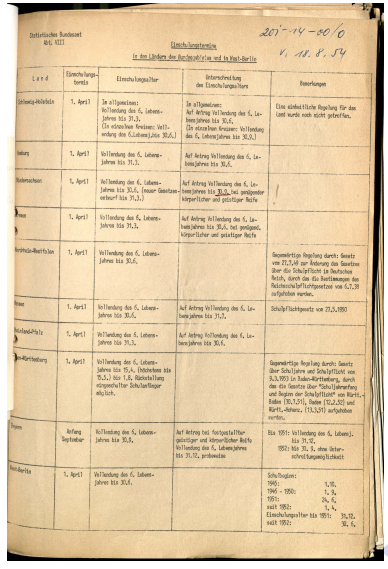


Note: Sample restricted to individuals born in Germany. Data weighted using a cross-sectional weight calibrated to Micro Census 2011. To smooth the data, the trends show three-year moving averages (i.e., including -/+1 year) instead of year-specific means.
Source: NEPS SC6:12.1.0.

Data on the treatments

Hand-collected data on school entry and leaving laws

- State-specific (sharp) cutoffs, early-enrollment exceptions, and compulsory schooling extensions
- Since the school year 1950/51 (post-war birth cohorts)
- From archival sources (school laws, official statistics, other historical records)
- Linkage with individual-level data by birth date (YYYY-MM) & state



Life-cycle panel of mobility outcomes

- Goal: infer **residential mobility** of a given individual **in monthly intervals over the life cycle** (starting from the month of birth)
- Challenge: missing or inconsistent information across different sources of information
- How to incorporate the available information into one variable?

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     - current vs retrospective information (address the recall problem)
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     - yields approx. 15% of missing monthly spells
  2. Fill in the unobserved monthly spells vertically by carrying forward the last observed spell

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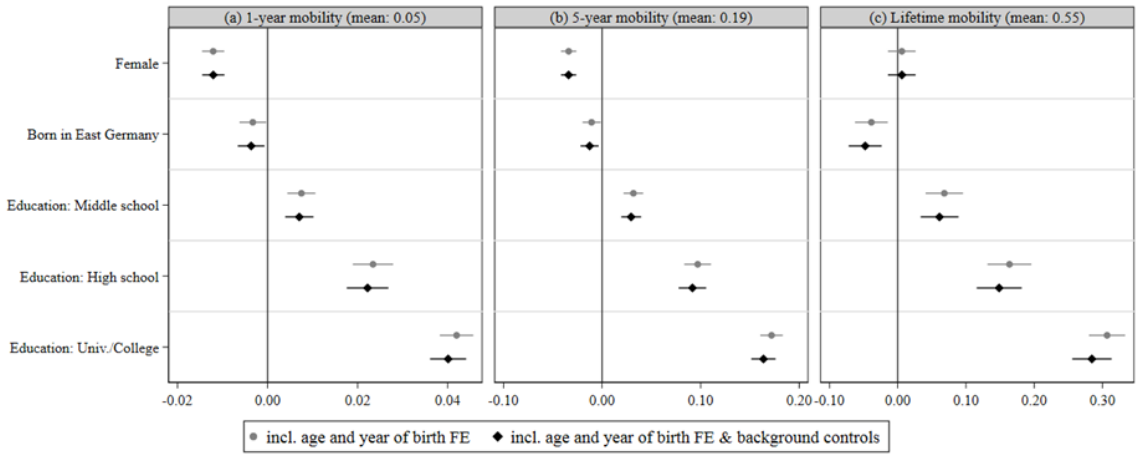
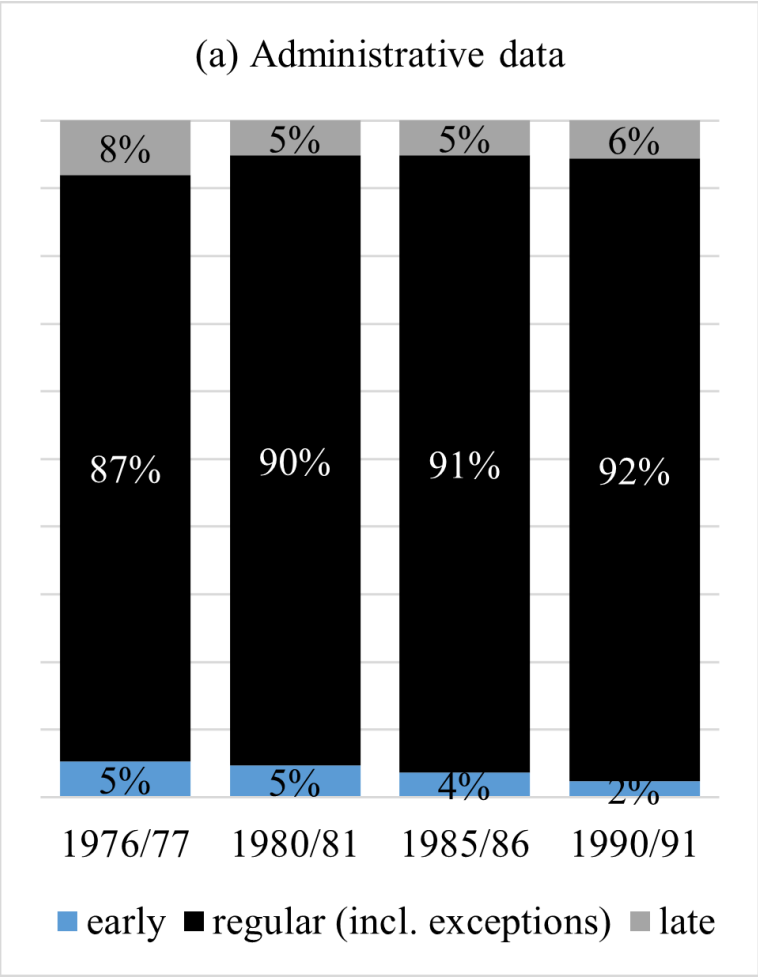
     - yields approx. 15% of missing monthly spells
  2. Fill in the unobserved monthly spells vertically by carrying forward the last observed spell
- Measurement error rather small (underestimated mobility)
- Validation using cross-sectional data from the Micro Census

