

income, inequality,
and educational outcomes:
u.s. and international evidence

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social reproduction

- on average, students from families of higher socioeconomic status perform better on academic tests, attain higher levels of schooling, and (as a consequence) attain higher socioeconomic status themselves as adults
- however, the extent of social reproduction – the strength of the correlation between parental socioeconomic status and children’s outcomes – is mutable; it may vary across time and place, as a result of social policy, education policy, norms, values, and economic conditions.

some big questions



- What role does schooling play in socioeconomic educational inequalities and social reproduction/mobility?
- What role does broader social inequality play in socioeconomic educational inequalities and social reproduction/mobility?
- Does schooling widen or narrow inequality?

some smaller questions

- How big are socioeconomic inequalities in educational outcomes?
- (How) have they changed over the last few decades?
- What features of societies and educational systems are associated with larger educational inequalities?
 - ▣ Does economic inequality matter?
 - ▣ If so, how?

outline

- Introduction
- income and educational outcomes in the US
 - ▣ income inequality, 1918-2010
 - ▣ the ‘income achievement gap’, 1960-2010
 - ▣ income and college enrollment, 1982-2004
- income, inequality, and educational outcomes in OECD countries
 - ▣ cross-national associations between income inequality and achievement gaps
- discussion & explanations

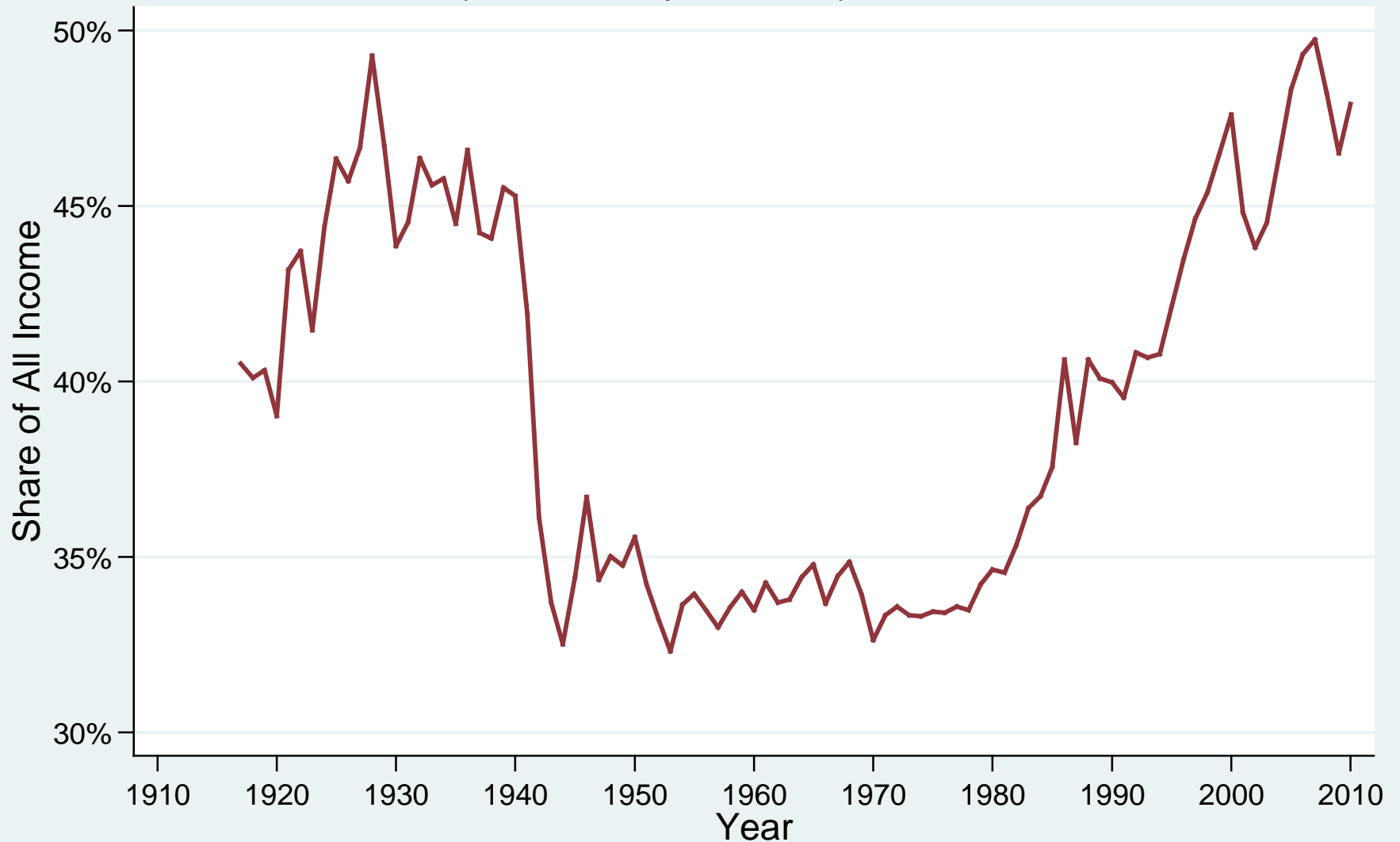
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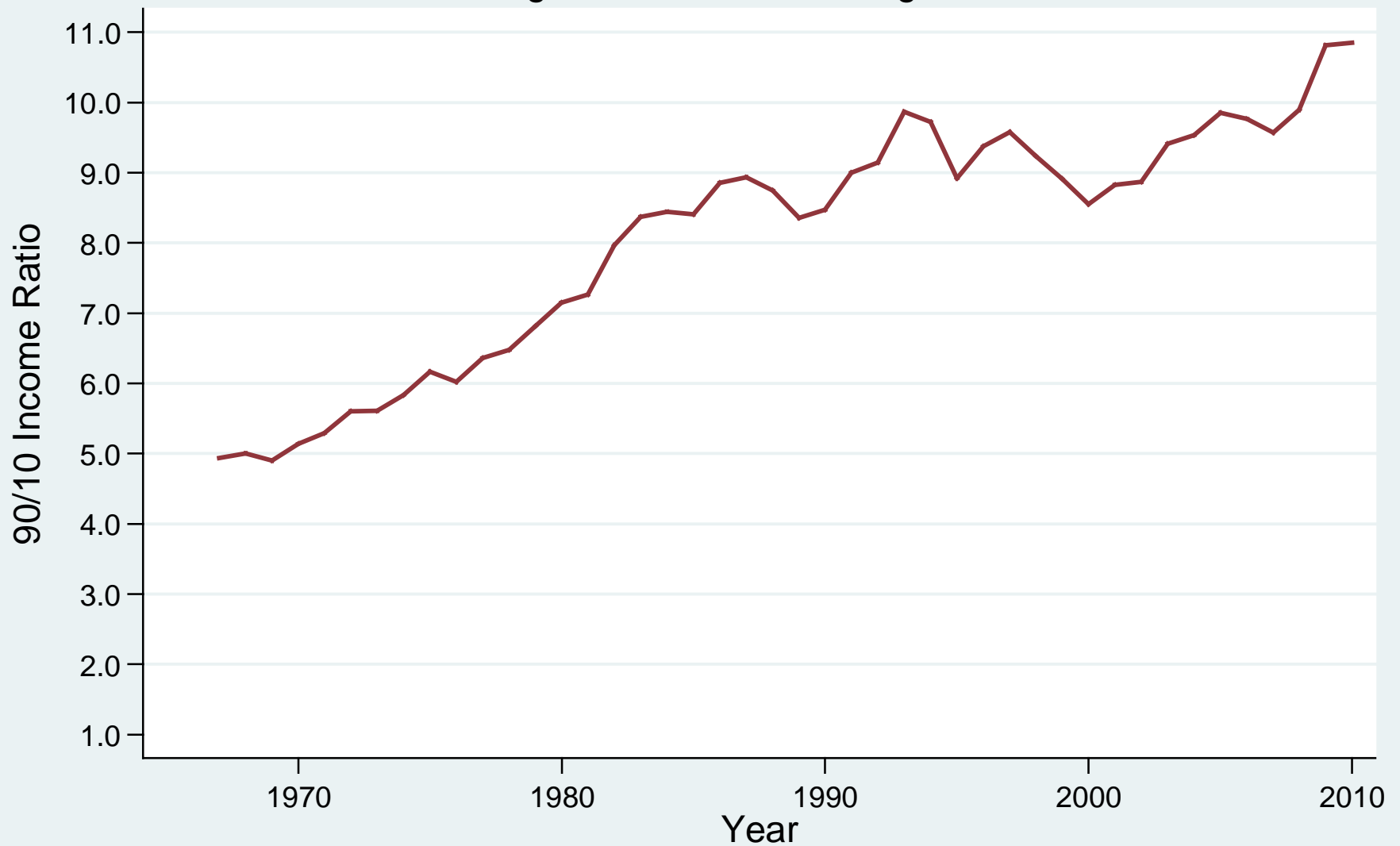
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Share of Total Income Accruing to 10% Highest Income Families, (Includes Capital Gains), 1918-2010



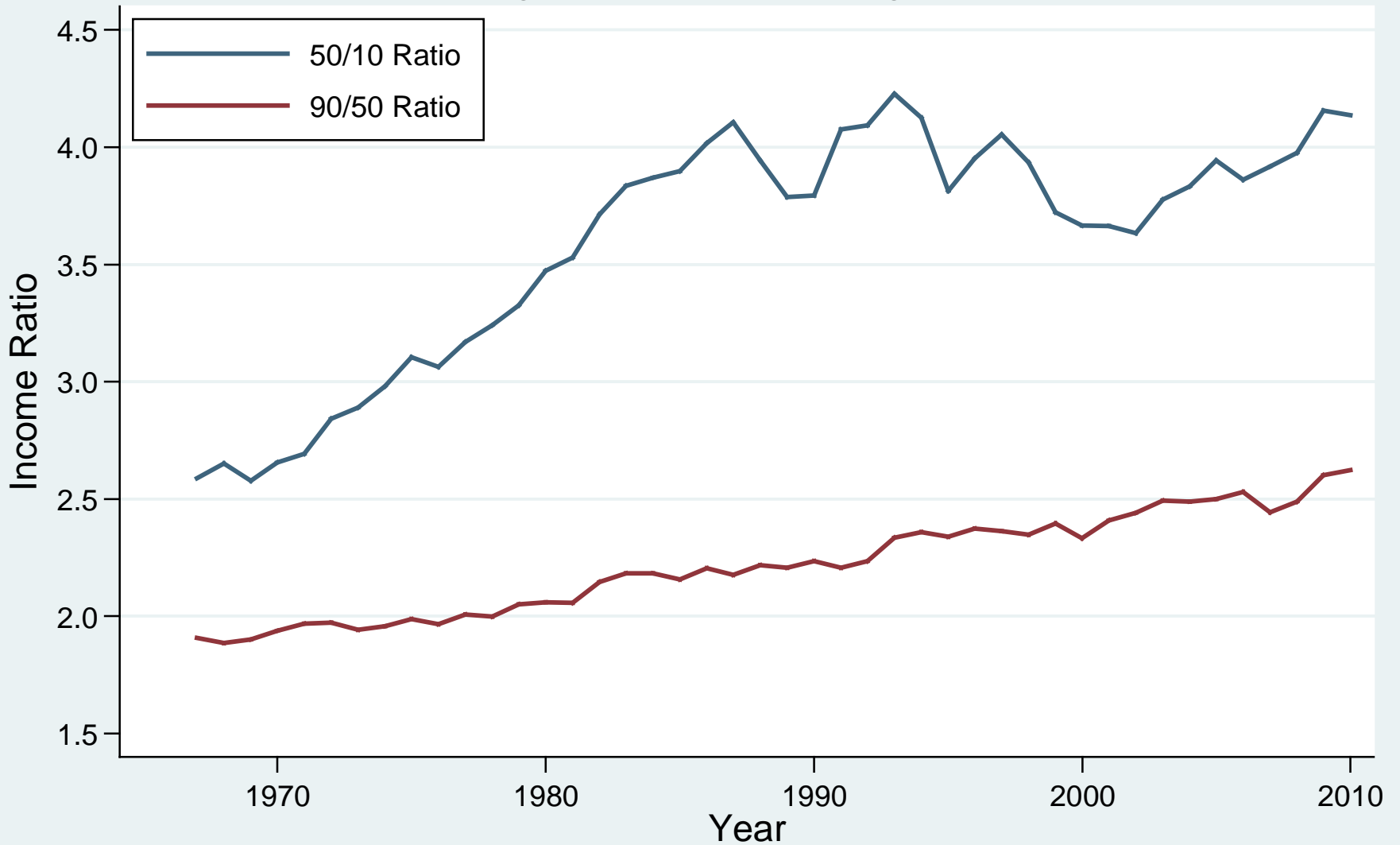
Source: Piketty & Saez (2012): <http://www.econ.berkeley.edu/~saez/TabFig2010.xls>

Income Inequality (90/10 Income Ratio), 1967-2010 Among Families of School-Age Children



Source: Author's calculations from CPS data 1968-2011

Income Inequality (50/10 and 90/50 Income Ratio), 1967-2010 Among Families of School-Age Children



