Education

131 Undergraduate Public Economics

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Education

Education is one of the 3 largest programs funded by government (along with retirement and health)

All advanced economies fund most (80% on average) of education (pre-K, K-12, higher ed) through government

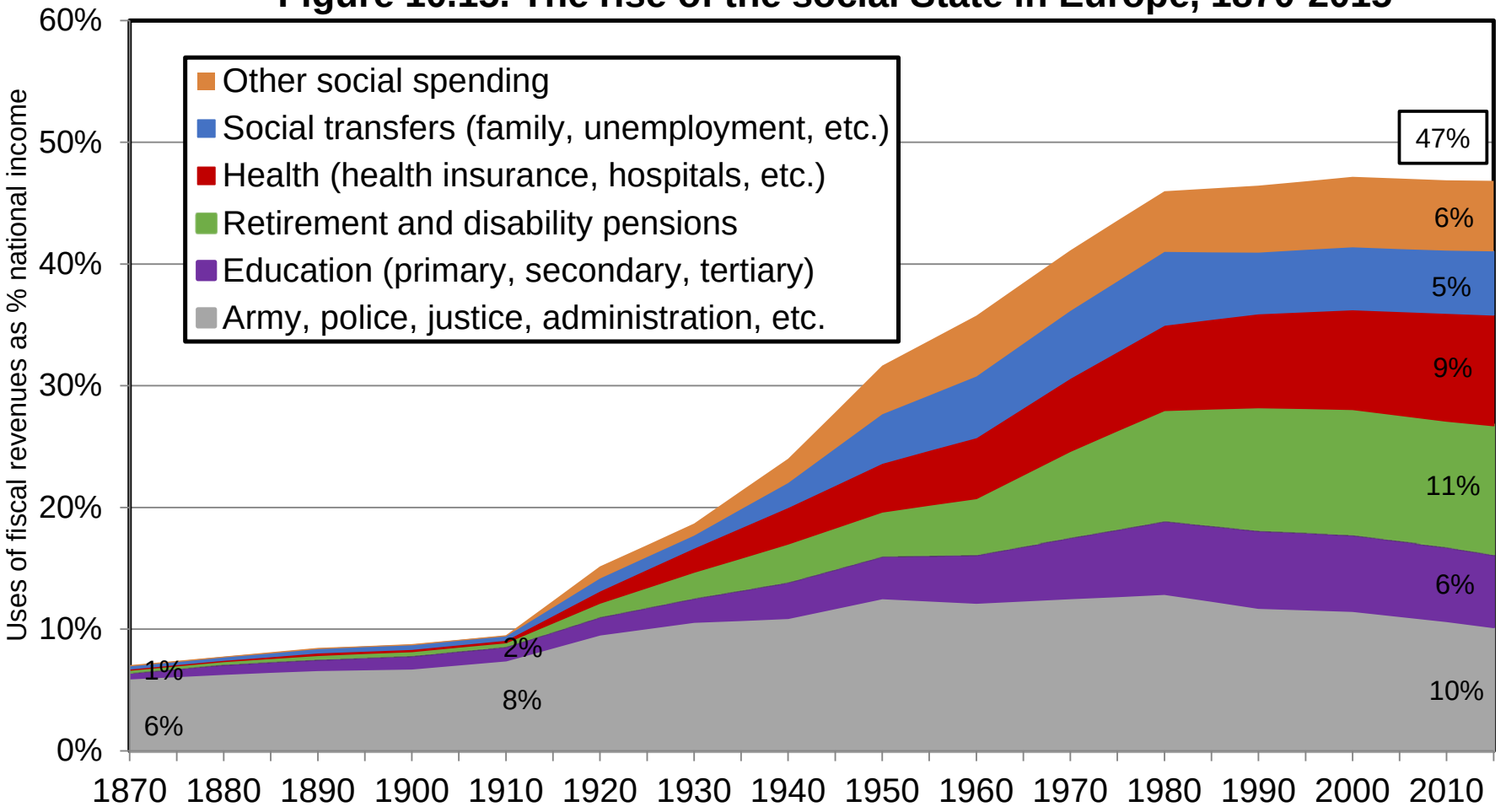
$\Rightarrow$ Education level highly dependent on govt policy

In US, 4.5% of GDP or 1/7 of total government expenditure

In US, 80% of ed spending done at the state and local level

Focus of an extensive body of research in the rapidly expanding field of economics of education