Determinants of lifetime mobility (cross-county)

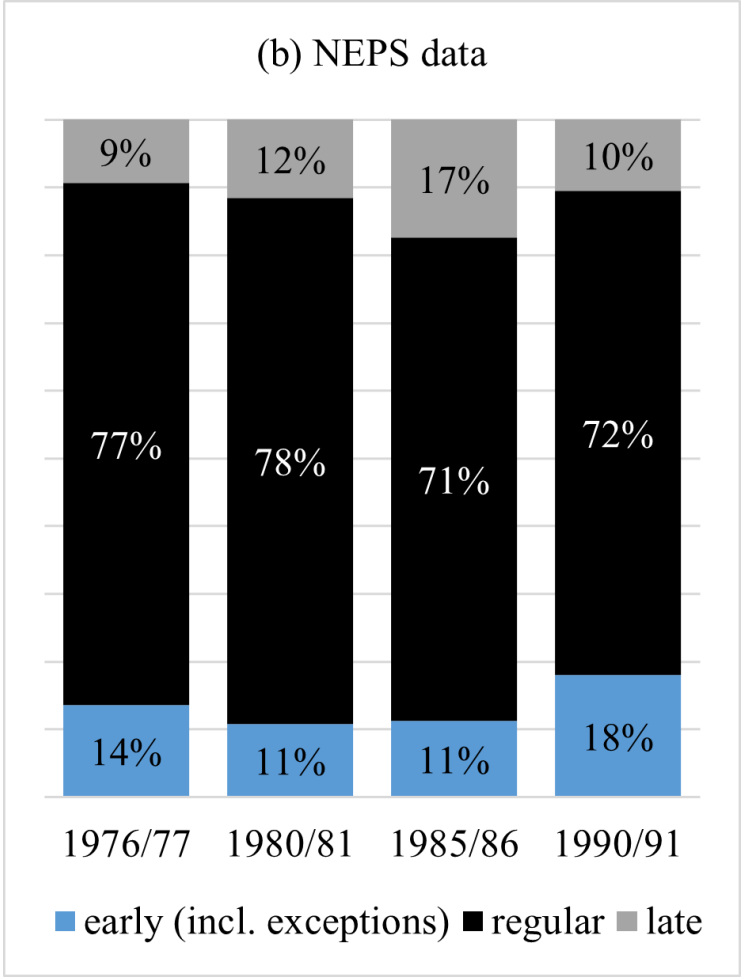


Note: The figure plots the estimates from pooled OLS regressions of cross-county mobility on indicators for gender, being born in East German states, and educational attainment. All regressions include age and year of birth fixed effects (FE). The extended specification (black diamonds) additionally include individual background characteristics such as parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, and dummies for missing information on each covariate. All regressions use a cross-sectional survey weight calibrated to Micro Census 2011. Sample restricted to individuals born in Germany and age years 25-55. The estimation sample consists of 2,268,745 person-age year observations on 12,661 individuals. Standard errors clustered at the individual level.

