Social Mobility Within and Between Generations

James J. Heckman
University of Chicago

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Inequality in What? Alternative Measures of Inequality and Social Mobility

We Have So Far Considered

Part 1: Income and Wage Measures

Part 2: Role of Taxes and Transfers in Post-Tax Transfer Outcomes

Part 3: Role of Skills & Skill Prices

Part 4: **Income Mobility**

Part 5: Inheritance of Inequality

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Upward Mobility as Families Age

Table 2

Income Mobility of Taxpayers Age 35–40 in 1987 Relative to 2007 Population Age 25 and Over

1987 Income Quintile or Centile Class	2007 Income Quintile or Top Centile Class							
	Income Quintiles						Top Centiles	
	Negative	Lowest	Second	Middle	Fourth	Highest	Top 10	Top 1
Negative	4.0	19.6	26.4	14.3	10.7	24.9	15.6	4.5
Lowest	1.1	38.1	26.3	17.2	9.9	7.2	3.4	0.5
Second	0.6	18.1	23.5	24.4	21.4	12.1	4.2	0.2
Middle	0.6	9.5	15.4	21.2	29.9	23.4	8.0	0.3
Fourth	0.4	6.2	10.7	16.4	27.8	38.5	16.8	0.8
Highest	1.0	4.3	5.3	8.7	20.4	60.4	40.8	6.1
Total	0.7	14.0	15.7	17.6	22.6	29.4	15.0	1.6
Top 10%	1.3	3.8	4.1	6.9	14.8	69.1	52.1	10.7
Top 1%	1.8	3.9	2.4	3.5	6.7	81.7	74.2	36.5

Notes: Both 1987 and 2007 centiles are based on taxpayers age 25 and over. Taxpayers with negative incomes are shown separately from other taxpayers in the lowest income quintile. The five quintiles plus negative incomes sum to 100 percent. Taxpayers not found in 2007 are omitted (see discussion in Appendix A).

More upward mobility when compare individuals against overall population (instead of their peers)

- Individuals aging and moving up lifetime earnings profile
- 60% bottom quintile moves up

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Persistence in "Top 1%" – Roughly 40% Drop Out in 1 Yr

Measure how many of those in "Top 1%" are in top after 1 yr, 2 yr, ...

Table 5

Persistence in the Top 1 Percent over Five-Year Periods, 2000–2010

Base Year	T+1	T+2	T+3	T+4	T+5
Panel A: Reoccurrence					
2000	0.53	0.45	0.42	0.42	0.41
2001	0.57	0.53	0.50	0.48	0.47
2002	0.63	0.57	0.53	0.51	0.49
2003	0.63	0.57	0.54	0.52	0.45
2004	0.60	0.57	0.54	0.46	0.41
2005	0.61	0.56	0.47	0.41	0.41
Panel B: Continuous Reoccurrence					
2000	0.53	0.38	0.31	0.26	0.23
2001	0.57	0.44	0.36	0.31	0.27
2002	0.63	0.49	0.40	0.35	0.31
2003	0.63	0.49	0.41	0.36	0.29
2004	0.60	0.48	0.40	0.31	0.25
2005	0.61	0.48	0.36	0.28	0.25

Notes: Panel A (Panel B) shows the probability that individuals in the top percentile of cash income in the base year reappear in a later year unconditional (conditional) on appearing in the top percentile during intervening years. Income percentiles are defined by cash income in each year.

Many drop out after 1 year, even more after 5 years

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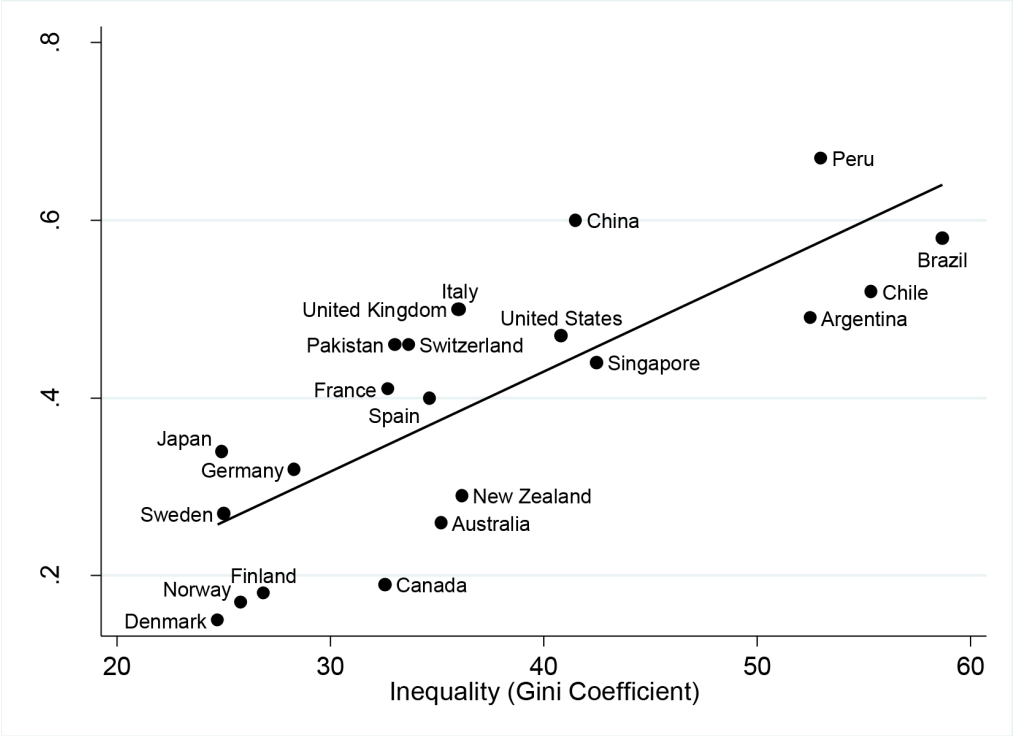
Figure 1: Intergenerational Mobility and Inequality: The "Gatsby Curve"

$$\text{IGE: } \underbrace{\ln Y_1}_{\substack{\text{Income in current} \\ \text{generation}}} = \alpha + \beta \underbrace{\ln Y_0}_{\substack{\text{Income of} \\ \text{parents}}} + \varepsilon$$



Source: Corak (2013)

- Inequality is measured **after taxes and transfers**.
- Gini index defined on **household income**.
- IGE measured by **pre-tax and transfer** income of **individual** fathers and sons. Notice inconsistencies.

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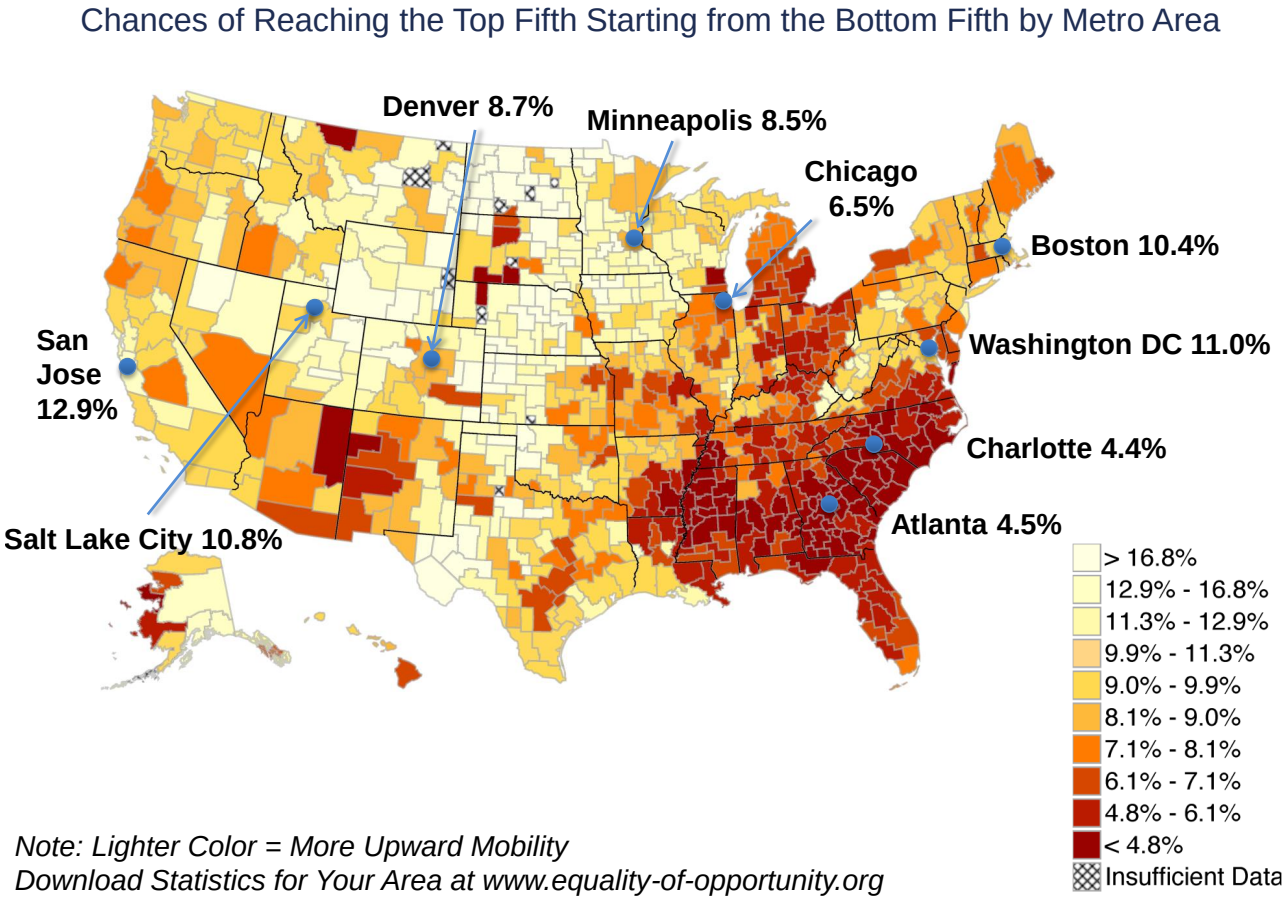
Figure 2: The Geography of Upward Mobility in the United States



The ranks are from national income distribution.

Source: Chetty (2016)
Note: The measure of P(Child in Q5–Parent in Q1) derived from within-CZ OLS regressions of child income rank against parent income rank.

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Figure 3: Fig. 3. Trends in absolute mobility: Sensitivity analysis

Source: The fading American dream: Trends in absolute income mobility since 1940.

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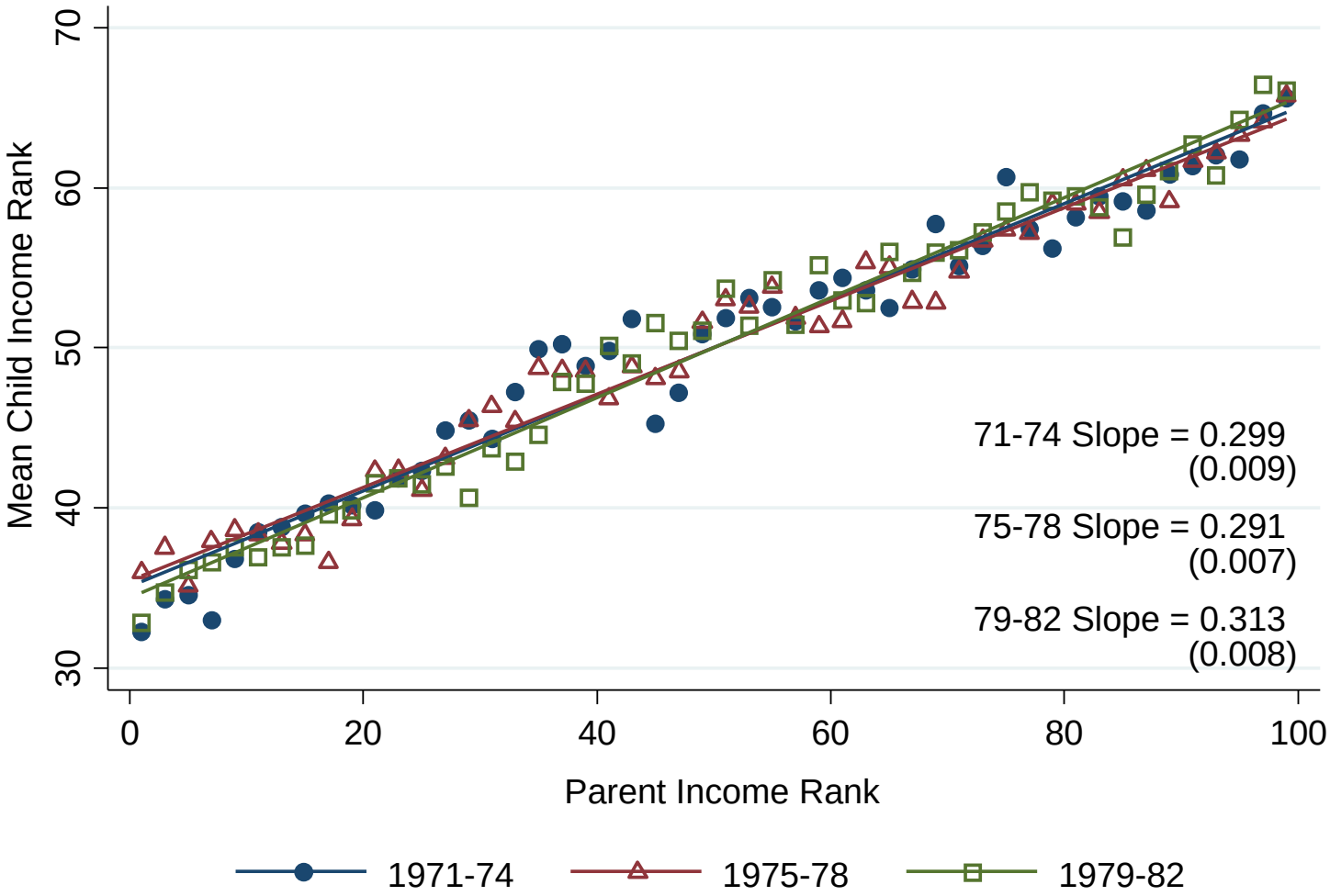
Figure 4: Child Income Rank vs. Parent Income Rank by Birth Cohort



Source: Chetty et al. (2014).

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Some Basic Questions

How to Interpret These Relationships?

What Policies (If Any) Should Be Adopted to Promote Social Mobility? To Reduce Inequality?

Is Income a Proper Measure of Welfare of Agents? Per Capita or Household or Extended Family Unit

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Direction of Causality for Gatsby Curve?

- Inequality $\uparrow \Rightarrow \beta \uparrow$?
- $\beta \uparrow \Rightarrow$ inequality $\uparrow$?
- Limited access to credit and labor markets $\Rightarrow$ both $\beta \uparrow$ and inequality $\uparrow$?
- Family or place? In what proportion?
- What exactly is place? What features determine place?

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Understanding the Sources of Inequality and Social Immobility is Essential for Devising Effective Policies

Families? Schools? Neighborhoods? Peers? Tax/Transfer Policy? Macro Policy?

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Which Measure of Mobility to Use?

- Rank (positional) Mobility? (and in what distribution?)
- Absolute Mobility (child doing better in real value terms than parent)?
- Mobility Within a Lifetime?

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Recent Cohorts Appear to be Doing Worse Than Previous Ones:
Effects Concentrated Among Younger Entrants Within Cohorts
Negative Effects Much More Pronounced for Males

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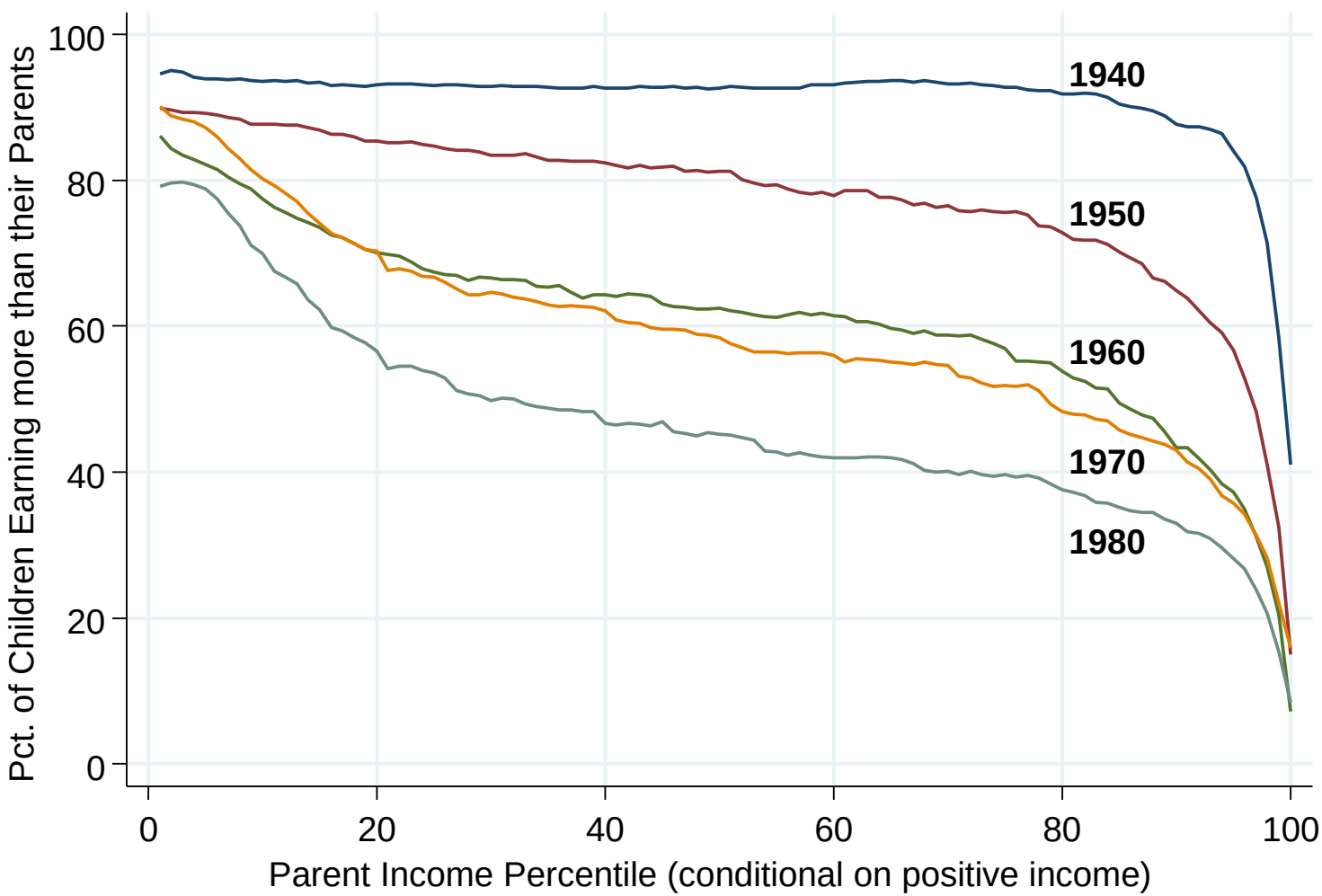
Figure 5: Percent of Children Earning More than their Parents By Parent Income Percentile



Source: Chetty et al. (2017)

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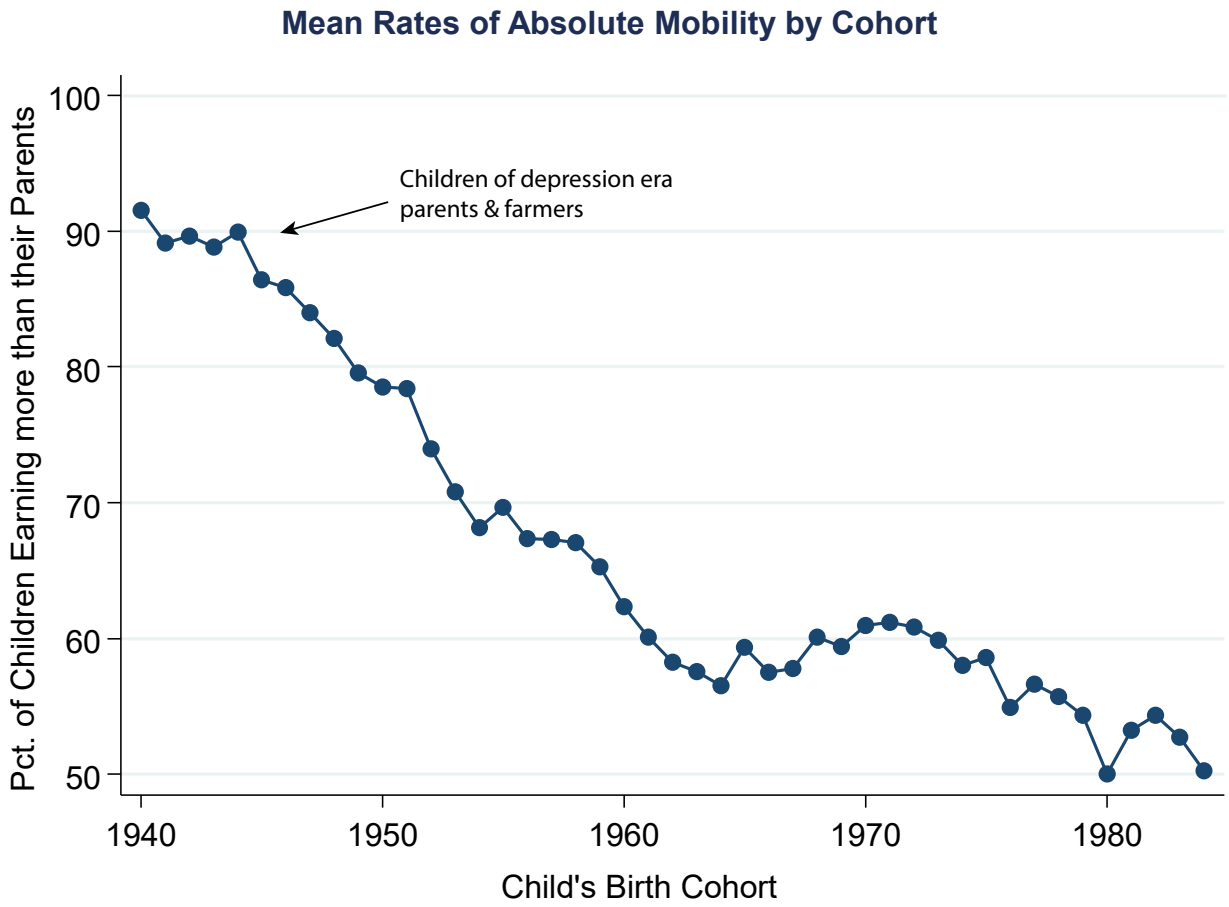
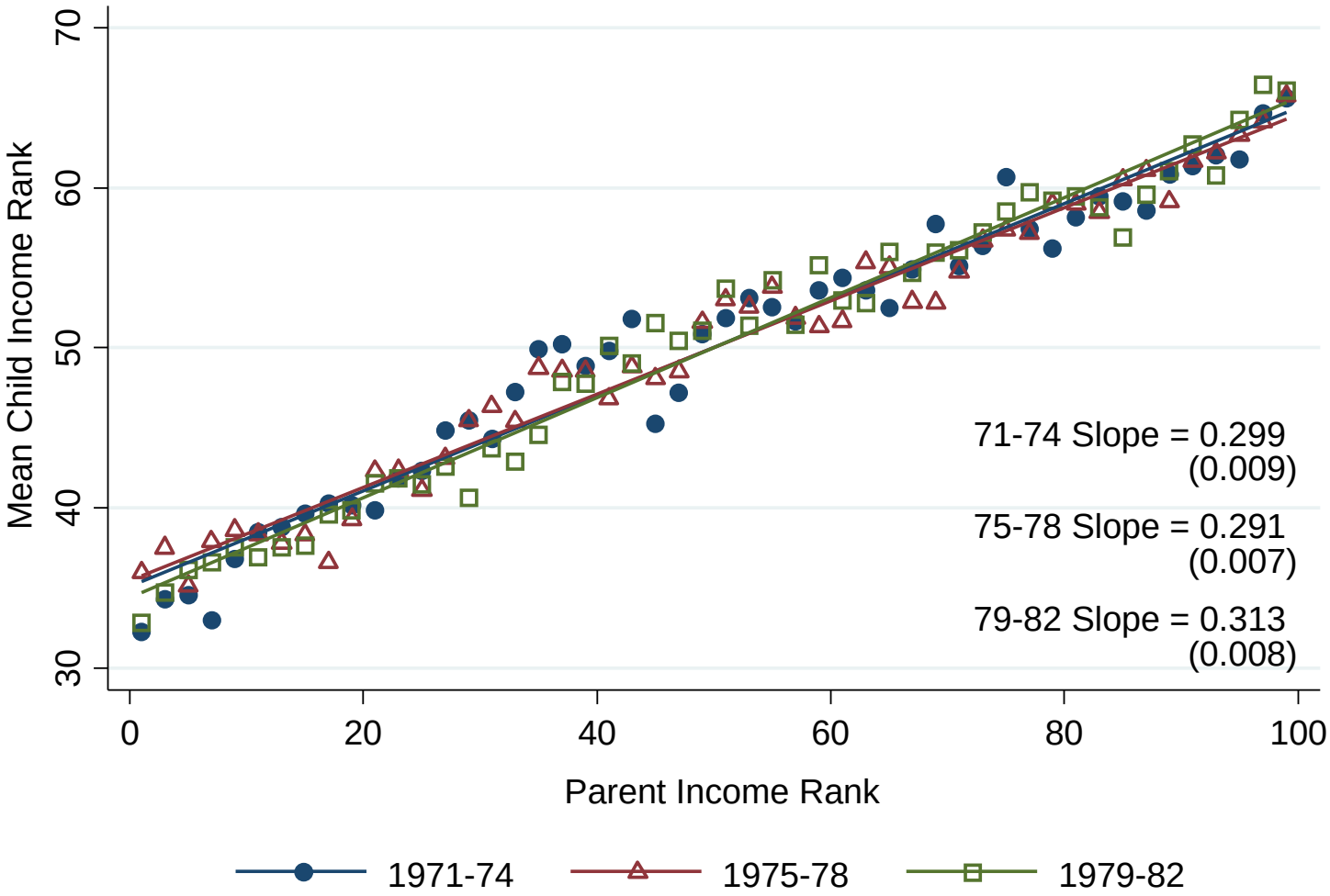
Relative Mobility Has Been Stable Over Time

Figure 6: Mean Rates of Absolute Mobility (Probability Children Do Better Than Parents) by Cohort



Source: Chetty et al. (2017)

Figure 7: Child Income Rank vs. Parent Income Rank by Birth Cohort



Source: Chetty et al. (2014).

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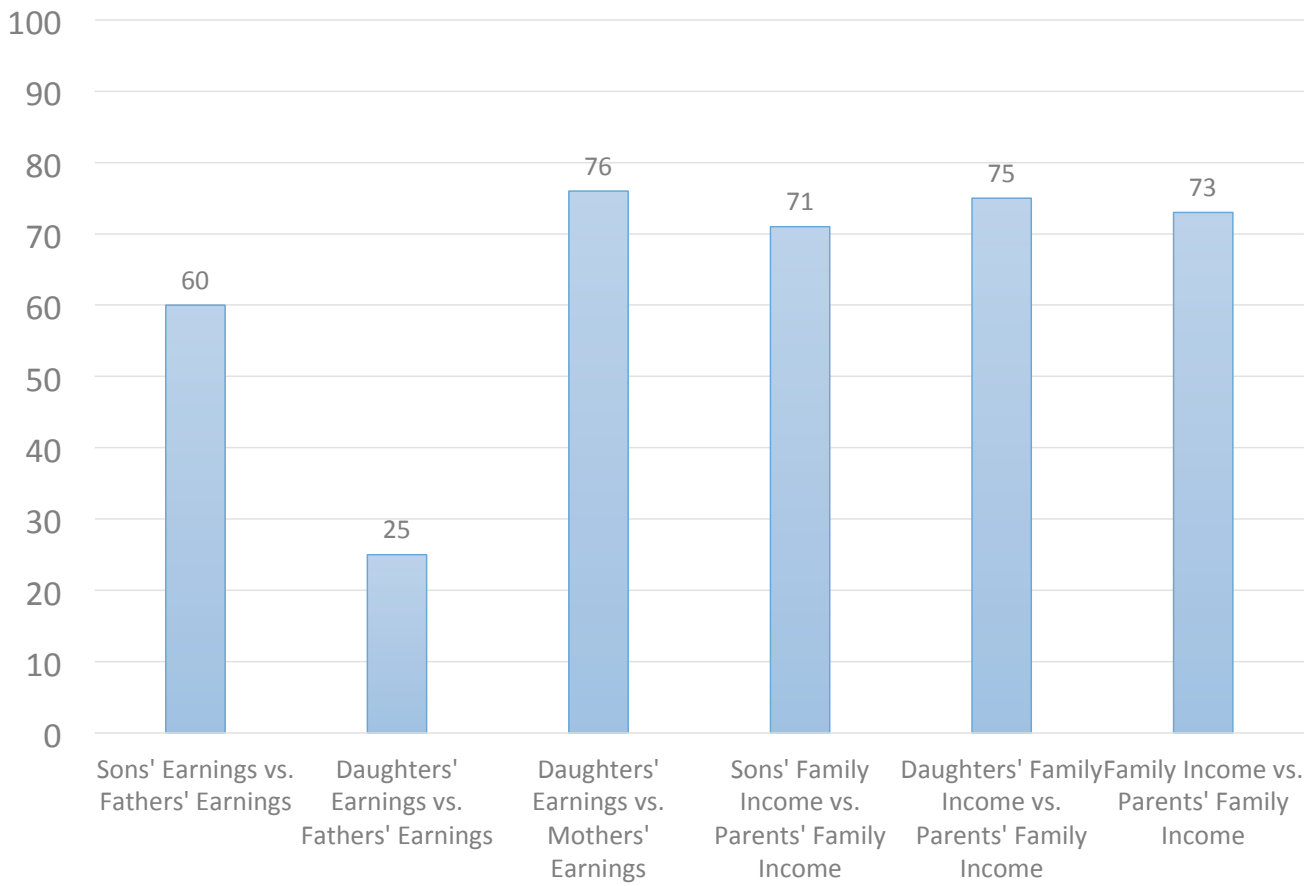
Figure 8: Percent of Grown Children Surpassing the Income of Parents



Source: Winship (2017). Author's analysis of the Panel Study of Income Dynamics (PSID).
Note: The sample begins with all parent–child pairs with income measured at either age 38, 39, 40, 41, or 42, and that single year of income is used (starting with age 40 and moving outward if unavailable). It then is restricted to pairs in which the parent turned 40 after 1974 and the child before 2006. Up to seven years of income are then averaged, using every other year, within a 13-year window. Family incomes are size-adjusted and all earnings and income measures are adjusted for inflation. Sample sizes are 129 for sons, 175 for daughters, and 308 for pooled family income. See Appendix 1 for methodological details.

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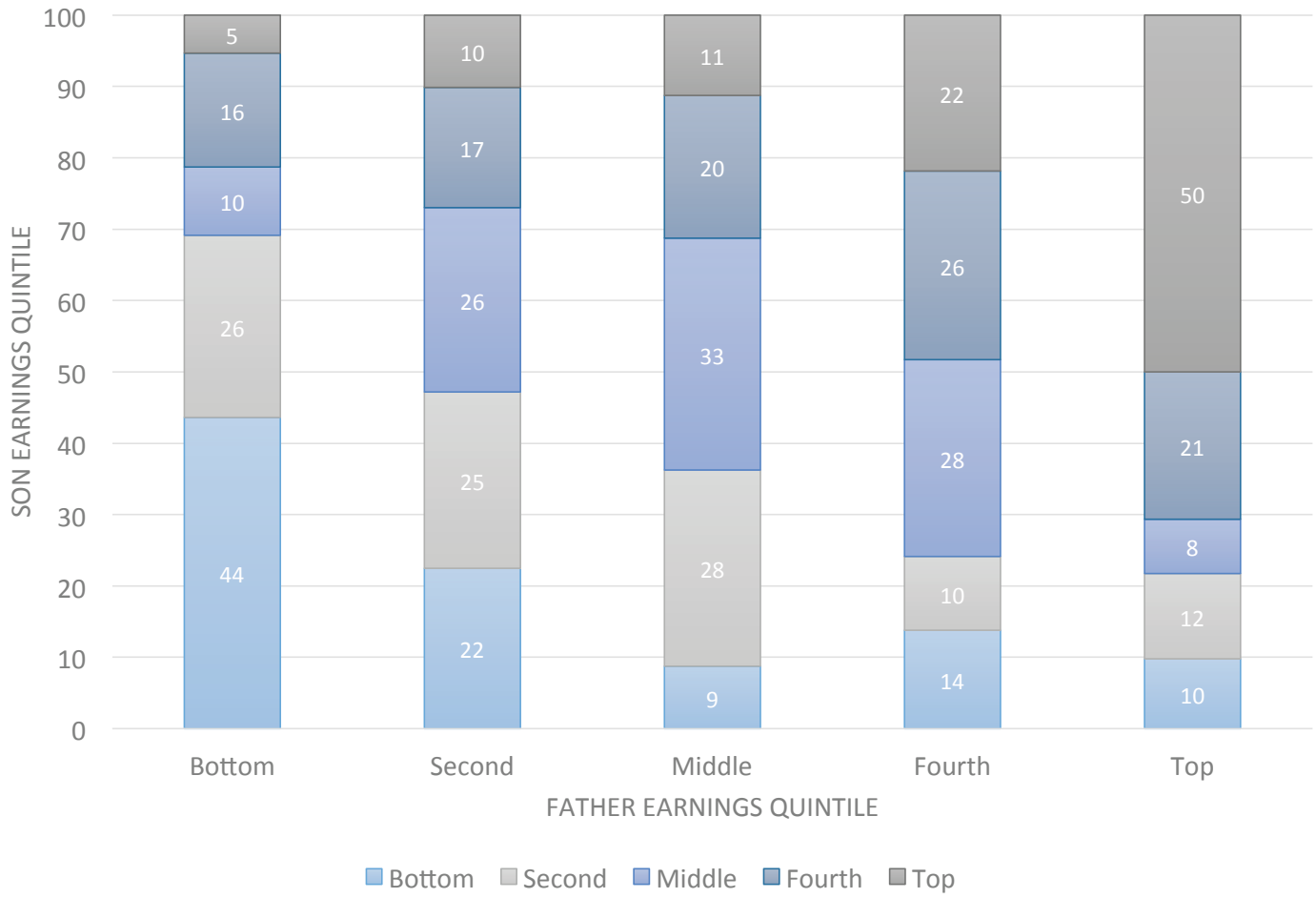
Figure 9: Percent of Grown Sons in Each Fifth of Male Earnings by Each Fifth of Father Earnings



Source: Winship (2017). Author's analysis of the Panel Study of Income Dynamics (PSID).
Note: The sample includes the 442 father–son pairs where fathers had at least 8 years of non-missing earnings (out of a maximum of 15) and sons had at least 9 years. See Appendix 1 for methodological details.