Source: Author's calculations from CPS data 1968-2011

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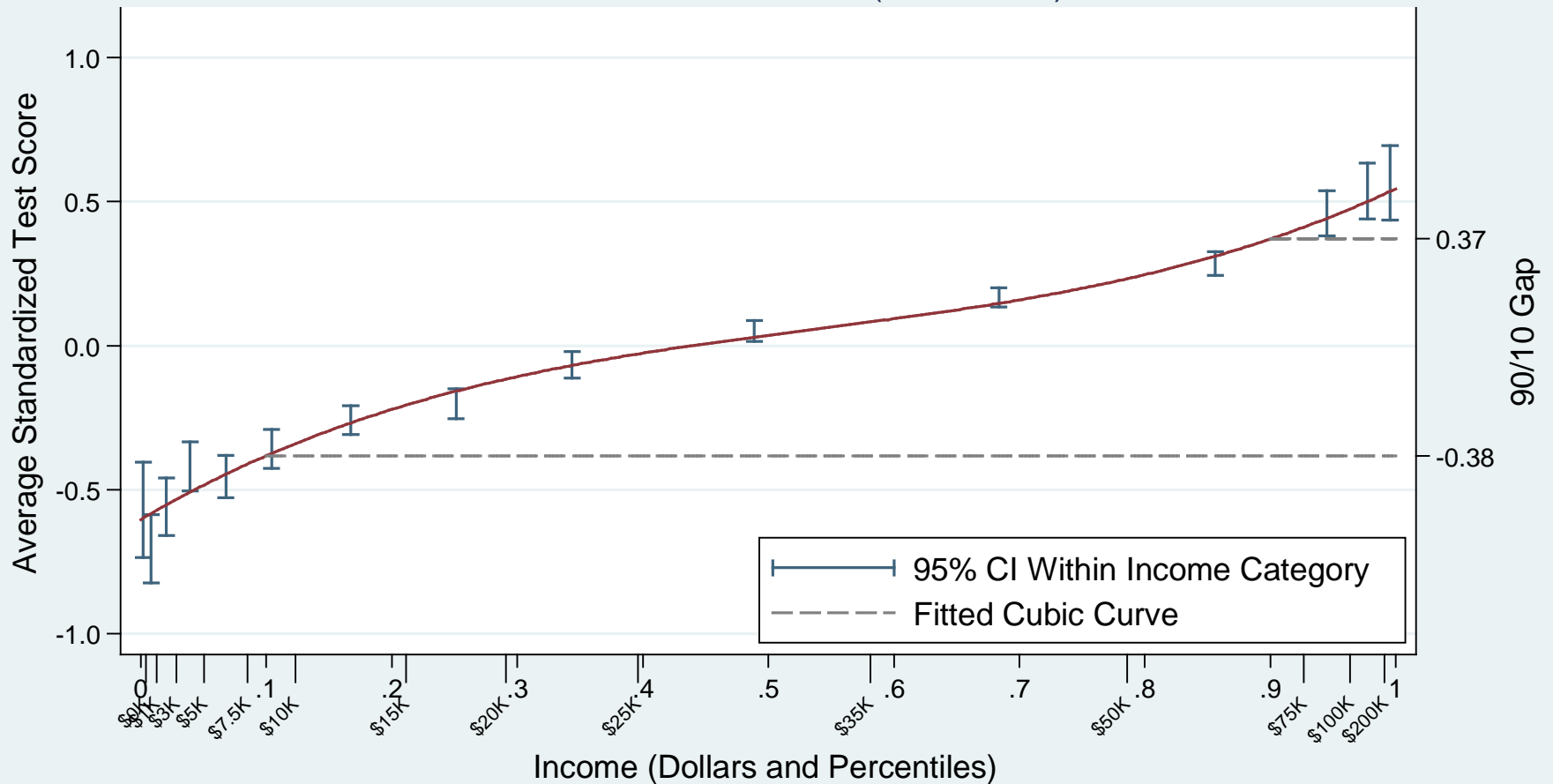
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data

- all available US studies meeting three criteria:
 - ▣ nationally-representative sample
 - ▣ standardized achievement test
 - ▣ information on family income
- 13 studies included
 - ▣ **Project TALENT, NLS72, HS&B, NLSY79, NELS, Add Health, Prospects, NLSY97, ELS, SECCYD, ECLS-K, HSLS, ECLS-B.**
- these include student cohorts born 1943-2001 and tested 1960-2009

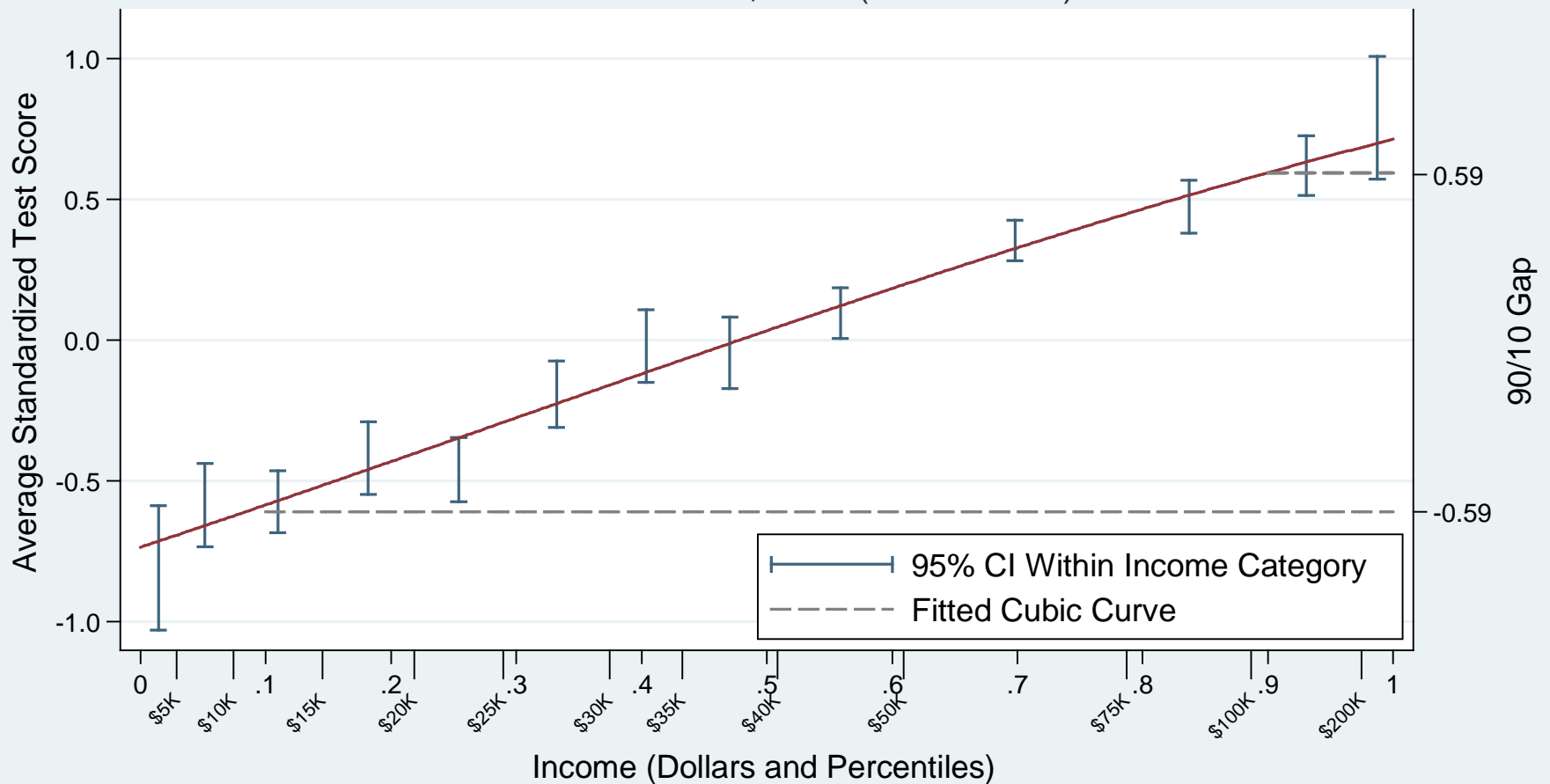
computing income achievement gaps

Association Between Reading Score and Family Income Percentile, Grade 8 Students, 1988 (NELS data)



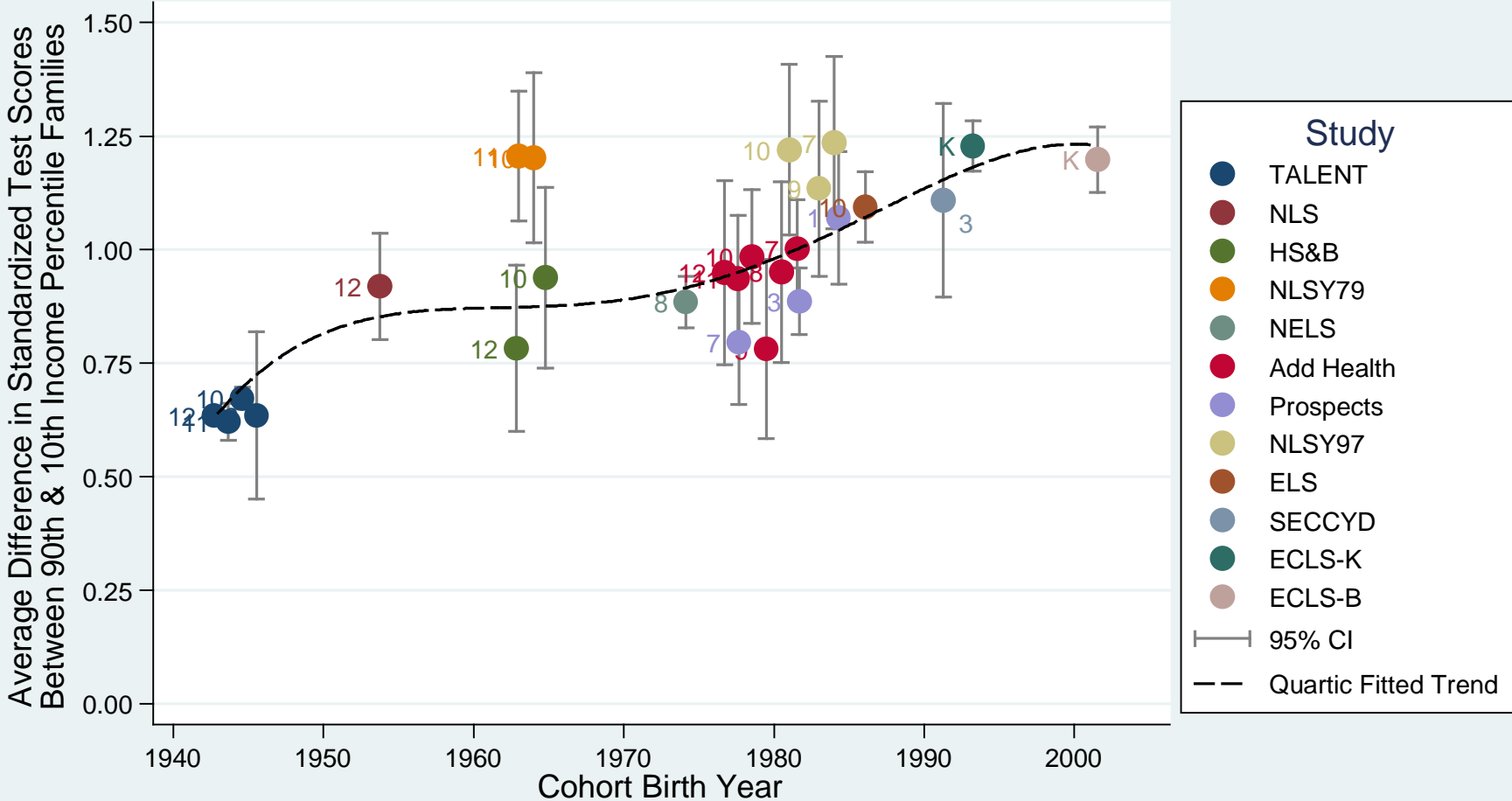
computing income achievement gaps

Association Between Reading Score and Family Income Percentile, Grade 8 Students, 2006 (ECLSK data)