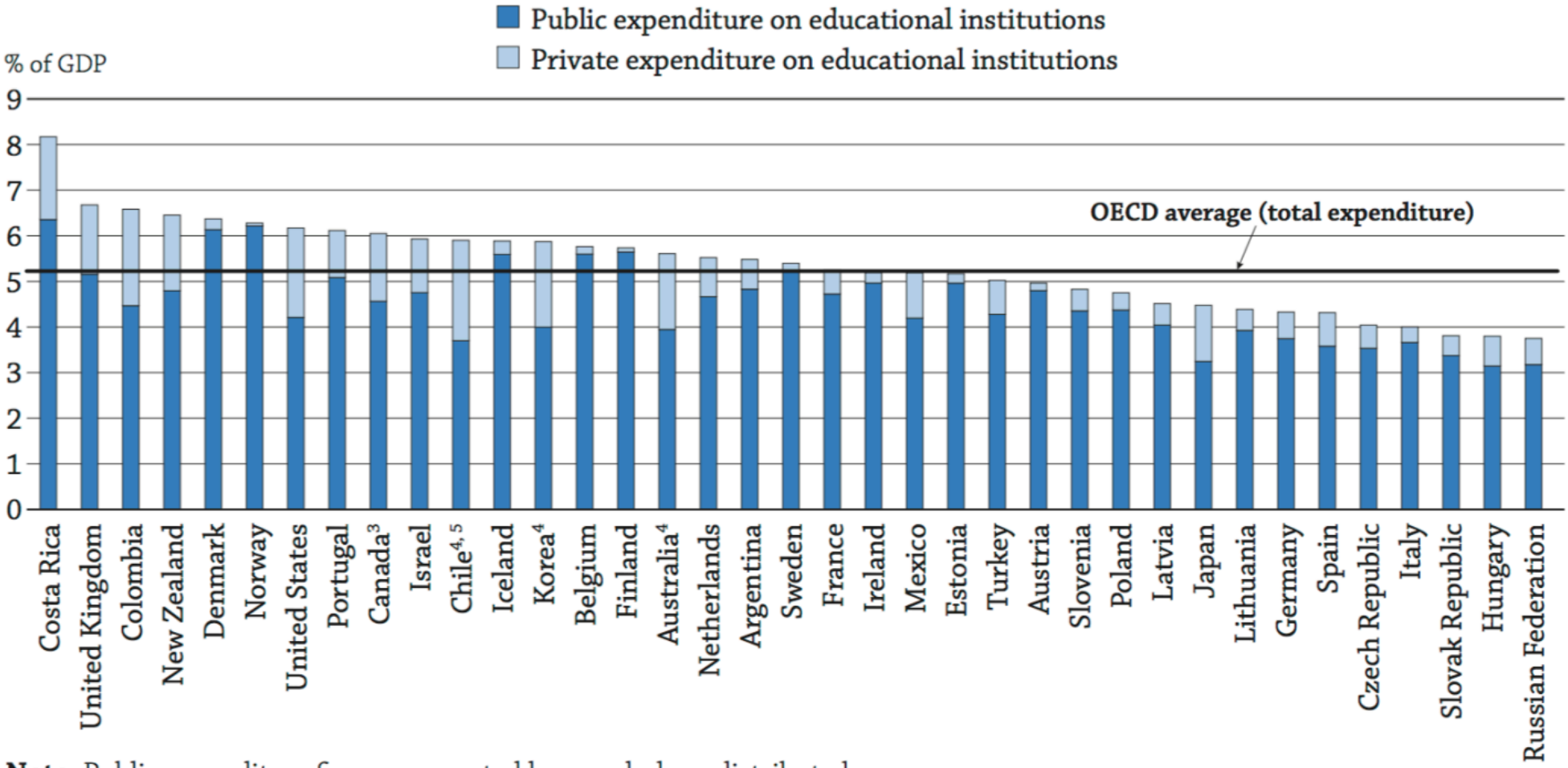
Figure 10.15. The rise of the social State in Europe, 1870-2015



Interpretation. In 2015, fiscal revenues represented 47% of national income on average in Western Europe et were used as follows: 10% of national income for regalian expenditure (army, police, justice, general administration, basic infrastructure: roads, etc.); 6% for education; 11% for pensions; 9% for health; 5% for social transfers (other than pensions); 6% for other social spending (housing, etc.). Before 1914, regalian expenditure absorbed almost all fiscal revenues. **Note.** The evolution depicted here is the average of Germany, France, Britain and Sweden (see figure 10.14). Sources and séries: see piketty.pse.ens.fr/ideology.