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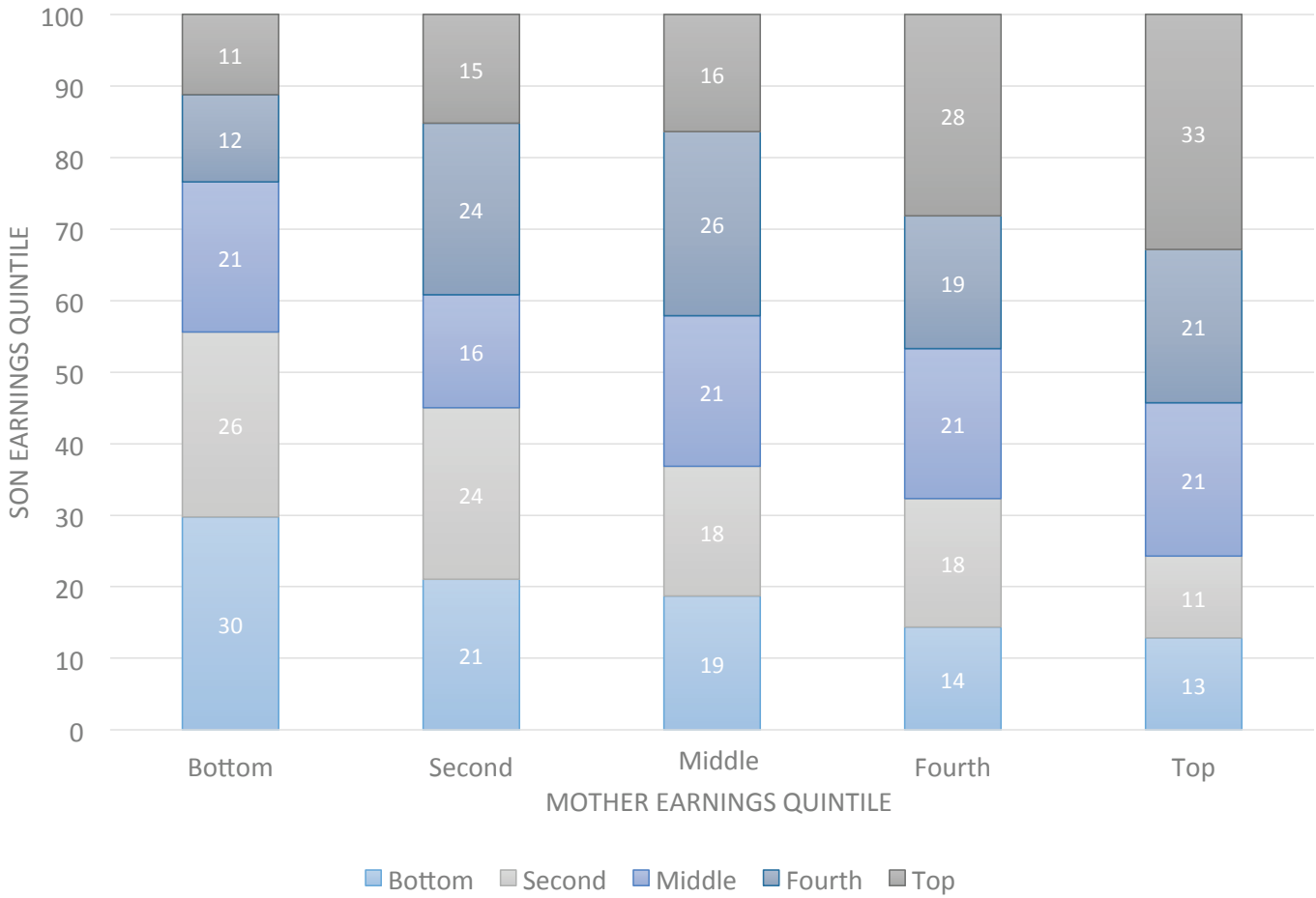
Figure 10: Percent of Grown Daughters in Each Fifth of Female Earnings by Each Fifth of Mother Earnings



Source: Winship (2017). Author's analysis of the Panel Study of Income Dynamics (PSID).
Note: The sample includes the 854 mother–daughter pairs where mothers had at least 5 years of non-missing earnings (out of a maximum of 15) and daughters had at least 7 years. See Appendix 1 for methodological details.

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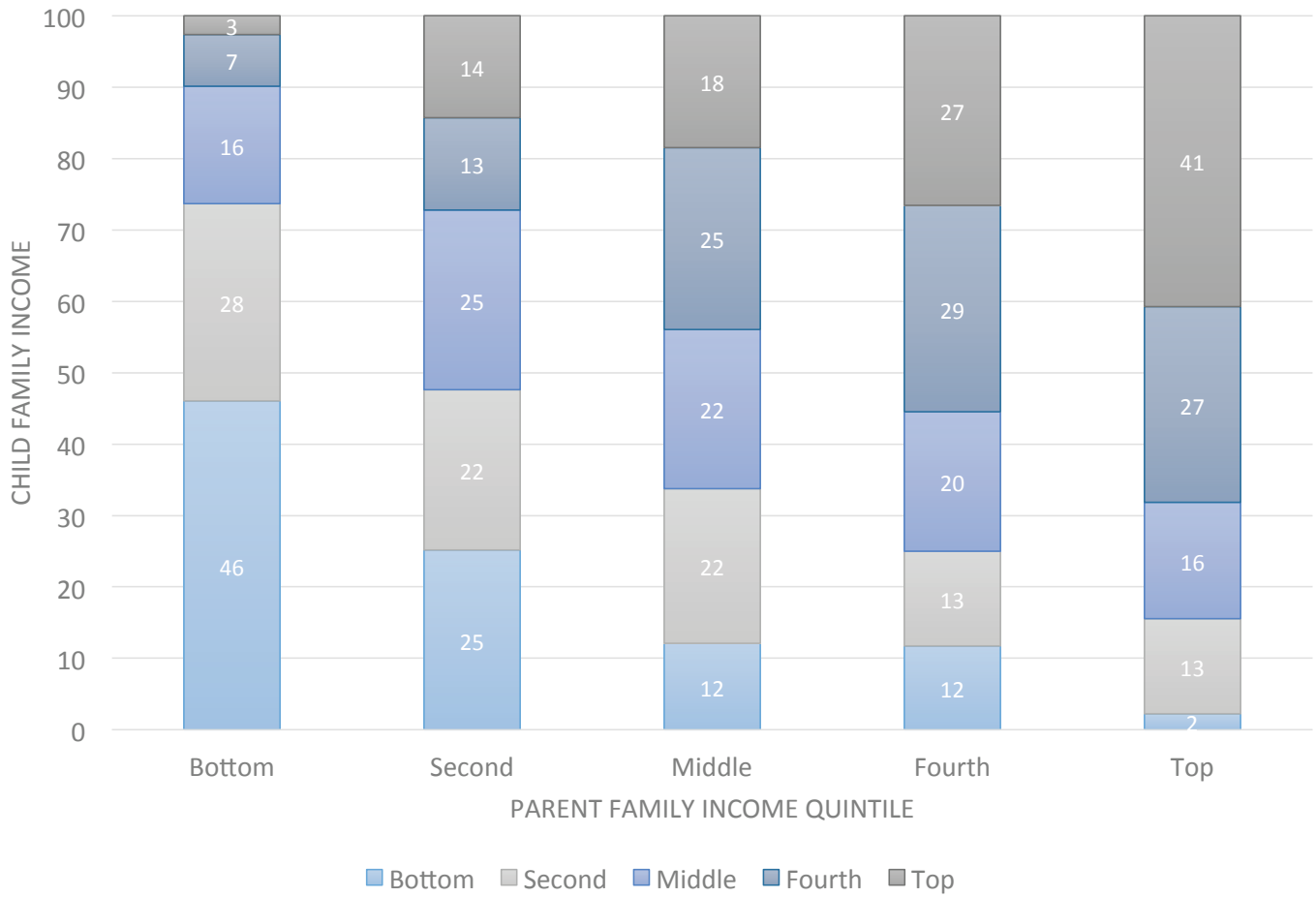
Figure 11: Percent of Grown Children in Each Fifth of Family Income by Each Fifth of Parental Income



Source: Winship (2017). Author's analysis of the Panel Study of Income Dynamics (PSID).
Note: The sample is restricted to the 719 parent–child pairs where parents had at least 10 years of non-missing income and children had at least 9 years. Incomes are adjusted for family size. See Appendix 1 for methodological details.

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Table 1: Summary of Key Measures of Persistence

Measure	Men's Earnings	Women's Earnings	Family Income
Persistence of Relative Inequality			
Intergenerational rank association (rank–rank)	.44–.52 (.51)	.31–.40 (.37)	.51–.53 (.53)
Persistence of Absolute Inequality			
Intergenerational elasticity	.44–.78 (.77)	.27–.54 (.40)	.59–.66 (.66)
Intergenerational correlation	.38–.51 (.48)	.35–.42 (.39)	.51–.53 (.53)
Sibling Similarity			
Sibling rank association	.38–.39 (.39)	.24–.32 (.31)	.36–.43 (.43)
Sibling correlation	.33–.45 (.39)	.22–.31 (.30)	.35–.45 (.45)

Source: Winship (2017).
Note: Estimates are preferred ranges and, in parentheses, preferred point estimates. See the text for selection criteria. Women's earnings compare women to their mothers or sisters. Family incomes are adjusted for family size. All earnings and incomes are adjusted for inflation.

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What are Effective Policies to Promote Social Mobility?

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Recent Analyses Recognize:

1. Fundamental importance of skills in modern economies
2. Multiplicity of skills
3. The multiple sources of skills
   a. Schools
   b. Families
   c. Neighborhoods and peers
   d. Firms
4. The importance of supporting and incentivizing all of these sources of skill
5. The importance of the early life origins of adult skills
6. Effective targeting by age of skill formation strategies
7. Need for evaluations of skill formation approaches accounting for costs and benefits measured in terms of social opportunity costs

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A Skills-based Policy Tackles Many Aspects of Poverty, Inequality, and Social Mobility

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Should We Solve Problems As They Arise?
"The Squeaky Wheel Gets the Grease"
OR Should We Target Them to Prevent?

Is Prevention Efficient? How Well Can We Target?

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Skill Gaps Open Up Early

- Gaps in skills across socioeconomic groups open up very early:
  - Persist strongly for cognitive skills
  - Less strongly for noncognitive skills
- Skills are not set in stone at birth—but they solidify as people age. They have genetic components.
- Skills evolve and can be shaped in substantial part by investments and environments.

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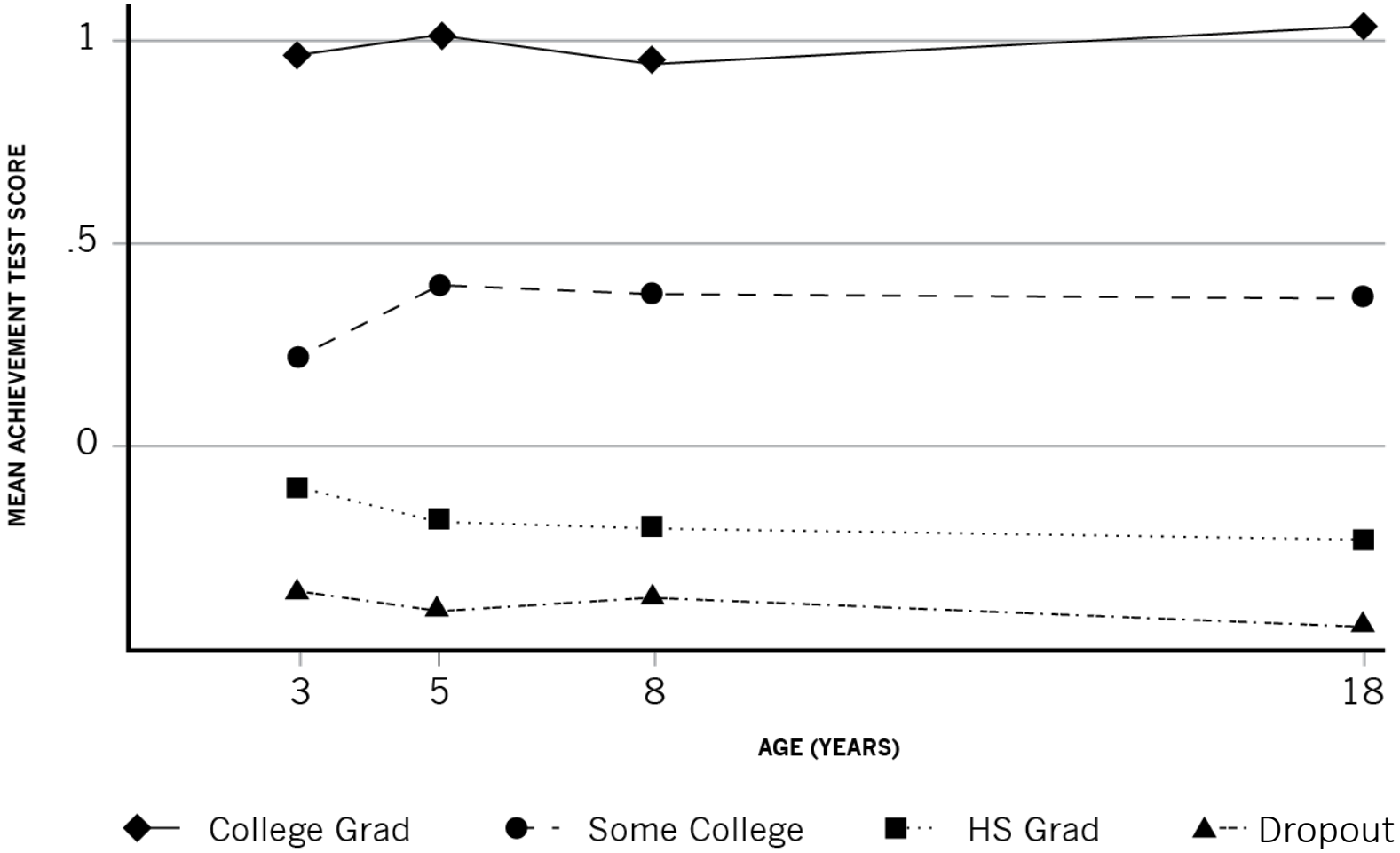
Figure 12: Mean Achievement Test Scores by Age by Maternal Education



Source: Brodsky, Gunn et al.

Impacts by Family Background Status

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Mothers' Speech and Child Vocabulary: Hart & Risley, 1995

Children enter school with "meaningful differences" in vocabulary knowledge.

1. **Emergence of the Problem** In a typical hour, the average child hears:

Family Status	Actual Differences in Quantity of Words Heard	Actual Differences in Quality of Words Heard
Welfare	616 words	5 affirmatives, 11 prohibitions
Working Class	1,251 words	12 affirmatives, 7 prohibitions
Professional	2,153 words	32 affirmatives, 5 prohibitions

2. **Cumulative Vocabulary at Age 3**

Cumulative Vocabulary at Age 3	
Children from welfare families:	500 words
Children from working class families:	700 words
Children from professional families:	1,100 words

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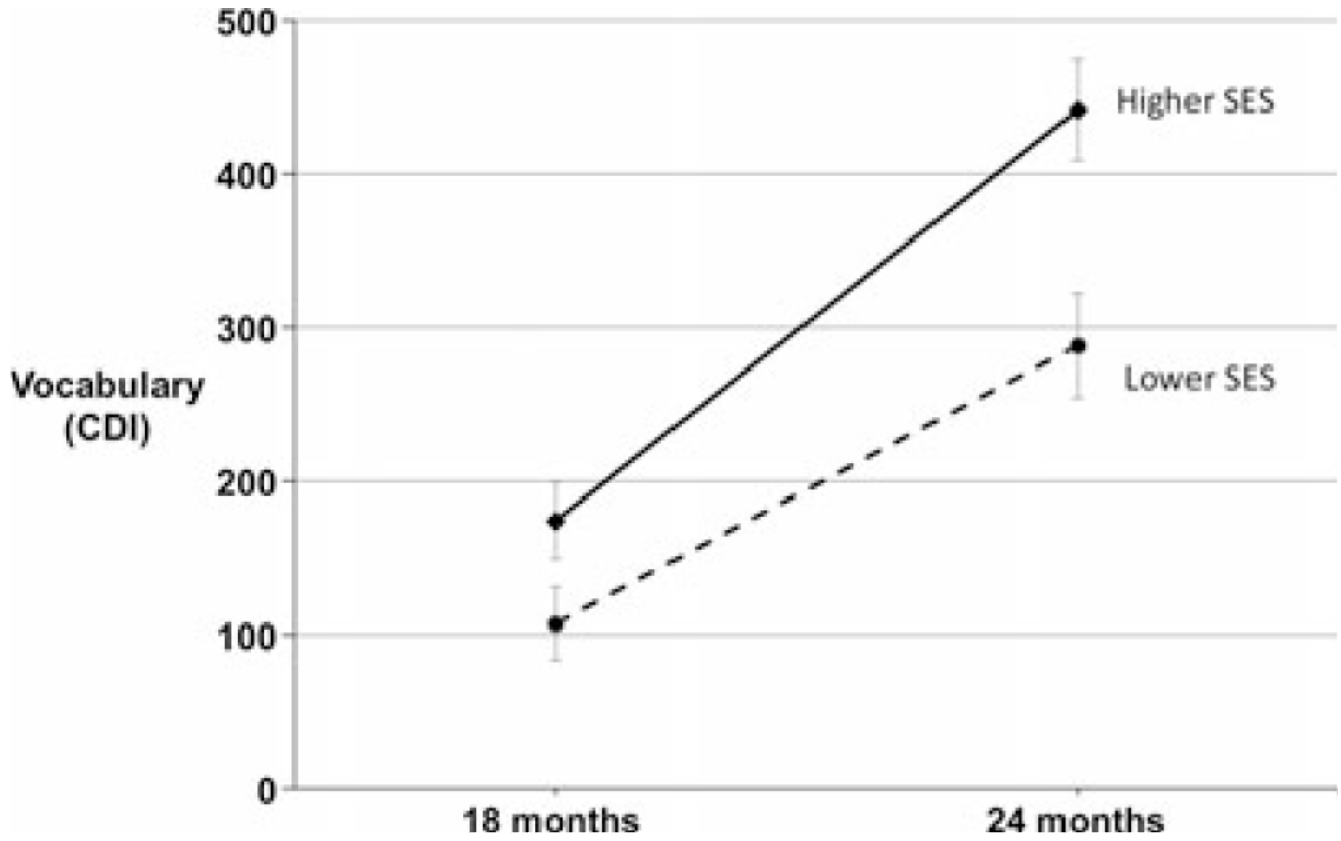
Figure 13: Mean number of spoken words reported on the MacArthur/Bates CDI by age and SES (HI). Error bars represent SE of the mean over participants



Source: Fernald et al. (2013).

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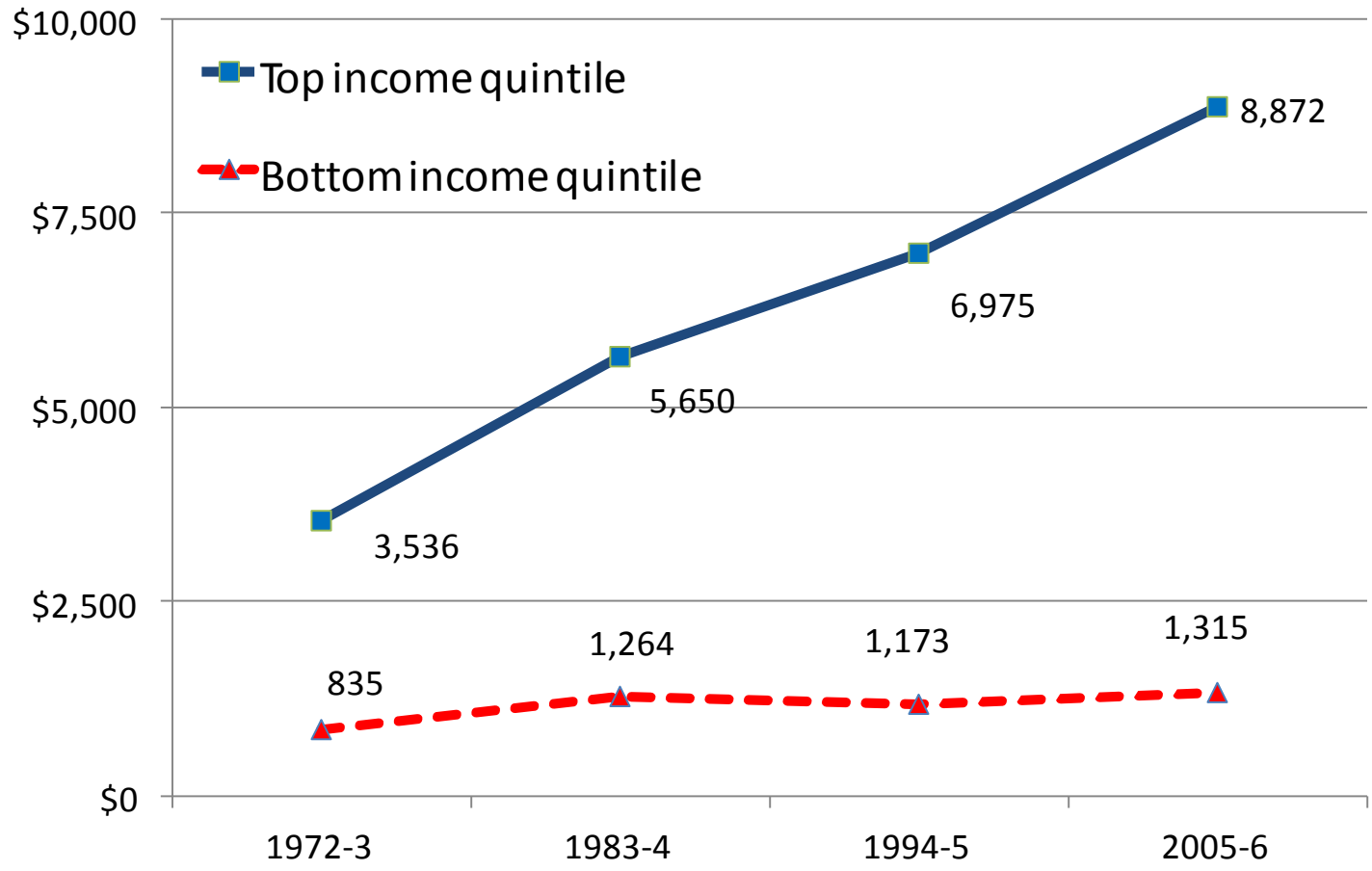
Figure 14: Per Capita Enrichment Expenditures on Children ($2008) Top Versus Bottom Quartile of Households



Source: Duncan and Murnane (2011).

Do Income Transfers Work?

Big Debate: Income Transfers Per Se vs What "Income" Really Represents

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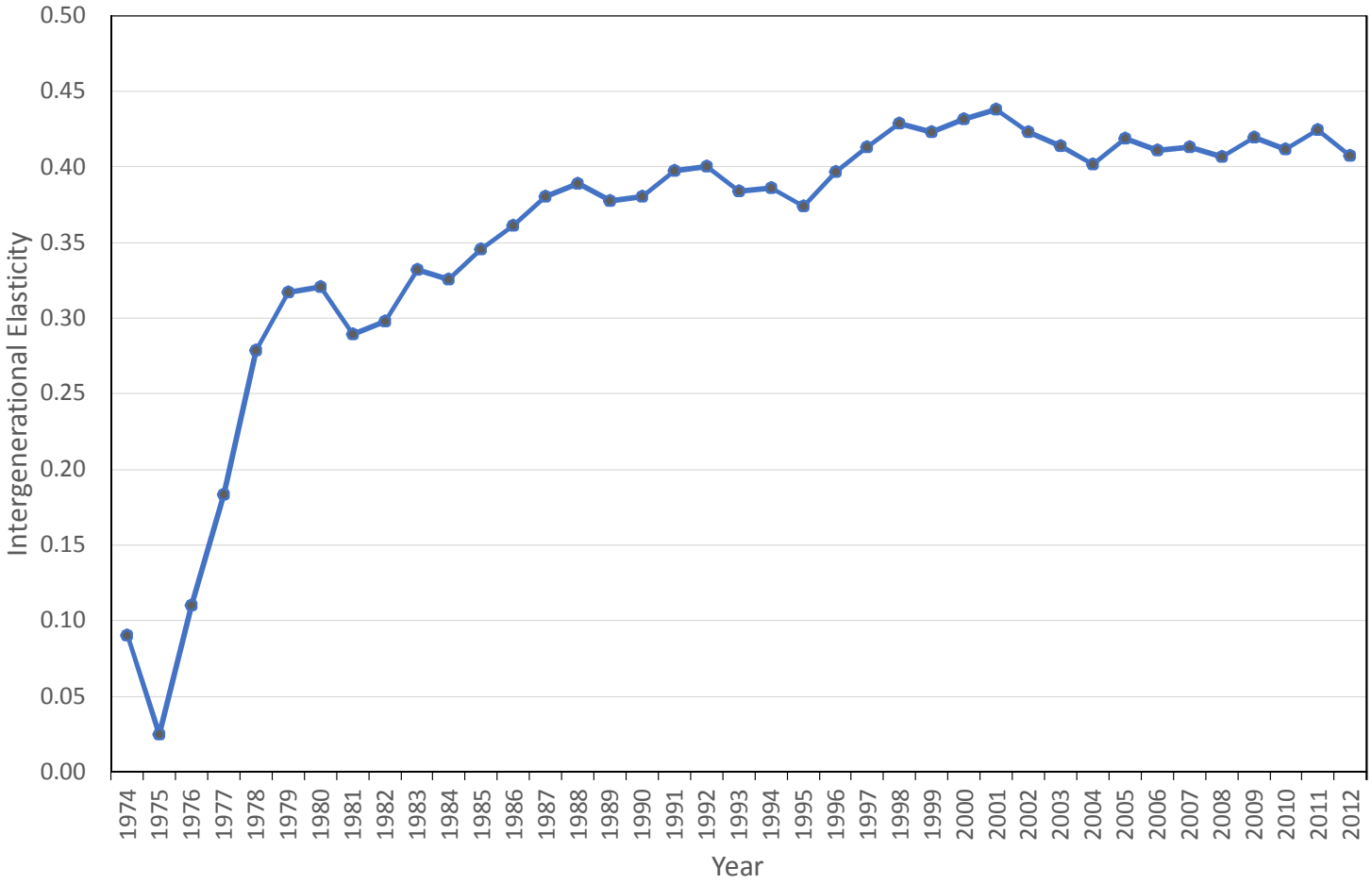
Figure 15: Trends in the Intergenerational Correlation of Welfare Participation



Source: Hartley et al. 2016
Note: Welfare participation includes AFDC/TANF, SSI, Food Stamps and Other Welfare.

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These Gaps Have Counterparts in Denmark, Despite its Much More Generous Welfare State

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Equal Access to High-Quality Public Services Uniformly Funded Across Neighborhoods: Health, Pre-K, Education, & Free Tuition

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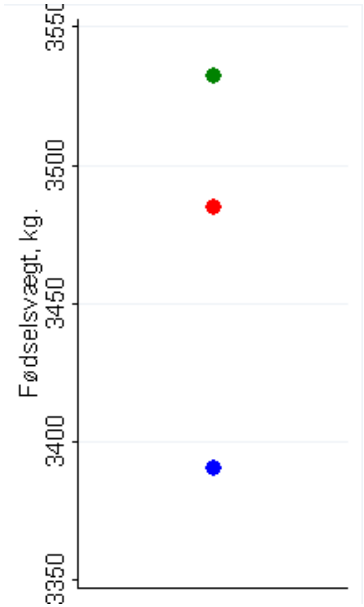
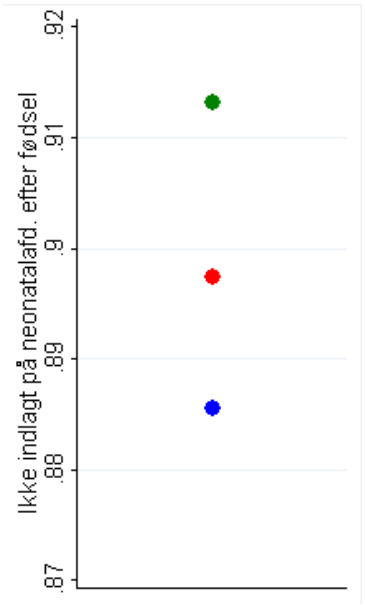
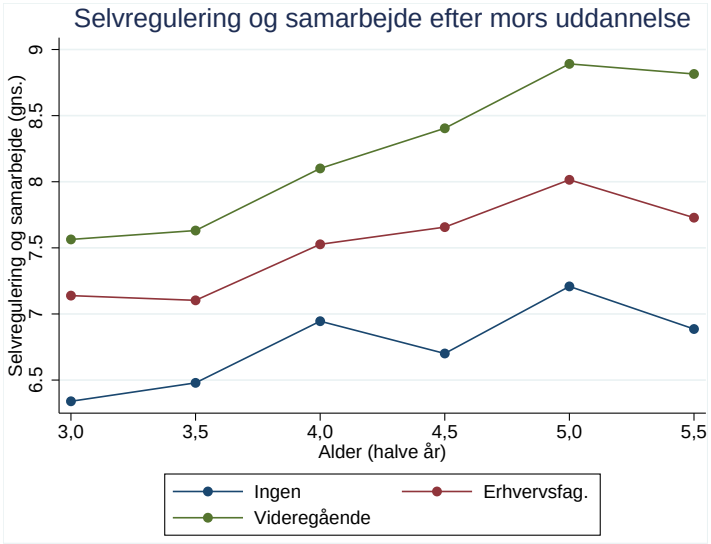
Figure 16: Gaps throughout life, by mother's level of education, Denmark







Age:	0 yrs	0 yrs	3–5 yrs
Outcome:	Birth weight	Not admitted to neo-natal ward	Score for self-regulation
Unit:	Gram	Fraction	Rating

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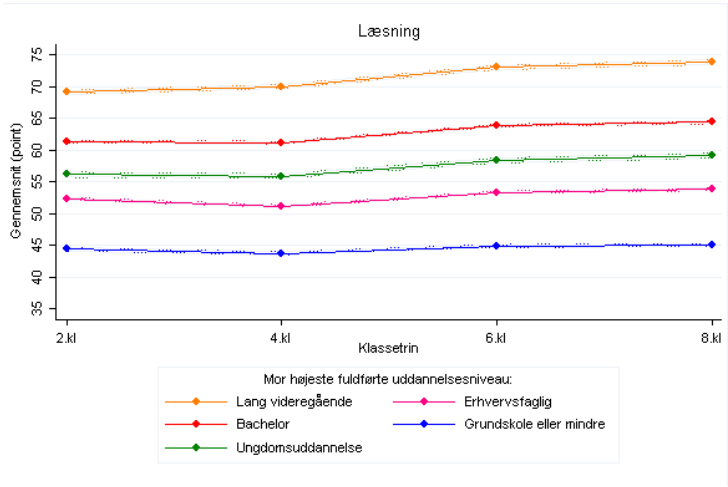
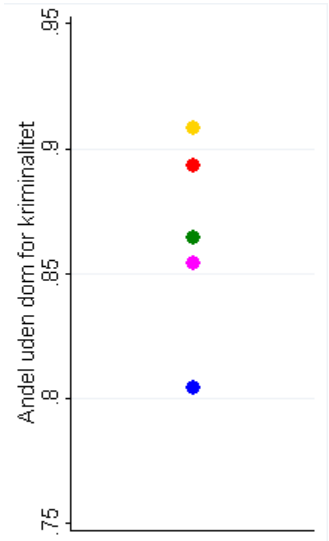
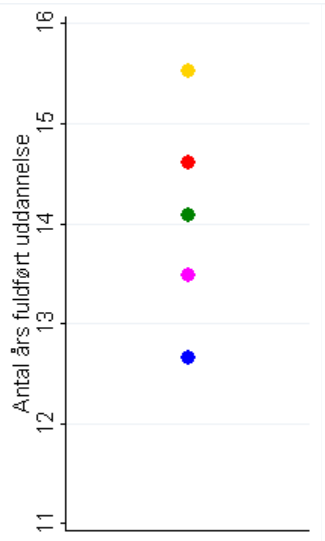
Figure 16: Gaps throughout life, by mother's level of education, Denmark, Cont'd







Age:	8–14 yrs	25 yrs	30 yrs
Outcome:	Test scores, Danish in national tests	No criminal conviction	Years of schooling
Unit:	Test score	Fraction	Years