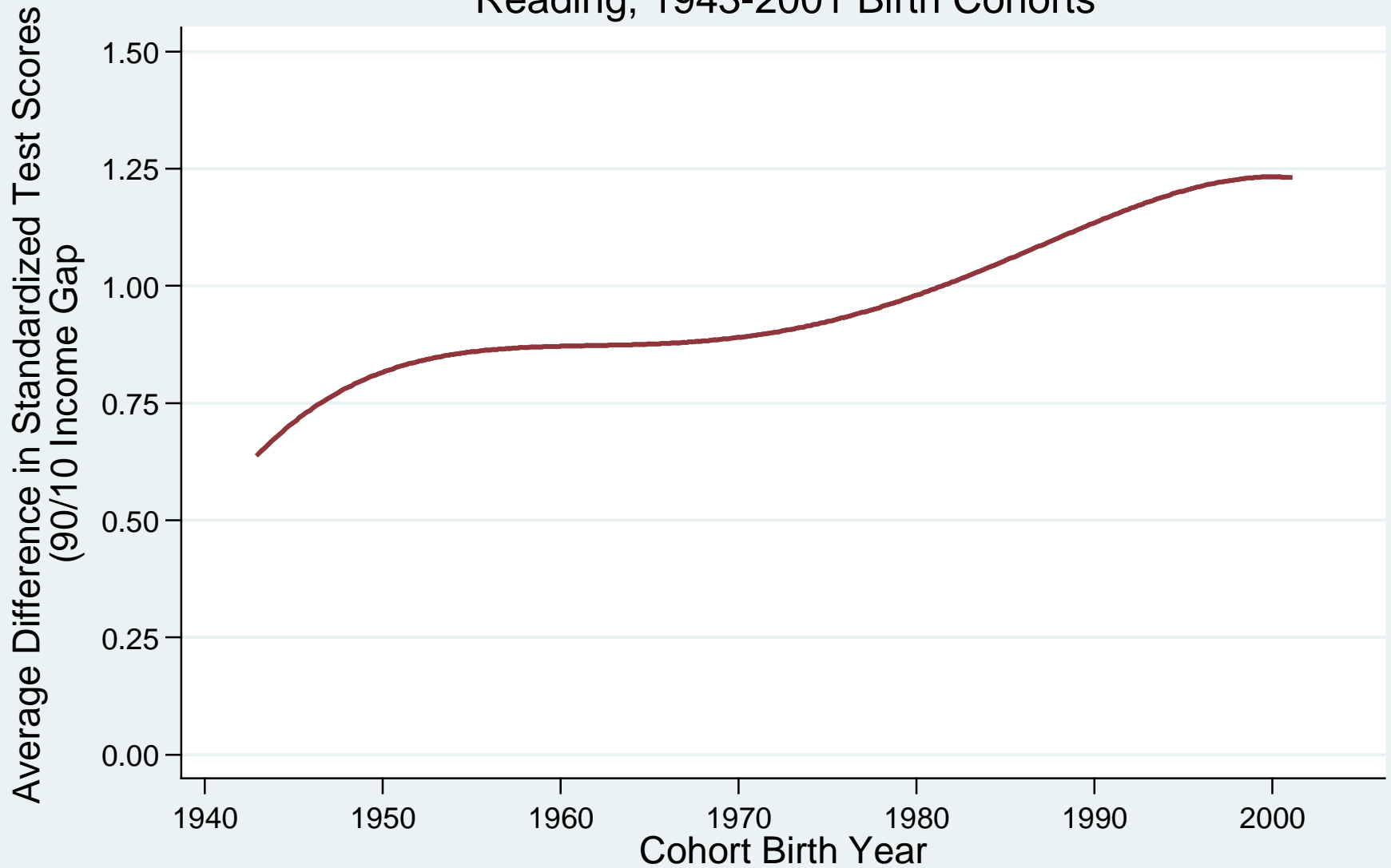


income achievement reading gaps, 1940-2001 cohorts

Trend in 90/10 Income Gap in Reading, 1940-2001 Cohorts

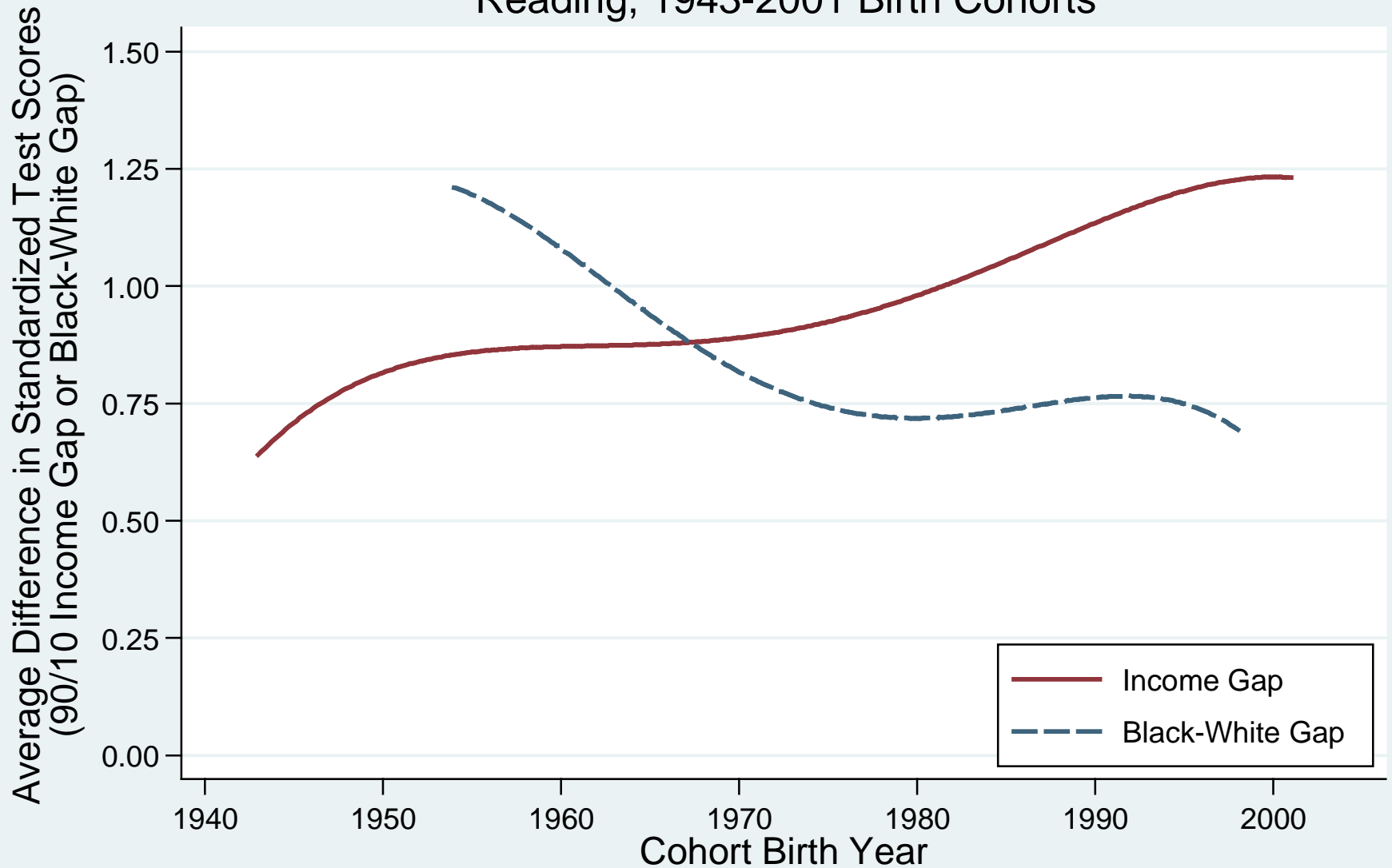


Income Achievement Gap (90/10 Gap) Reading, 1943-2001 Birth Cohorts



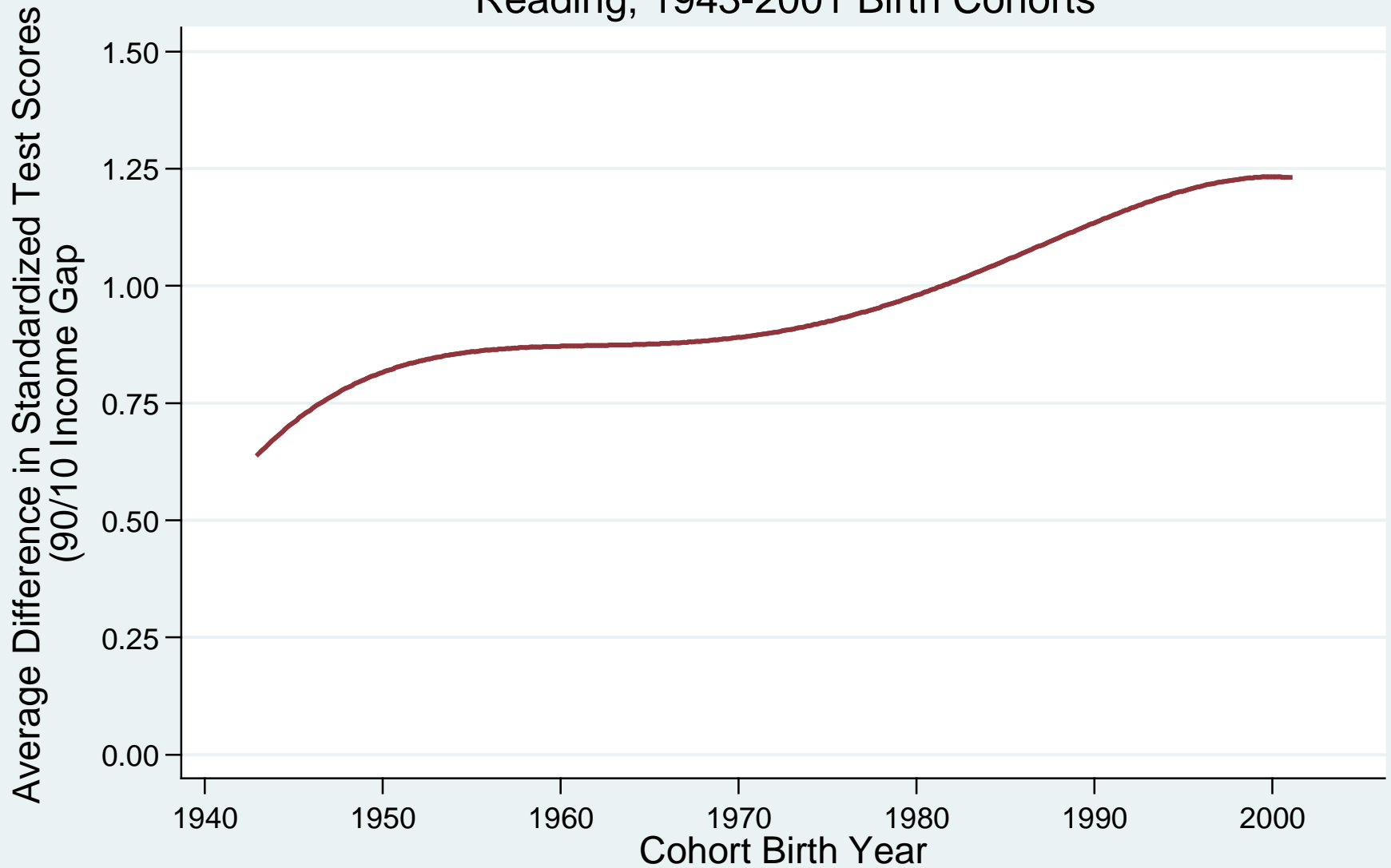
Source: Reardon (2011)

Income Achievement Gap and Black-White Achievement Gap Reading, 1943-2001 Birth Cohorts



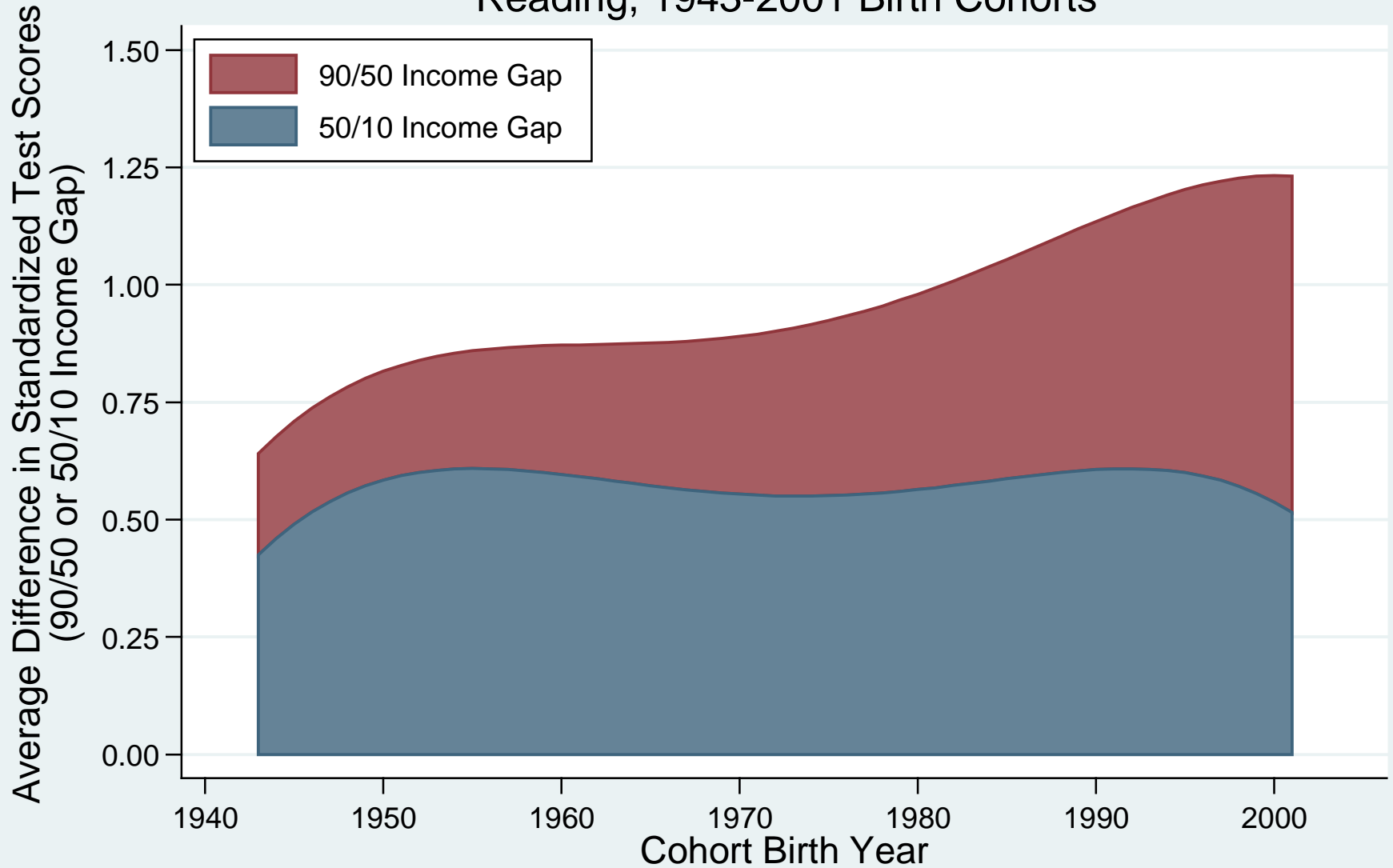
Source: Reardon (2011)