School starters by the type of enrollment

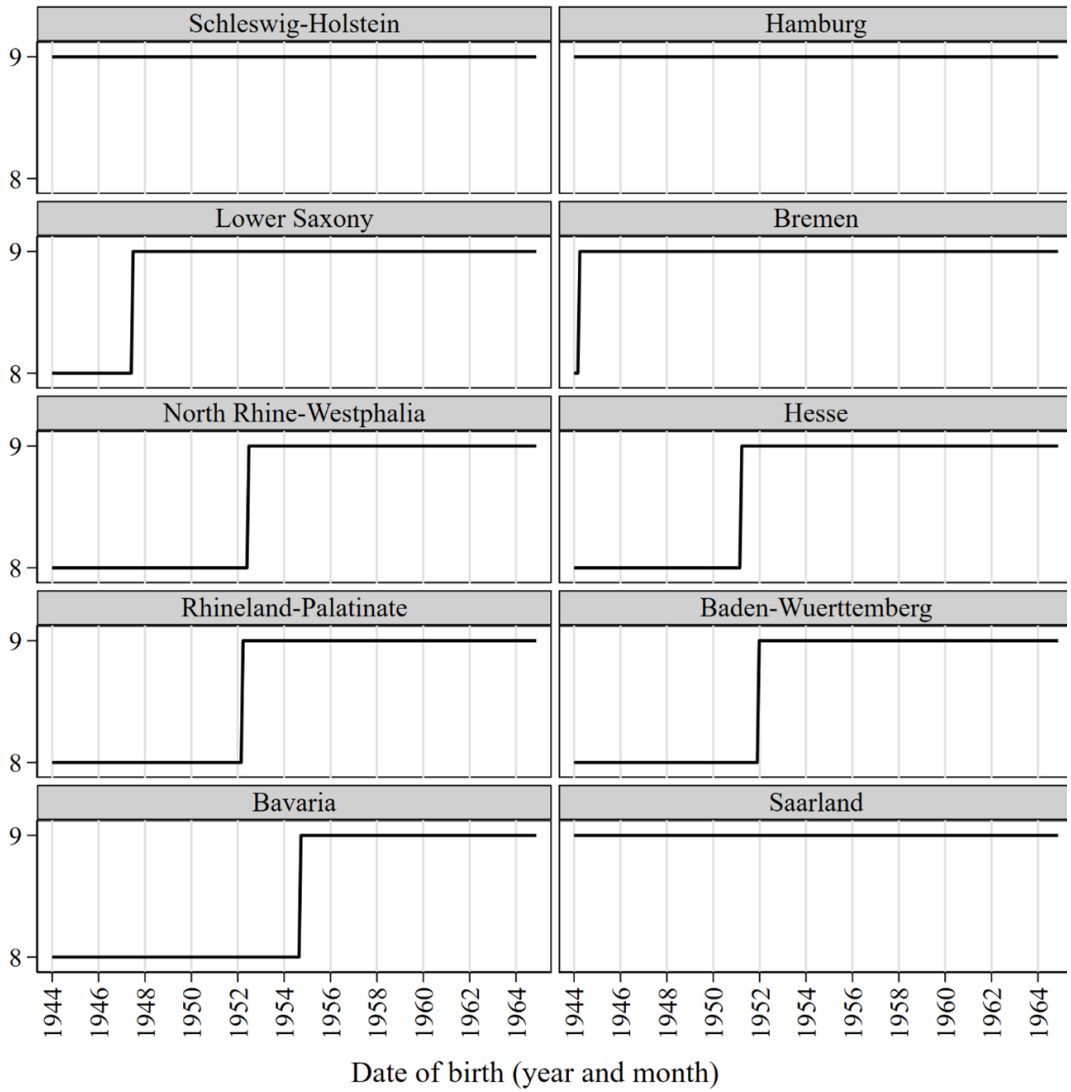