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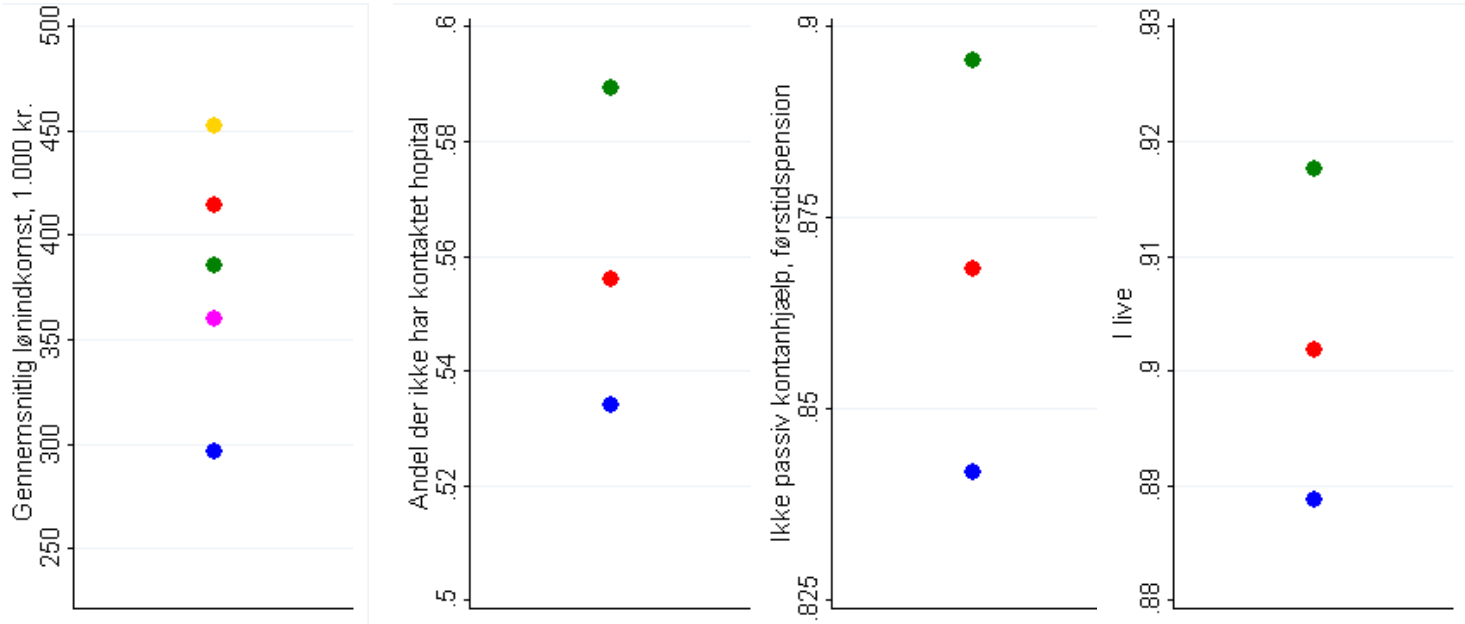
Figure 16: Gaps throughout life, by mother's level of education, Denmark, Cont'd



Age:	40 yrs	40–50 yrs	54 yrs	60 yrs
Outcome:	Wage earnings	Not contacted a hospital	In the labor force	Alive
Unit:	1.000DKK	Fraction	Fraction	Fraction

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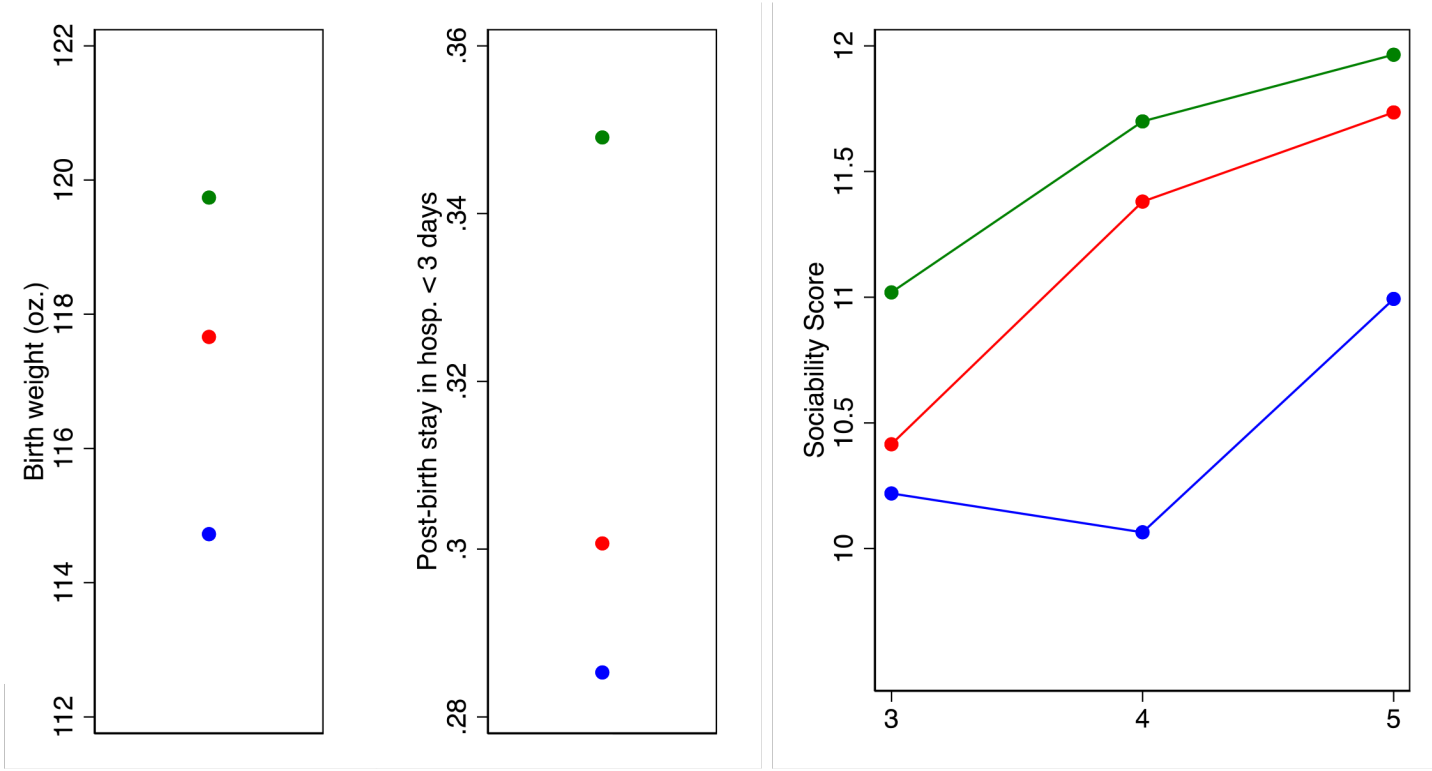
Figure 17: Gaps throughout life, by mother's level of education, U.S.



Age:	0 yrs	0 yrs	3–5 yrs
Outcome:	Birth weight	Post-birth stay in hospital < 3 days	Sociability Score
Unit:	Ounces	Fraction	Rating

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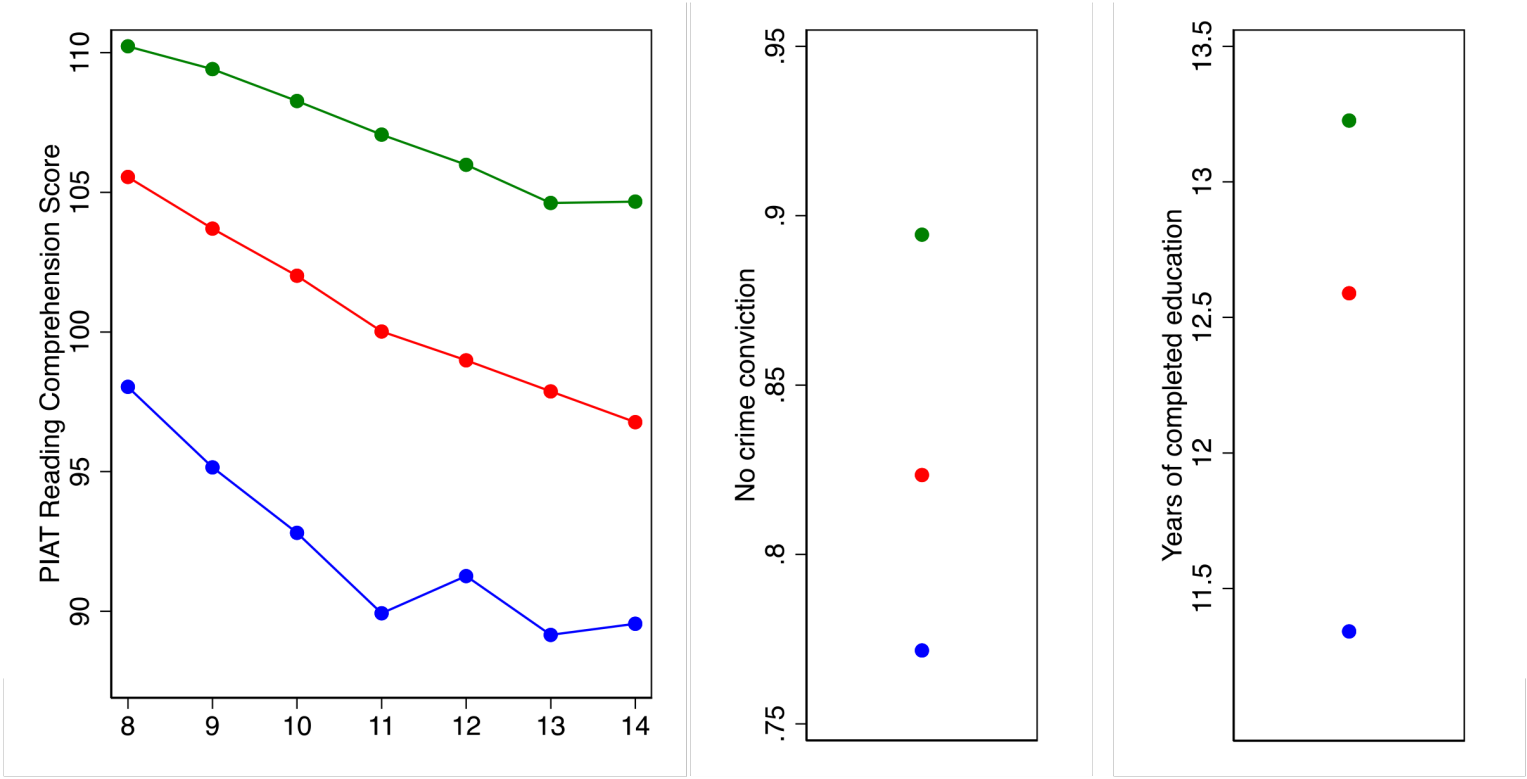
Figure 17: Gaps throughout life, by mother's level of education, U.S.



Age:	8-14 yrs	25 yrs	30 yrs
Outcome:	PIAT Reading Comprehension Score	No criminal conviction	Years of schooling
Unit:	Test score	Fraction	Years

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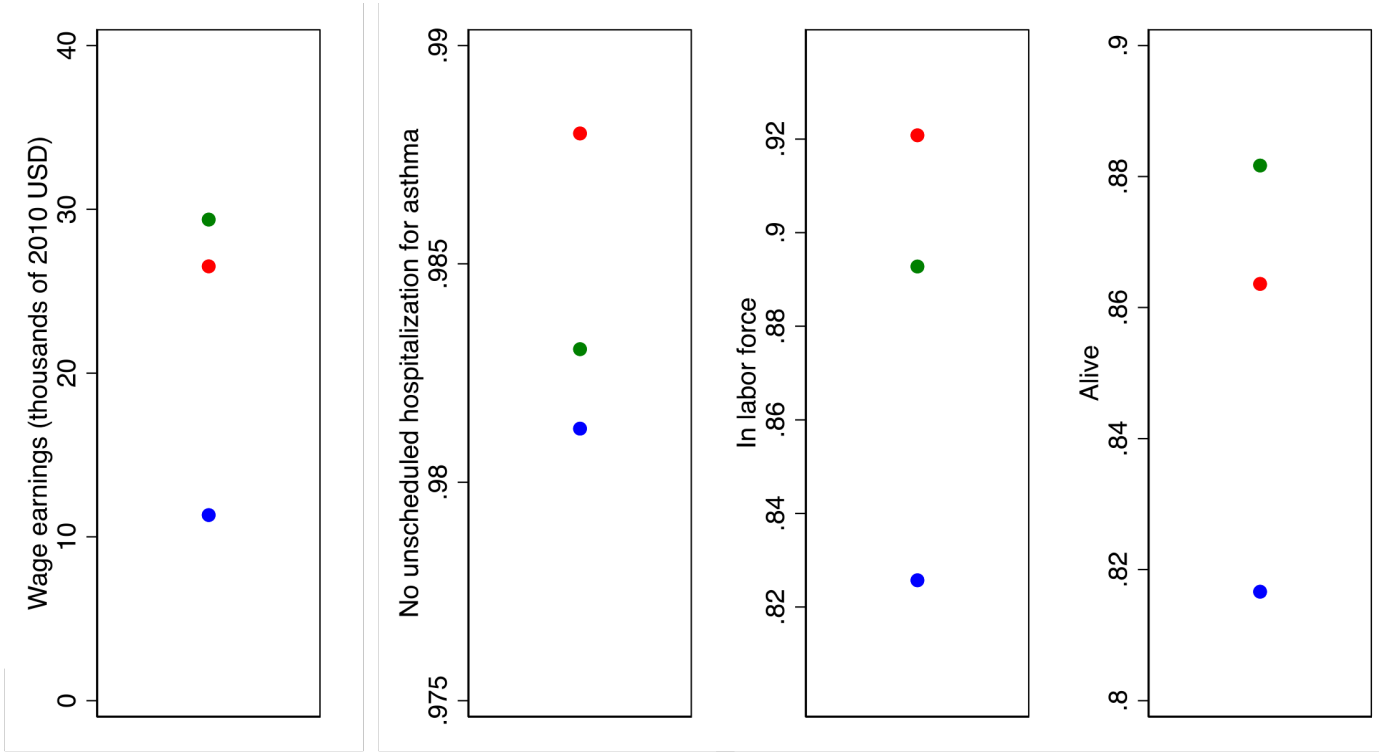
Figure 17: Gaps throughout life, by mother's level of education, U.S.



Age:	40 yrs	40-50 yrs	54 yrs	55-57 yrs
Outcome:	Wage earnings	No unscheduled hospitalization for asthma	In the labor force	Alive
Unit:	1,000 USD	Fraction	Fraction	Fraction

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How to Interpret This Evidence

- Evidence on the early emergence of gaps leaves open the question of which aspects of families are responsible for producing these gaps.
- Genes? Eugenics?
- Parenting and family investment decisions?
- Family environments? Neighborhood, peer, and sorting effects?
- The evidence from a large body of research demonstrates an important role for investments and family and community environments in determining adult capacities above and beyond the role of the family in transmitting genes.
- The quality of home environments by family type is highly predictive of child success.

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Genes, Biological Embedding of Experience, and Gene-Environment Interactions

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Gene Expression Modified by Environments

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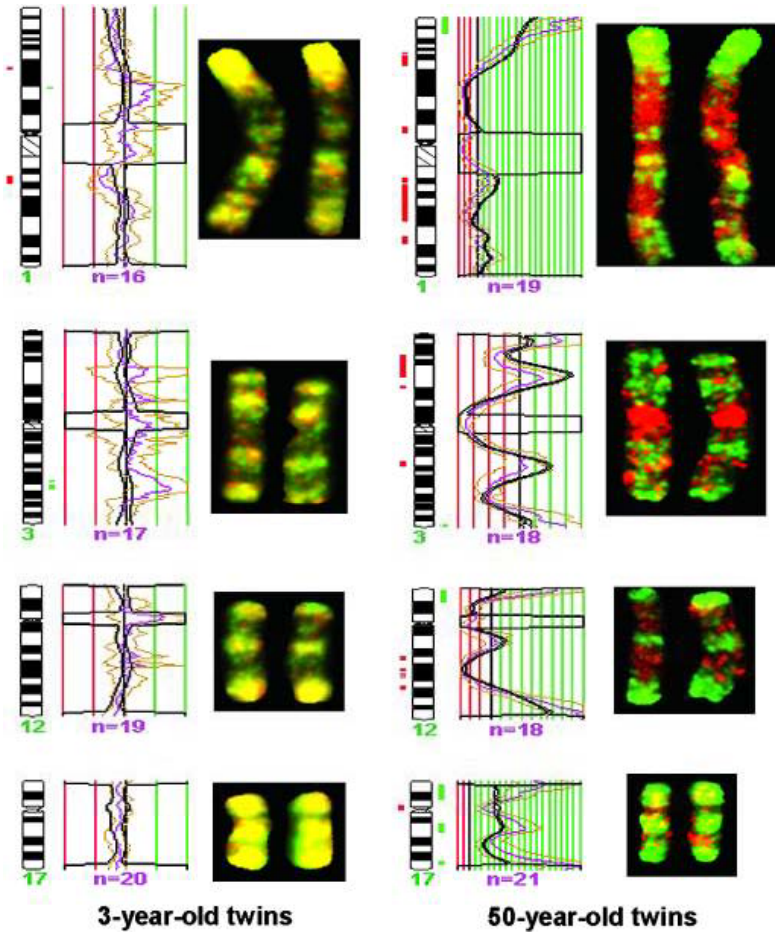
Figure 18: DNA Methylation and Histone Acetylation Patterns in Young and Old Twins



Source: Fraga, Ballestar et al. (2005)

The Family as Producer of Child Quality and as a Source of Inequality: Early Family Environments are Deteriorating

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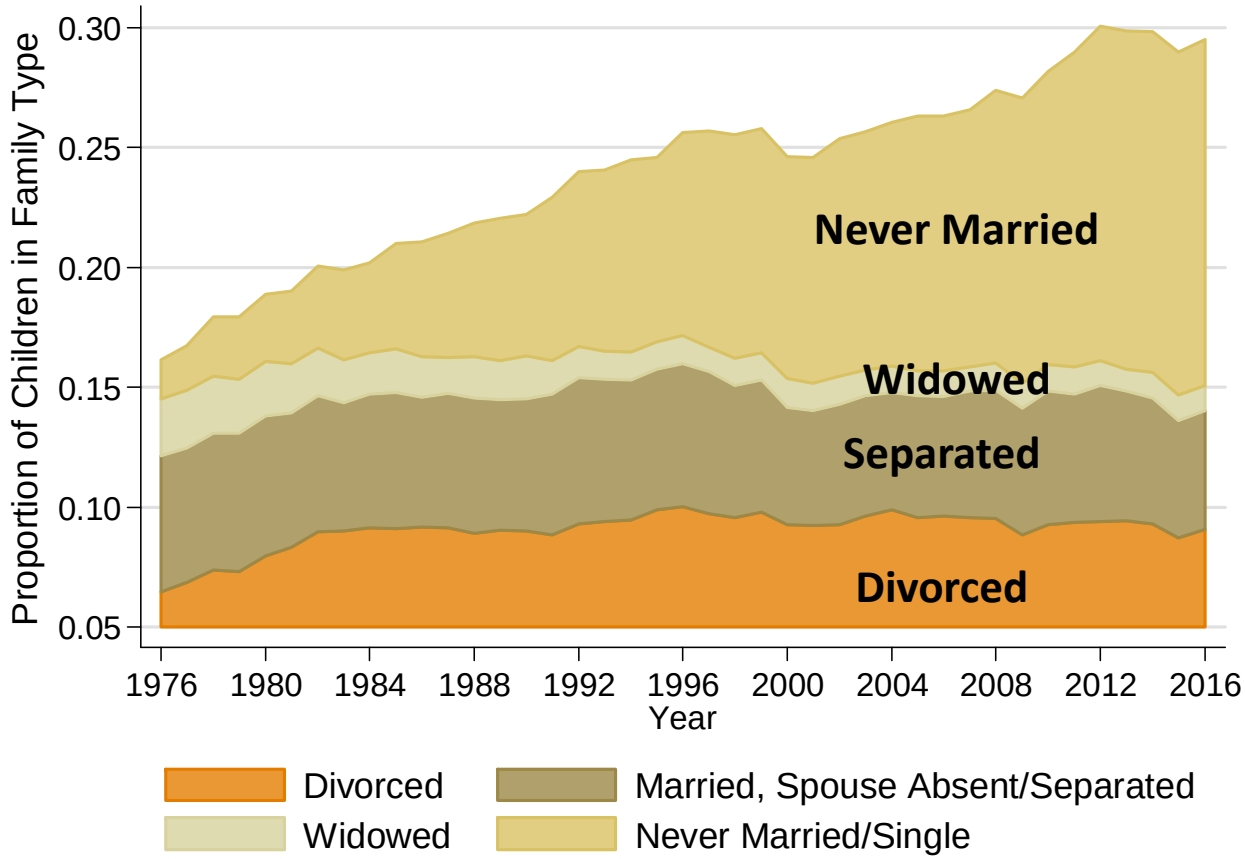
Figure 19: Children Under 18 Living in Single Parent Households by Marital Status of Parent



Note: Parents are defined as the head of the household. Children are defined as individuals under 18, living in the household, and the child of the head of household. Children who have been married or are not living with their parents are excluded from the calculation. Separated parents are included in "Married, Spouse Absent" Category.
Source: IPUMS March CPS 1976-2016.

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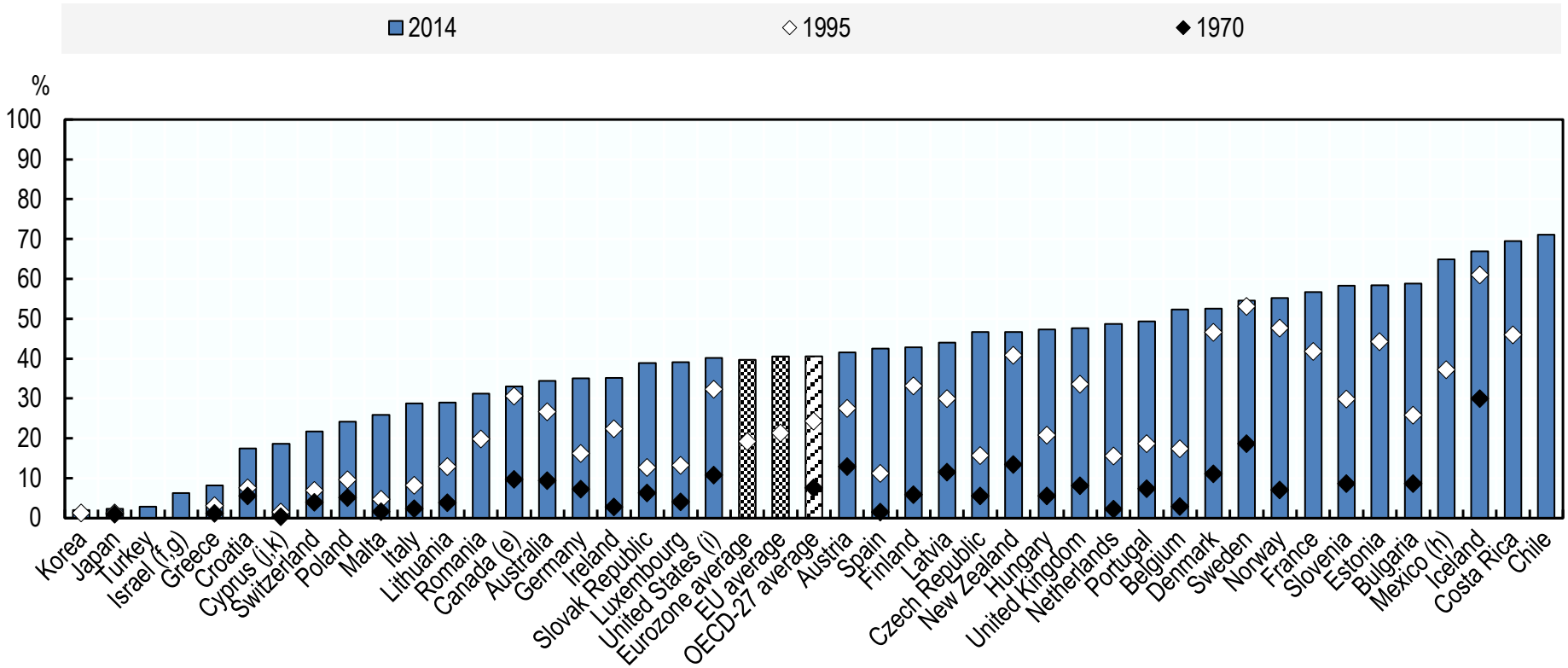
Figure 20: Share of births outside of marriage, 1970[a], 1990[b] and 2014 or latest available year[c] — Proportion (%) of all births where the mother's marital status at the time of birth is other than married[b]



Source: OECD Family Database

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Demographic Factors:
Change in Households and Household Behavior

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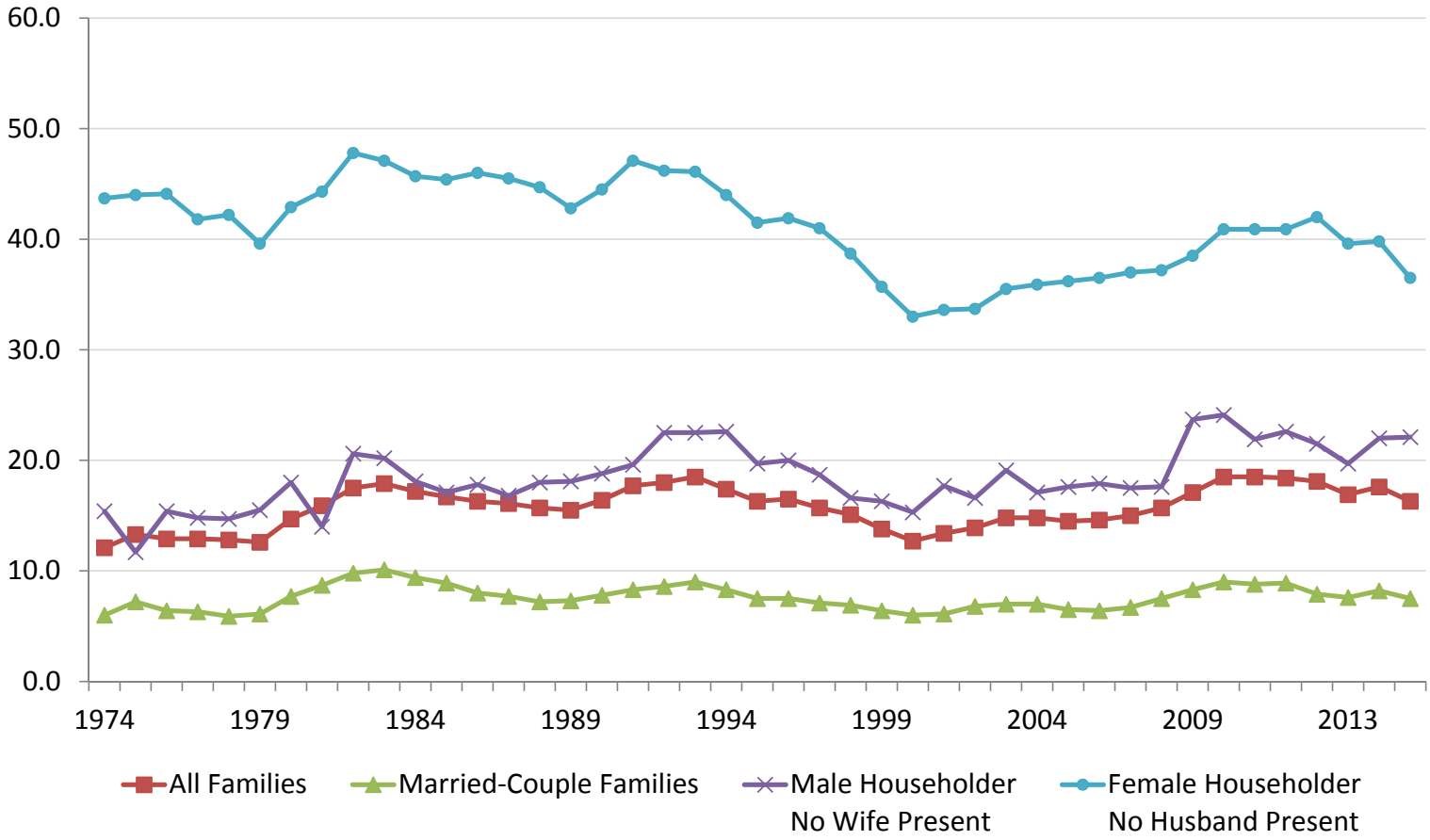
Figure 21: Family Poverty Rates by Household Type, 1974-2015 : Households with Children Under Age 18



Sources: `http://www.census.gov`.

Figure 22: Labor Force Participation Rates of Mothers by Marital Status and Child's Age , US

Note: Married category includes married husband present. Single category includes never married, widowed, divorced or separated and married with spouse absent.
Source: Census The 2012 Statistical Abstract, Women in the Labor Force: A Databook 2015, United States Department of Labor.

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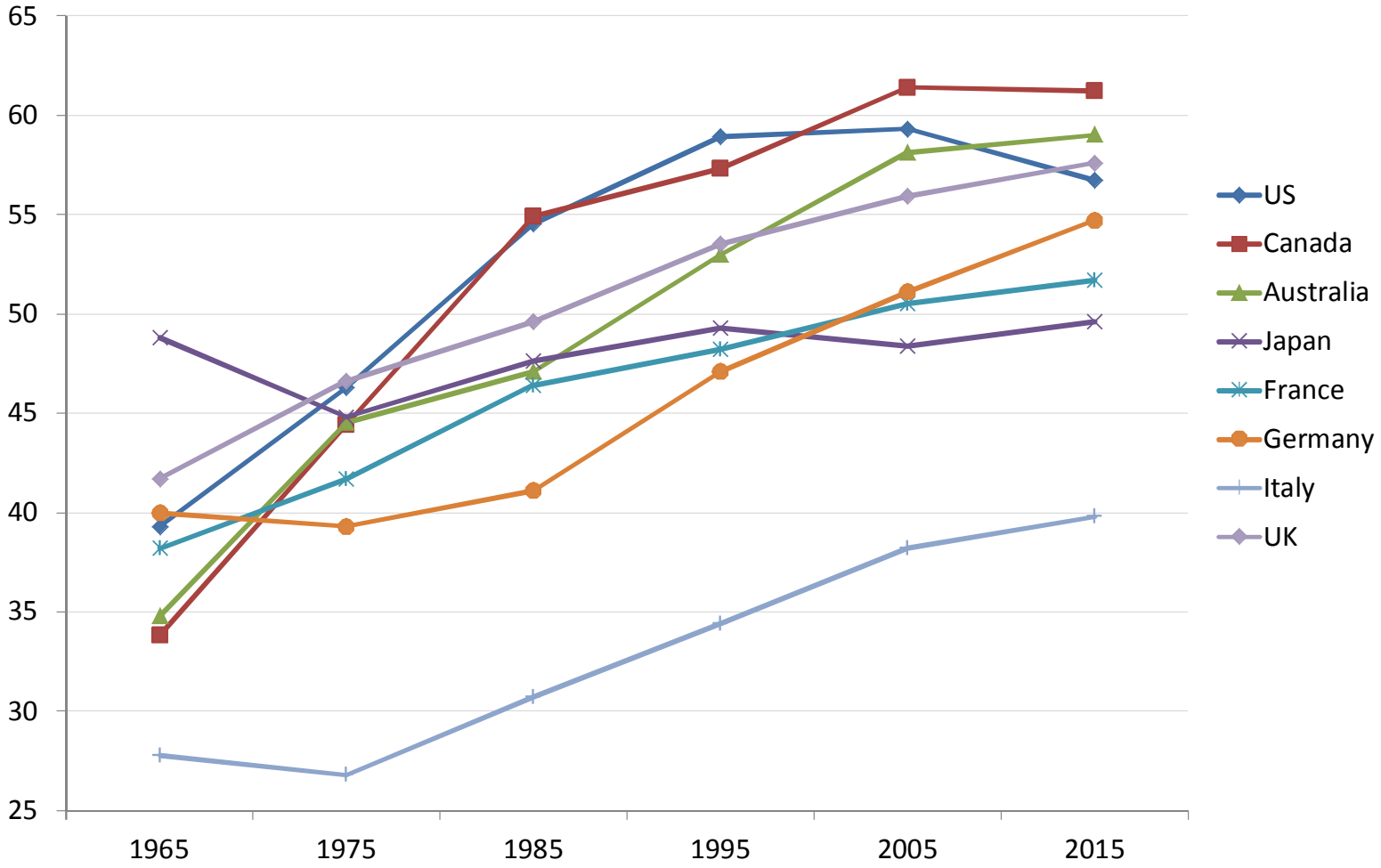
Table 2: Female Labor Force Participation Rates, 15+



Source: Browning, Martin, Pierre-Andre Chiappori, and Yoram Weiss. Economics of the Family. Cambridge University Press, 2014 and OECD.stat.