Income Achievement Gap (90/10 Gap) Reading, 1943-2001 Birth Cohorts



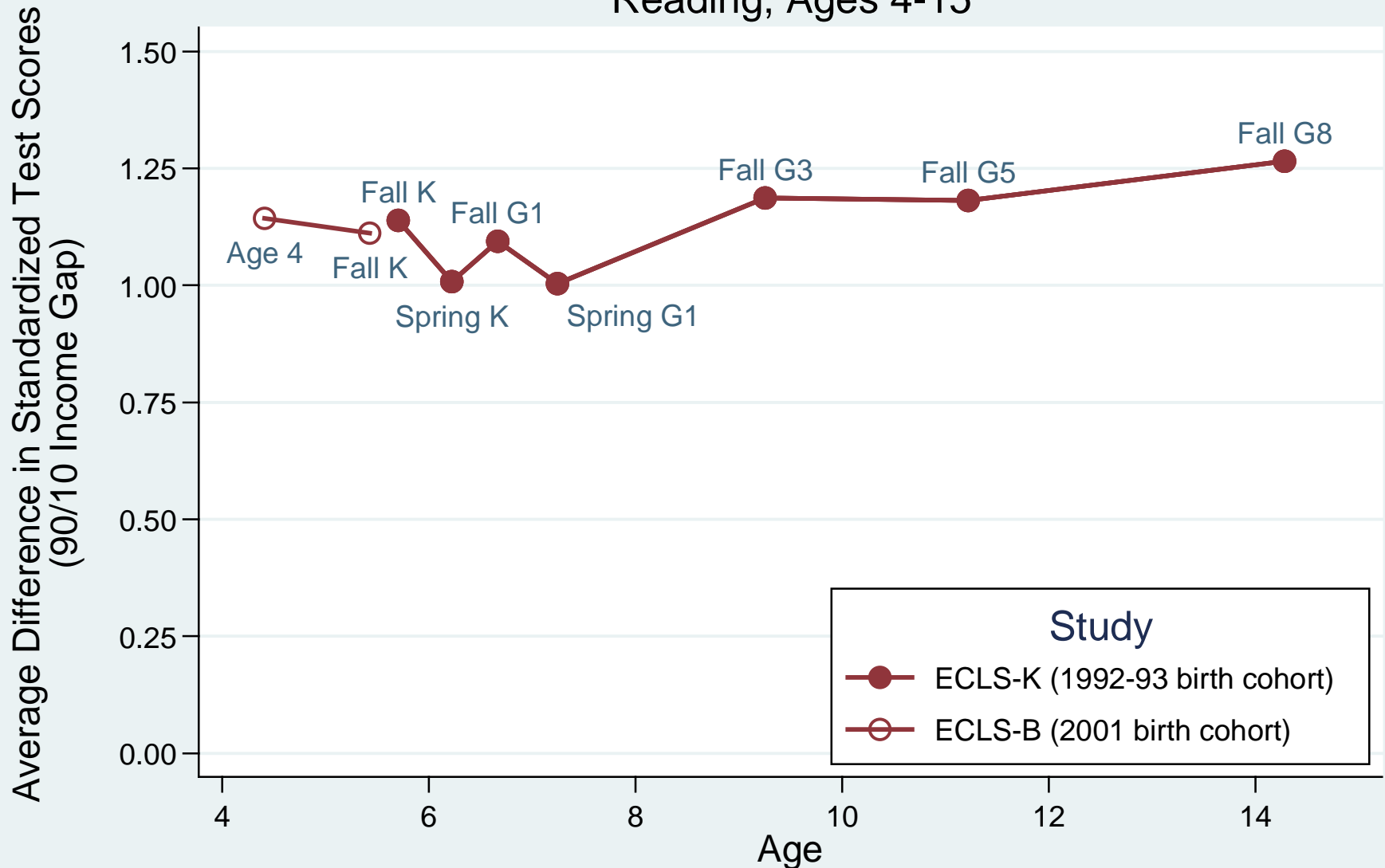
Source: Reardon (2011)

Income Achievement Gaps (90/50 and 50/10 Gaps) Reading, 1943-2001 Birth Cohorts



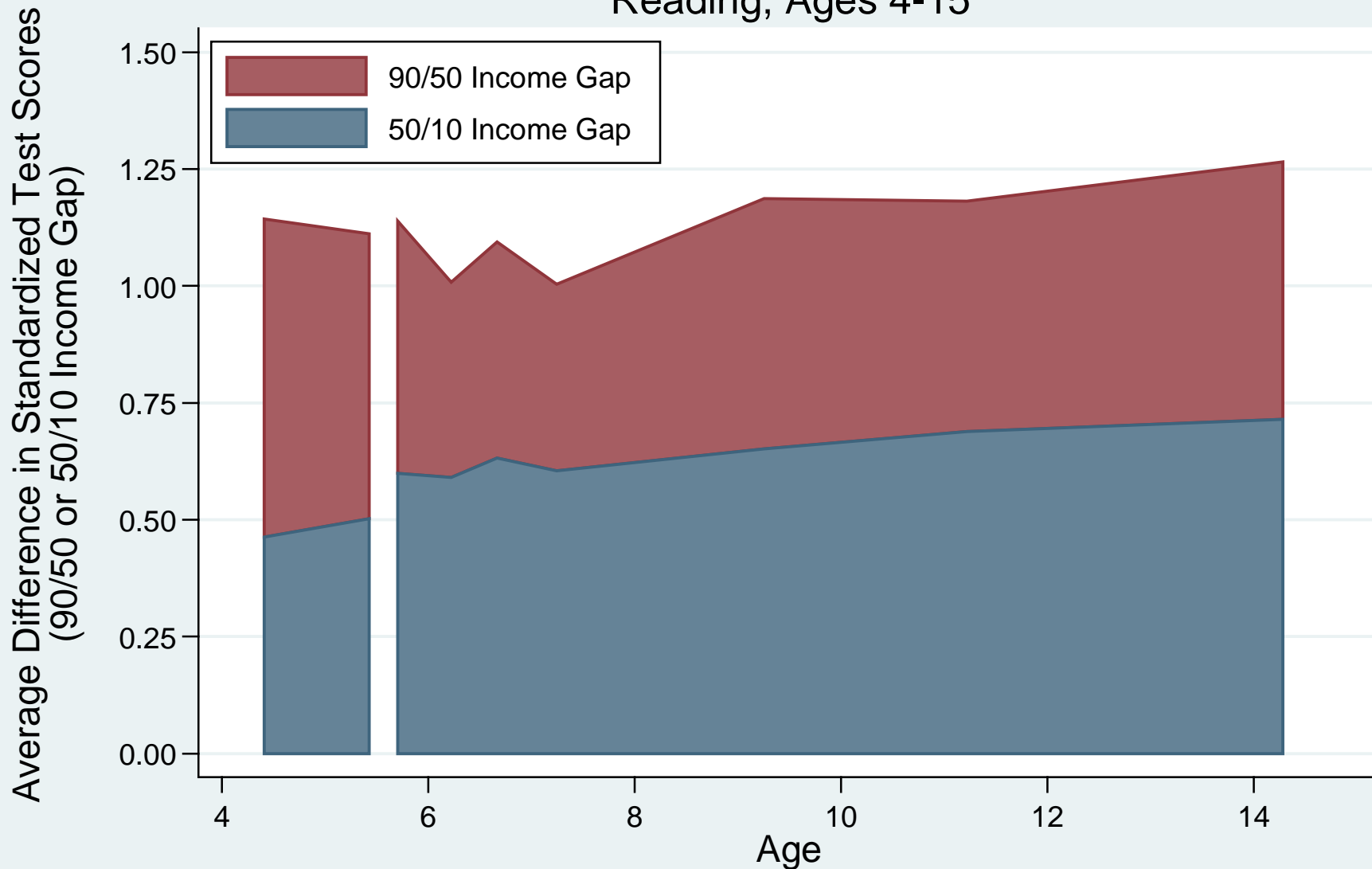
Source: Reardon (2011)

Development of Income Achievement Gap (90/10 Gap) Reading, Ages 4-15



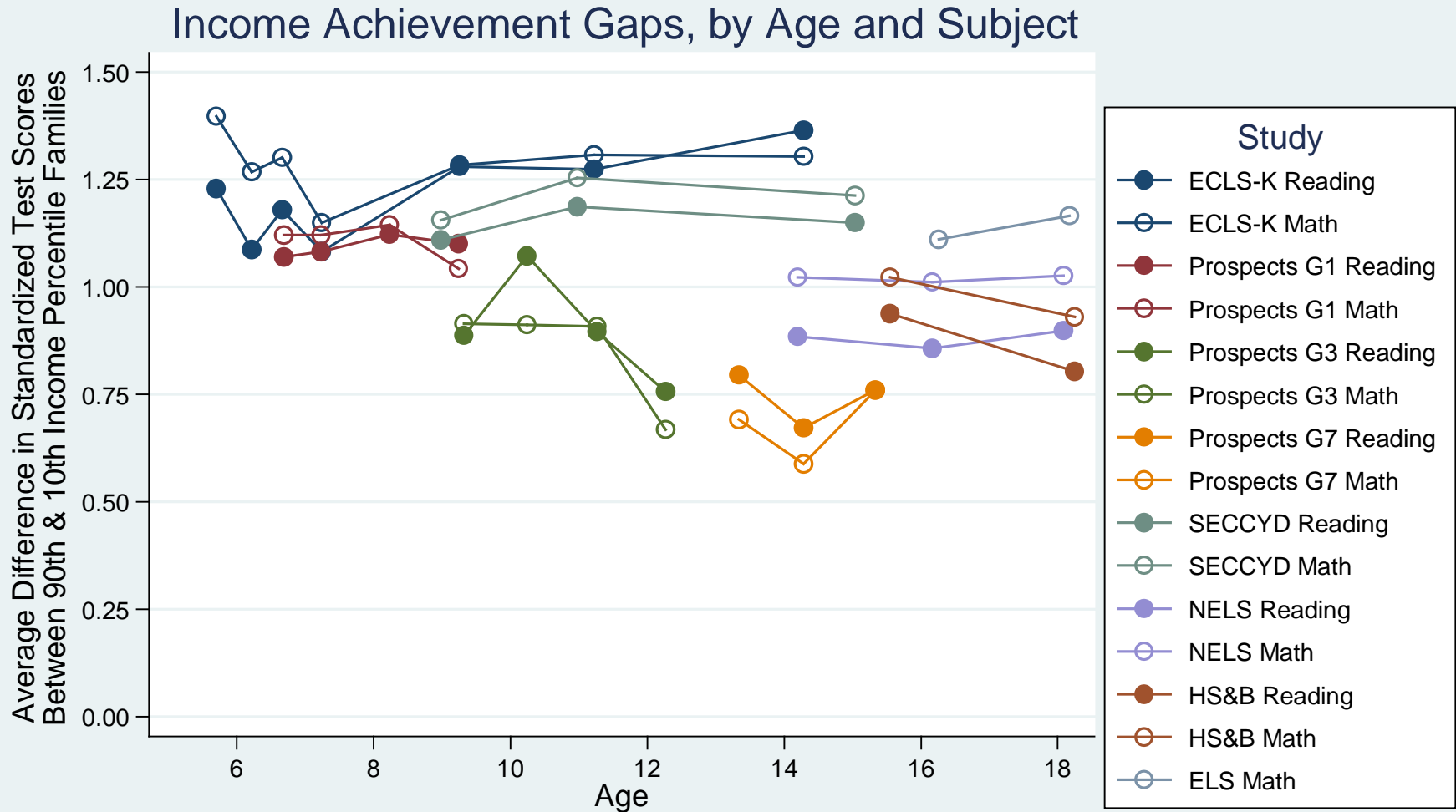
Source: Reardon (2011)

Income Achievement Gaps (90/50 and 50/10 Gaps) Reading, Ages 4-15



Source: Reardon (2011)