Source: DESTATIS



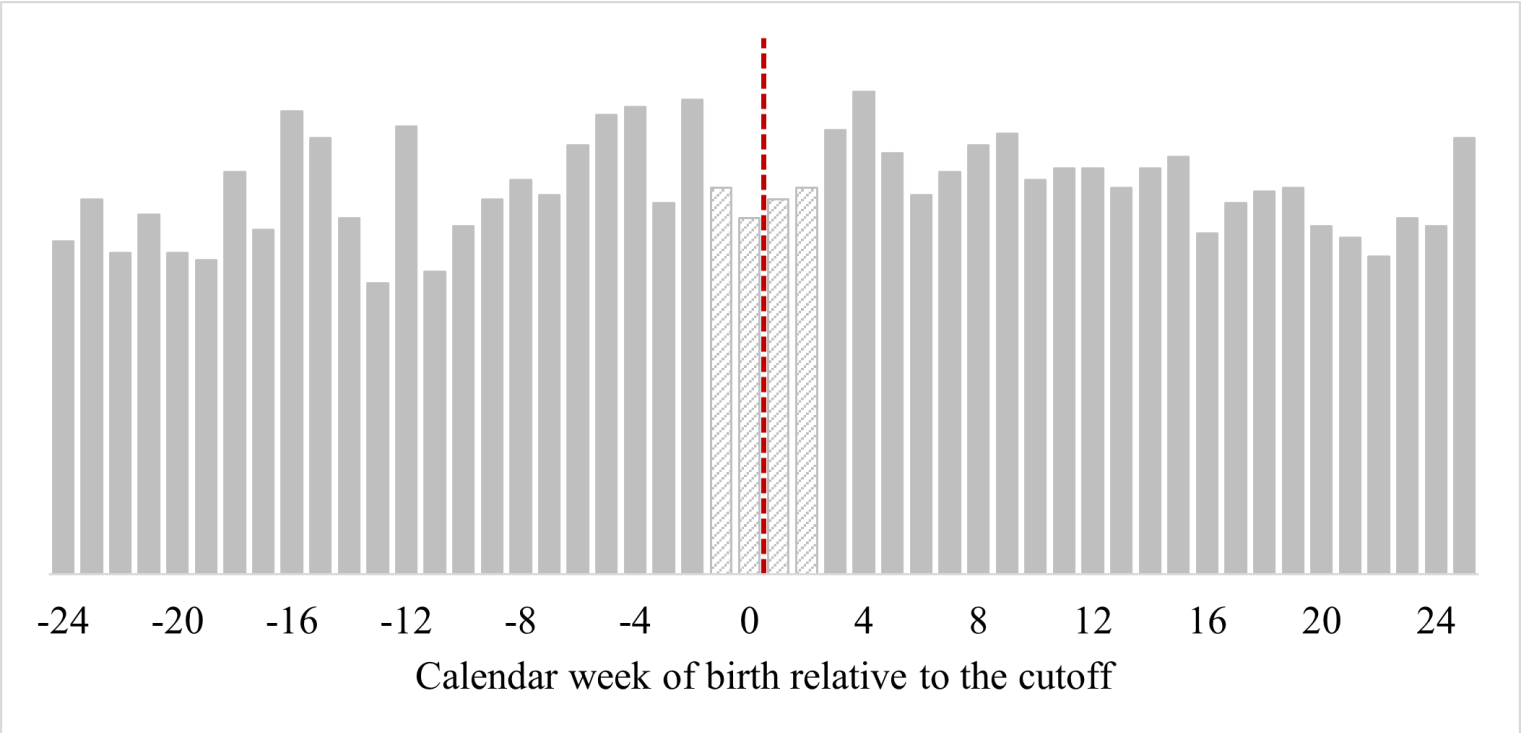
Source: NEPS SC6:12.1.0.