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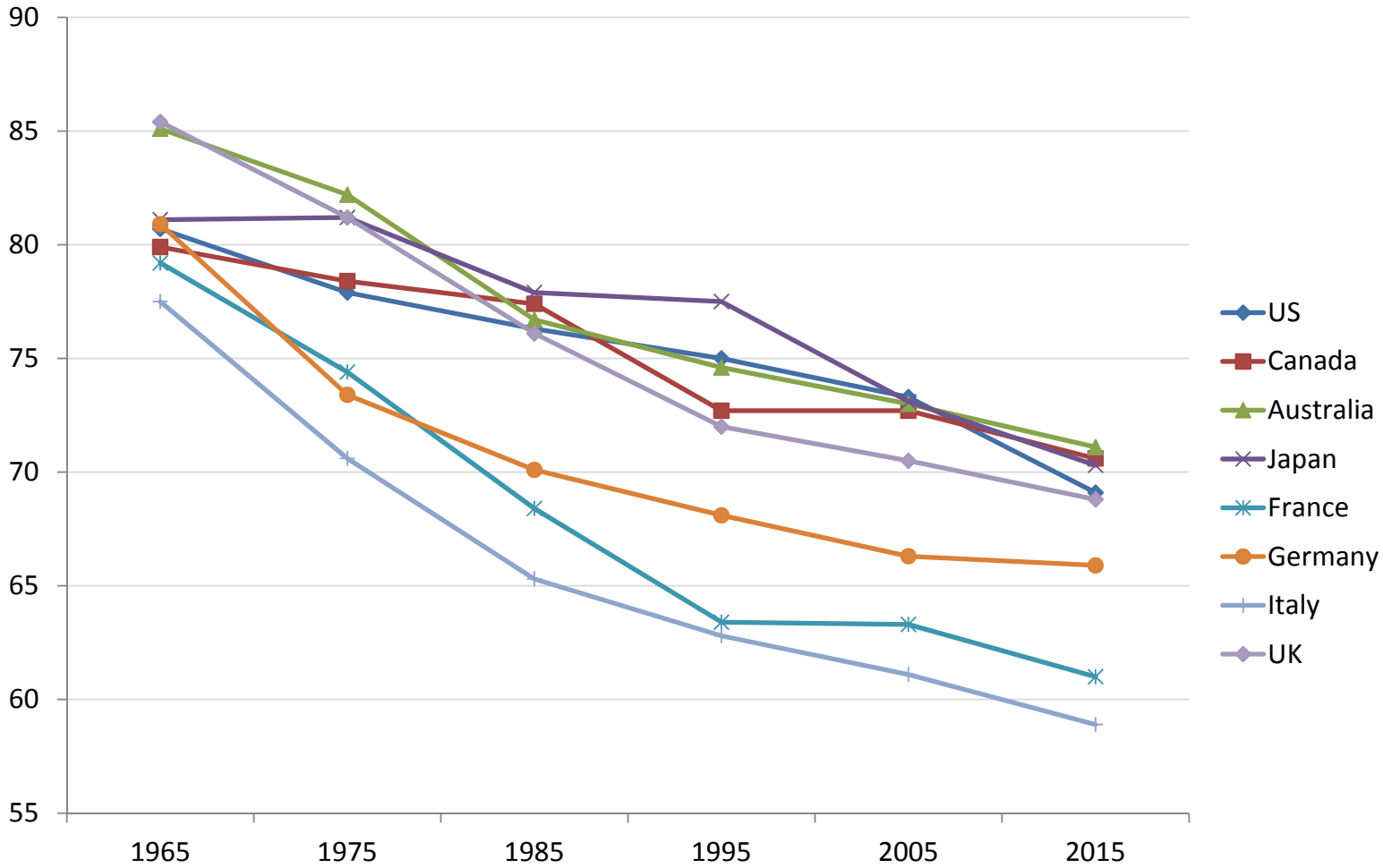
Table 3: Male Labor Force Participation Rates, 15+



Source: Browning, Martin, Pierre-Andre Chiappori, and Yoram Weiss. Economics of the Family. Cambridge University Press, 2014 and OECD.stat.

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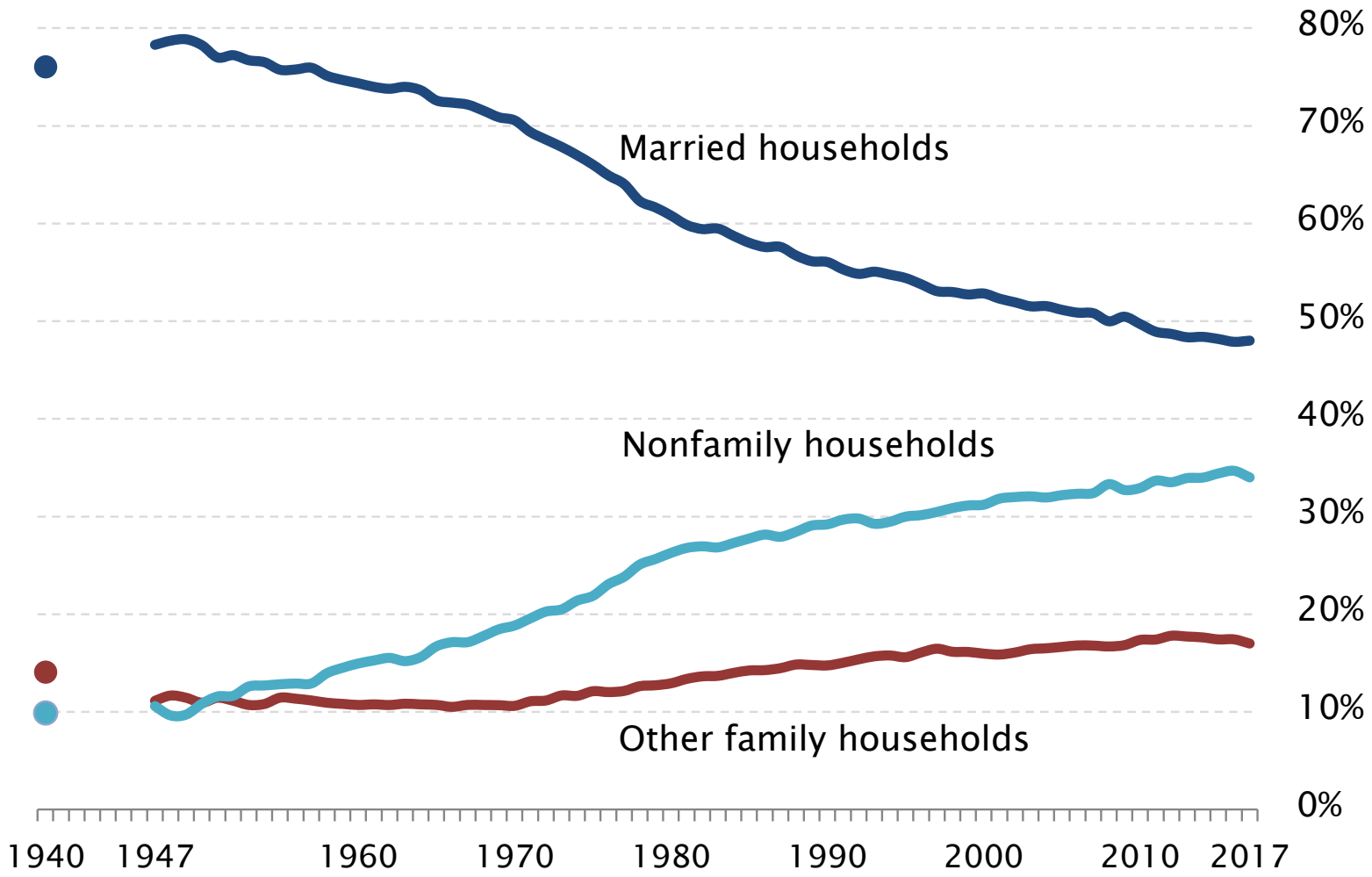
Figure 23: Percent of households by type



Source: U.S. Census Bureau, Decennial Census, 1940, and Current Population Survey, Annual Social and Economic Supplements, 1968 to 2017.

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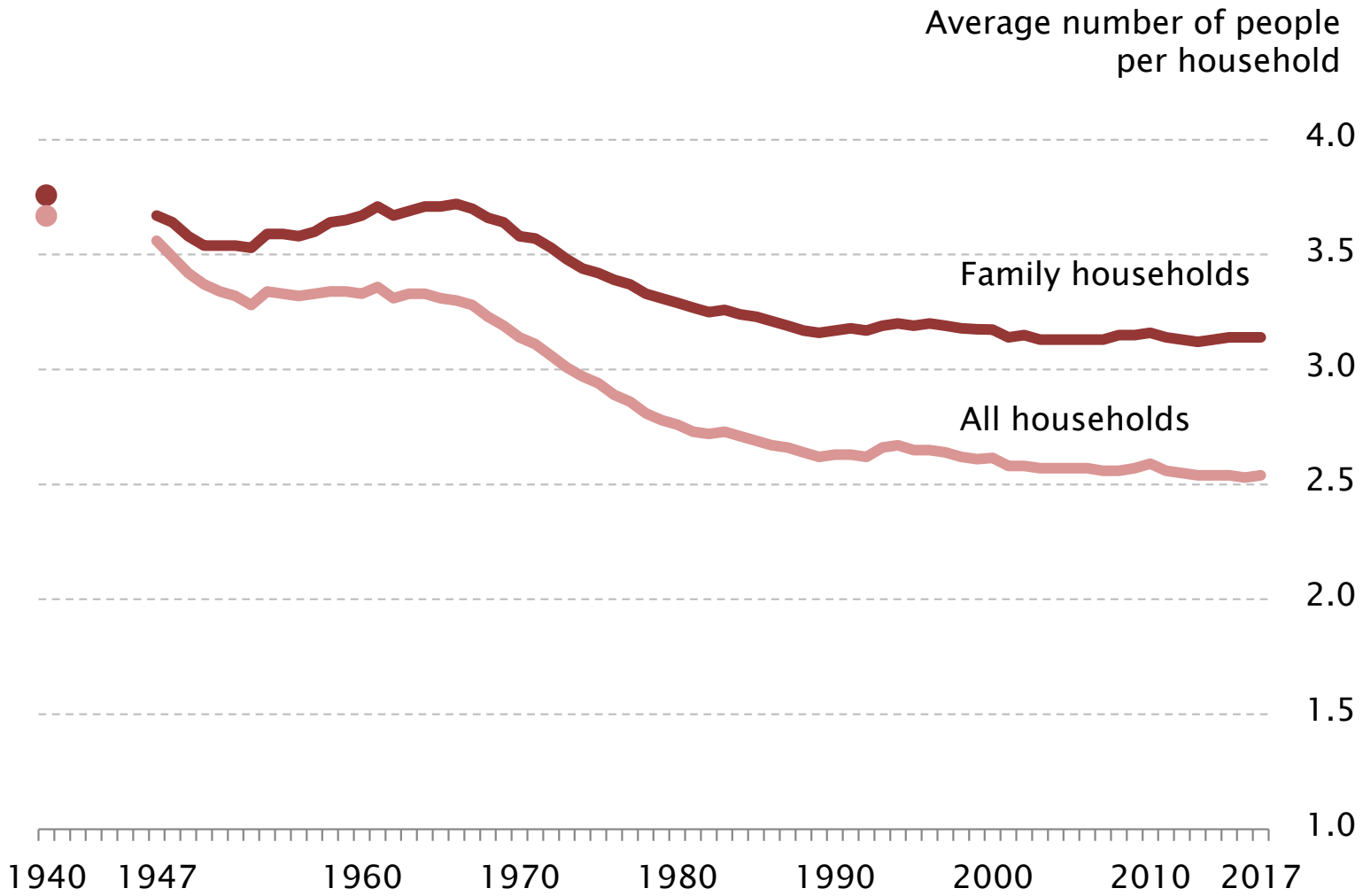
Figure 24: Changes in household size



Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplements, 1940 and 1947 to 2017.

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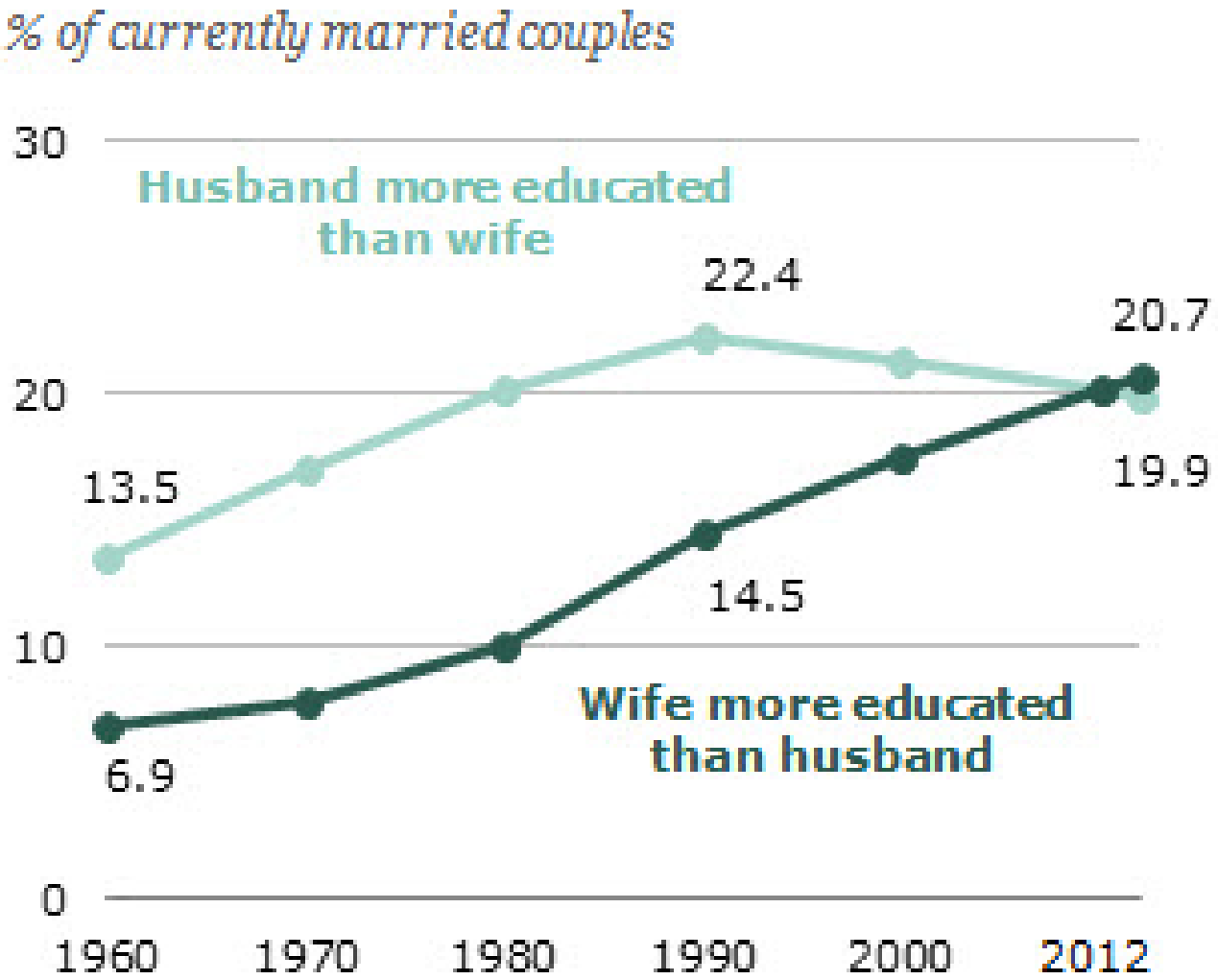
Figure 25: More Women Marrying Down



Source: Pew Research Center (2014) analysis of the Decennial Census and American Community Survey, IPUMS files.

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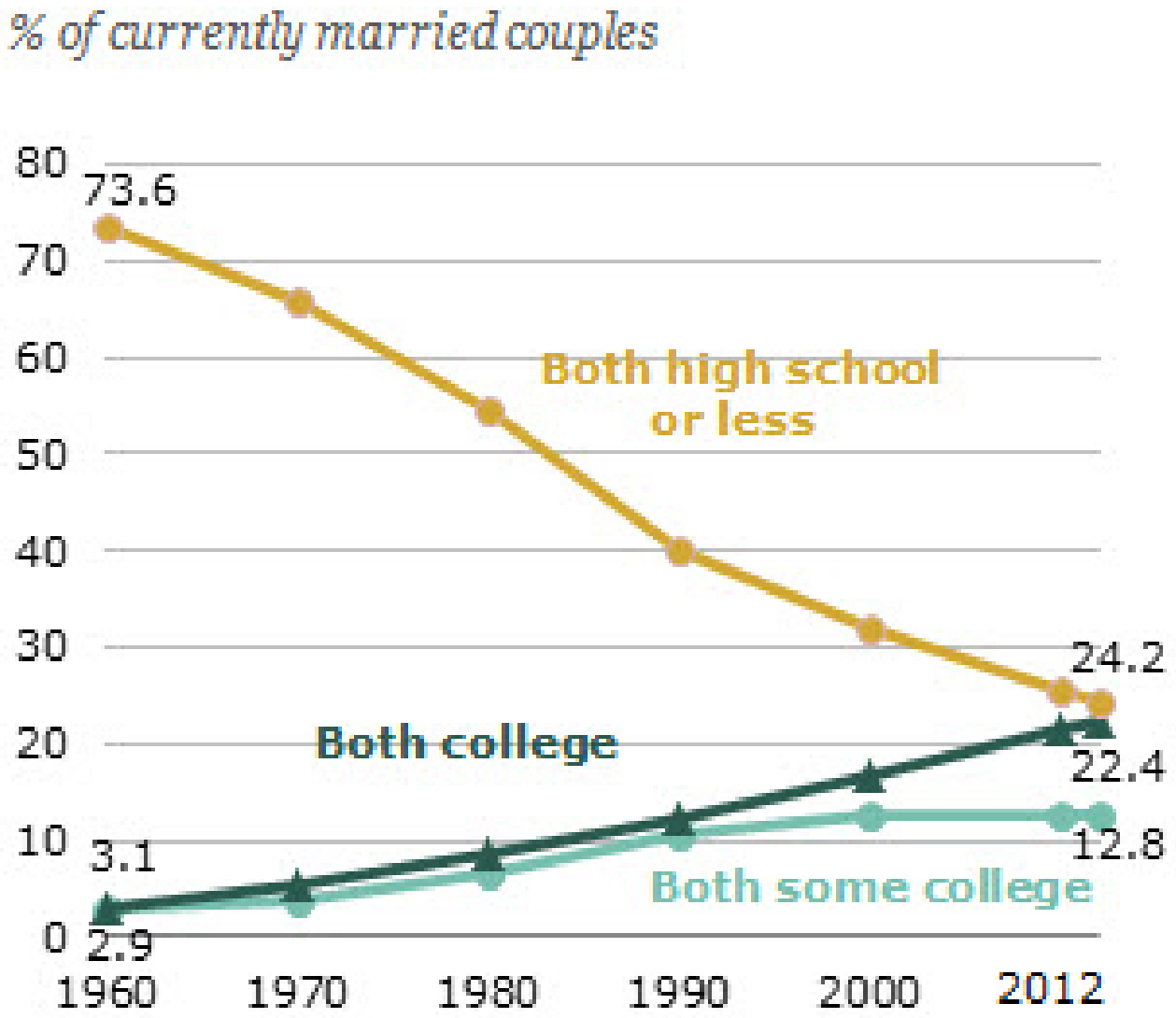
Figure 26: Share of Marriages Between Less-Educated Declines



Source: Pew Research Center (2014) analysis of the Decennial Census and American Community Survey, IPUMS files.

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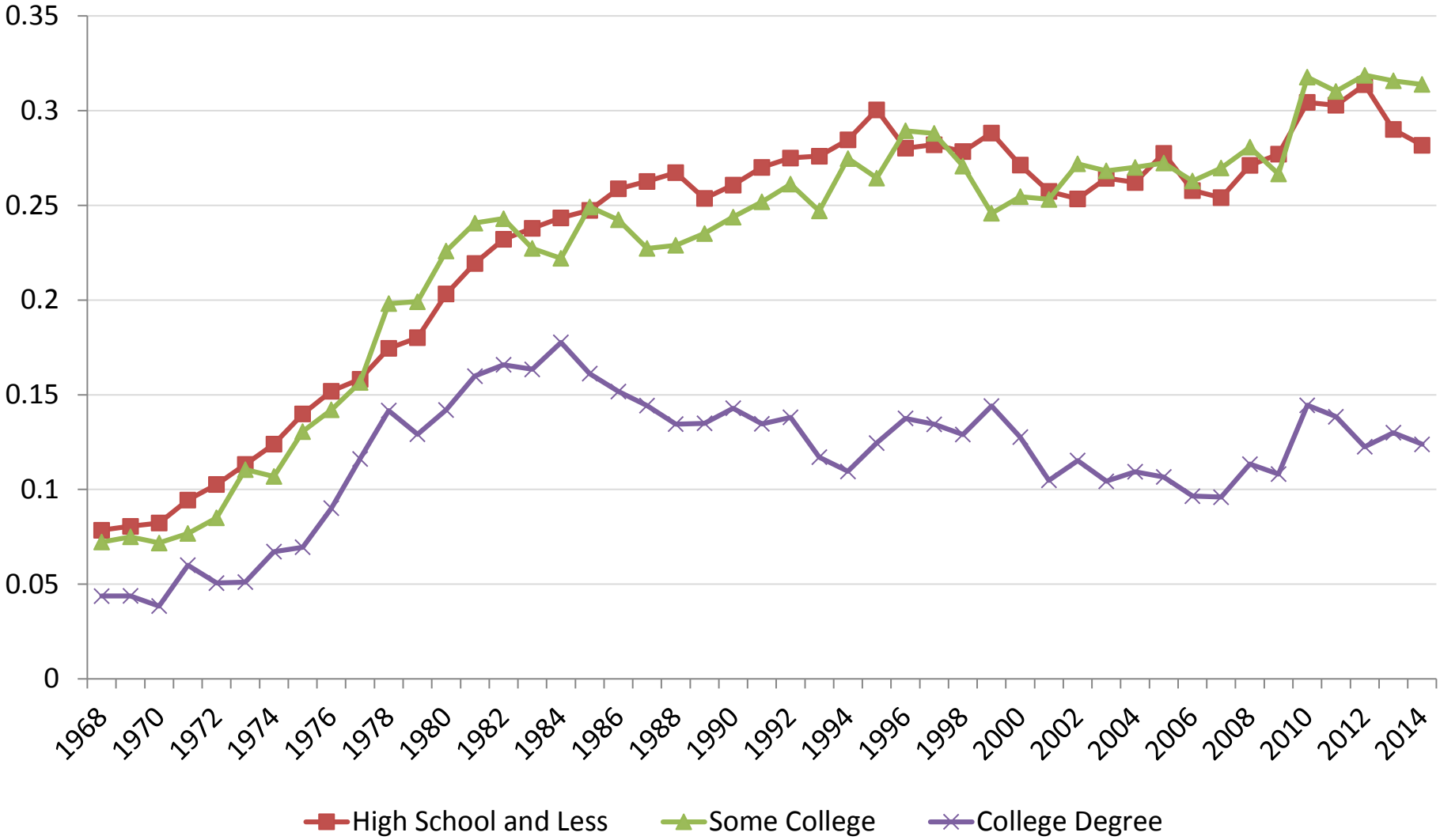
Figure 27: Divorce Rates by Schooling, US



Source: IPUMS CPS. Divorce Rate is defined as (% divorced ages 30–35) /(% married age 25–30).

Figure 28: Birth Rates, 1909-2016

Source: Population Research Institute. NCHS, National Vital Statistics Report, Vol 66, No 1 (for data 1960–2015). NCHS, Vital Statistics of the United States, 2003, Volume 1, Natality (for data 1909–1960).

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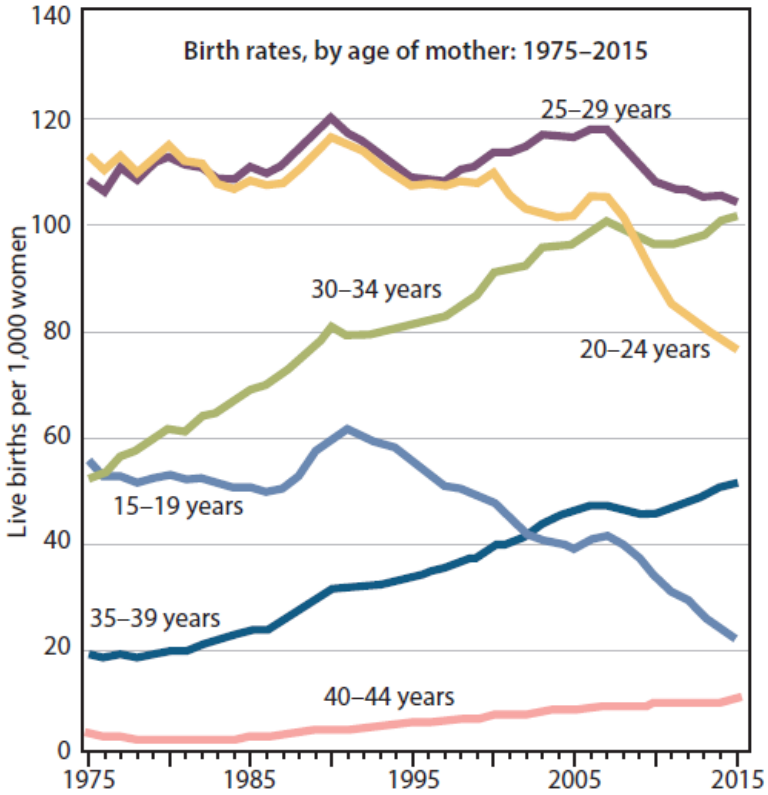
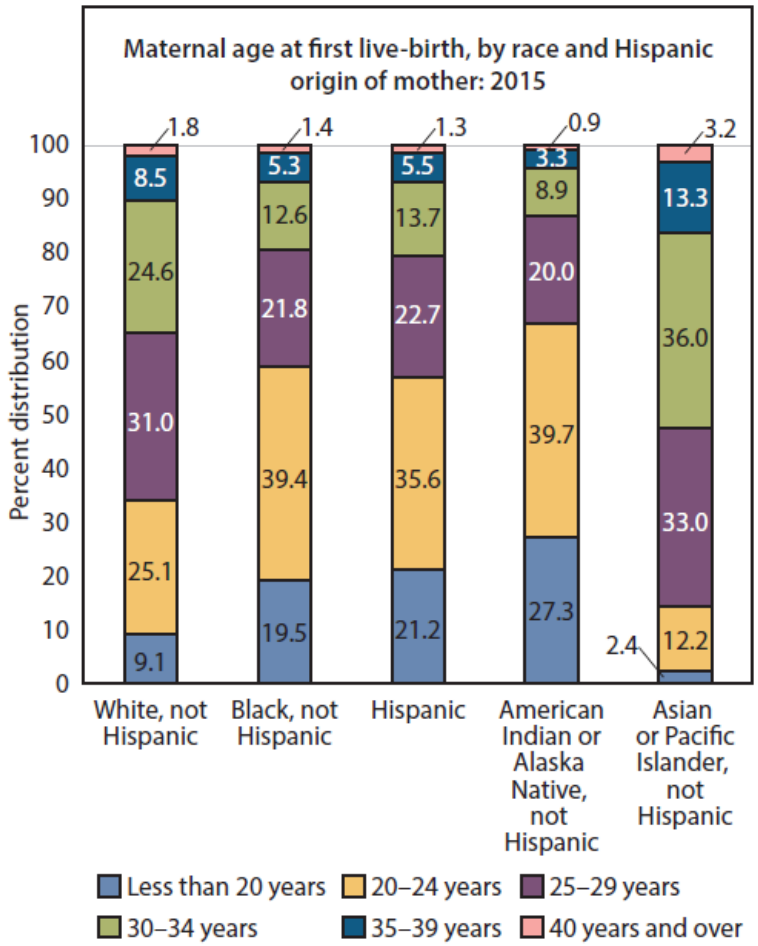
Figure 29: Birth rates, by age of mother and age at first live-birth: United States, 1975–2015





NOTE: See data table for Figure 9.

SOURCE: NCHS, National Vital Statistics System (NVSS).

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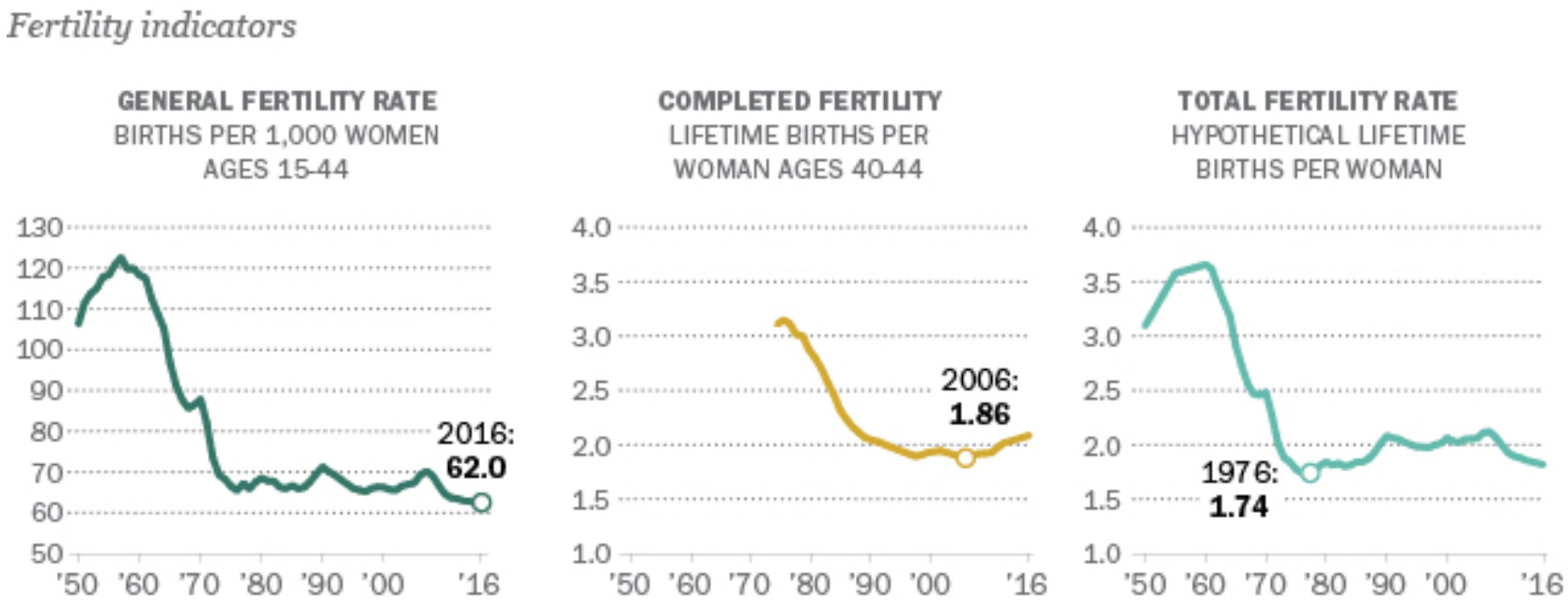
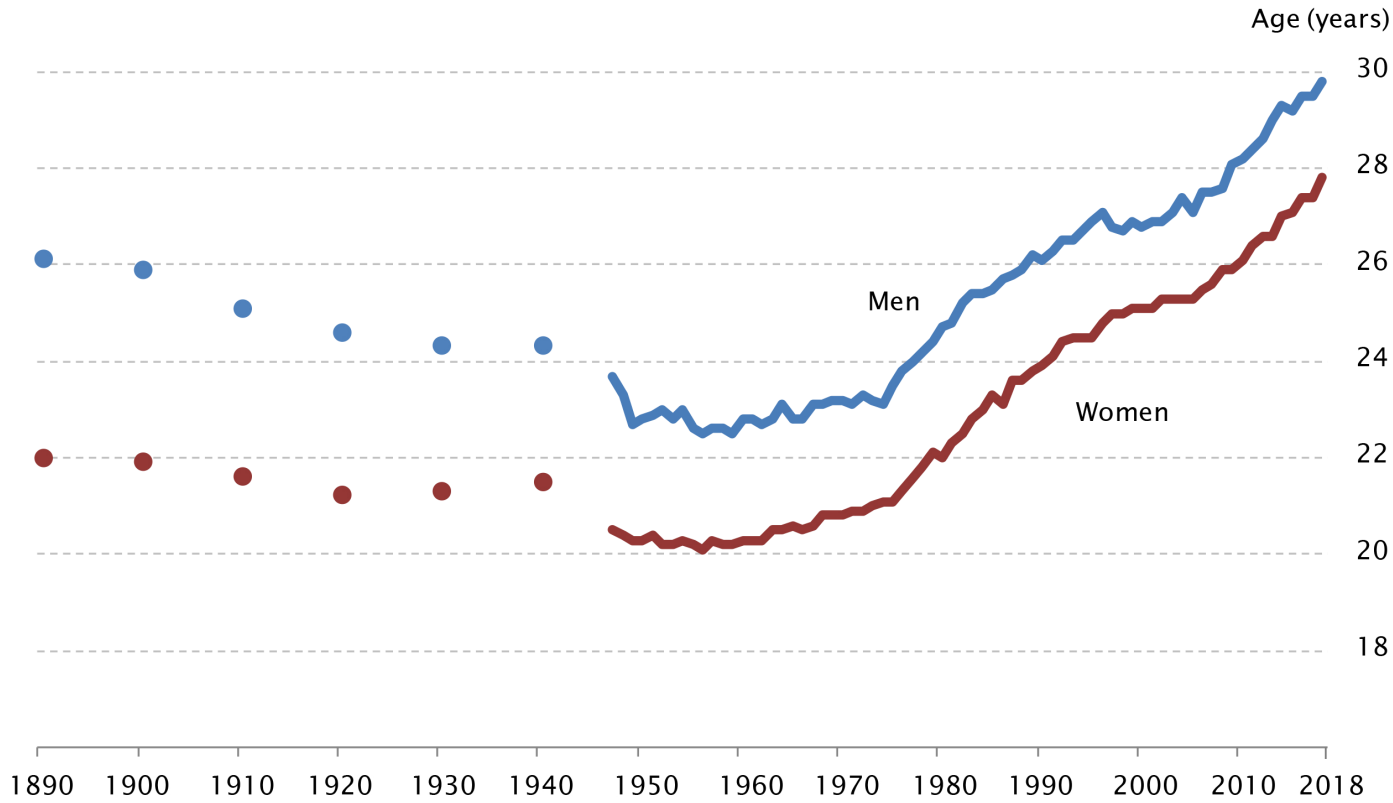
Figure 30: U.S. Fertility Hits All-Time Low in 2016... and 2006... and 1976



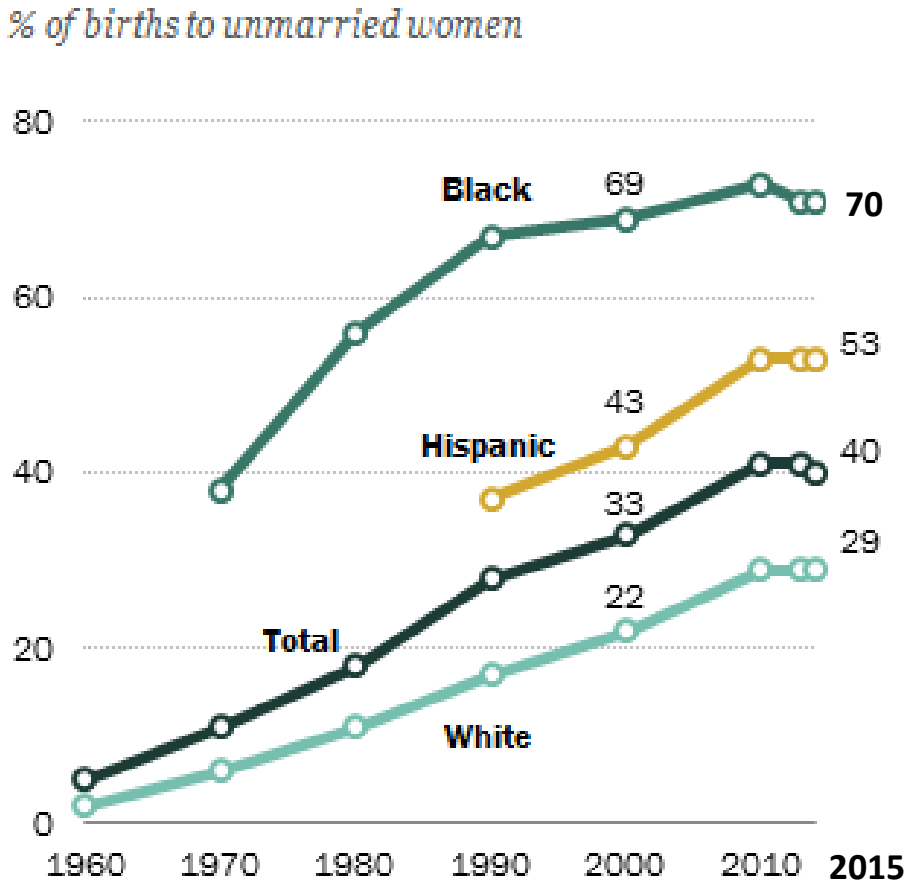
Note: Completed fertility data available for 1976-2012 only. Where necessary, TFR and completed fertility values are interpolated. All values based upon live births.
Source: Pew Research Center (2015). Data for GFR obtained from National Center for Health Statistics and Heuser (1976); for completed fertility, U.S. Census Bureau, Current Population Survey; for TFR, National Center for Health Statistics.