Figure B2.1. Public and private expenditure on educational institutions, as a percentage of GDP (2013)

From public[1] and private[2] sources



Note: Public expenditure figures presented here exclude undistributed programme.

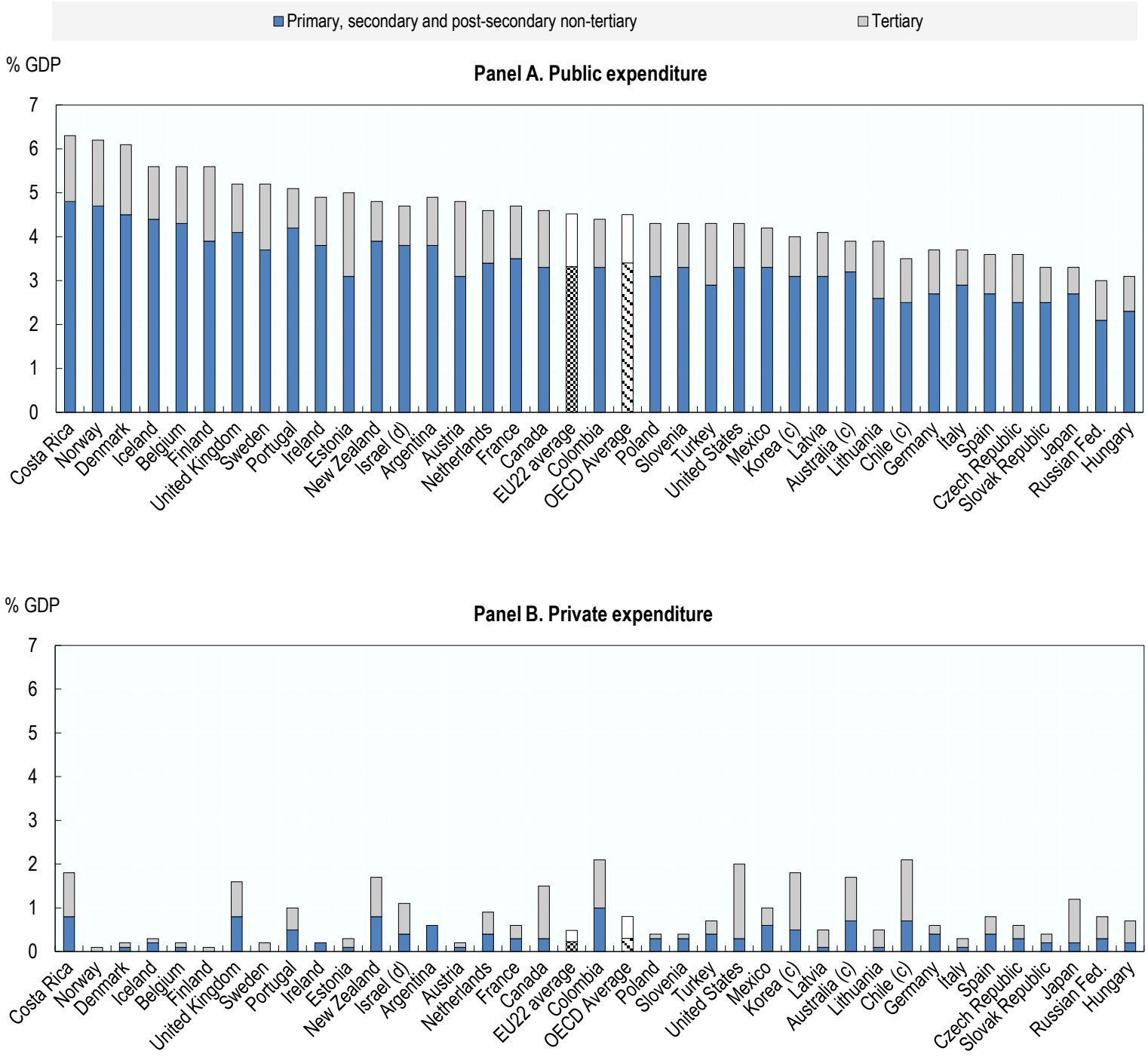
1. Including public subsidies to households attributable to educational institutions, and direct expenditure on educational institutions from international sources.
2. Net of public subsidies attributable for educational institutions.
3. Year of reference 2012.
4. Public does not include international sources.
5. Year of reference 2014.