Compulsory schooling by state & birth cohort



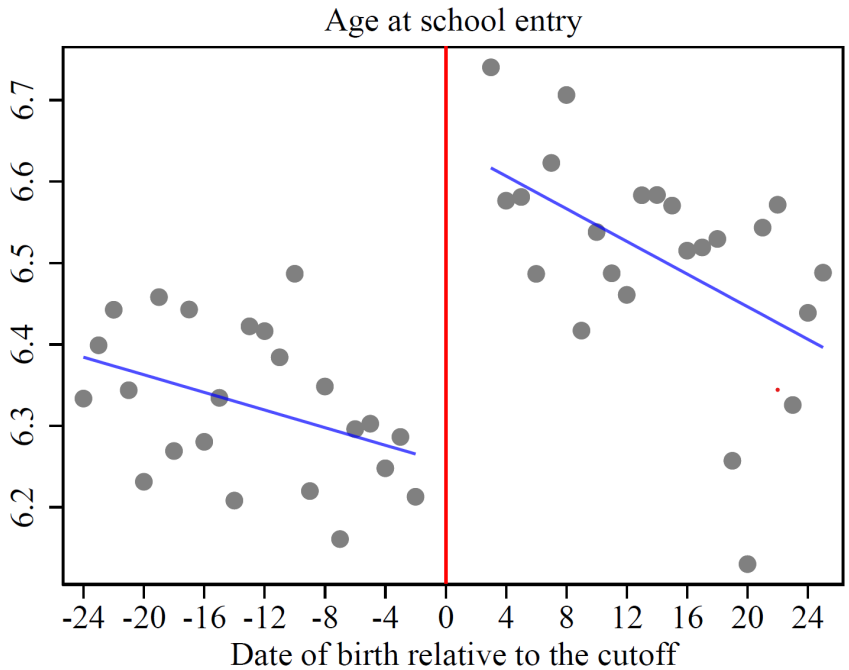
Note: The figure shows the required duration of compulsory schooling depending on state and birth date, which determines the expected year of school enrollment.
Source: State-specific laws from Makrolog (2019). Further details available on request.

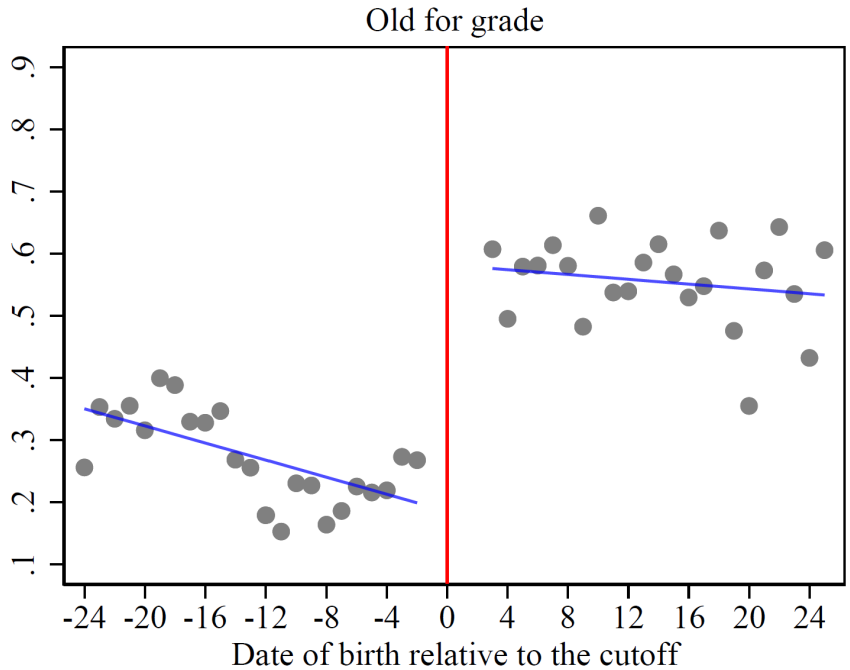
Distribution of births by running variable