Figure 31: Median Age at First Marriage, 1890 to Present



Source: United States Census Bureau. Decennial Census, 1890 to 1940, and Current Population Survey, Annual Social and Economic Supplements, 1947 to 2018.

Figure 32: The Decoupling of Marriage and Childbearing



Note: Whites and blacks include only single-race non-Hispanics. Hispanics are of any race. 2014 data are preliminary. Data for Asians only not available.
Source: National Center for Health Statistics natality data, PEW Research Center.

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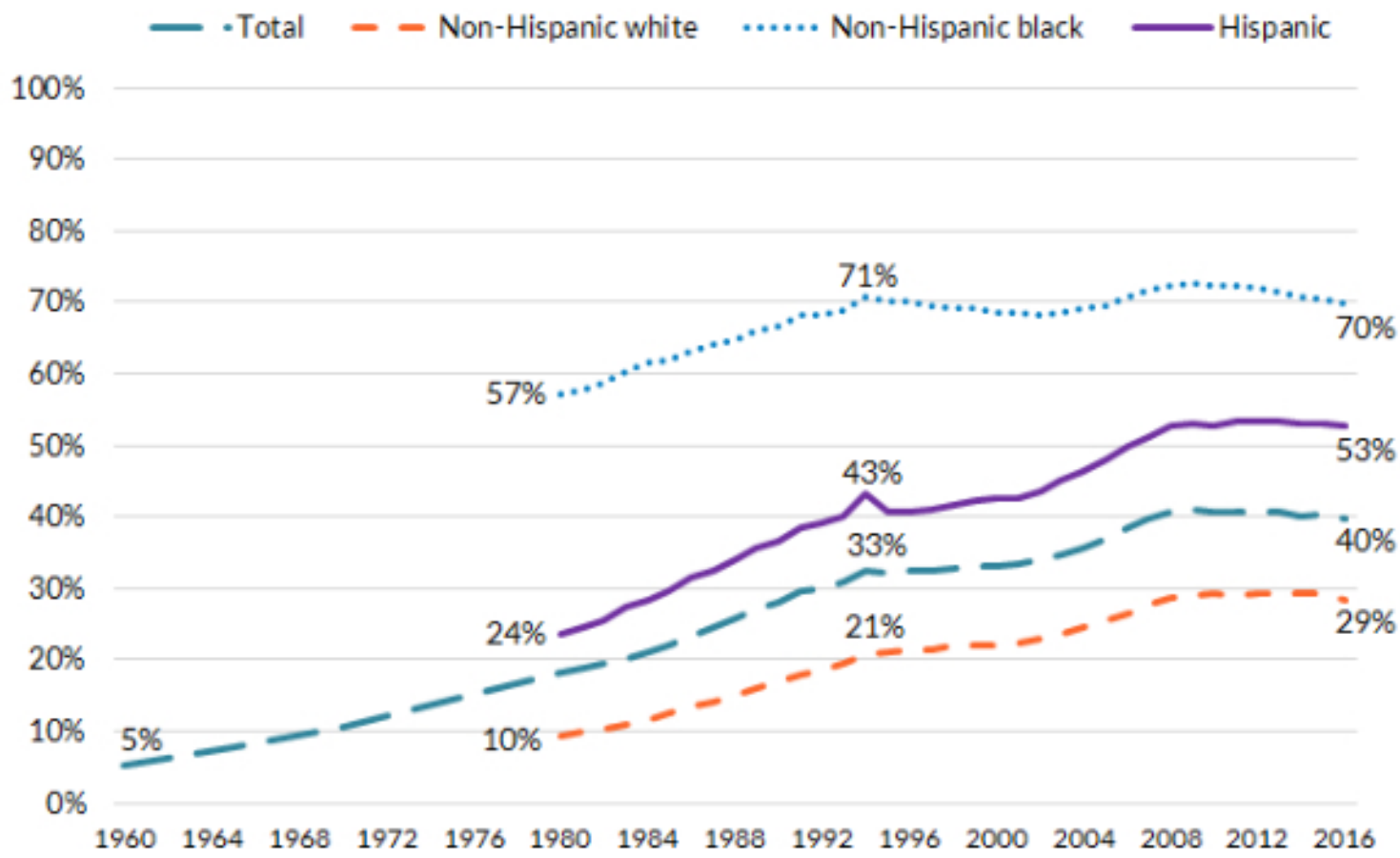
Figure 33: Percentage of All Births that Were to Unmarried Women, by Race and Hispanic Origin: Selected Years, 1960-2016



Source: Data by race and Hispanic origin for 1980–1989: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics (2014).

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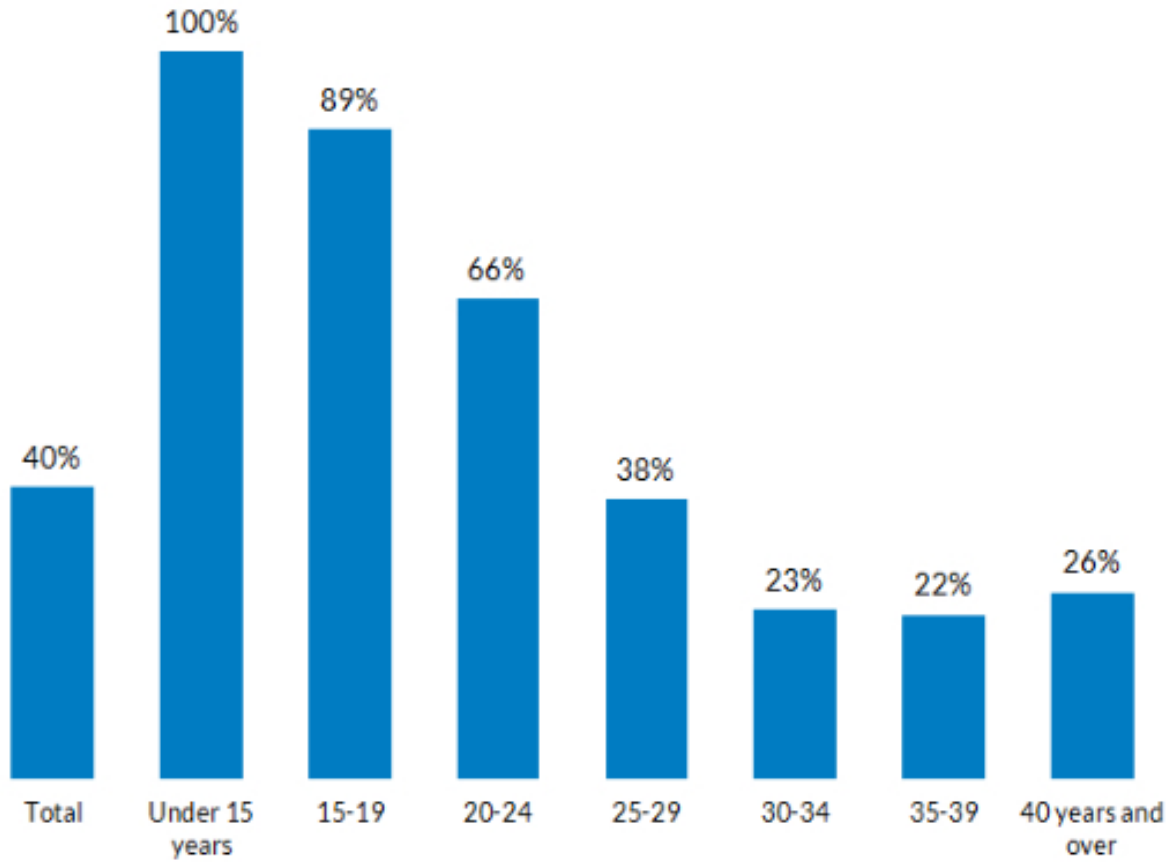
Figure 34: Percentage of All Births That Were to Unmarried Women, by Maternal Age: 2016



Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System (2018). CDC Wonder (data tool).

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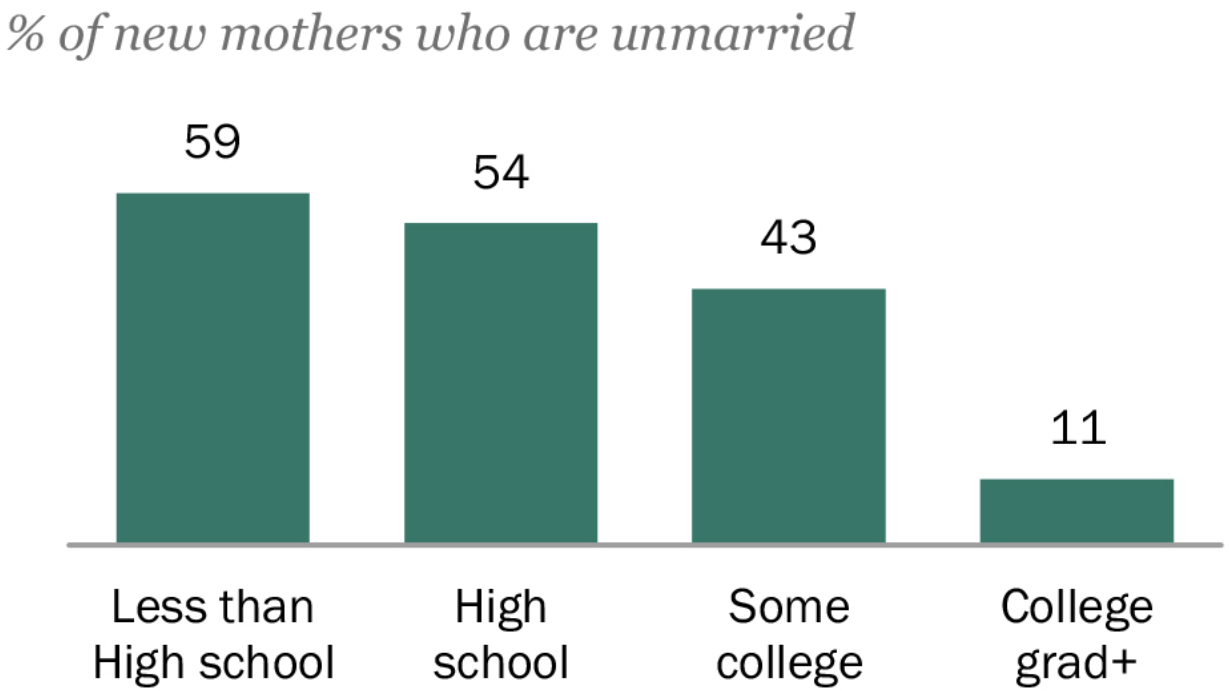
Figure 35: For the Less Educated, More Births Outside of Marriage



Note: Based on women ages 15–44 who have given birth in the past year. Marital status is based on time of survey.
Source: Pew Research Center analysis of 2014 American Community Survey (IPUMS).

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Evidence on the Effectiveness of Early Targeting to Promote Skills (Including Character Skills)

- 80% of adult social problems regarding health, healthy behaviors, crime and poverty are due to 20% of the population.
- Reliable indicators of these problems by age 5
  Caspi et al. (2016).

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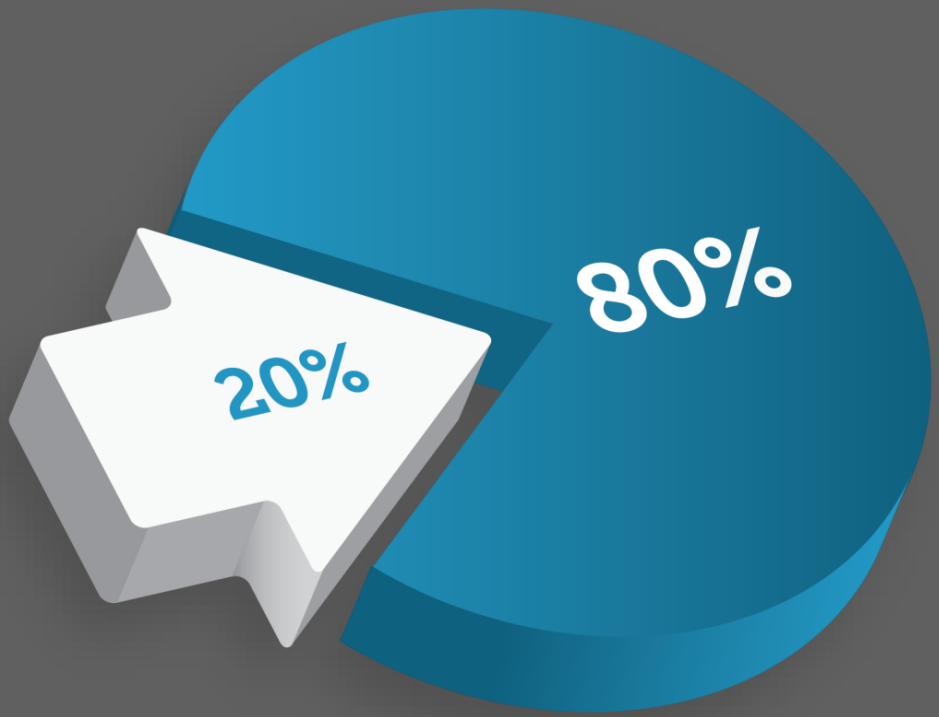
Childhood Forecasting of a Small Segment of the Population with Large Economic Burden

Caspi, Moffitt, et al. (2017)

Nature Human Behaviour

The Pareto Principle

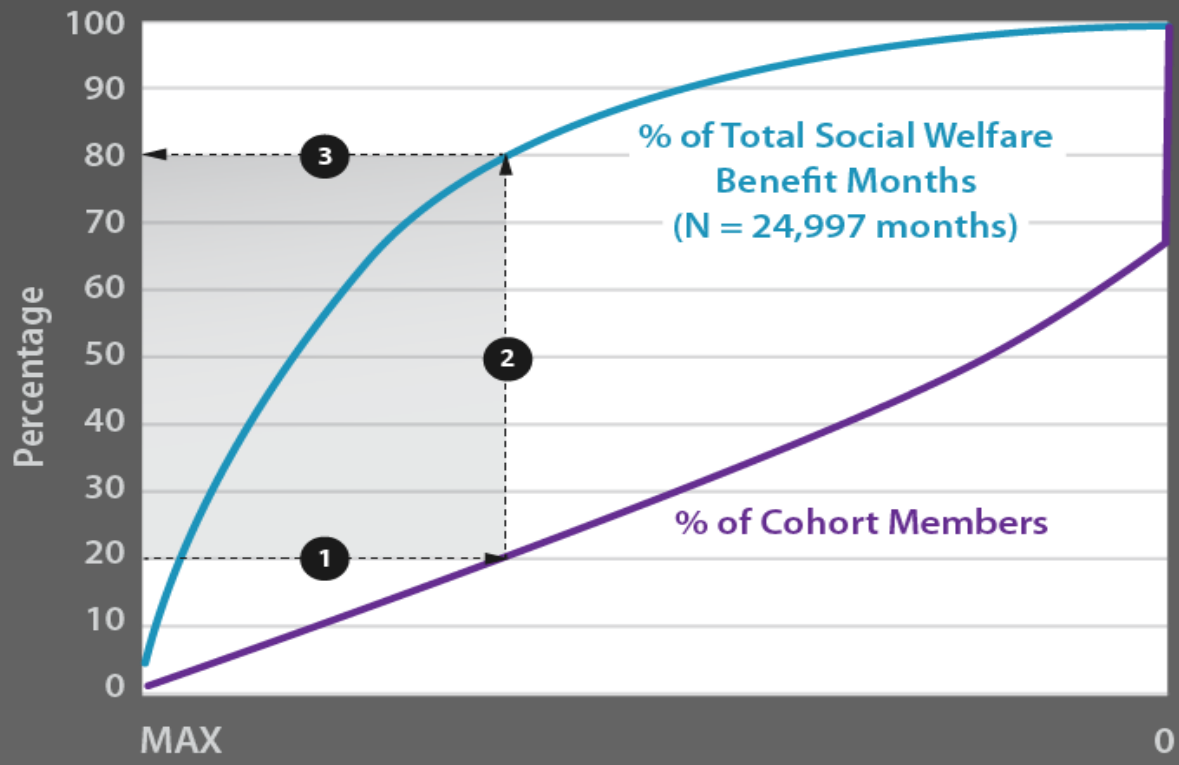


20% of the Actors Account for **80%** of the Results.

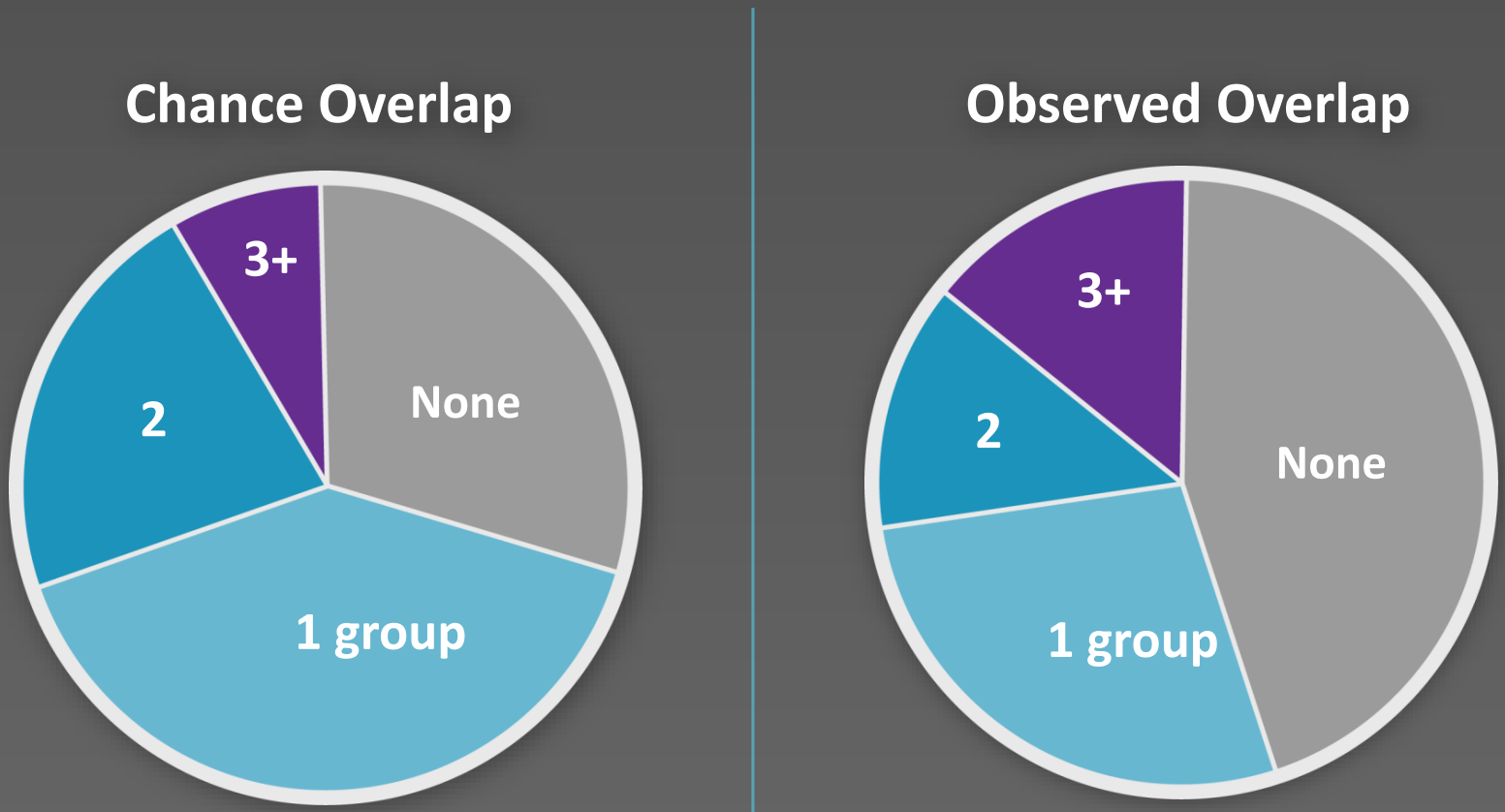
Vilfredo Pareto, 1848-1923

Social Welfare Benefit Months

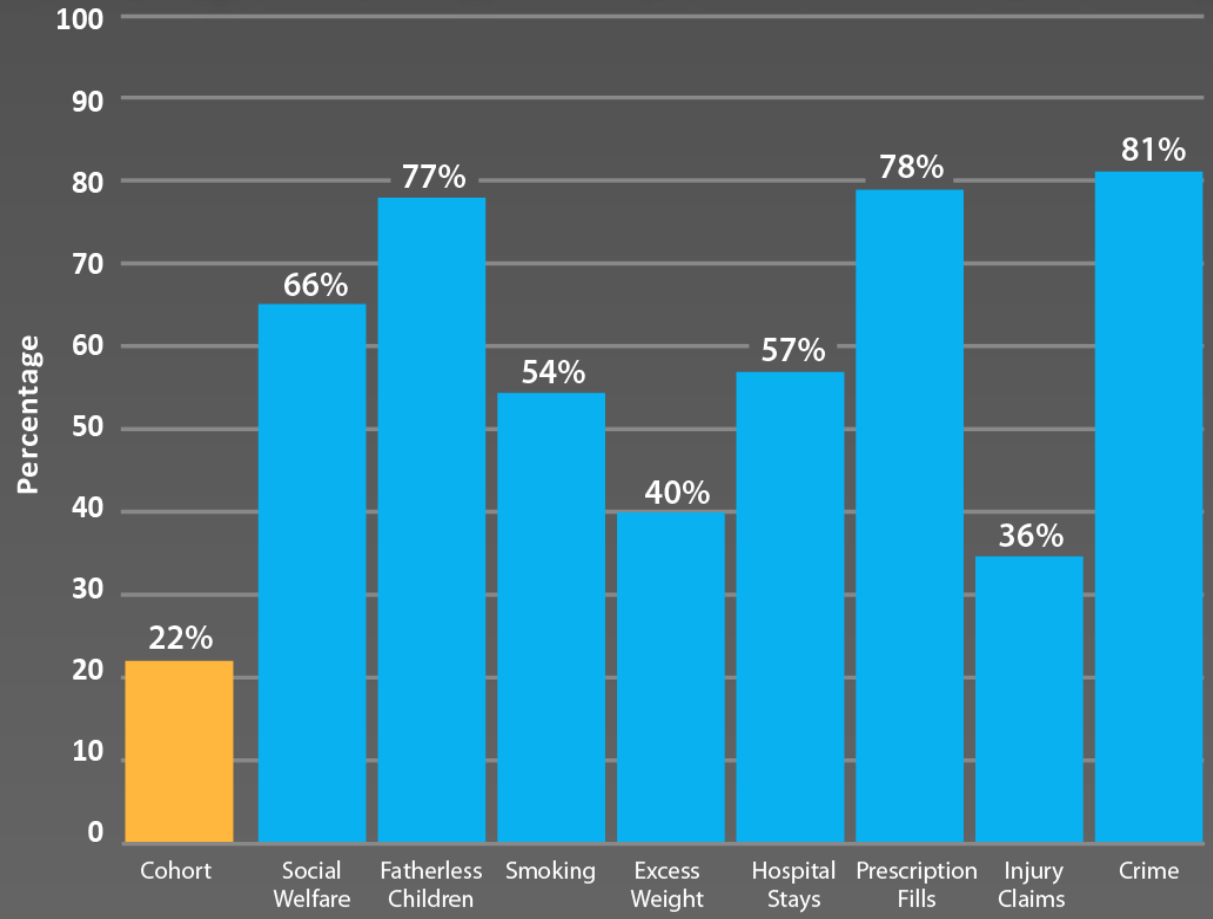
20% of Cohort Members = 80% of Total Social Welfare Benefit Months



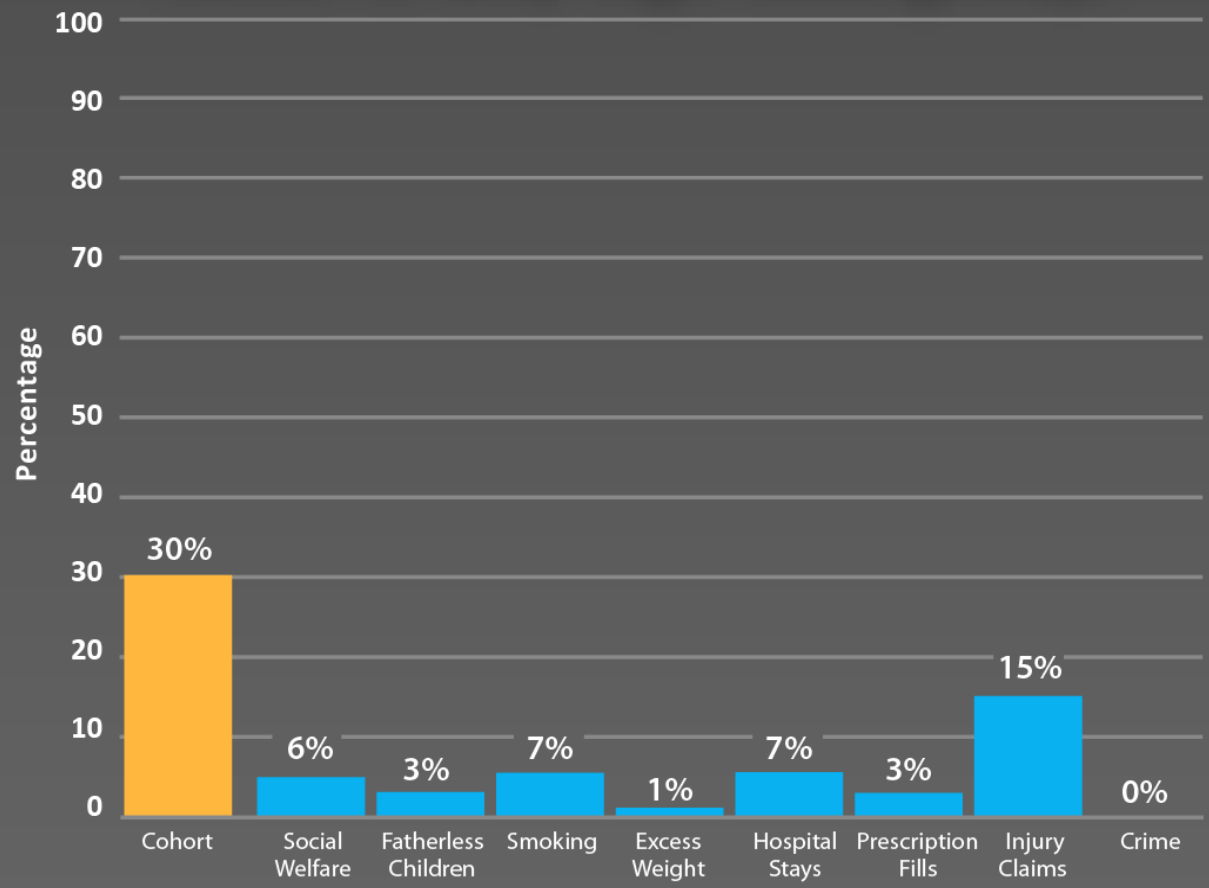
Concentration of High-Cost Groups in the Dunedin Birth Cohort



The High-need/High-cost Group in 3 or more sectors: How many health/social services do they use?



Small Footprint of cohort members never in any high-cost group:



Childhood Risk Factors to Describe High-cost Actor Groups: Composites across ages 3, 5, 7, 9, 11

- IQ
- Self-control
- SES (socio-economic status)
- Maltreatment

Summary of findings

- 20% of people contribute 80% of social/health problems.
- A high-need/high-cost population segment uses ~half of resources in multiple sectors.
- Most high-need/high-cost people in this segment share risk factors in the first decade of life;
- Brain integrity in the first years of life is important.

Seen in this way, early-life risks seem important enough to warrant investment in early-years preventions.

Skill Development by Family Background (Consider Just Cognitive Skill)

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The Importance of Cognition and Character

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a. Major advances have occurred in understanding which human capacities matter for success in life.

b. Cognitive ability as measured by IQ and achievement tests is important.

c. So are the **socio-emotional skills** – sometimes called character traits or personality traits:

- Motivation
- Sociability; ability to work with others
- Attention
- Self Regulation
- Self Esteem
- Ability to defer gratification
- Health and Mental Health

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Welfare Subsidized Poverty Enclaves: Detached The Poor from Society

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The Dynamics of Skill Formation: Two Notions of Complementarity

Link to Additional Material

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50% of Inequality in Lifetime Earnings Due to Factors in Place by Age 18

Cunha et al. (2005)

- Roemer (2017) reports a similar estimate
- Keane and Wolpin: 90%!

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Power of Place

Is Geography Destiny?

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Open Question in the Literature: What Are the Mechanisms Underlying the Power of Place?

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Sorting and Segregation?

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- Segregation: How similar are families who live in the same neighborhood?
  - Can be measured in many different ways
  - Different dimensions of segregation: native / immigrant (binary), education (discrete), income (continuous).
  - Different definitions of areas

- Measure of segregation in income in neighborhoods: Theil (1972), Reardon and Bishoff (2011), can be used to form a scale from 0-1:
  - 0 is no income segregation, 1 is full income segregation
  - 0: All income percentiles equally represented in all neighborhoods.
  - 1: Each neighborhood consists of families from same part of income distribution.

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Diversity Score

$$E = \sum_{r=1}^{r} (\Pi_r) \ln[1/\Pi_r]$$

$$\Pi_r = 1 \Rightarrow E = 0$$

- Π_r refers to a particular racial/ethnic group's proportion of the whole metropolitan area population.
- Measure of diversity

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- Unit i within the metropolitan area, such as a census tract, would analogously have its **entropy score**, or diversity, defined as:

$$E_i = \sum_{r=1}^{r} (\Pi_{ri}) \ln[1/\Pi_{ri}]$$

- Π_{ri} refers to a particular racial/ethnic group's proportion of the population in tract i.

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Theil Entropy Index:

$$\mathrm{H} = \sum_{i=1}^{n} \left[\frac{t_i(E - E_i)}{ET} \right]$$

- $t_i =$ total population of tract i
- T is the metropolitan area population.
- $\sum t_i = T$

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- E_i and E represent tract i's diversity (entropy) and metropolitan area diversity, respectively.
- The entropy index varies between 0, when all areas have the same composition as the entire metropolitan area (i.e., maximum integration), to a high of 1, when all areas contain one group only (maximum segregation).
- Diversity score influenced by the relative size of the various groups in a metropolitan area
- The entropy index, being a measure of evenness, is not.
- It measures how evenly groups are distributed across metropolitan area neighborhoods, regardless of the size of each of the groups.

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In the U.S., Sorting is High at Both Ends of the Income Distribution

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Sorting Increasing

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Figure 36: Income Segregation Patterns in the U.S.