Countries are ranked in descending order of expenditure from both public and private sources on educational institutions.

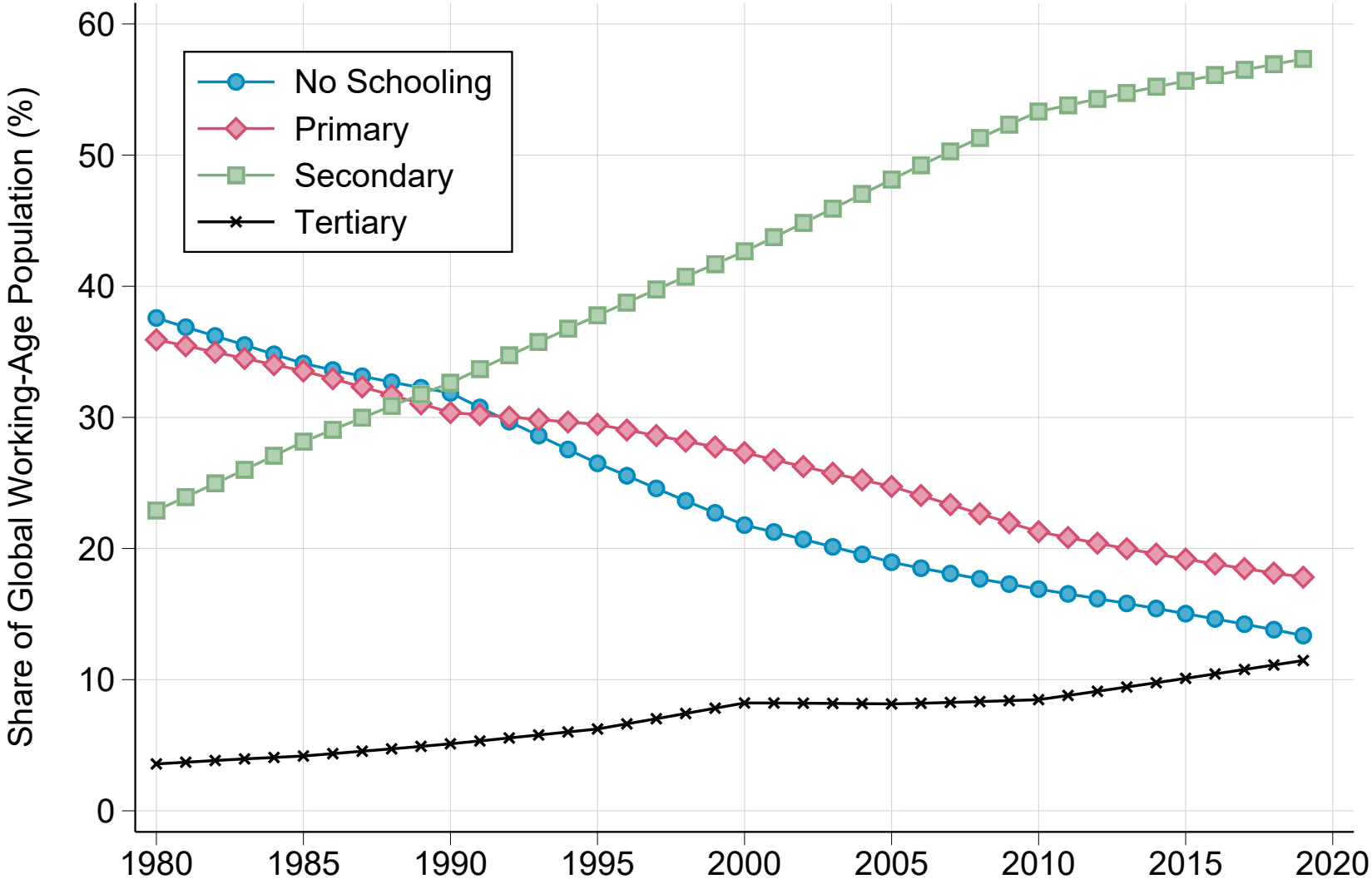
Source: OECD. Table B2.3. See Annex 3 for notes (www.oecd.org/education/education-at-a-glance-19991487.htm).