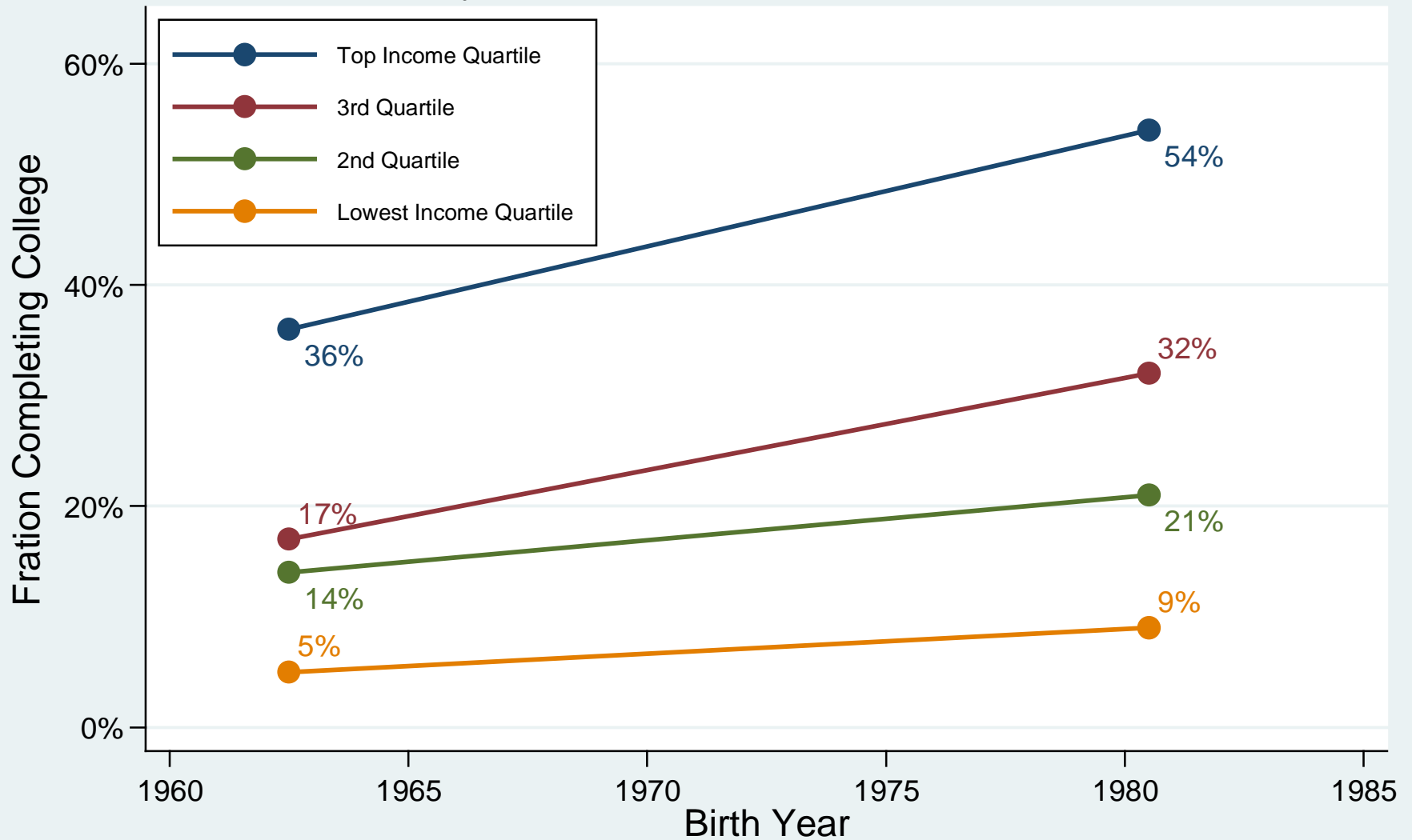
development of income achievement gap, by age and subject, all longitudinal studies



outline

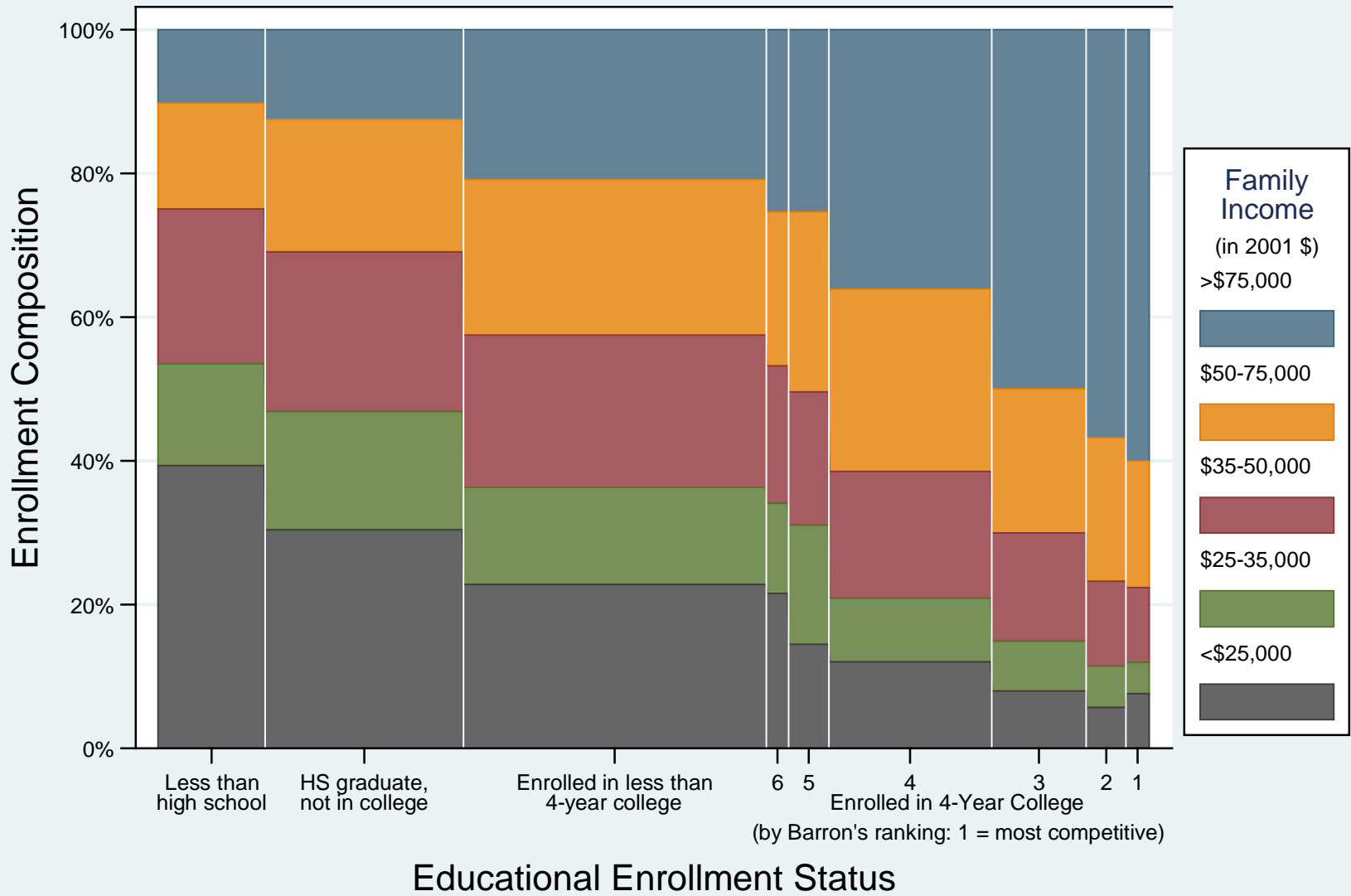
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Fraction of Students Completing College by Income Quartile and Year of Birth



Source: Bailey and Dynarski (2011)

Income Composition of Postsecondary Destinations, Class of 2004



Probability of Attending a Highly Selective College, By Income and High School Graduation Year, 1982-2004



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data for cross-national comparisons

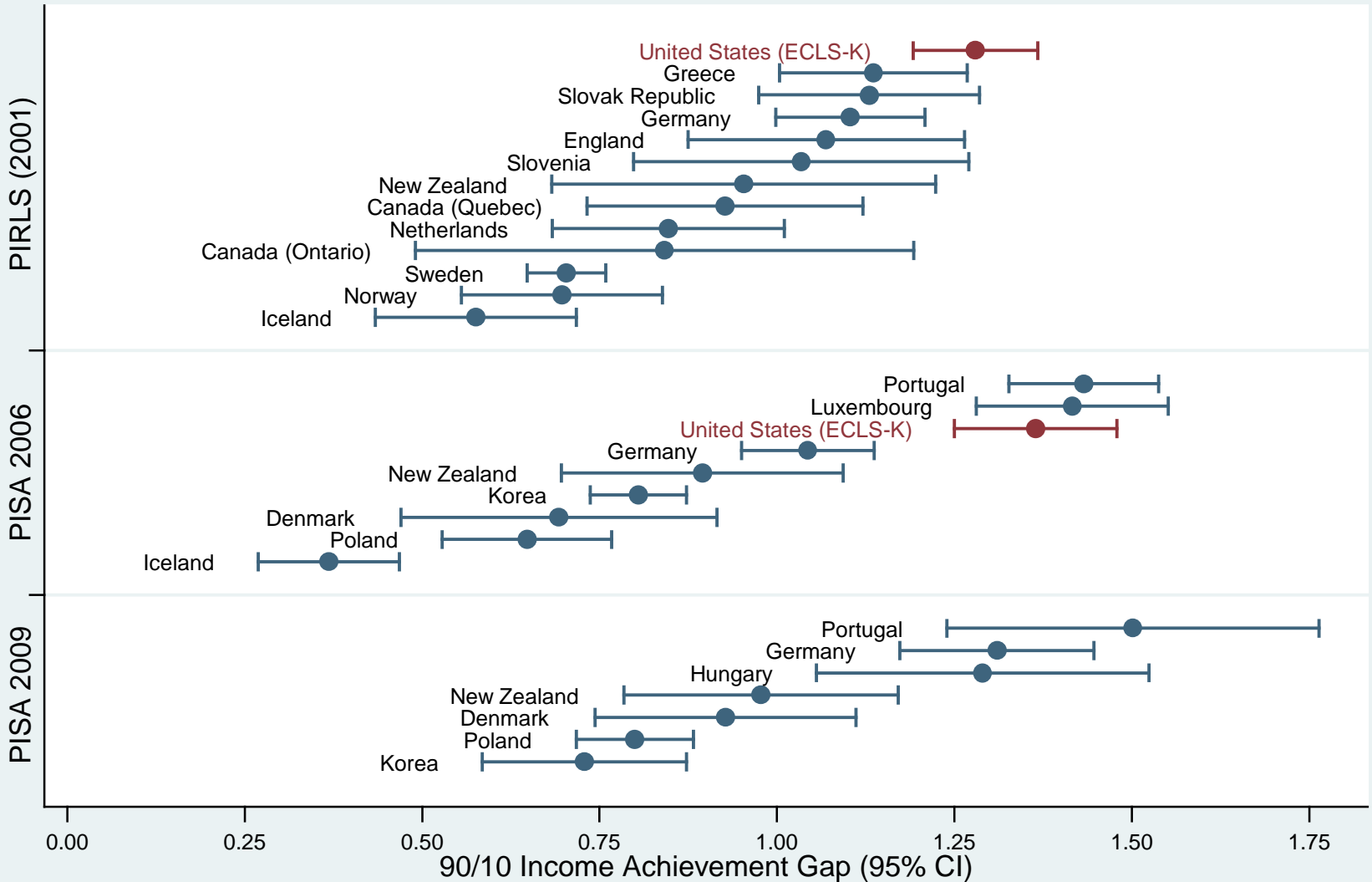
(reardon & chmielewski, 2012)

- Sample: U.S. plus 18 wealthy OECD countries that participated in parent income survey in PIRLS (2001) or PISA (2006; 2009).
- U.S. data comes from ECLS-K (3rd grade in 2002; 8th grade in 2007)
- We construct estimates of the 90/10, 90/50, and 50/10 income achievement gaps in each country in multiple years and subjects
 - ▣ 19 countries
 - ▣ 60 subject-by-year-by-country observations

measures

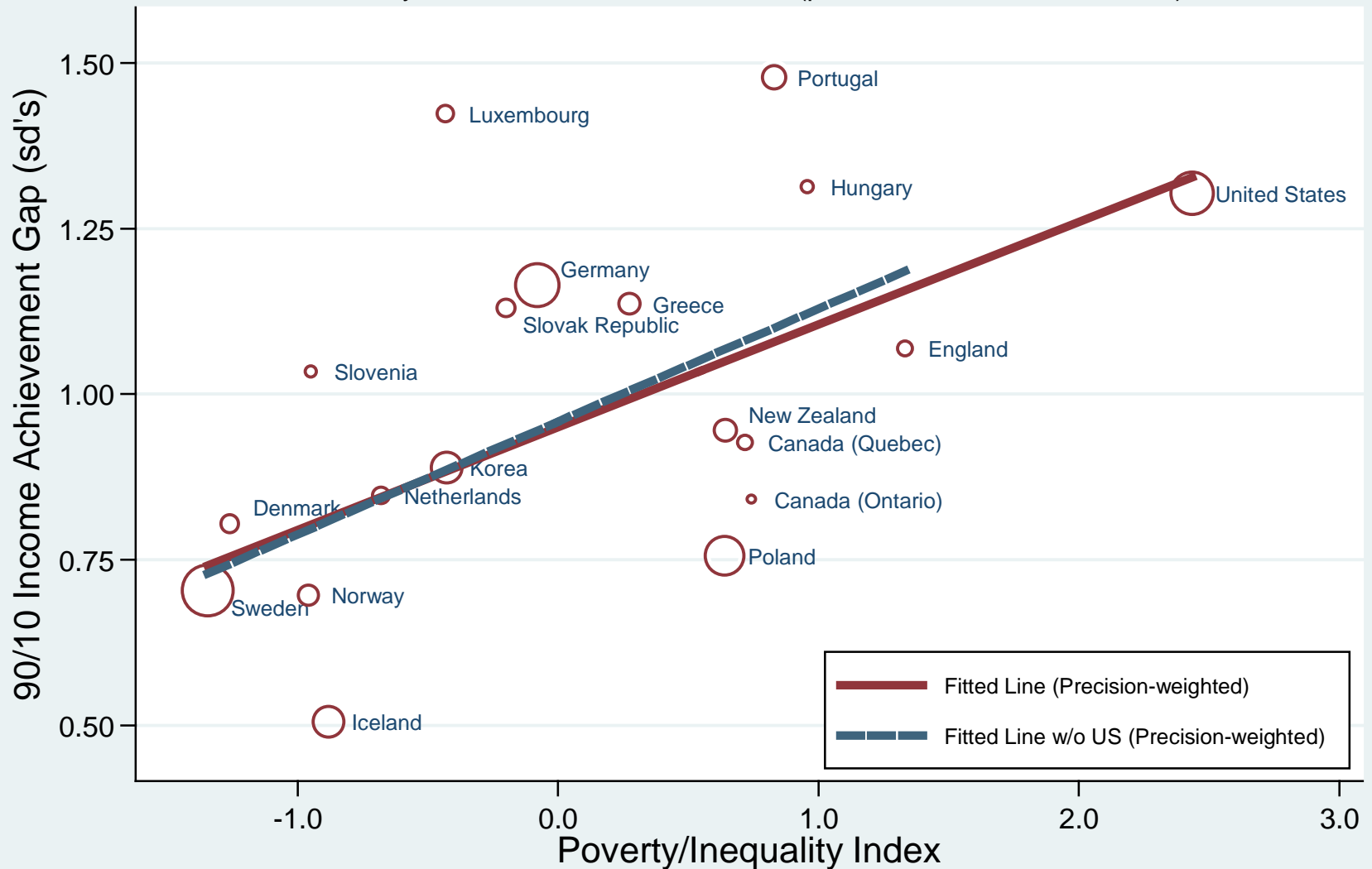
- Four indices of national social and educational inequality indicators:
 - ▣ **Poverty/Inequality Index**
 - income inequality, child poverty rate, school income segregation, low birthweight rate, teen childbearing rate
 - ▣ **Social Welfare Index**
 - public health expenditures, public spending on family benefits in cash, public spending on family benefits services, and pre-primary school enrollment rates
 - ▣ **Parental Support Index**
 - weeks of maternal and paternal leave; mothers' and fathers' paid leave full-rate equivalent
 - ▣ **Educational Differentiation Index**
 - private school enrollment rate, proportion enrolled in vocational programs, number of tracks, age at first tracking