Note: The figure shows the number of individuals in our estimation sample by the calendar week of birth relative to the cutoff for school enrolment. The lighter bars indicate the range of the running variable excluded in our donut-hole RDD regressions (-/+2 points). The density test using the robust inference procedure recommended by Cattaneo et al. (2020) yields a p-value of 0.5882. *Source:* NEPS SC6:12.1.0.

Cutoff rules & timing of school entry





Note: School starting age (in years) is calculated as a difference between the date of an individual's school entry and his/her date of birth. Birth date on the x-axis is measured in calendar weeks relative to the cutoff for school enrollment in an individual's state of residence at age 6. Source: NEPS SC6:12.1.0.

Compulsory schooling: Long-run effects on educational credentials

	(1) Basic degree	(2) Middle degree	(3) High school	(4) Vocational training	(5) University degree
Panel A: DD regressions without controls					
Reform	-0.028	0.026	0.002		-0.019
	(0.037)	(0.035)	(0.025)		(0.022)
Panel B: DD regressions with controls					
Reform	-0.023	0.031	-0.009		-0.028
	(0.037)	(0.038)	(0.027)		(0.024)
Y-Mean	0.449	0.307	0.224		0.148
Obs./Indiv.	5,258	5,258	5,258		4,651

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are measured at the individual level. Each cell is based on a separate linear regression using a cross-sectional weight calibrated to Micro Census 2011. All regressions include state and birth date fixed effects. Controls comprise gender, parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, exposure to short school years, and dummies for missing information on each covariate. Robust standard errors in parentheses.
Source: NEPS SC6:12.1.0.

Cutoff rules: Long-run effects on educational credentials

	(1) Basic degree	(2) Middle degree	(3) High school	(4) Vocational training	(5) University degree
Panel A: RDD regressions without controls					
After	-0.040	0.017	0.023		0.011
	(0.042)	(0.038)	(0.030)		(0.023)
Panel B: RDD regressions with controls					
After	-0.034	0.021	0.013		0.003
	(0.040)	(0.037)	(0.028)		(0.023)
Y-Mean	0.449	0.307	0.224		0.146
Obs./Indiv.	4,651	4,651	4,651	4,651	4,651

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are measured at the individual level. Each cell is based on a separate linear regression using a cross-sectional weight calibrated to Micro Census 2011. All regressions include linear trends in the running variable (week of birth) that are allowed to vary on both sides of the cutoff. Controls comprise gender, parental education and citizenship, maternal age at birth, an individual's birth order, kindergarten attendance, exposure to short school years, and dummies for missing information on each covariate. Robust standard errors in parentheses. *Source:* NEPS SC6:12.1.0.

Compulsory schooling: Long-run effects on cognitive skills

	(1) Reading competence	(2) Reading speed	(3) Self-assessed reading	(4) Math competence	(5) Self-assessed math
Panel A: DD estimate of the effect on cognitive skills					
Reform	0.240 ***	0.167 *	0.099	0.069	0.025
	(0.080)	(0.092)	(0.090)	(0.112)	(0.121)
Y-Mean	0.000	0.000	-0.053	-0.012	-0.024
Obs./Indiv.	3,411	3,684	3,322	2,259	2,231
Panel B: DD estimate of the effect on the probability of a missing outcome					
Reform	0.013	0.020	0.013	-0.028	-0.031
	(0.038)	(0.037)	(0.038)	(0.034)	(0.034)
Y-Mean	0.445	0.382	0.427	0.682	0.688
Obs./Indiv.	5,259	5,259	5,259	5,259	5,259

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are standardized. Each cell is based on a separate linear regression using a cross-sectional weight calibrated to Micro Census 2011. All regressions include state and birth date fixed effects. Robust standard errors in parentheses.
Source: NEPS SC6:12.1.0.