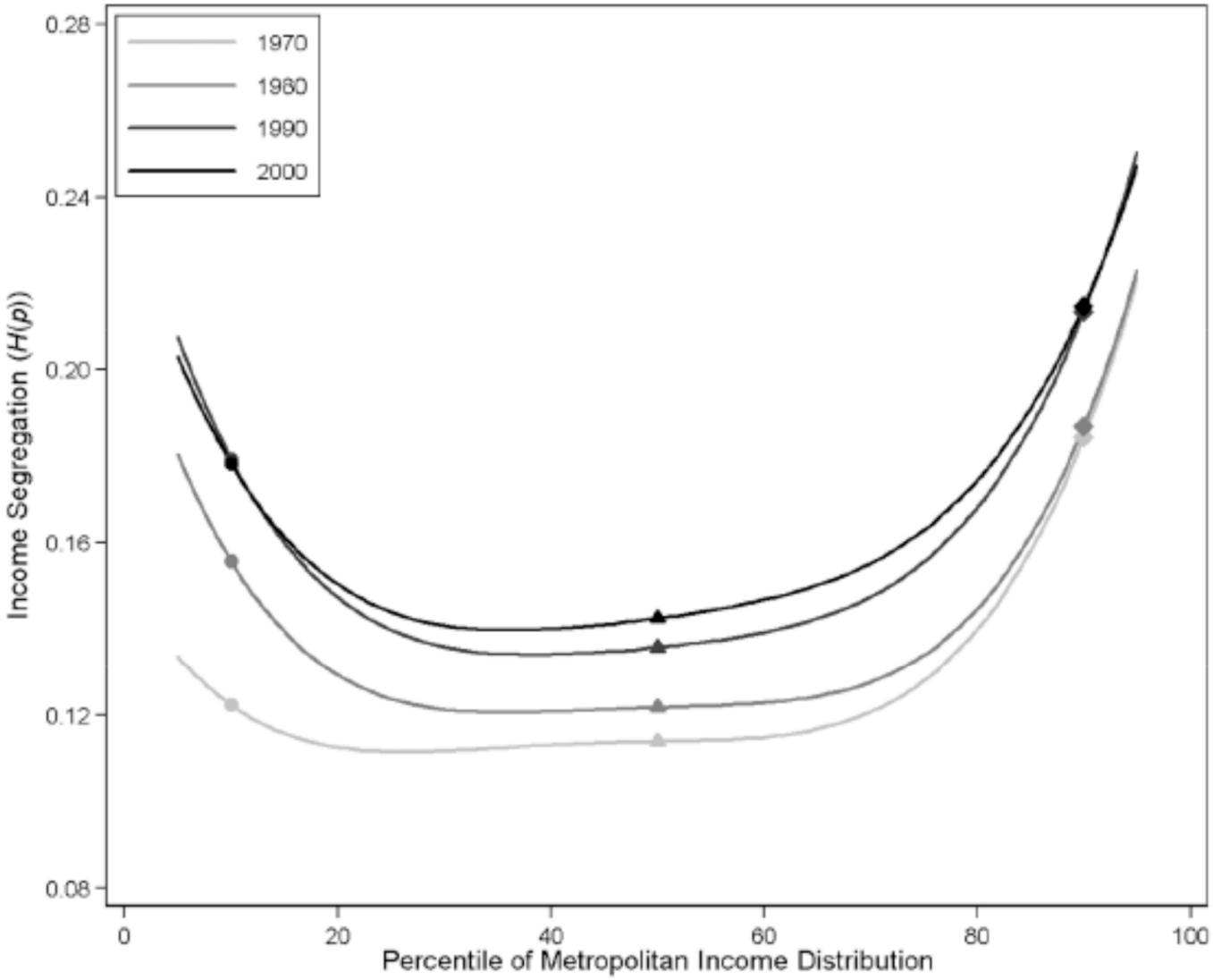

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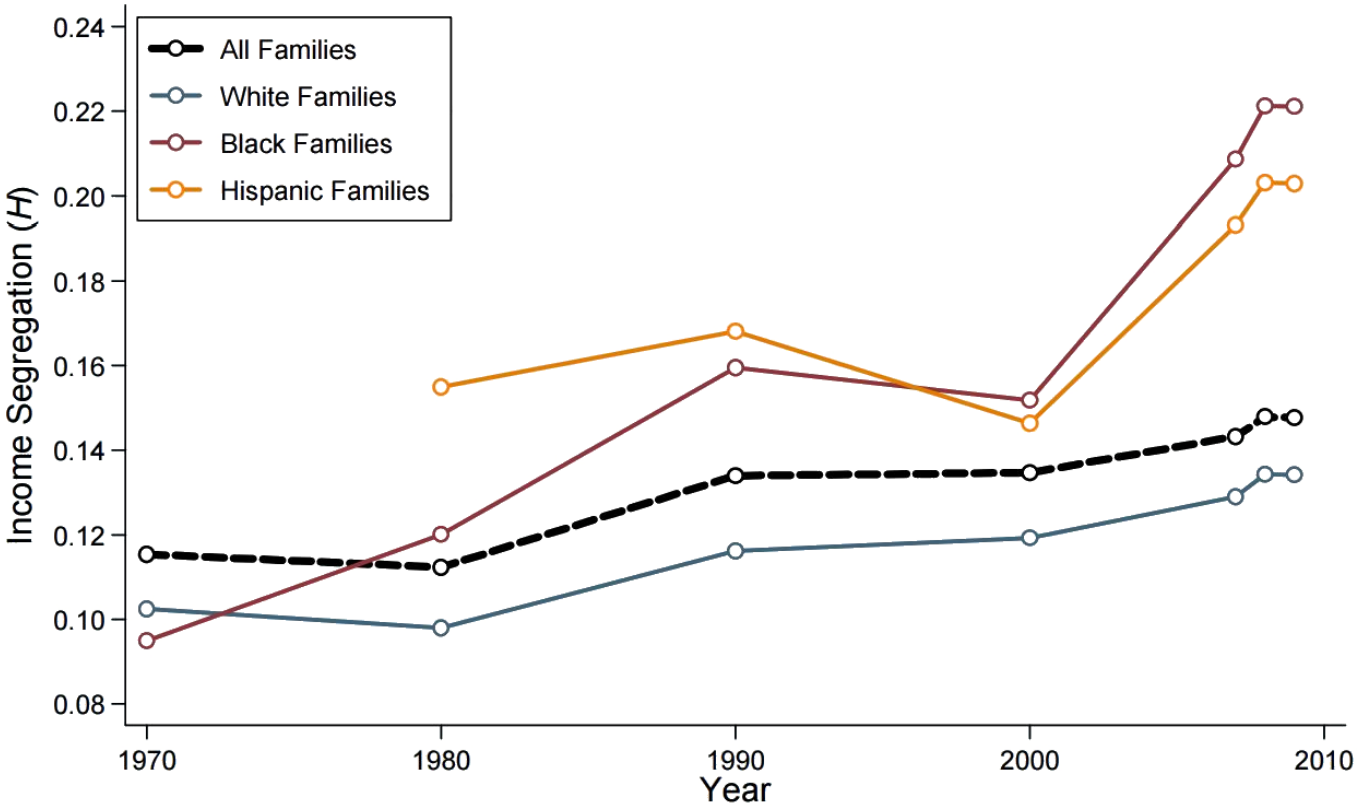
Figure 37: Trends in family income segregation, by race



Source: Bischoff and Reardon (2014)
Notes: Authors' tabulations of data from U.S. Census (1970-2000) and American Community Survey (2005- 2011). Averages include all metropolitan areas with at least 500,000 residents in 2007 and at least 10,000 families of a given race in each year 1970-2009 (or each year 1980-2009 for Hispanics). This includes 116 metropolitan areas for the trends in total and white income segregation, 65 metropolitan areas for the trends in income segregation among black families, and 37 metropolitan areas for the trends in income segregation among Hispanic families. *Note:* the averages presented here are unweighted. The trends are very similar if metropolitan areas are weighted by the population of the group of interest.

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Similar Phenomena in Denmark

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Figure 38: Income segregation in Greater Copenhagen by different income measures, families with children (2004)

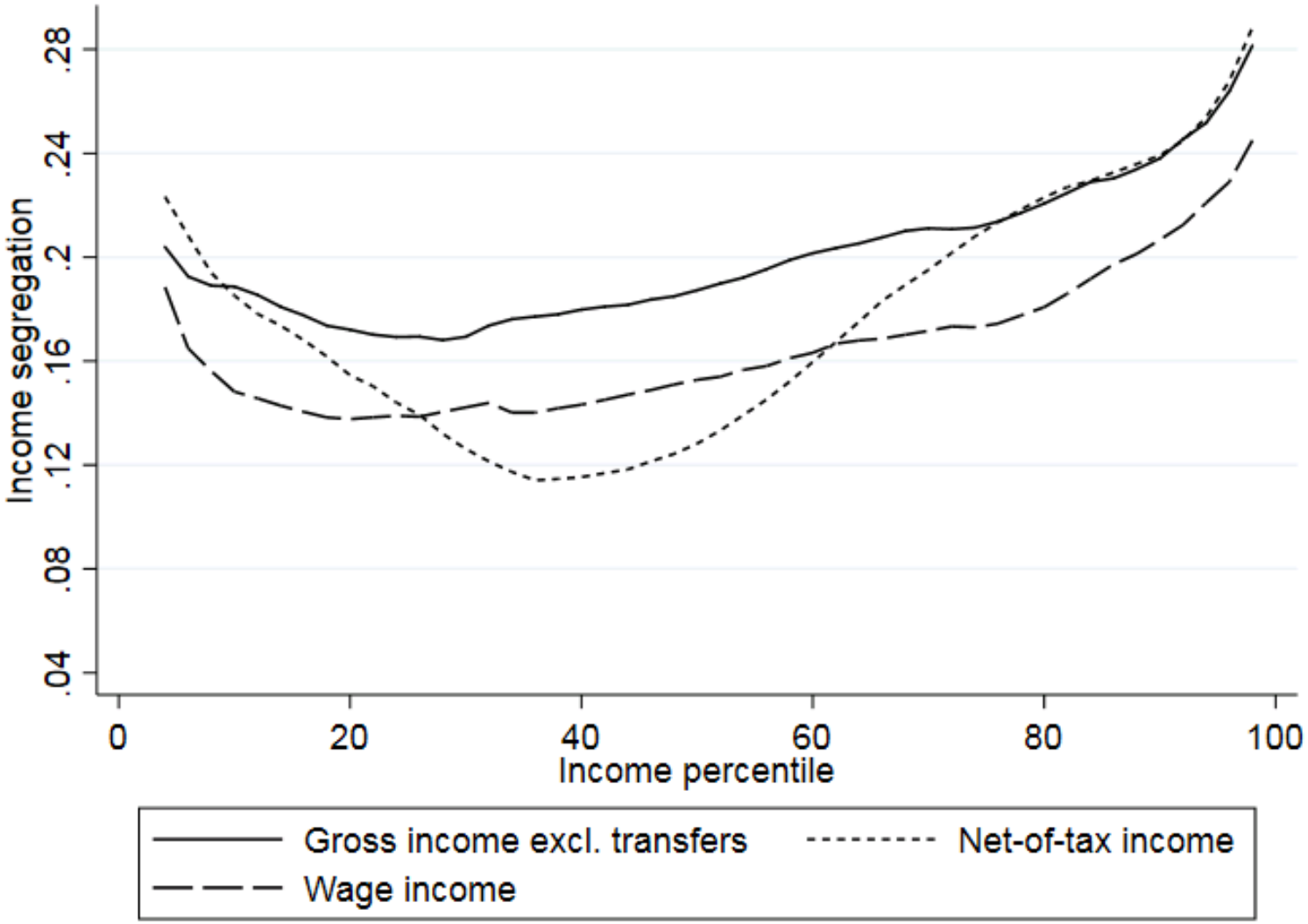

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Figure 39: Income segregation in Greater Copenhagen in different years, net-of-tax income, families with children

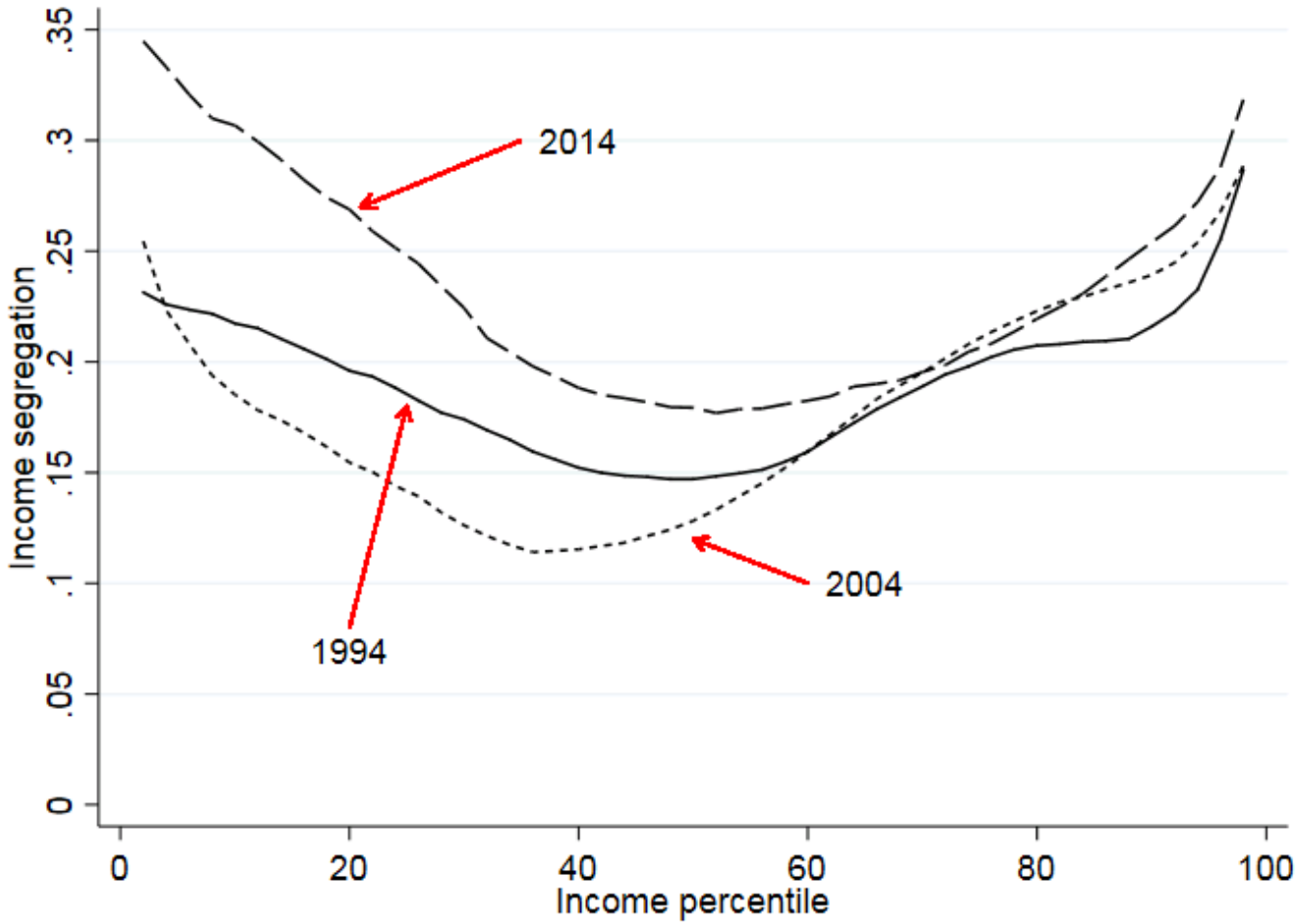

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Figure 40: Income segregation by gross income excl. transfers across primary school Catchment Areas by year, Denmark

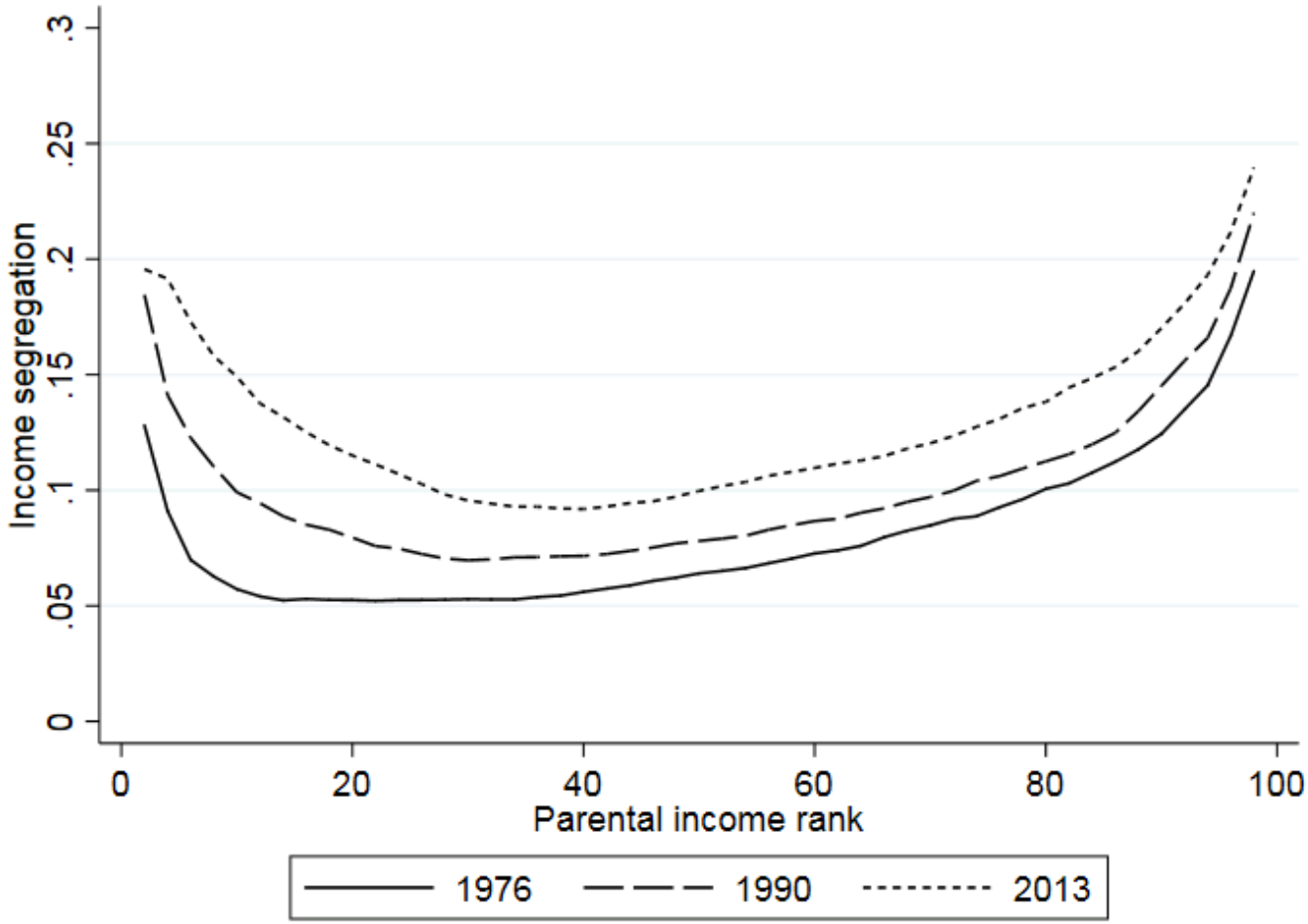

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Figure 41: Income segregation by gross income excl. transfers across primary schools by year, Denmark and Copenhagen

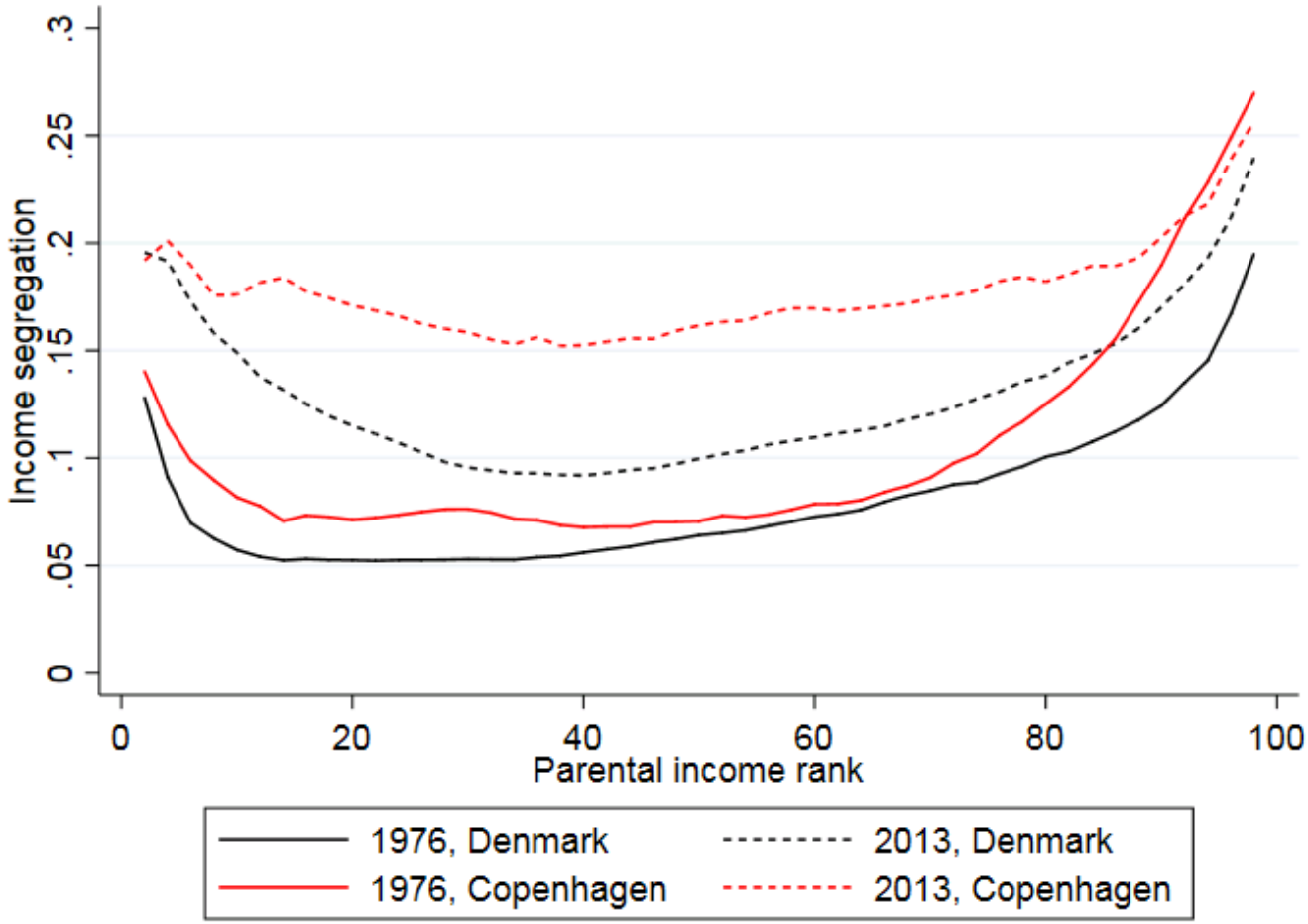

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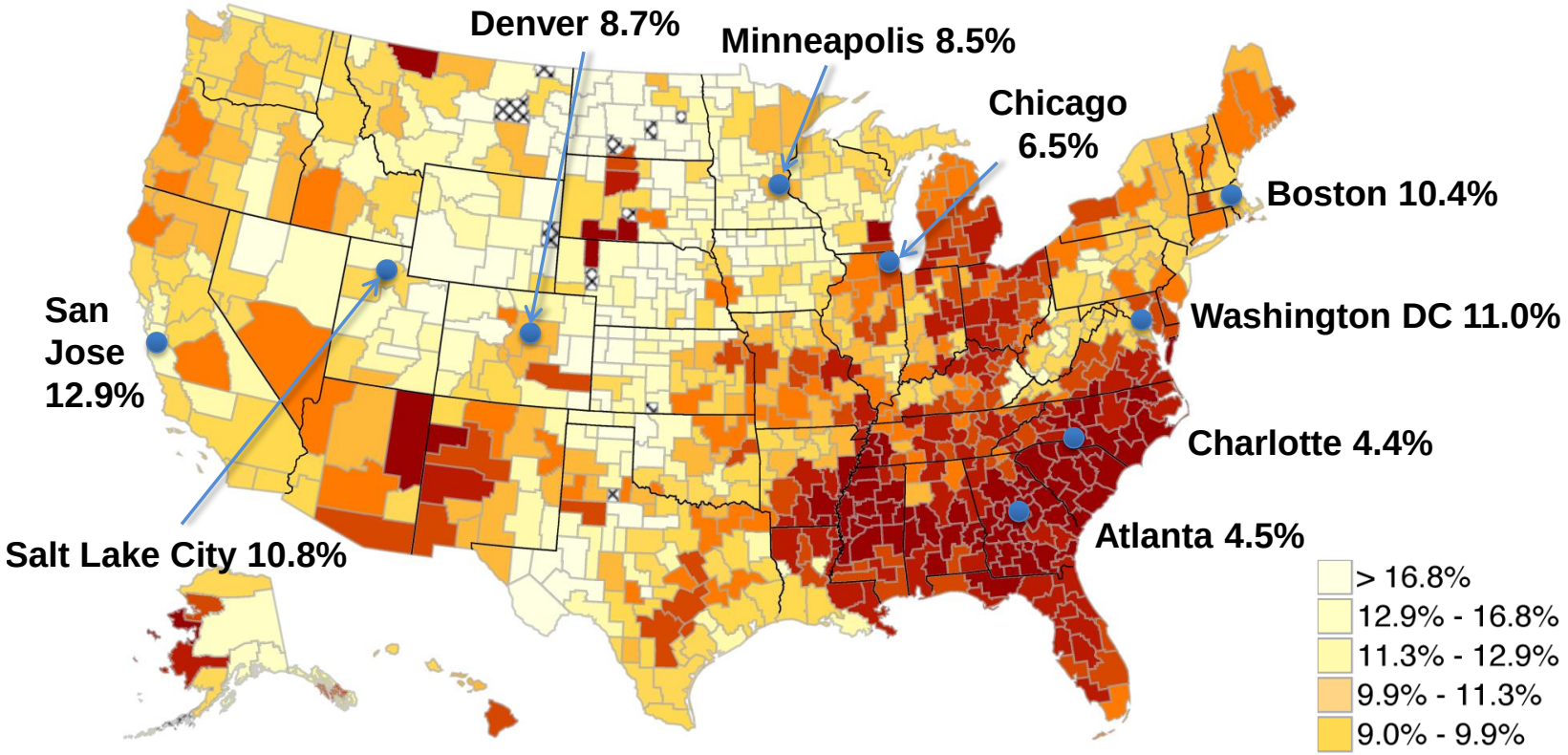
Figure 42: The Geography of Upward Mobility in the United States

Chances of Reaching the Top Fifth Starting from the Bottom Fifth by Metro Area



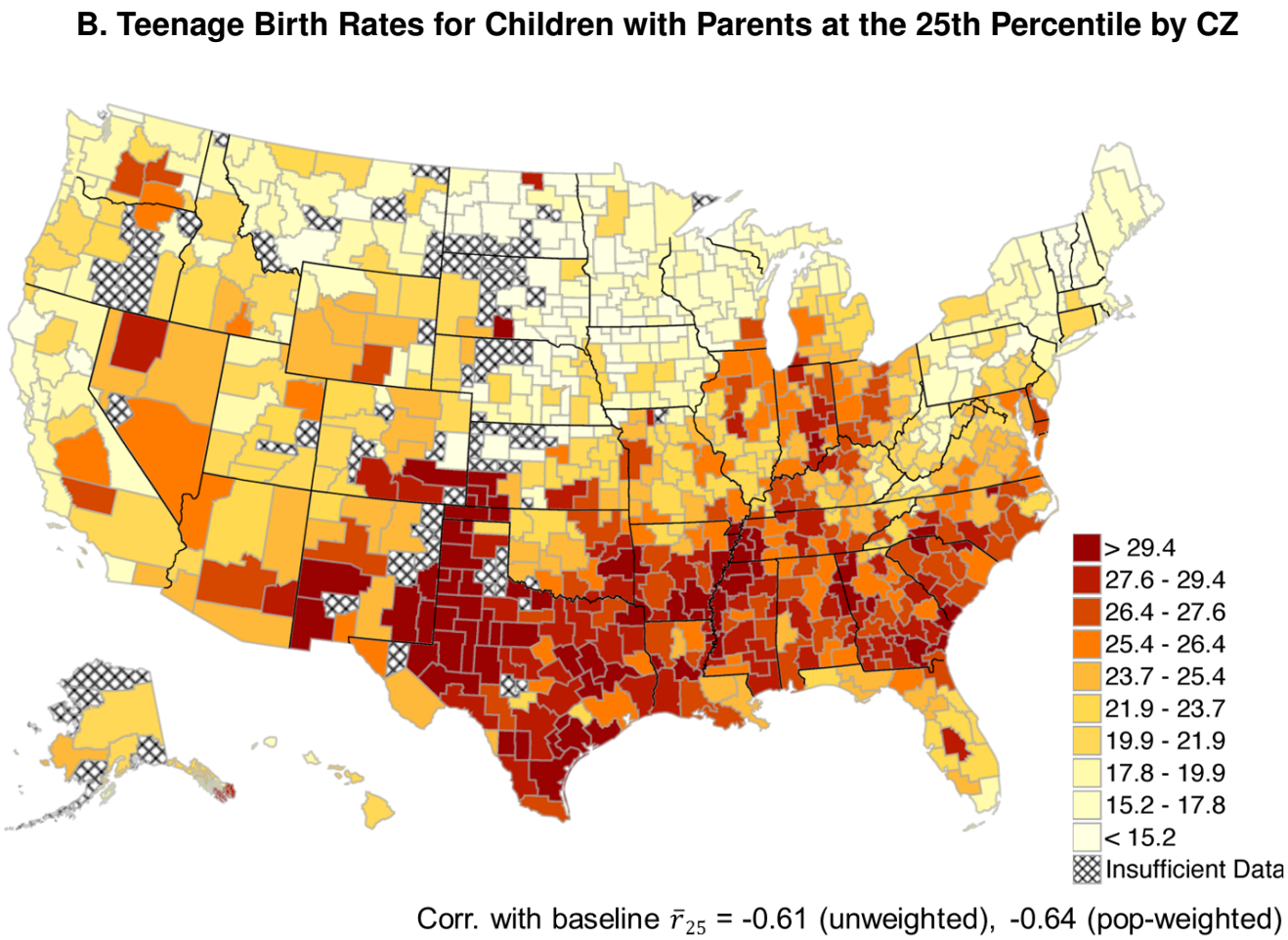
Note: Lighter Color = More Upward Mobility
Download Statistics for Your Area at www.equality-of-opportunity.org

Source: Chetty (2016).

Figure 43: Fig. 3. Trends in absolute mobility: Sensitivity analysis

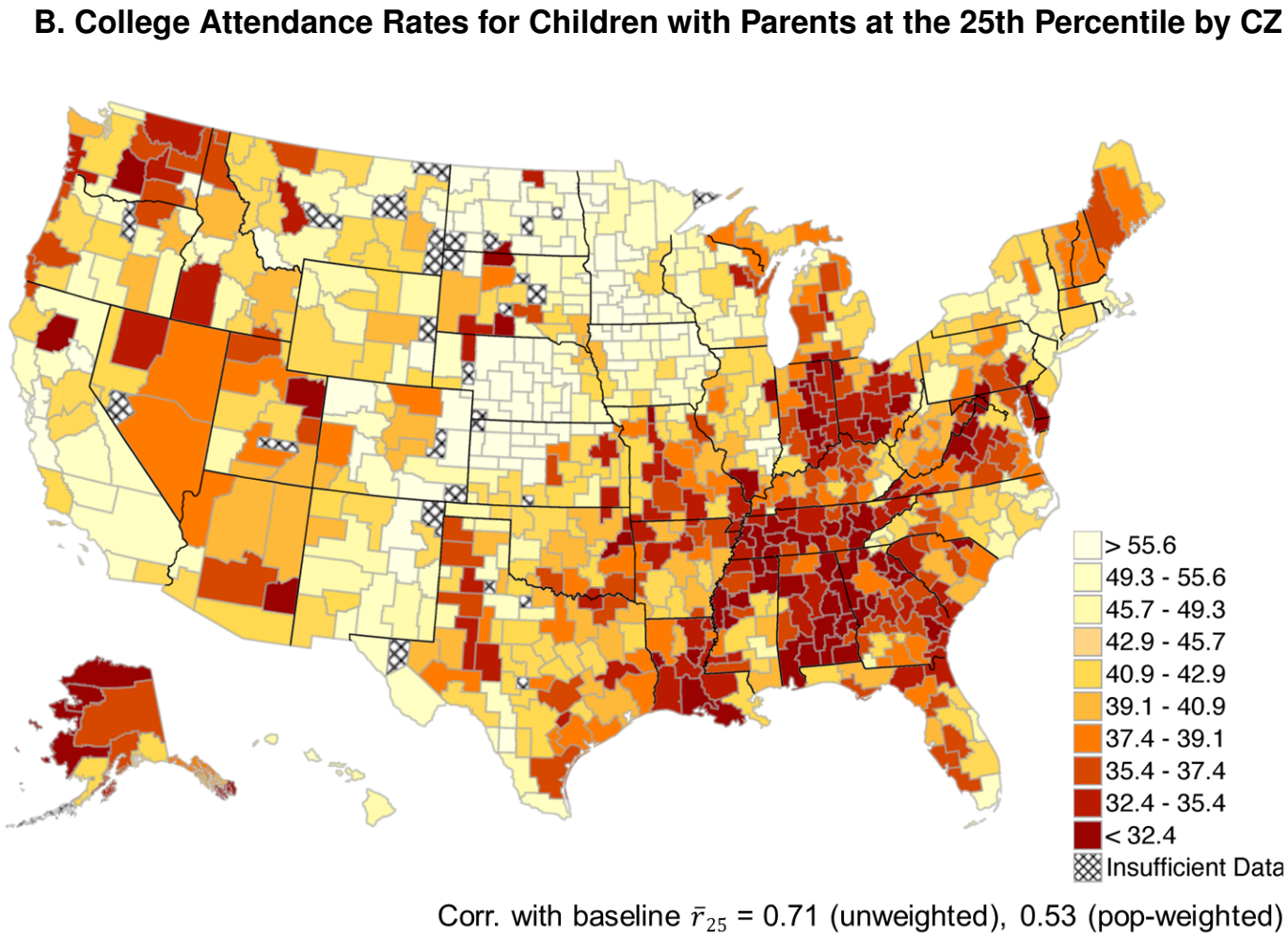
Source: The fading American dream: Trends in absolute income mobility since 1940.