Estimated 90/10 Income Achievement Gaps, Reading, PIRLS & PISA



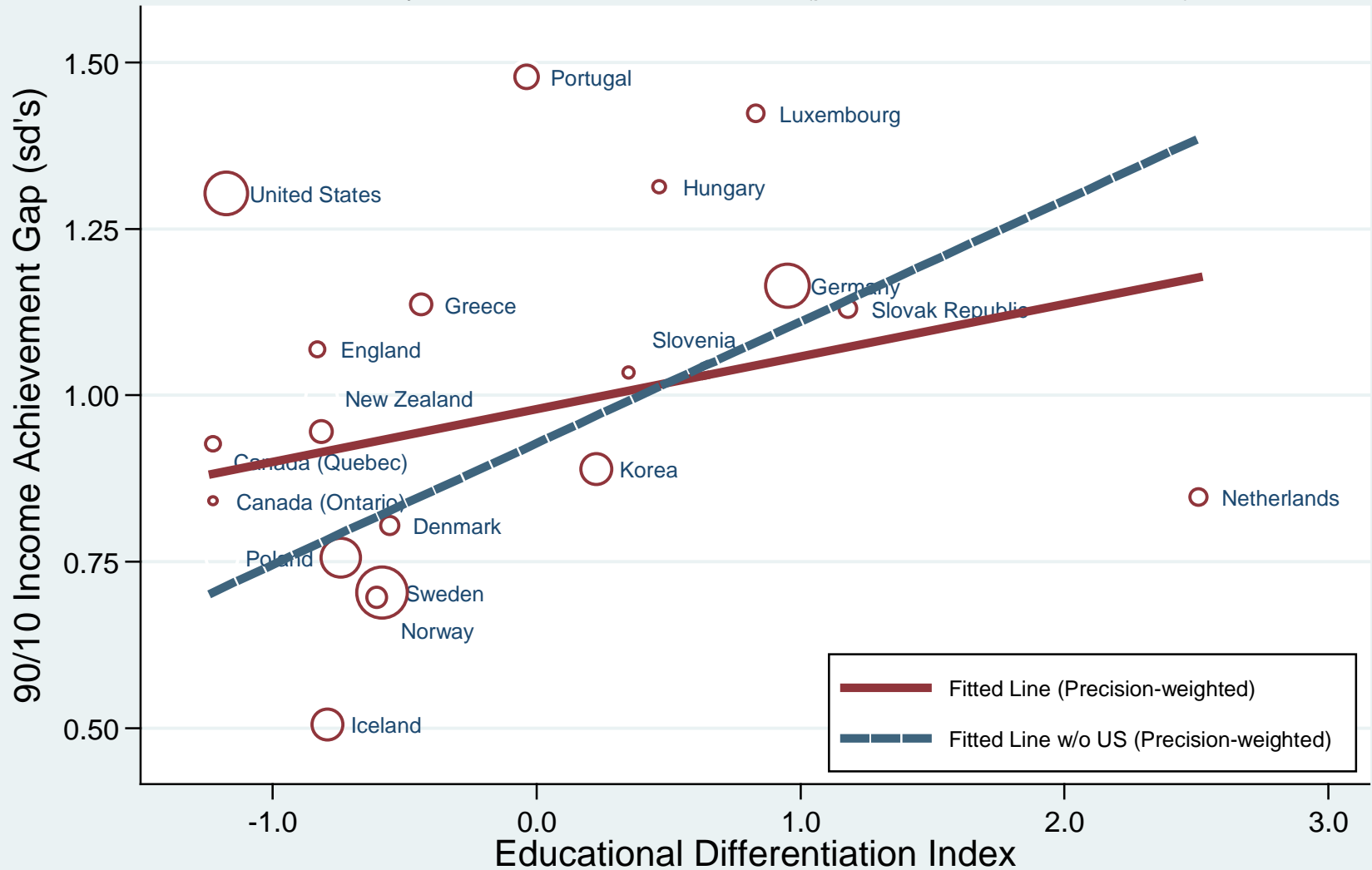
Association Between Income Achievement Gap and Poverty/Inequality Index

Wealthy OECD Countries, 2001-2009 (pooled PIRLS and PISA data)



Association Between Income Achievement Gap and Differentiation Index

Wealthy OECD Countries, 2001-2009 (pooled PIRLS and PISA data)



Estimated Multivariate Associations of Country Characteristics with 90/10 Income Achievement Gap (Random Effects Models Using Pooled PIRLS and PISA Data)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Educational Differentiation Index	0.078 (0.063)	0.146 ** (0.049)	0.111 * (0.053)	0.149 * (0.059)	0.125 * (0.050)	0.106 * (0.050)
Poverty/Inequality Index		0.193 *** (0.056)				
Social Welfare Index		0.025 (0.051)				
Parental Support Index		-0.019 (0.048)				
Income Inequality (Gini Index)			-0.051 (0.105)	0.157 ** (0.057)		
Child Poverty Rate			0.155 (0.107)		0.172 *** (0.048)	
School Income Segregation			0.084 (0.059)			0.158 *** (0.048)
Intercept	0.964 *** (0.07)	0.938 *** (0.051)	0.721 (0.518)	-0.016 (0.360)	0.622 *** (0.112)	0.458 ** (0.163)
Within-Country Residual Variance	0.0020	0.0009	0.0018	0.0020	0.0020	0.0021
Between-Country Residual Variance	0.0608	0.0307	0.0284	0.0421	0.0339	0.0357
N (Observations)	60	60	60	60	60	60
N (Countries)	19	19	19	19	19	19

Notes: * p<.05; ** p<.01; *** p<.001. USA included; USA data from ECLS-K Study.

some caveats

- Small N (models may be overfit)
- Very incomplete set of relevant national characteristics
- Poor measurement of covariates may lead to attenuated correlations and measurement-error induced bias in coefficients
- Idiosyncratic sample of wealthy OECD countries (generalizability?)
- U.S. data is from a different study (though results are robust to exclusion of U.S. from sample)
- All variation is between-country; no evidence here regarding within-country temporal variation

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Does schooling produce educational inequality?

- the income achievement gap in the US does not appear to grow appreciably during the K-12 year
 - ▣ indeed, some evidence that it narrows during the school year, and widens in the summer
 - ▣ this suggests schooling is not the primary cause of the gaps in the US (it may even narrow gaps)
- but, in the cross-national data, school system differentiation predicts the income achievement gap,
 - ▣ this suggests that features of the schooling system may affect educational inequality

So why has income achievement gap widened?

- Does rising income inequality explain the rising income achievement gap?
- Or is it because income is more strongly associated with achievement than several decades ago?
 - ▣ and if that is so, why?

income and educational outcomes

- Assume a very simple (stylized) association between educational outcome Y and income (Inc):

$$Y = \beta \cdot \ln(Inc) + e$$

- Then the average difference in Y between those at the 90th and 10th percentile of the income distribution is

$$\begin{aligned} E[Y^{90} - Y^{10}] &= \beta \cdot [\ln(Inc^{90}) - \ln(Inc^{10})] \\ &= \beta \cdot \ln\left(\frac{Inc^{90}}{Inc^{10}}\right) \end{aligned}$$

- The 90/10 gap in Y depends on both β and Inc^{90}/Inc^{10}

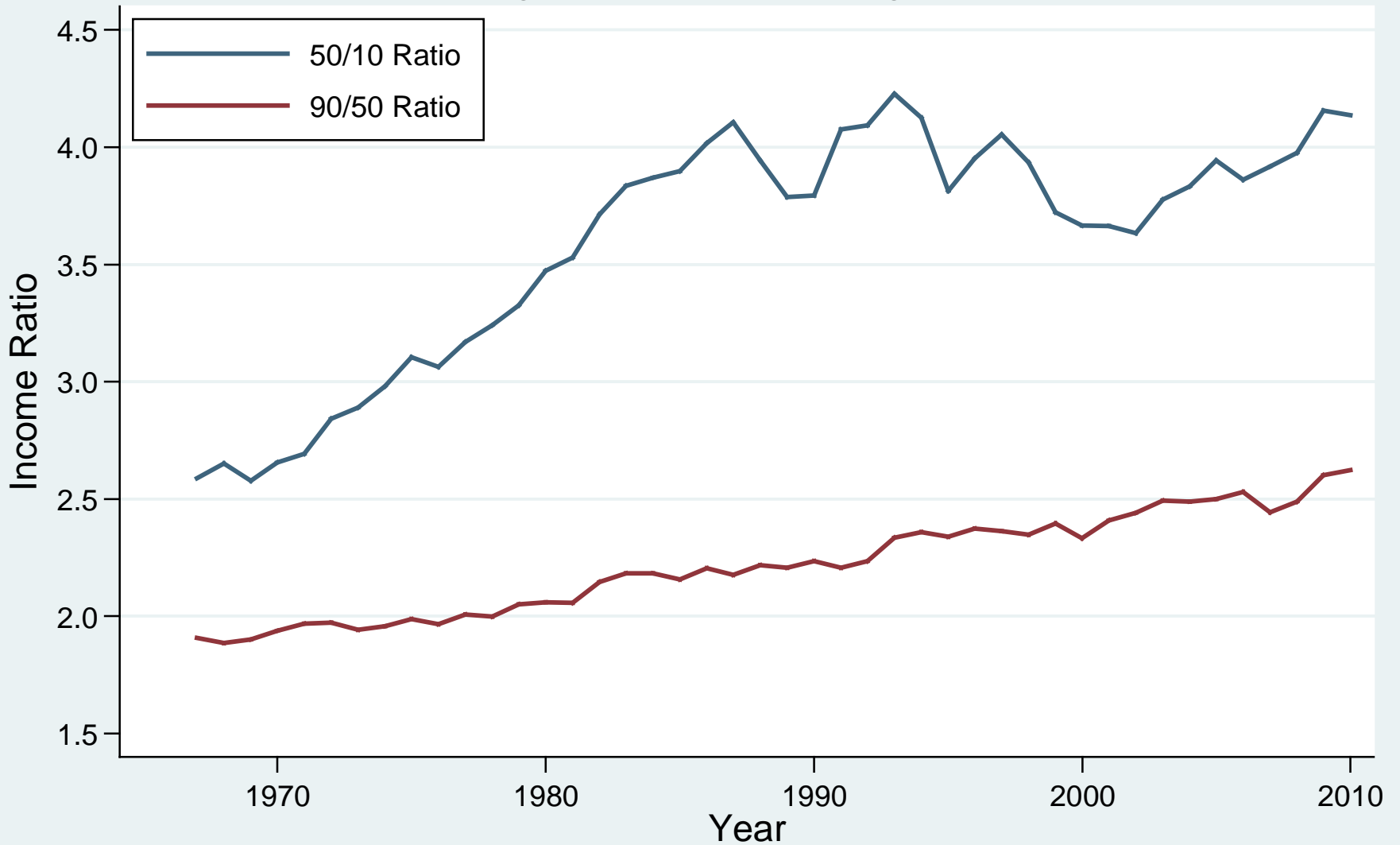
income inequality and educational inequality

$$E[Y^{90} - Y^{10}] = \beta \cdot \ln\left(\frac{Inc^{90}}{Inc^{10}}\right)$$

- Is the change in the 90/10 income achievement gap due to a **mechanical** association between income and achievement?
 - i.e., income directly affects educational outcomes, so wider income dispersion leads to wider dispersion of educational outcomes
 - implies β is constant as Inc^{90}/Inc^{10} (income inequality) grows

- and/or to a change in the **contextual** association between income and achievement
 - i.e., income inequality leads to stronger association between income and achievement
 - implies β grows as Inc^{90}/Inc^{10} (income inequality) grows