Cutoff rules: Long-run effects on cognitive skills

	(1) Reading competence	(2) Reading speed	(3) Self-assessed reading	(4) Math competence	(5) Self-assessed math
Panel A: RDD regressions without controls					
After	-0.041	-0.080	-0.045	0.031	0.059
	(0.092)	(0.103)	(0.093)	(0.118)	(0.122)
Y-Mean	-0.048	0.000	-0.051	-0.007	-0.021
Obs./Indiv.	3,020	3,263	2,944	1,975	1,952
Panel B: RDD regressions with controls					
After	-0.034	0.021	0.013	0.003	0.122
	(0.040)	(0.037)	(0.028)	(0.023)	(0.119)
Y-Mean	0.425	0.378	0.442	0.684	0.689
Obs./Indiv.	4,651	4,651	4,651	4,651	4,651

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. The outcomes are standardized. Each cell is based on a separate linear regression using a cross-sectional weight calibrated to Micro Census 2011. All regressions include linear trends in the running variable (week of birth) that are allowed to vary on both sides of the cutoff. Robust standard errors in parentheses. *Source:* NEPS SC6:12.1.0.

Treatment effect heterogeneity

- Standard TWFE estimate is biased if the effect varies across states or/and over time (e.g., Goodman-Bacon, 2021)
- How to deal with this?

$\rightarrow$

Local Linear Regressions

Back

- Is the assumption about linear trends correct?
- Higher-order polynomials can lead to overfitting and introduce a bias (e.g., Gelman and Imbens, 2019)
- How to estimate this more flexible using non-parametric approaches?

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Potential mechanisms

- Migration as an investment decision (Sjaastad 1962)
- Education can affect location choices through different channels

(1) **Improved ability** to react to disequilibria (Schultz 1975)

→ Assumption: education enhances the ability to acquire and interpret information and take appropriate actions (relocation)
→ Improvement in **cognitive abilities**? compulsory cutoffs

(2) **Increased supply** of higher-educated workers, i.e., local labor markets for this group become relatively thin

→ Assumption: education affects educational credentials (which are transferable between regions)
→ Important in Germany as secondary school degrees and postsecondary diplomas play a crucial role in certifying knowledge and skills
→ Effect on **educational credentials**? compulsory cutoffs

Compulsory schooling - Balancing tests

	(1)	(2)	(3)		(4)	
	Dependent variable: After (0/1)				Biv. correlation	
Female (0/1)	0.008	0.006	0.003		0.037	
	(0.008)	(0.008)	(0.007)		(0.038)	
Parental education (in yrs)	0.001	0.001	0.000		0.001	
	(0.002)	(0.002)	(0.002)		(0.203)	
Parental education: missing	0.046	0.063	0.019		0.011	
	(0.040)	(0.044)	(0.044)		(0.011)	
Non-German parent (0/1)		-0.023	-0.047		-0.010	
		(0.040)	(0.034)		(0.014)	
Non-German parent: missing		0.019	0.070		-0.001	
		(0.095)	(0.083)		(0.004)	
Maternal age at birth (in yrs)		-0.001	-0.001		0.208	
		(0.001)	(0.001)		(0.662)	
Maternal age at birth: missing		-0.052	-0.038		-0.019	
		(0.032)	(0.029)		(0.016)	
Kindergarten attendance (0/1)		-0.006	-0.009		-0.024	
		(0.008)	(0.008)		(0.034)	
Kindergarten attendance: missing		-0.035	-0.026		-0.008	
		(0.025)	(0.0229)		(0.006)	
Exposed to short school years (0/1)			0.359	***	0.451	***
			(0.017)		(0.018)	
F-Statistic	0.726	0.797	42.84			
p-value	0.536	0.644	0.000			
Individuals			5,259			