Figure 44: The Geography of Teenage Birth by Parent Income Gradients



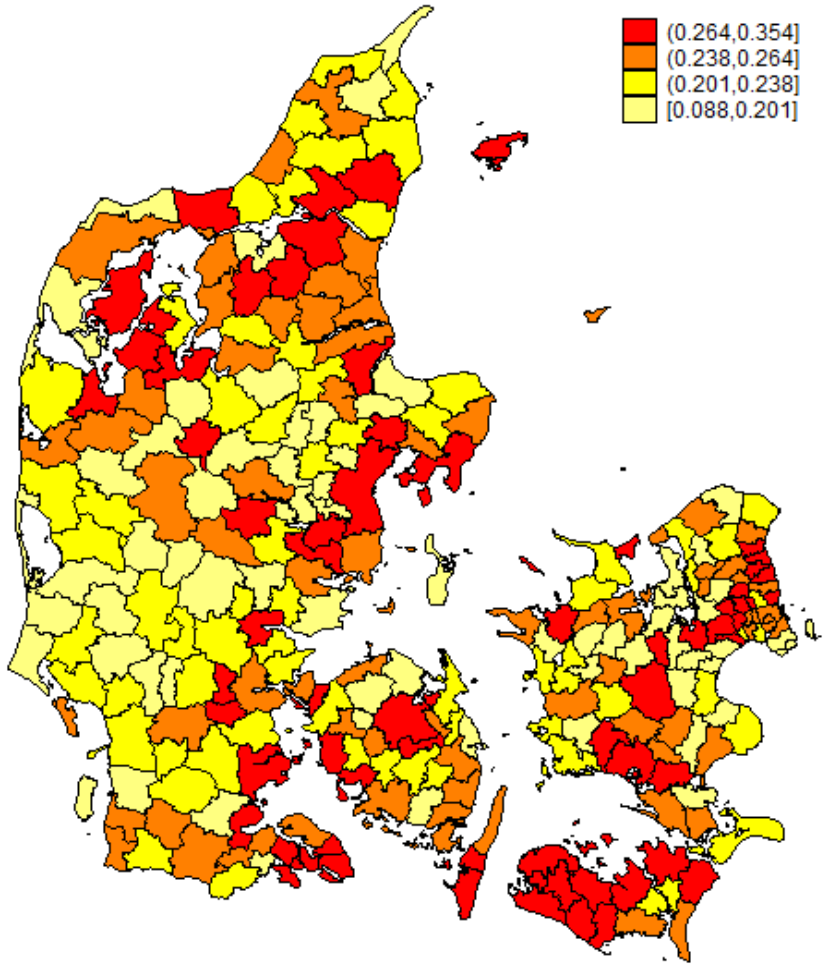
Source: Chetty et al. (2014)

Figure 45: The Geography of College Attendance by Parent Income Gradients



Source: Chetty et al. (2014)

Figure 46: The Geography of Income Mobility in Denmark, rank-rank estimates by municipality



Note: Birth cohorts 1971–1976 (parental income measured as 9-year averages during child generations; childhood; children's income measured at ages 35–37,...,40–42 depending on cohort).
Source: Own calculations based on data from Statistics Denmark.

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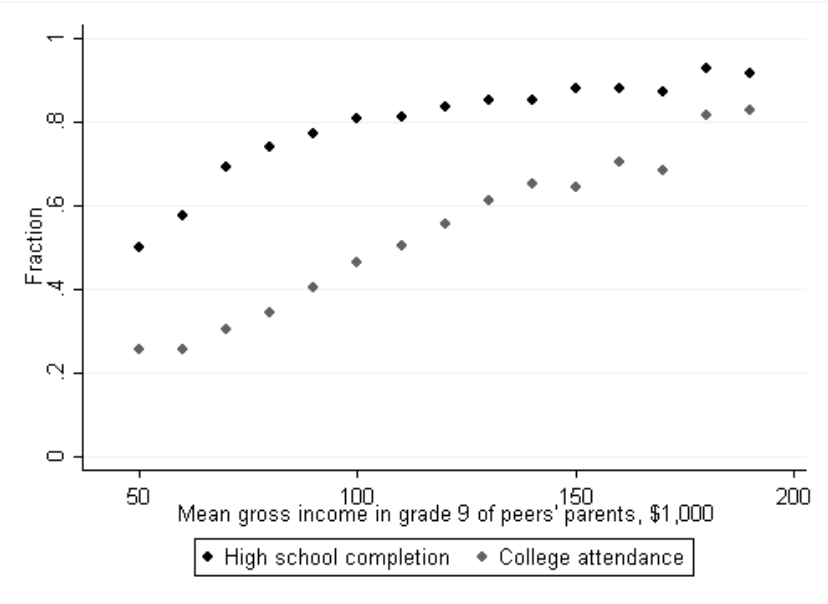
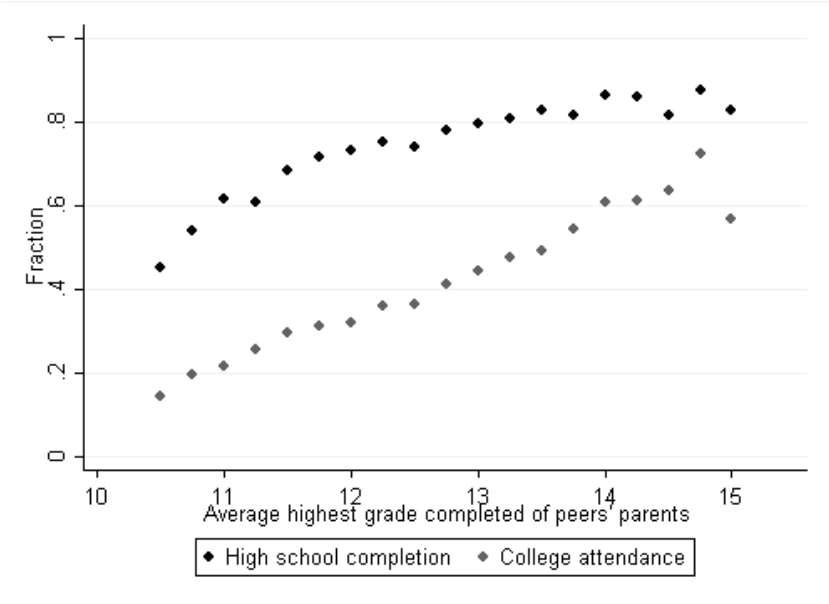
Figure 47: Strong Socioeconomic Gradients in Neighborhood Quality in Educational Attainment

(A) High school completion and college attendance rates across average gross income of school peers' parents



(B) High school completion and college attendance rates across average highest grade completed of school peers' parents



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- But also, despite inequality in expenditure and allocations, in Denmark sorting of teachers by family status.

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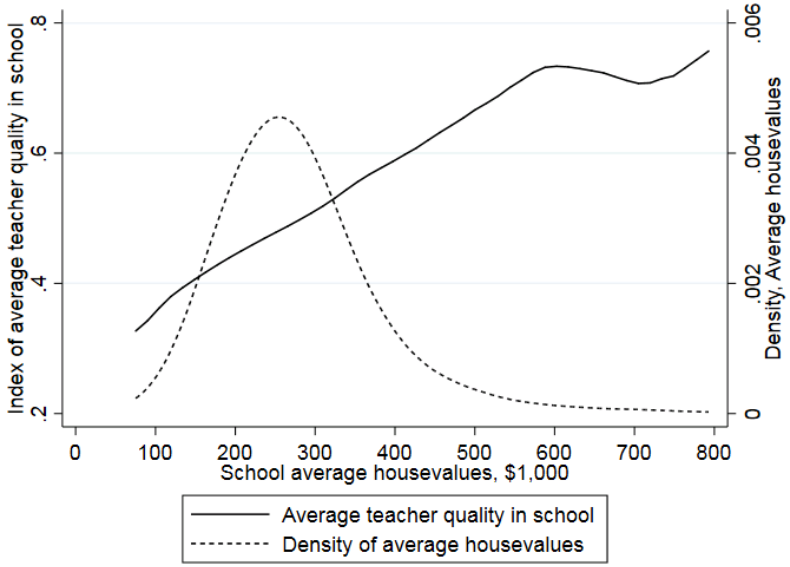
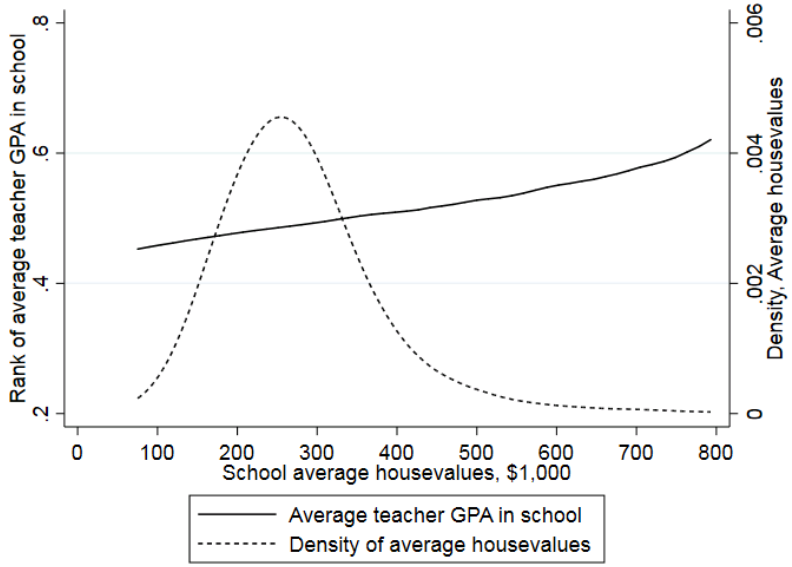
Figure 48: Average characteristics of teachers at schools by average property values in catchment area

Average property value in school catchment area

(a) Teacher index (0-1)



(b) Teachers' average GPA, rank (0-1)



Note: Figure shows local polynomial smoothed graphs between the teacher quality index (a,b) / teacher GPA (c,d) and the average (on shcool level) property value of the children's homes.

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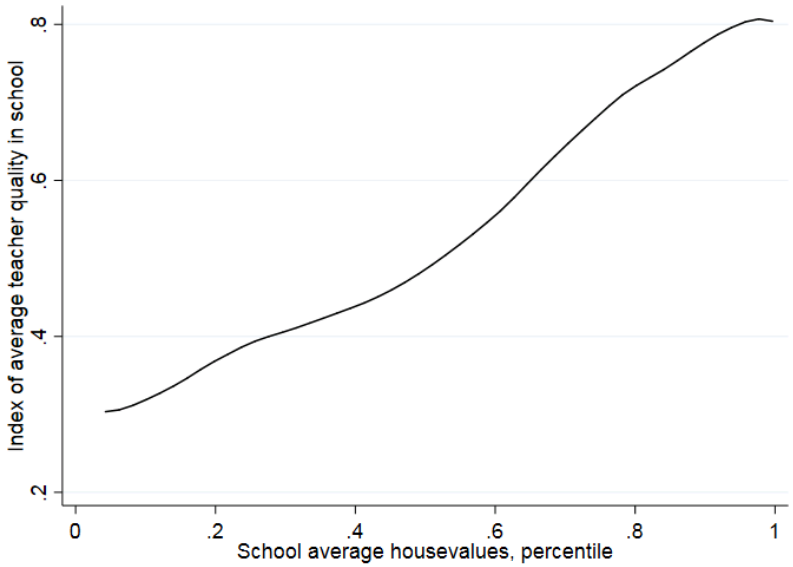
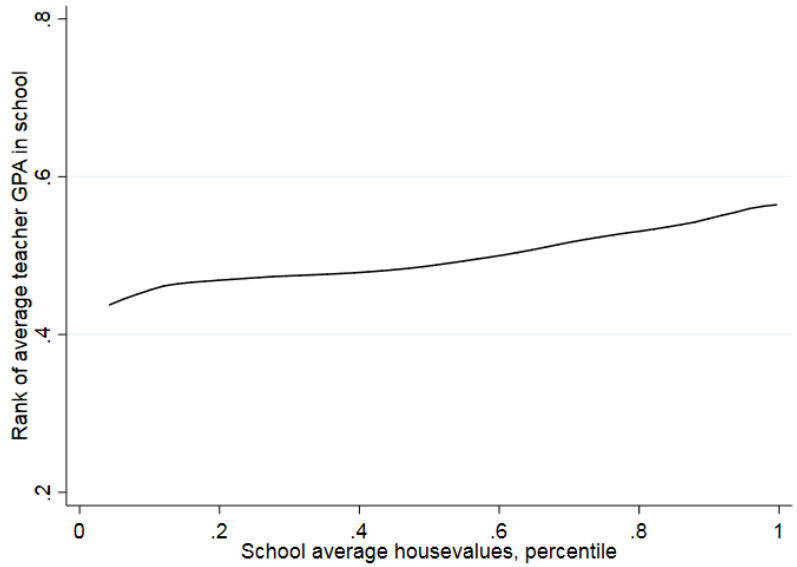
Figure 48: Average characteristics of teachers at schools by average property values in catchment area

Rank of average property value in school catchment area

(c) Teacher index (0-1)



(d) Teachers' average GPA, rank (0-1)



Note: Figure shows local polynomial smoothed graphs between the teacher quality index (a,b) / teacher GPA (c,d) and the average (on shcool level) property value of the children's homes.

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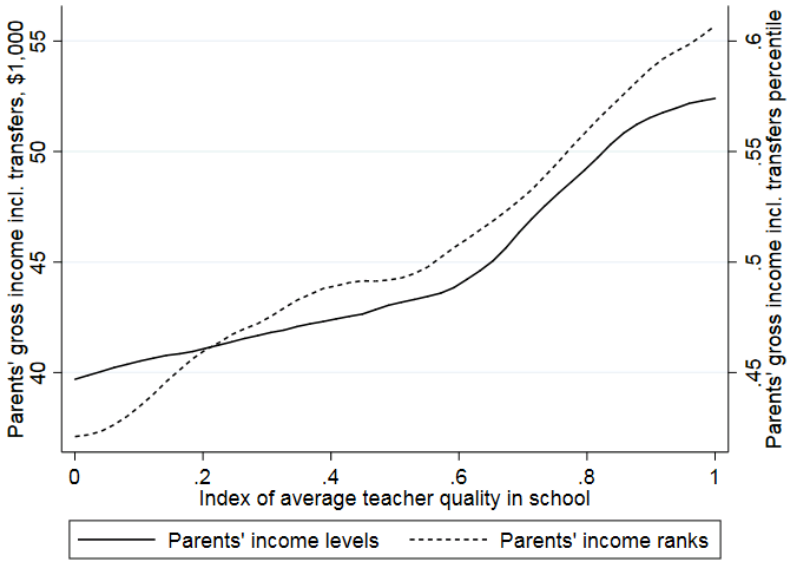
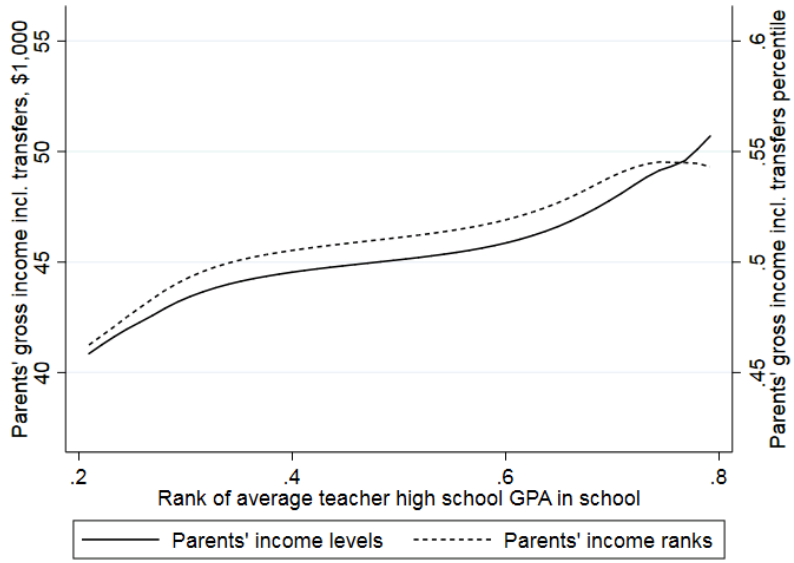
Figure 49: Parents' income and education by average characteristics of teachers at schools

Gross income incl. transfers

(a) Teacher index (0-1)



(b) Teachers' average GPA, rank (0-1)



Note: Figure shows local polynomial smoothed graphs between the teacher quality index (a,b) / teacher GPA (c,d) and the parents' average gross income including transfers and years of schooling (parents refers to the parents of school children).

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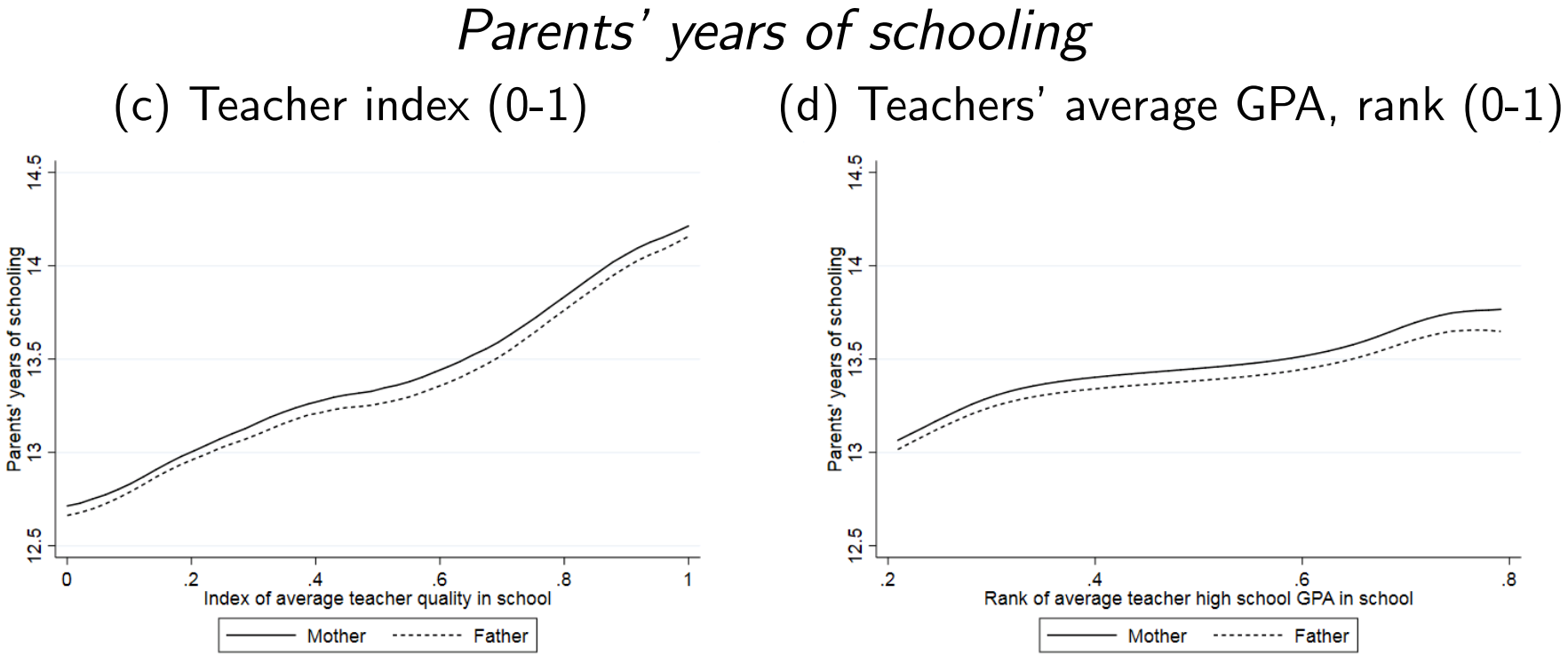
Figure 49: Parents' income and education by average characteristics of teachers at schools



Note: Figure shows local polynomial smoothed graphs between the teacher quality index (a,b) / teacher GPA (c,d) and the parents' average gross income including transfers and years of schooling (parents refers to the parents of school children).

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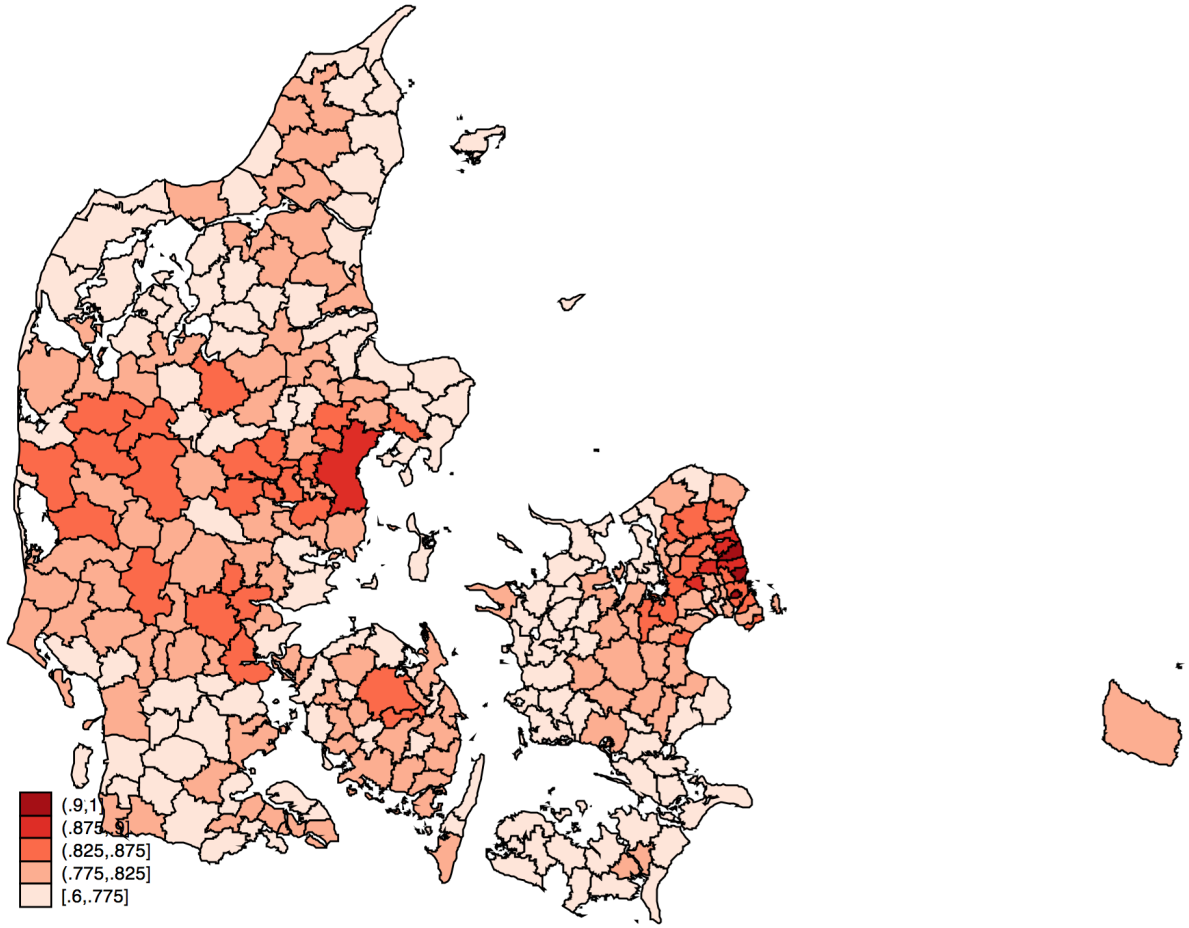
Figure 50: Fraction of mothers who smoke during pregnancy by household wage earnings year prior to childbirth:

Red = few & white = many



Family Environments Fundamentally Unequal Across the Income Distribution

Figure 51: Fraction of mothers smoke during pregnancy by household wage earnings year prior to childbirth (Denmark)

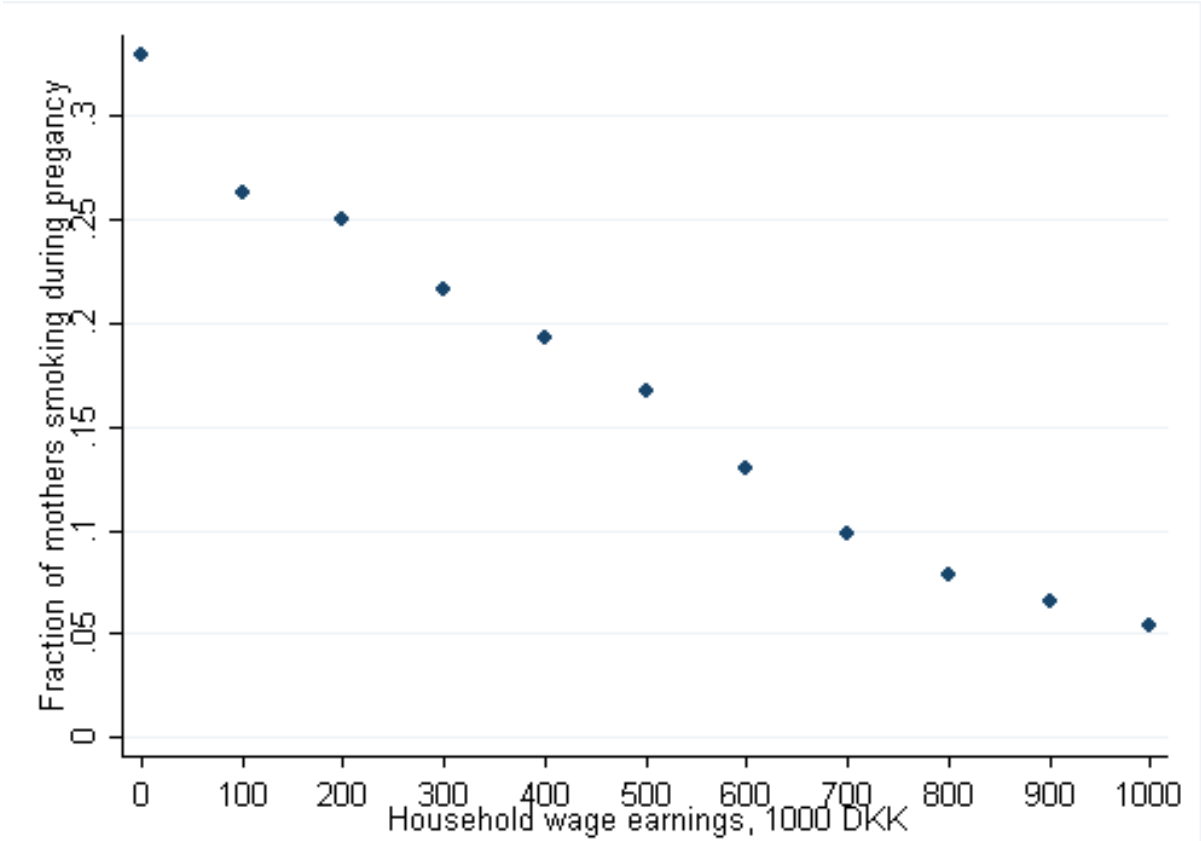


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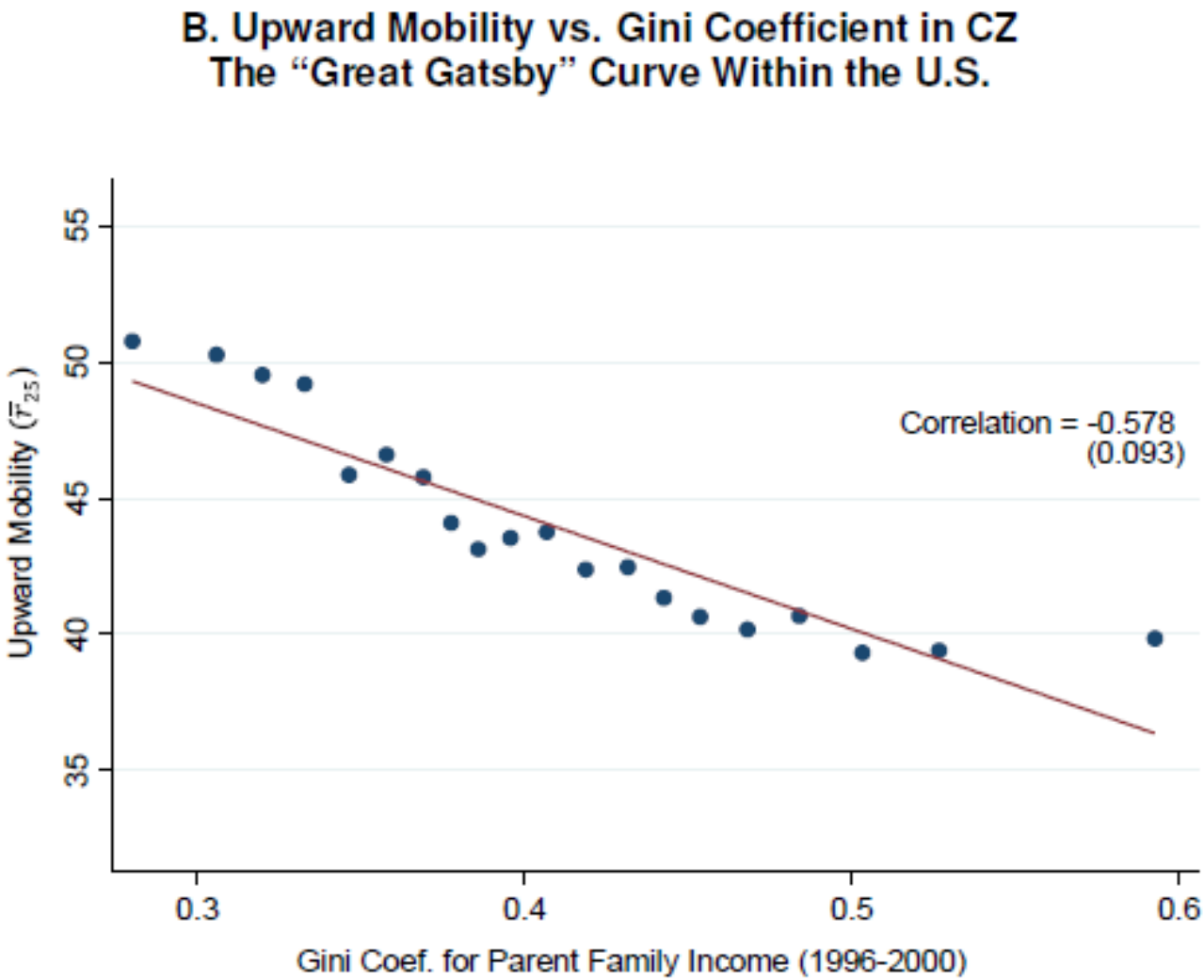
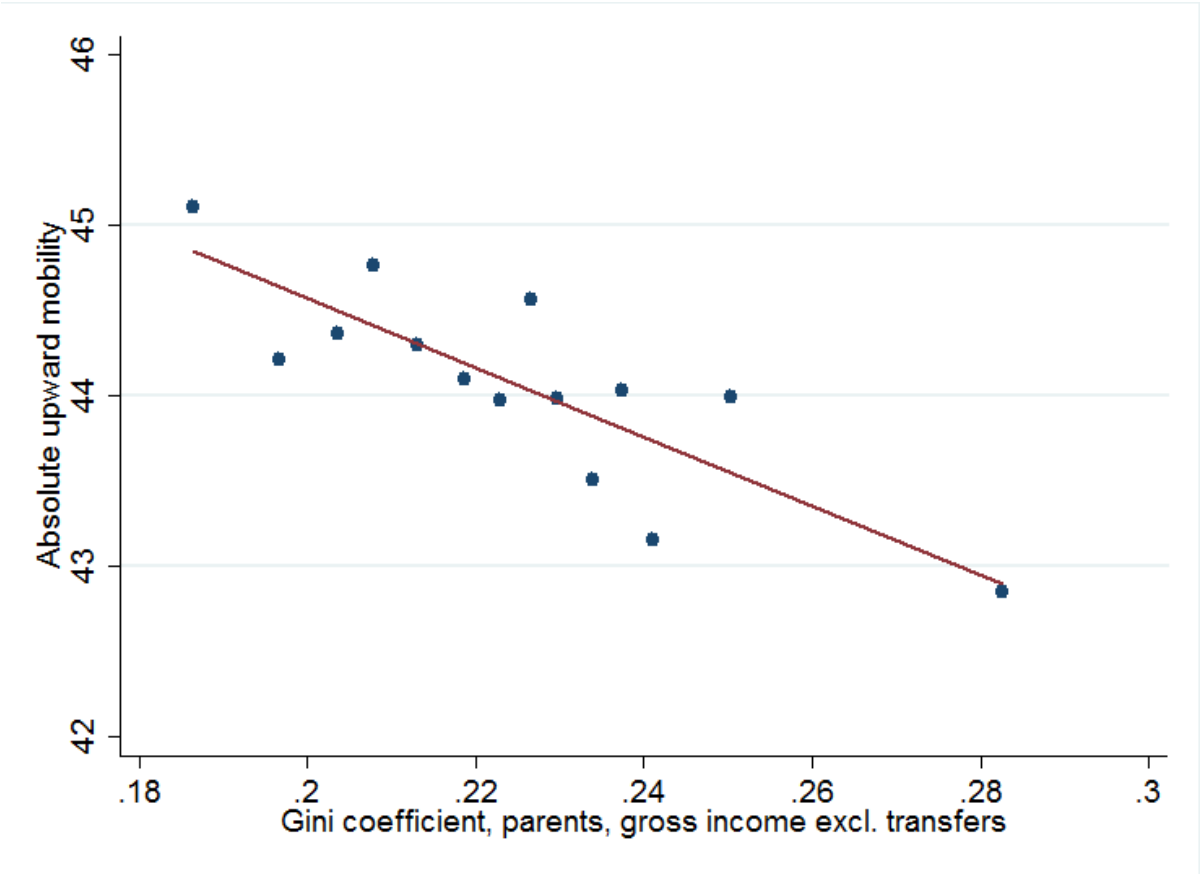
Figure 52: The Great Gatsby Curve, within the U.S.