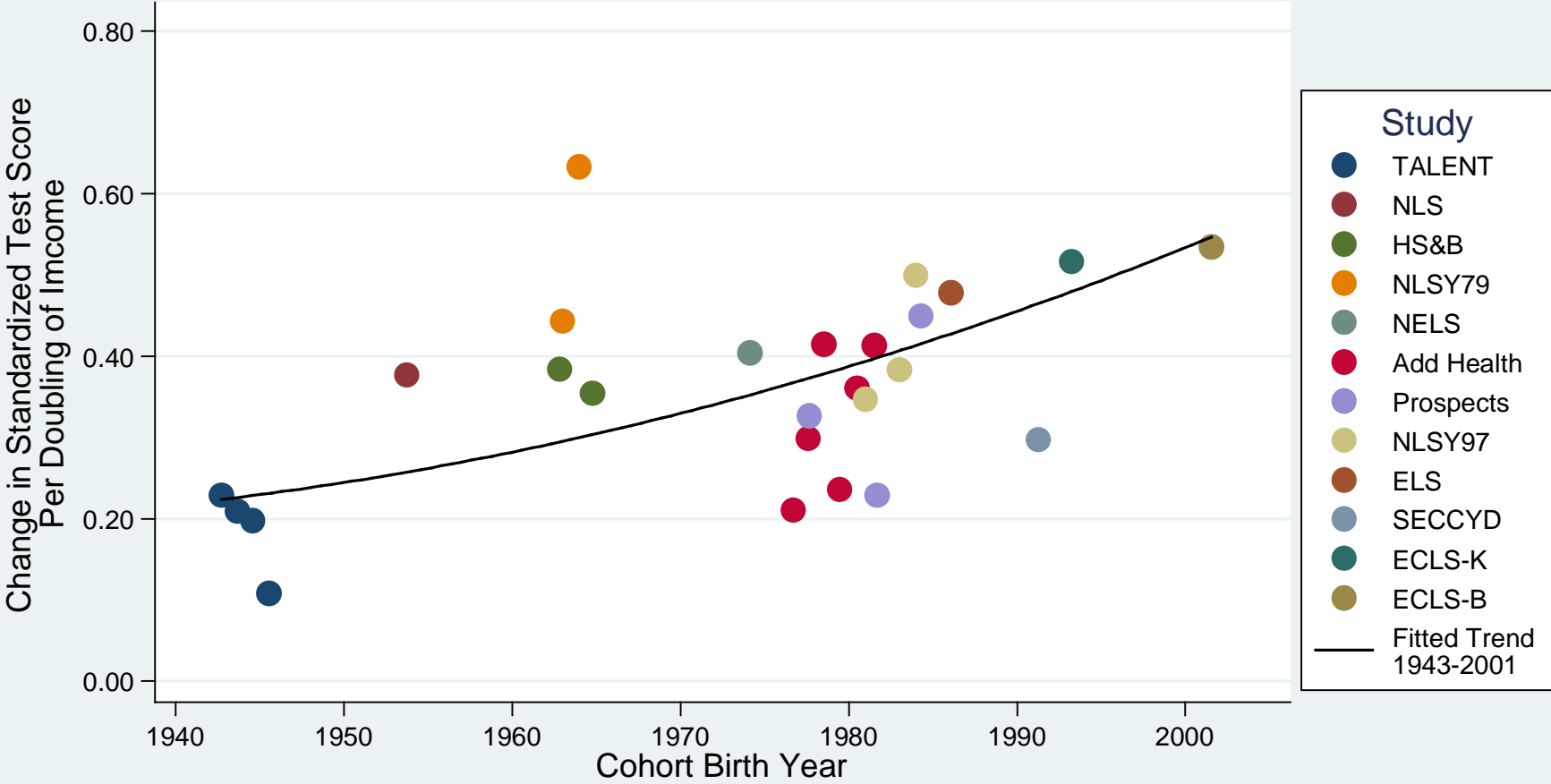
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Source: Author's calculations from CPS data 1968-2011

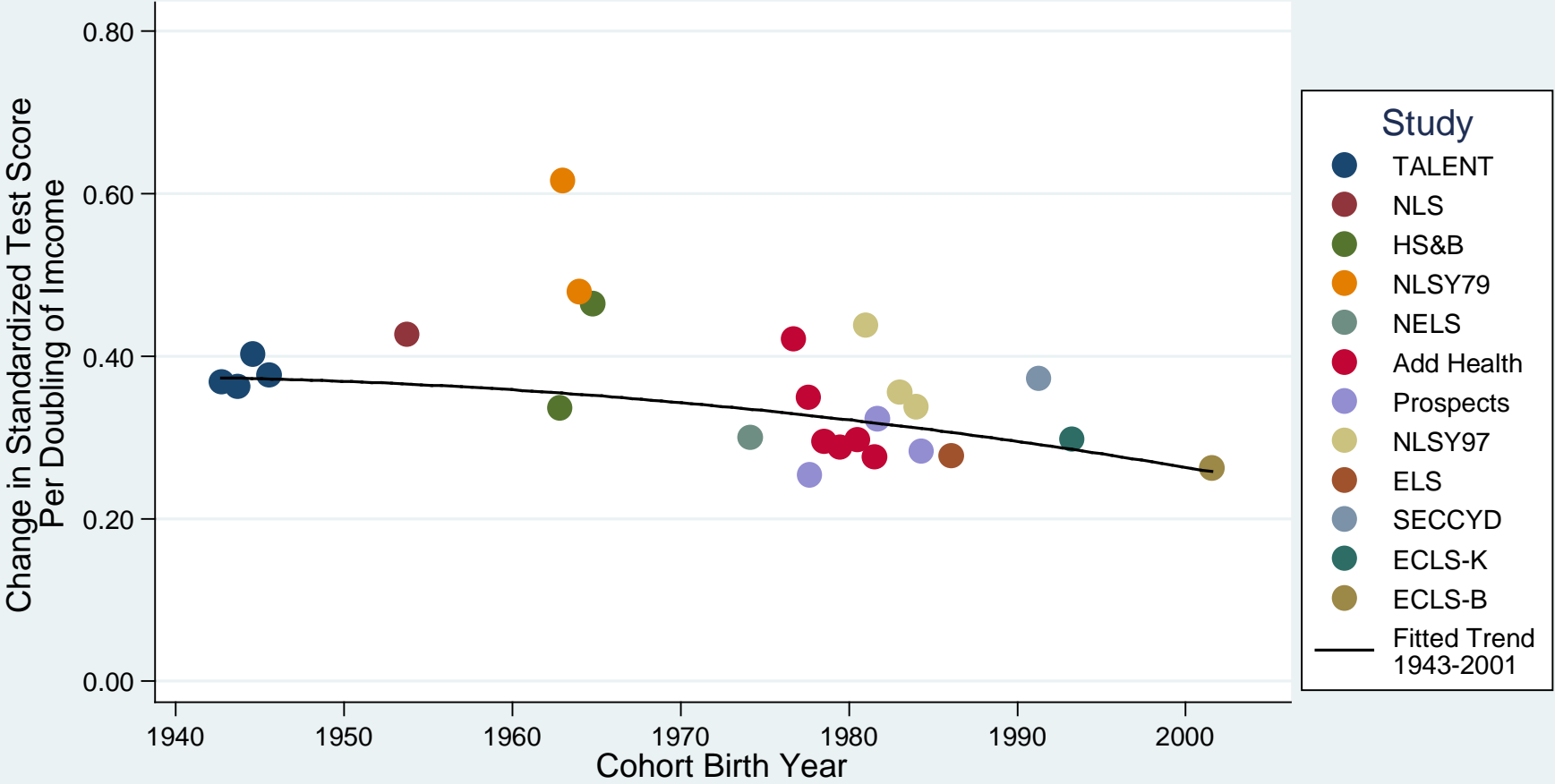
estimated achievement returns to income, reading, high-income families, 1940-2001 cohorts

Trend in Association Between Income and Reading Achievement, Families Above Median Income, 1940-2001 Cohorts



estimated achievement returns to income, reading, low-income families, 1940-2001 cohorts

Trend in Association Between Income and Reading Achievement, Families Below Median Income, 1940-2001 Cohorts



income and educational outcomes

- Now assume a slightly less simple association between educational outcome Y and income (Inc) and X :

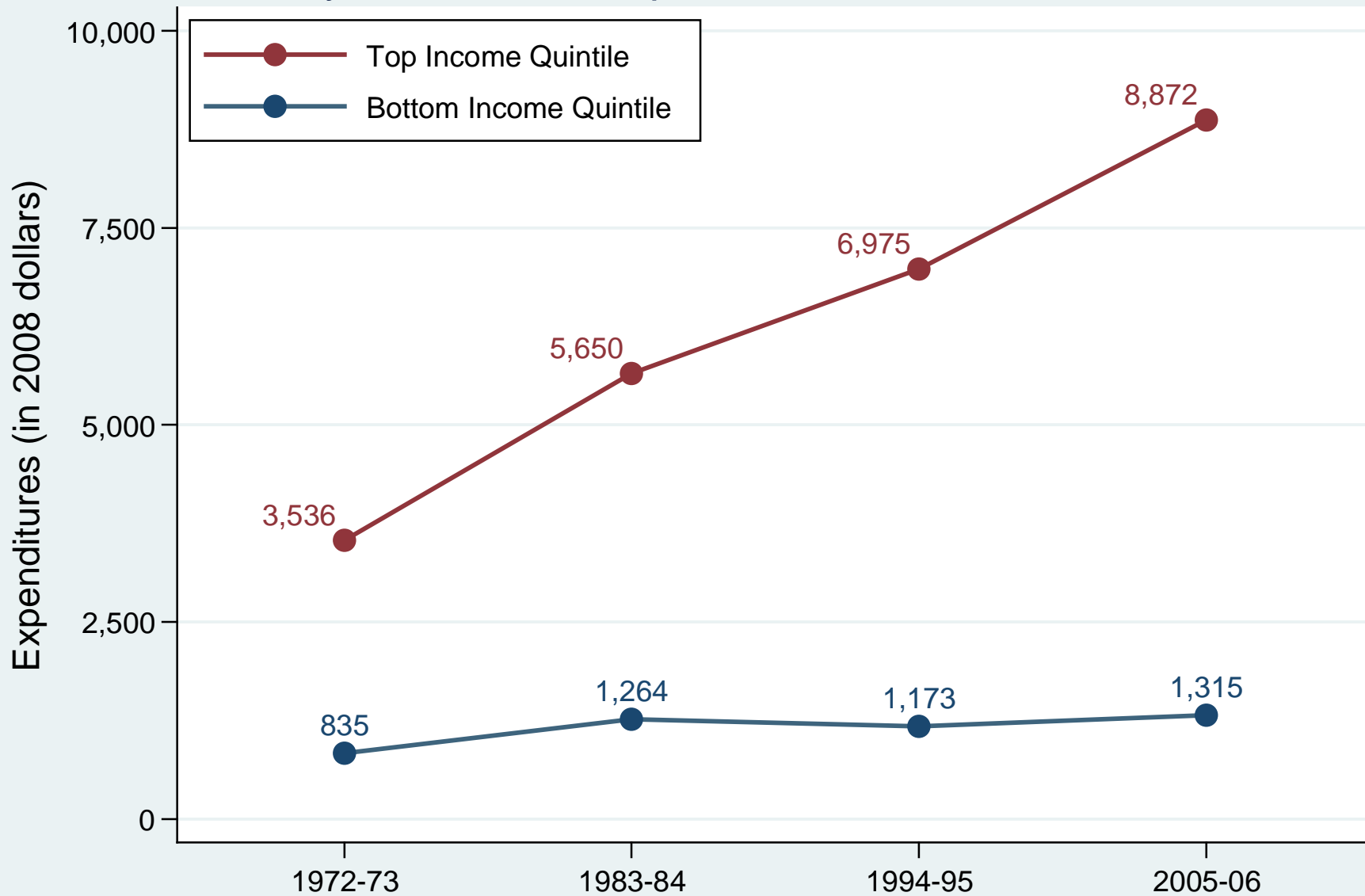
$$Y = \beta' \cdot \ln(Inc) + \gamma \cdot X + e$$

- Then the average difference in Y between those at the 90th and 10th percentile of the income distribution is

$$E[Y^{90} - Y^{10}] = \beta' \cdot \ln\left(\frac{Inc^{90}}{Inc^{10}}\right) + \gamma \cdot (X^{90} - X^{10})$$

- The 90/10 gap in Y depends on β' , Inc^{90}/Inc^{10} , γ and $X^{90} - X^{10}$

Family Enrichment Expenditures on Children, 1972-2006



Source: Duncan & Murnane (2011)

changes in spending on children's education, 1972-2007

- kornrich & furstenburg (2010)
 - increasing spending on children from 1972-2007
 - particularly large increase on spending on children under age 6 (child care and pre-school spending)
 - increase in spending largest among highest earners