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. Data weighted using a cross-sectional weight calibrated to Micro Census 2011. All regressions include include state and (monthly) birth

Cutoff rules - Balancing tests

	(1)	(2)	(3)	(4)
	Dependent variable: After (0/1)			Biv. correlation
Female (0/1)	-0.008	-0.008	-0.008	-0.041
	(0.009)	(0.009)	(0.009)	(0.042)
Parental education (in yrs)	0.001	0.001	0.001	0.241
	(0.002)	(0.002)	(0.002)	(0.224)
Parental education: missing	-0.033	-0.037	-0.037	-0.014
	(0.040)	(0.044)	(0.044)	(0.011)
Non-German parent (0/1)		0.006	0.006	0.002
		(0.036)	(0.036)	(0.011)
Non-German parent: missing		0.014	0.014	-0.003
		(0.098)	(0.099)	(0.005)
Maternal age at birth (in yrs)		0.000	0.000	0.375
		(0.001)	(0.001)	(0.504)
Maternal age at birth: missing		0.002	0.002	-0.010
		(0.032)	(0.032)	(0.017)
Kindergarten attendance (0/1)		-0.008	-0.008	-0.032
		(0.009)	(0.009)	(0.042)
Kindergarten attendance: missing		-0.018	-0.018	-0.004
		(0.041)	(0.041)	(0.011)
Exposed to short school years (0/1)			0.001	-0.001
			(0.010)	(0.039)
F-Statistic	0.988	0.493	0.457	
p-value	0.397	0.909	0.940	
Individuals			4,651	

Note: Sample restricted to individuals born in West Germany between 1945 and 1964. Data weighted using a cross-sectional weight calibrated to Micro Census 2011. All regressions include linear trends in the running variable (week of birth) that are allowed to vary on both sides of the cutoff. Robust standard errors in parentheses. The

Sample means

	Full sample (1945-1986)	West Germany, 1945-1964 Compulsory schooling	Enrollment cutoffs
Mobility Outcomes (mean at age 25-55)			
1-year cross-state	0.02	0.02	0.01
1-year cross-county	0.05	0.04	0.04
5-year cross-state	0.08	0.06	0.06
5-year cross-county	0.18	0.15	0.15
Lifetime cross-state	0.25	0.22	0.22
Lifetime cross-county	0.51	0.53	0.53
Socio-demographic characteristics			
Year of birth	1964.78	1955.68	1955.54
Month of birth	6.40	6.47	6.44
Female	0.50	0.52	0.52
Born in East-Germany	0.74	0.00	0.00
State: Schleswig-Holstein	0.03	0.05	0.05
State: Hamburg	0.02	0.03	0.03
State: Lower Saxony	0.10	0.13	0.13
State: Bremen	0.01	0.02	0.02
State: Nordrhein-Westphalia	0.21	0.28	0.28
State: Hesse	0.07	0.08	0.07
State: Rheinland-Palatinate	0.05	0.07	0.07
State: Baden-Wurttemberg	0.11	0.15	0.14
State: Bavaria	0.14	0.18	0.18
State: Saarland	0.01	0.02	0.02
Parental education (in yrs)	11.64	11.02	11.00
Non-German parent (0/1)	0.97	0.98	0.98
Maternal age at birth (in yrs)	27.53	28.28	28.28
Firstborn (0/1)	0.49	0.52	0.52
Kindergarten attendance (0/1)	0.70	0.50	0.50
Exposed to compulsory schooling reform (0/1)	0.90	0.76	0.76

Sample means (Cont.)

	Full sample (1944-1986)	West Germany, 1945-1964 Compulsory schooling	Enrollment cutoffs
Educational outcomes			
School starting age	6.58	6.44	6.42
Tracked to Gymnasium	0.21	0.21	0.21
Years of schooling	9.90	9.74	9.73
Highest school degree: basic	0.32	0.47	0.44
Highest school degree: middle	0.40	0.31	0.31
Highest school degree: high school	0.29	0.23	0.22
College/University degree	0.18	0.15	0.15
Individuals	12,612	5,259	4,651