Source: Chetty et al. (2014).
Note: $\bar{r}_{25}$ is the relative mobility in rank at the 25th percentile.

Figure 53: The Great Gatsby Curve in Denmark



Note: Birth cohorts 1971–1976 (parental income measured as 9-year averages during child generations; childhood; children's income measured at ages 35–37,...,40–42 depending on cohort). Figure shows a scatter plot of "absolute upward mobility" (defined as the expected child rank at parents' 25th percentile, where ranks are defined in terms of gross income excluding transfers in full population) across municipality-specific Gini coefficients. 15 bins of 6.67% of municipalities.

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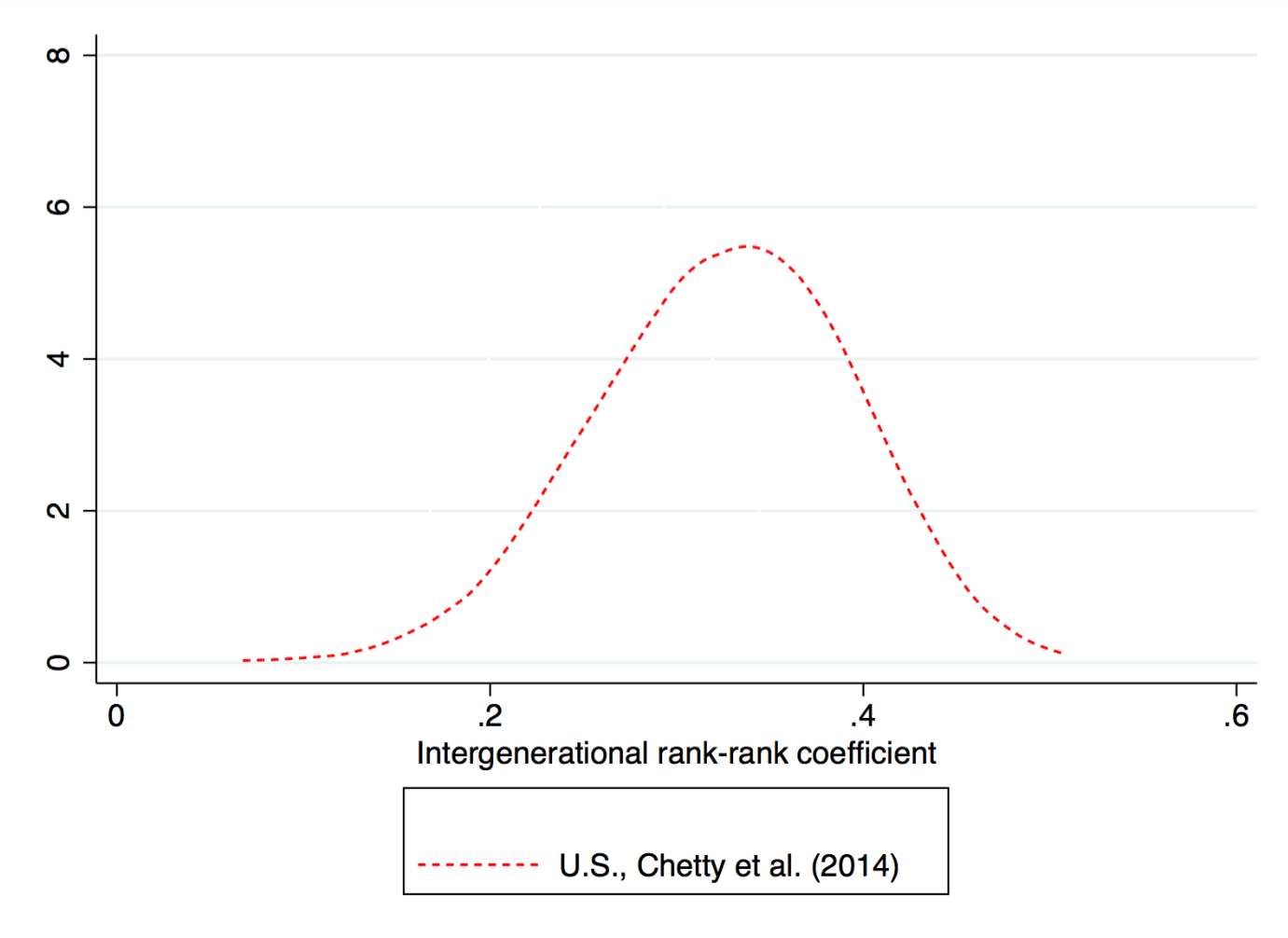
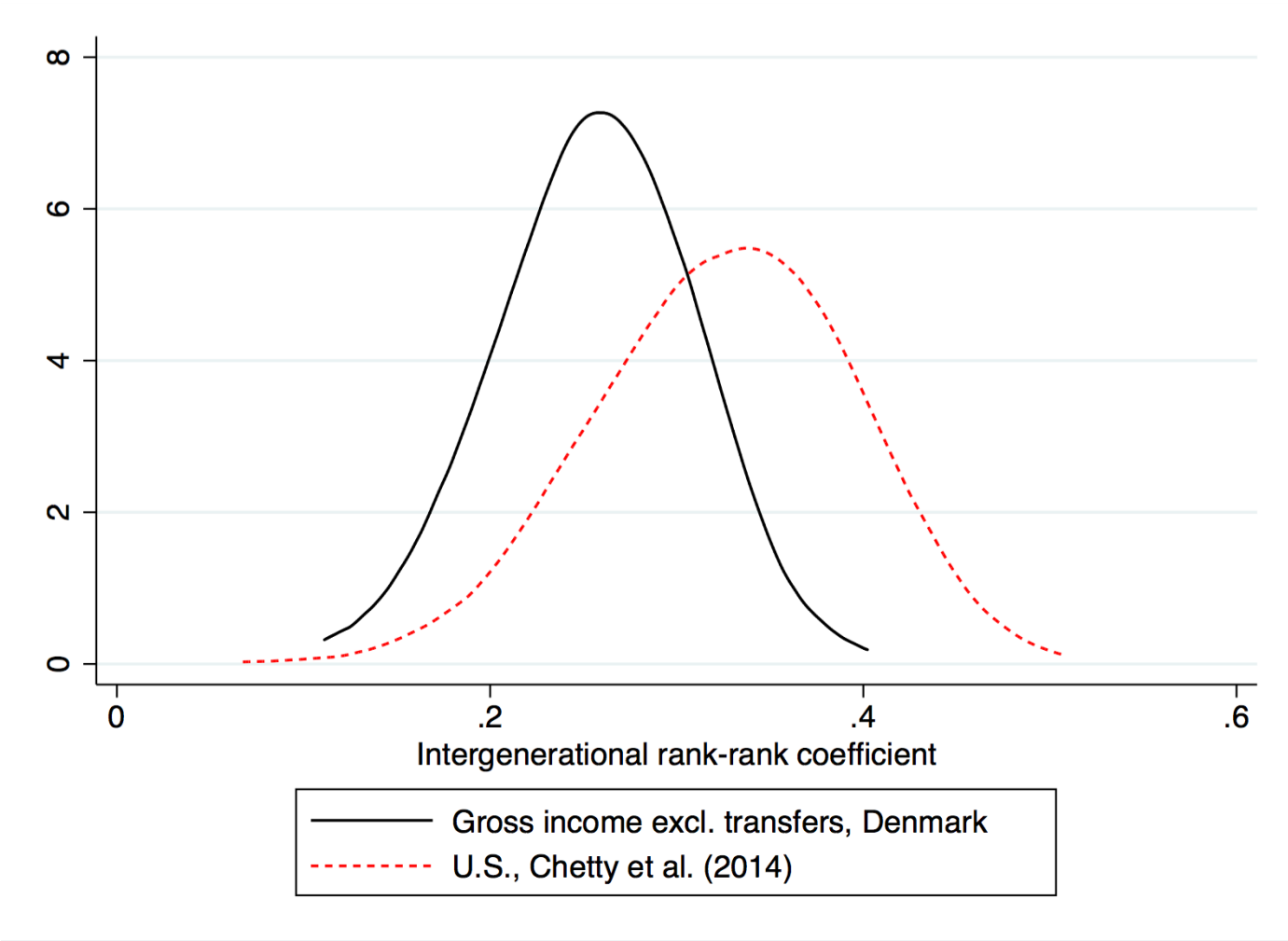
Figure 54: Distribution of rank-rank estimates across the U.S.



Source: Chetty et al. (2014)

- When we analyze Denmark – a small homogenous country – we see similar variation.



Note: Birth cohorts 1971–1976 (parental income measured as 9-year averages during child generations; childhood; children's income measured at ages 35–37,...,40–42 depending on cohort).
Source: Chetty et al. (2014) and own calculations.

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- **The similarity between within country variation in mobility between Denmark and the U.S. – two very different countries – questions what the underlying sources of income mobility are.**

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Sources of These Effects are Unclear
What Is It About Neighborhoods That Produce the Geographic Correlations?

a. **Schools?**
b. **Parents?**
c. **Peers?**
d. **Group norms?**

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Putting It All Together: Redistribution and Importance of Incentives

A Case Study of Denmark/U.S.

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Denmark the Garden of Eden?

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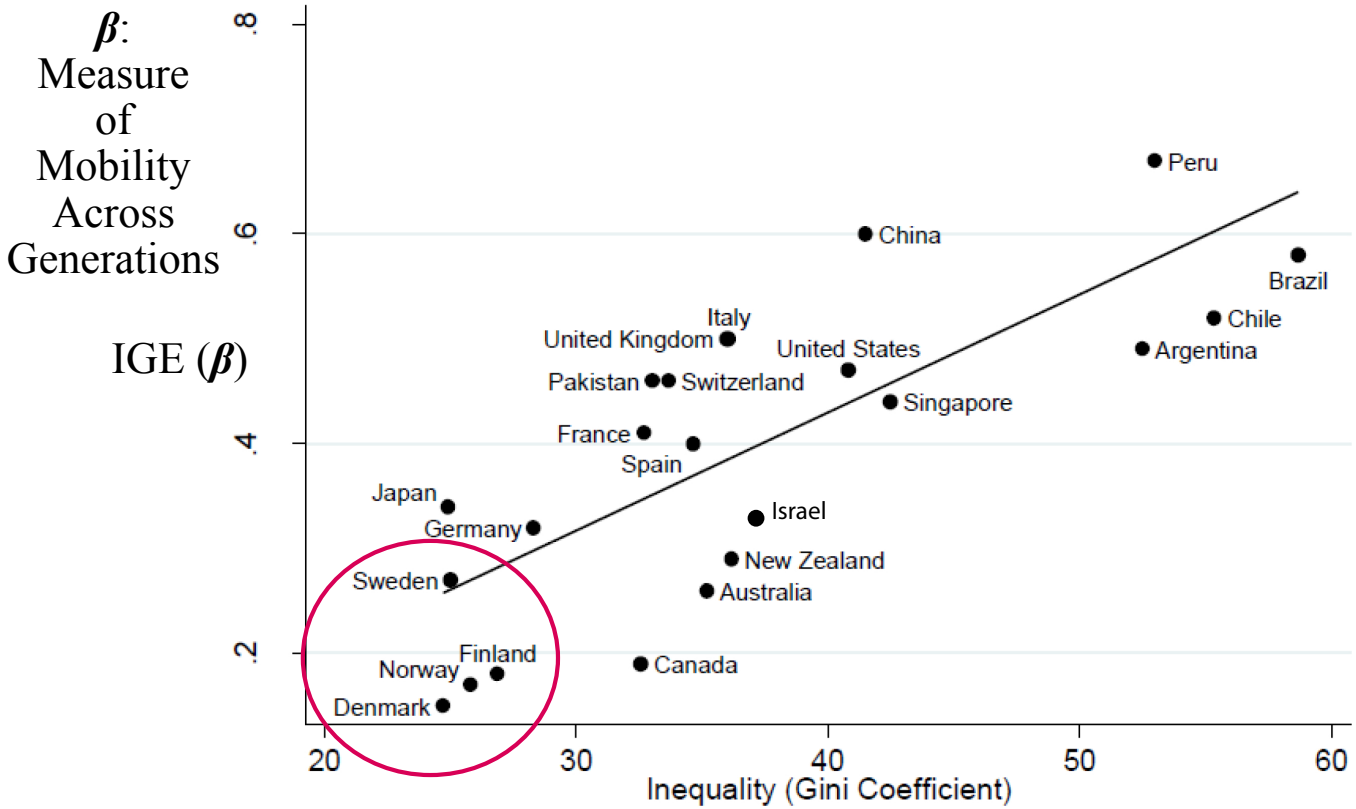
Figure 55: Intergenerational Mobility and Inequality

$$\underbrace{\ln Y_1}_{\text{income of child}} = \alpha + \underbrace{\beta}_{\text{IGE}} \underbrace{\ln Y_0}_{\text{income of parent}} + \varepsilon$$

$\beta \uparrow$, Mobility $\downarrow$



Source: Corak (2016), *Inequality from Generation to Generation: The United States in Comparison*. Heller (2017), *"Intergenerational Income Mobility in Israel."*

Denmark Spends Generously on Public Education Equalizes Expenditure By Design

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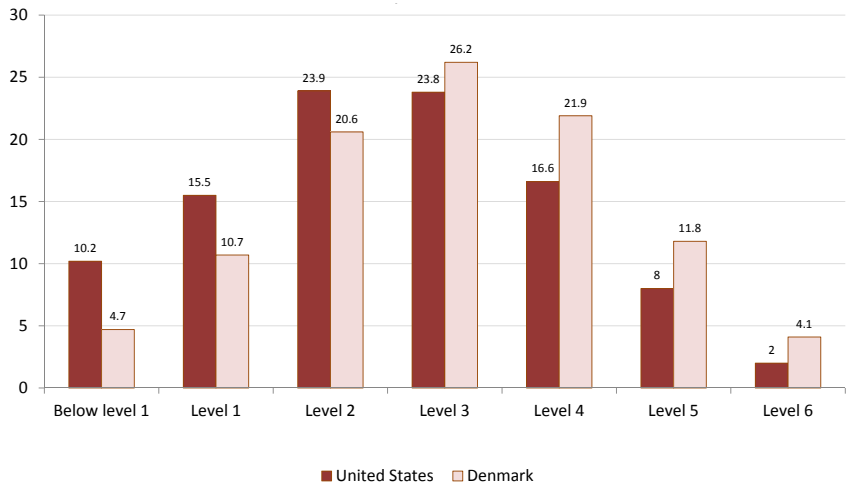
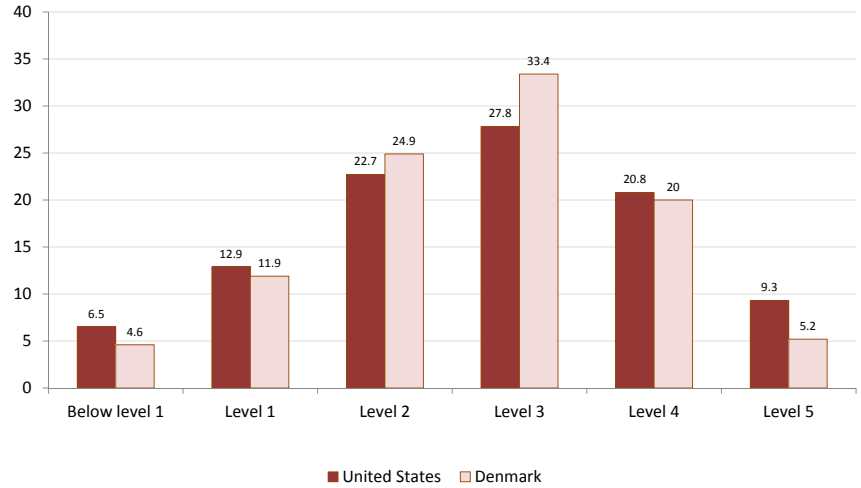
Produces Better Test Score Distributions than U.S.

Figure 56: Percentage of Students at Each Proficiency Level, PISA 2003

(a) Mathematics Scale



(b) Reading Scale



Source: OECD (2003) Learning for Tomorrow's World, First Results from PISA (2003).

- **Nonetheless, there are steep gradients of children's education in parental education, income, and wealth in both the U.S. & Denmark.**

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Evidence for Denmark on the IGE in Education
Levels and Trends

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- Danish levels in a broader historical perspective.
- Use historical surveys to construct the long run education IGEs for Denmark (preliminary analysis):

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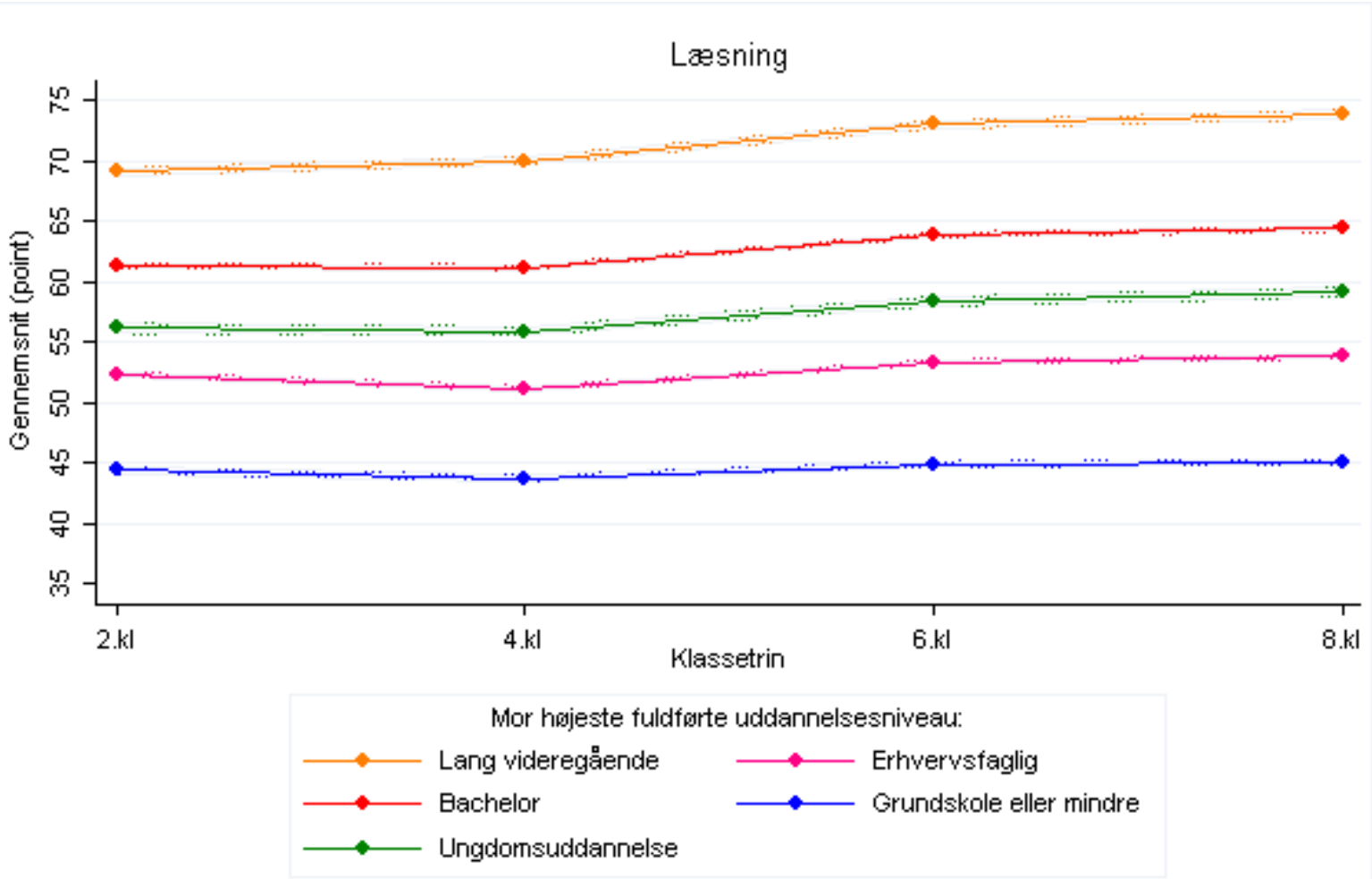
Figure 57: Language Test Scores in Grade 2–8, by Mother's Education



Source: Beuchert & Nandrup (2016).

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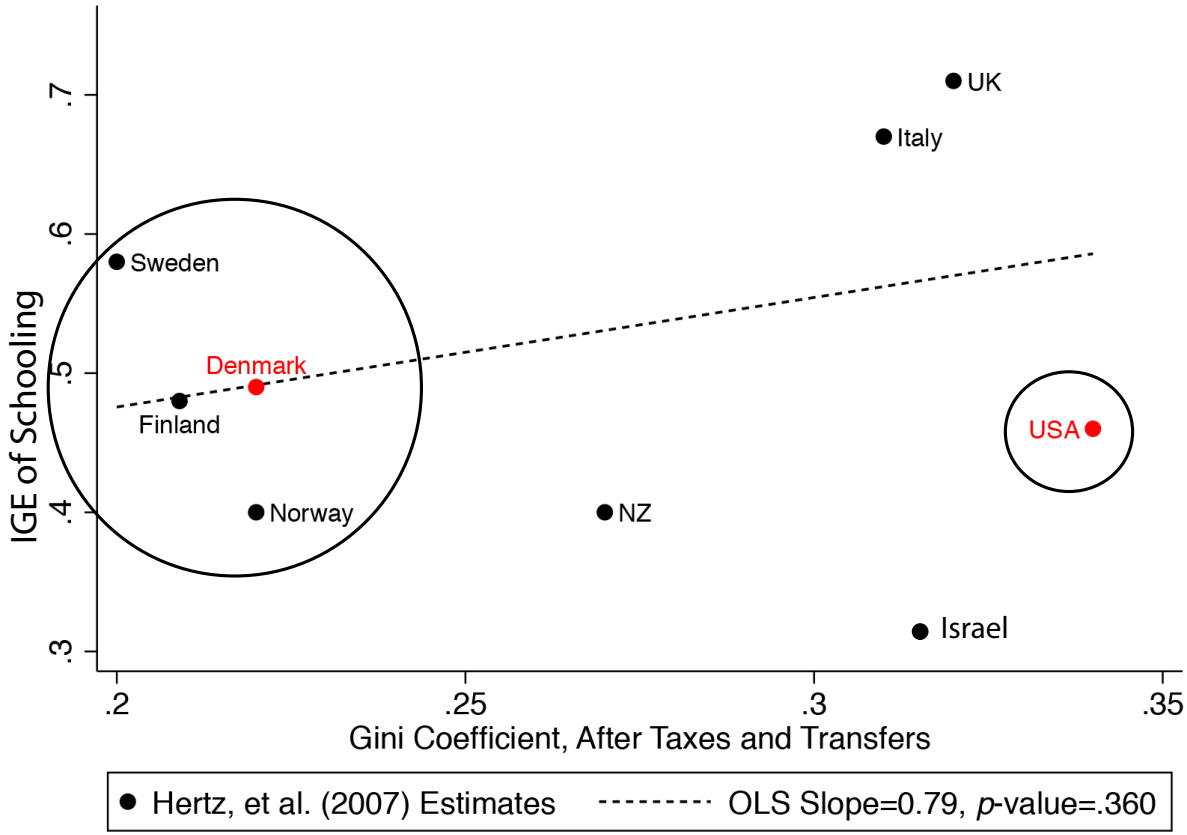
Figure 58: Intergenerational Educational Mobility and Inequality

$$\underbrace{YOS}_{\substack{\text{years of}\\ \text{schooling}\\ \text{child}}} = \alpha + \underbrace{\beta}_{\substack{\text{IGE}\\ \text{education}}} \underbrace{YOS}_{\substack{\text{years of}\\ \text{schooling}\\ \text{parents}}} + \varepsilon$$



Source: Setzler (2015).

Scandinavia invests heavily in child development and boosts the test scores of the disadvantaged (though not to full equality), but undermines these beneficial effects by providing weak labor market incentives.

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Tax and Transfer Policy the Main Engine of Scandinavian Reduced Inequality and Enhanced Social Mobility

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Static Complementarity

- The productivity of investment greater for the more capable.
  - **High returns for more capable people: Matthew Effect**
  - **Does this justify social Darwinism?**
  - On grounds of economic efficiency, should we invest primarily in the most capable?
  - **Answer: It depends on where in the stage of the life cycle we consider the investment.**

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Dynamic Complementarity

- If we invest today in the base capabilities of disadvantaged young children, there is a huge return.
- Makes downstream investment more productive.
- **No necessary tradeoff between equality and efficiency goals**.
- Augmenting this investment by public infrastructure and schools gives agency to people and enhances economic and social functioning.

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- Both processes are at work.
- No necessary contradiction.
- Investing early creates the skill base that makes later investment productive.
- Effective targeting.

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Figure 59: Life Cycle Developmental Framework

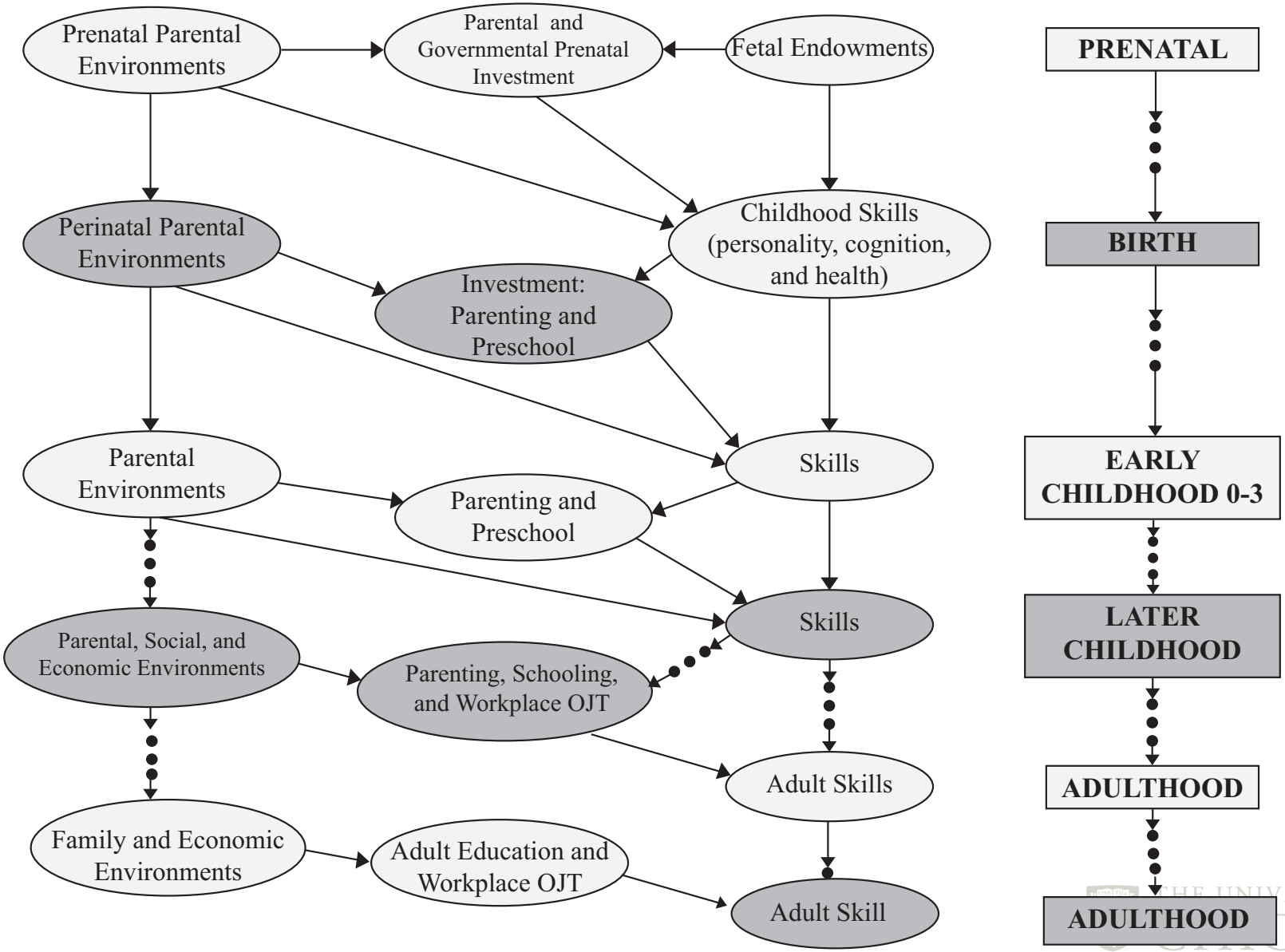

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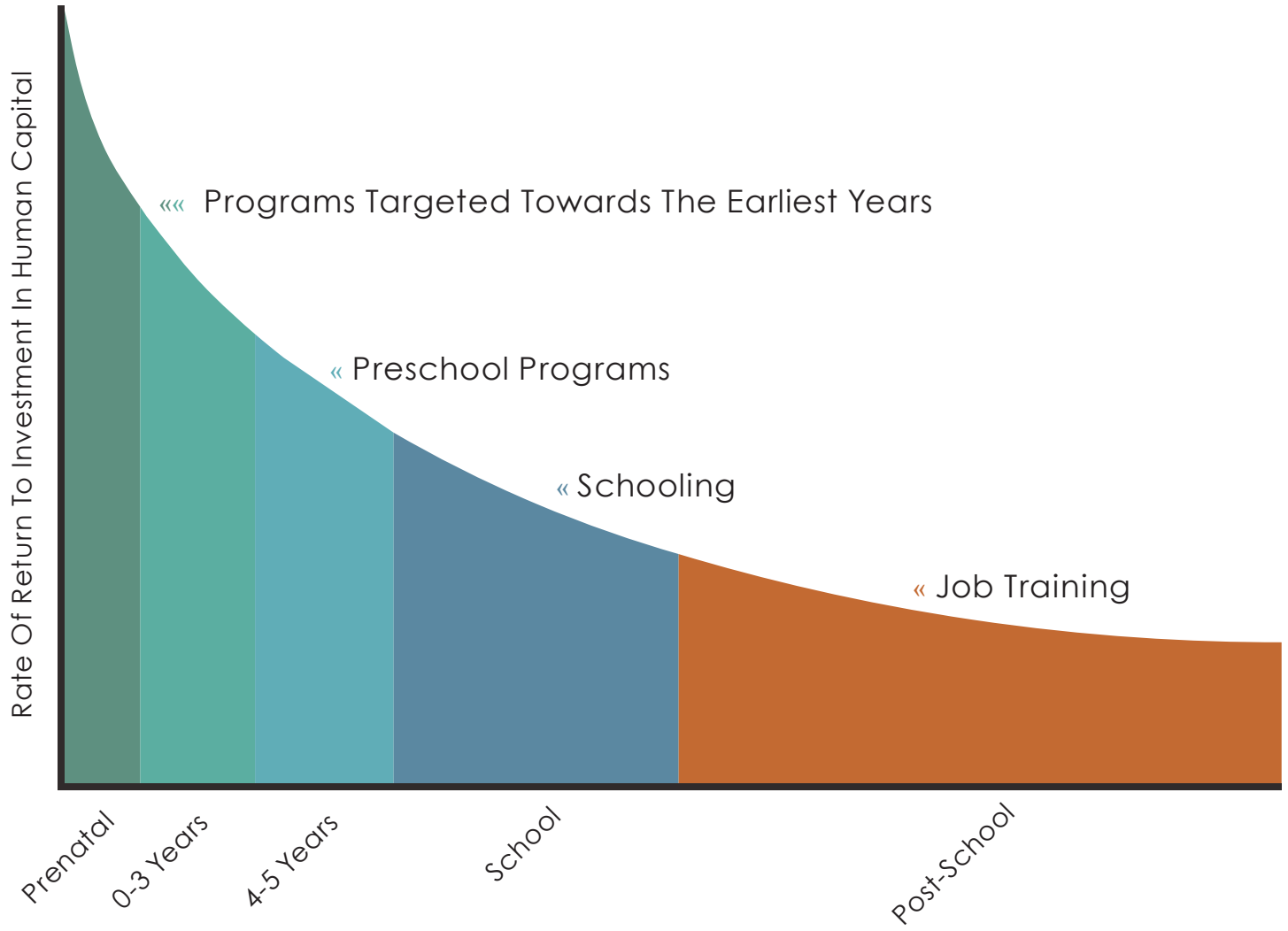
Figure 60: Returns to a Unit Value Invested



Source: Heckman (2008)

Modern Understanding of the Dynamics of Skill Formation Causes Us to Rethink Traditional Distinctions in Philosophy and Political Science

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Raises Question of How and When Merit Acquired

Merit vs. Chance vs. Effort Distinctions Currently Used in Philosophy and Political Science Literature Are Without Much Empirical Content

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