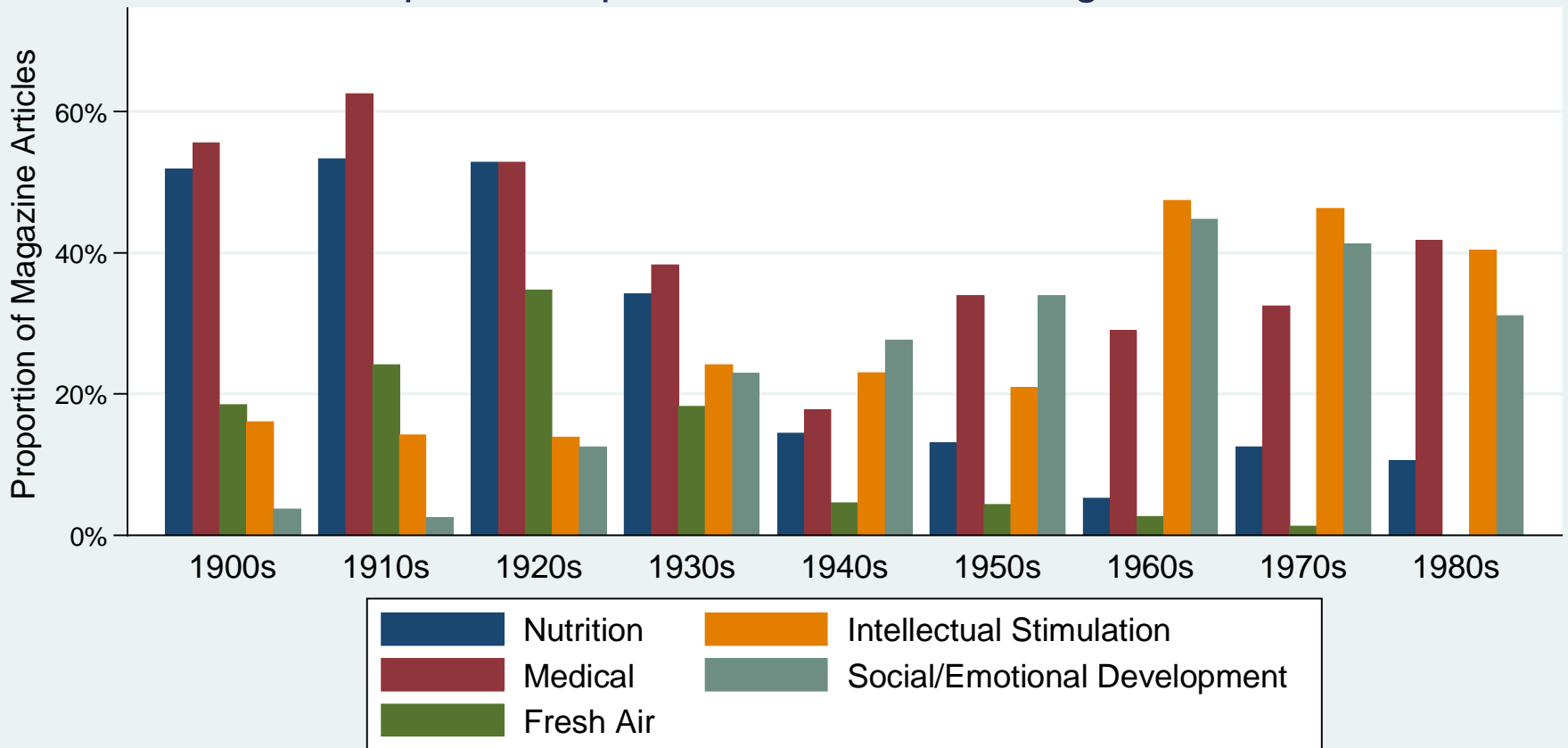
[I]n the race to the top, higher income families are at an ever greater advantage because they can afford to absorb the growing costs of childcare and pre-school spending and the huge and growing costs of post-secondary education. ... [these] costs borne by the family impose a growing burden on low and moderate income families whose incomes have stagnated over the past several decades. It seems evident that unless these constraints on less than advantaged households are reduced, the children of low and moderate income families will continue to lose ground. (Kornrich & Furstenburg, 2010)

changing view of parental role

- parental views of their role as parents has changed over twentieth century (wrigley, 1989; schaub, 2010)
 - ▣ increasing focus on importance of parenting for cognitive development
- some evidence of social class differences in parenting practices (lareau, 2003)
 - ▣ middle/upper-class: *concerted cultivation*
 - ▣ working-class: *accomplishment of natural growth*
- education policy may play a role, by focusing and legitimating test scores as primary goal of schooling and evidence of success (schaub, 2010)

changing views of parenting, 1900-1985 (wrigley, 1989)

Topics of Expert Advice on Parenting, 1900-1985



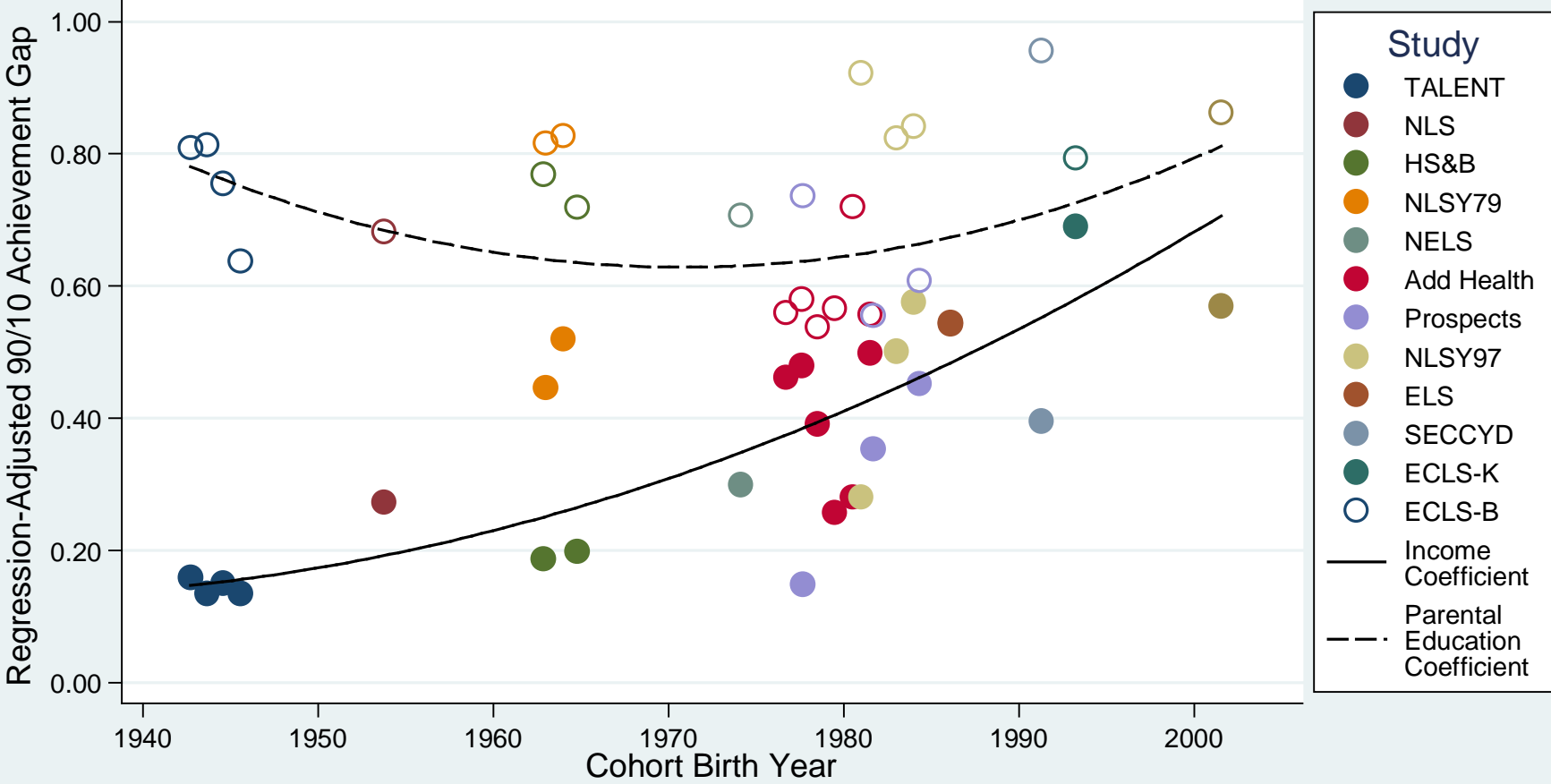
Source: Wrigley, Julia. (1989). Do Young Children Need Intellectual Stimulation? Experts' Advice to Parents, 1900-1985. *History of Education Quarterly* 29/1:41-75 (Table 1).

relationship between income and other family resources

- polarization of families (mclanahan 2004)
- increasing returns to college education and cognitive skill (murnane, willett, & levy, 1995)
 - ▣ income more strongly associated with parental education and cognitive skill
- increased assortative mating (schwartz & mare, 2005)
- high-income families not only have more income, but increasingly also have more of other resources that matter (dual parents, high educational attainment & cognitive skill, smaller families, fewer very young mothers)

adjusted trends in income-achievement and education-achievement associations, reading, 1940-2001

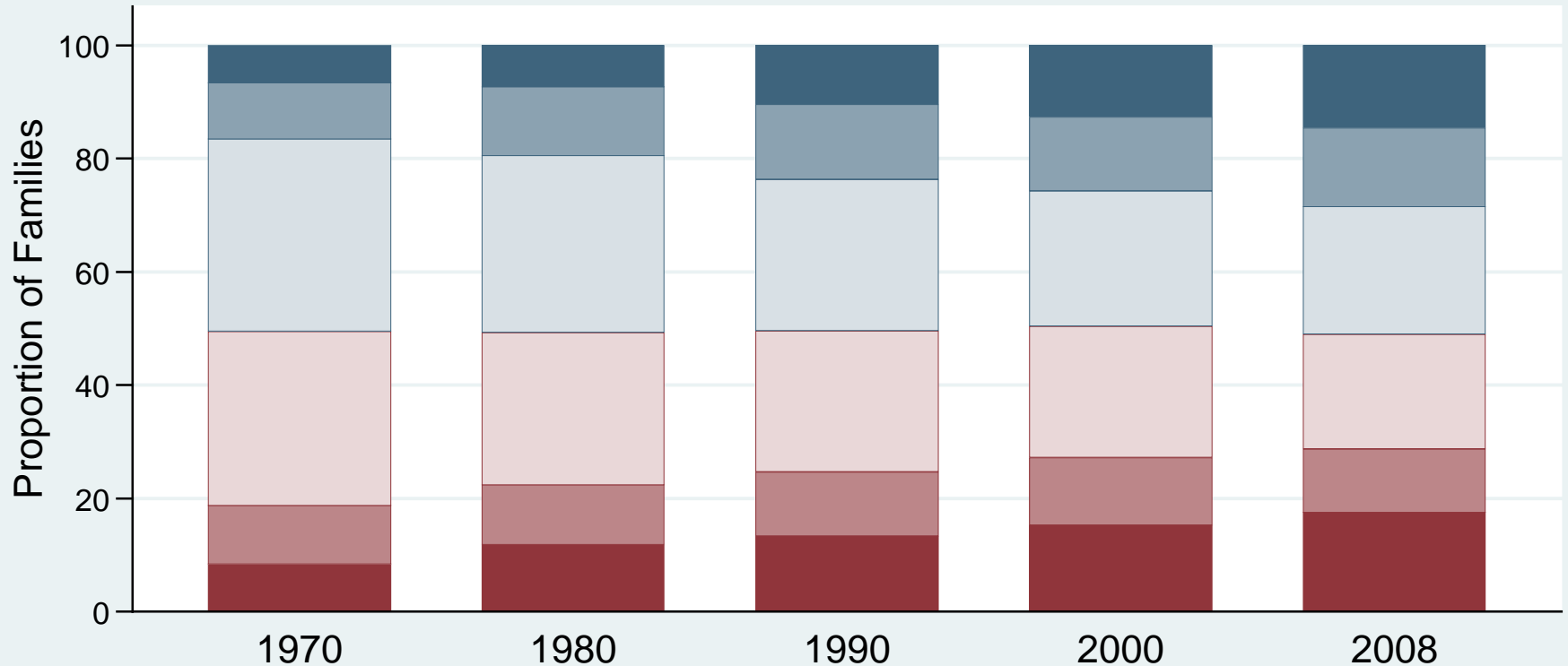
Trends in Adjusted Associations Between Reading and Both Income and Parental Education, 1943-2001 Cohorts



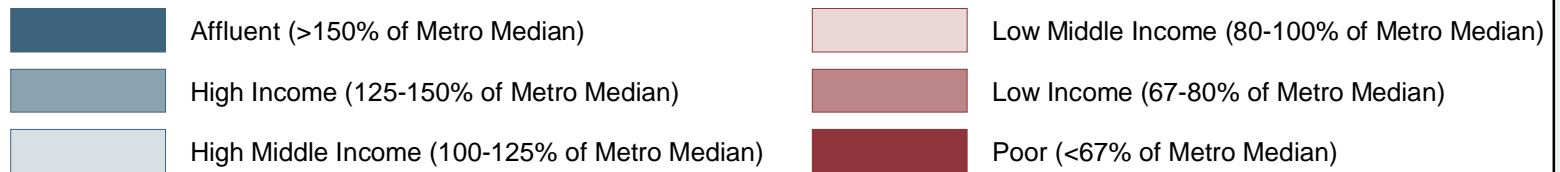
increasing segregation

- residential income segregation grew 1970-2008
 - ▣ in response to growing income inequality and low-income housing policy
 - ▣ (jargowsky 1997, watson 2009, reardon & bischoff 2011, 2012)
- implies that school segregation by income grew as well
 - ▣ though evidence on the impact of this is unclear

Proportion of Families Living in High-, Middle-, and Low-Income Neighborhoods Metropolitan Areas with Population > 500,000, 1970-2008



Neighborhood Type (Based on Median Family Income Level)



inequality and education

- differences in inequality, coupled with a stable association between income and educational achievement, seems insufficient to explain the patterns of association between inequality and income achievement gaps
- rather, the association between income and achievement has changed as well
- but why?

a provisional hypothesis

- For young workers, the returns to a college degree doubled from 1980-2000 (card & lemieux, 2001)
- The increasing importance of education in the labor market and economic mobility have made educational success ever more important
 - ▣ This **changes parental behavior/investment** – changes how parents think about children
 - ▣ It also changes how we think about **the role of schools**— increased focus on academic success (as measured by test scores)
- This leads to increased competition for educational advantage
 - ▣ Money (and other forms of capital) is an advantage in this competition
 - ▣ So income matters more than before (i.e., β is larger)

implications

- the link between family income and children's achievement, coupled with the increasing importance of cognitive skills in determining earnings, produces a feedback cycle that leads to low socioeconomic mobility and growing inequality.
- this feedback cycle may operate partly through schooling, though schools (in a narrow, functional sense) do not appear to be a primary cause of this trend
- nor is it clear that schools (alone) can reverse this trend, though they may be a helpful mechanism.