Chart PF1.2.A Expenditure on education as % of GDP, by level of education and source of funds, 2013[a]

Expenditure on primary, secondary and post-secondary non-tertiary and on tertiary education by public or private source[b], as % of GDP



Educational Attainment of the World's Working-Age Population, 1980-2019



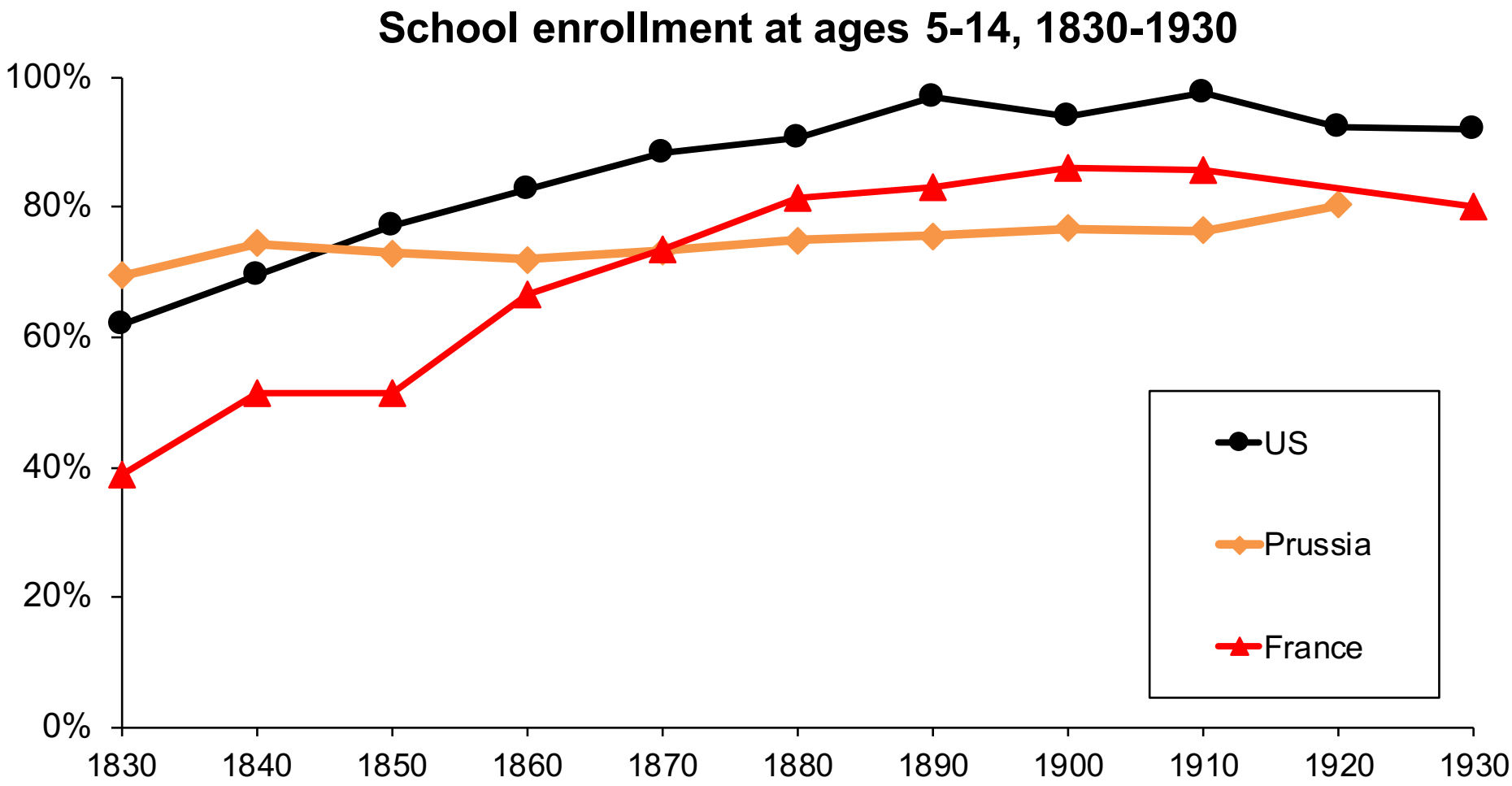
Why Should the Government Be Involved in Education?

Fundamental reason: education is long and costly (teachers+schools, US cost is $15K/year-kid) AND everybody needs it in modern economy

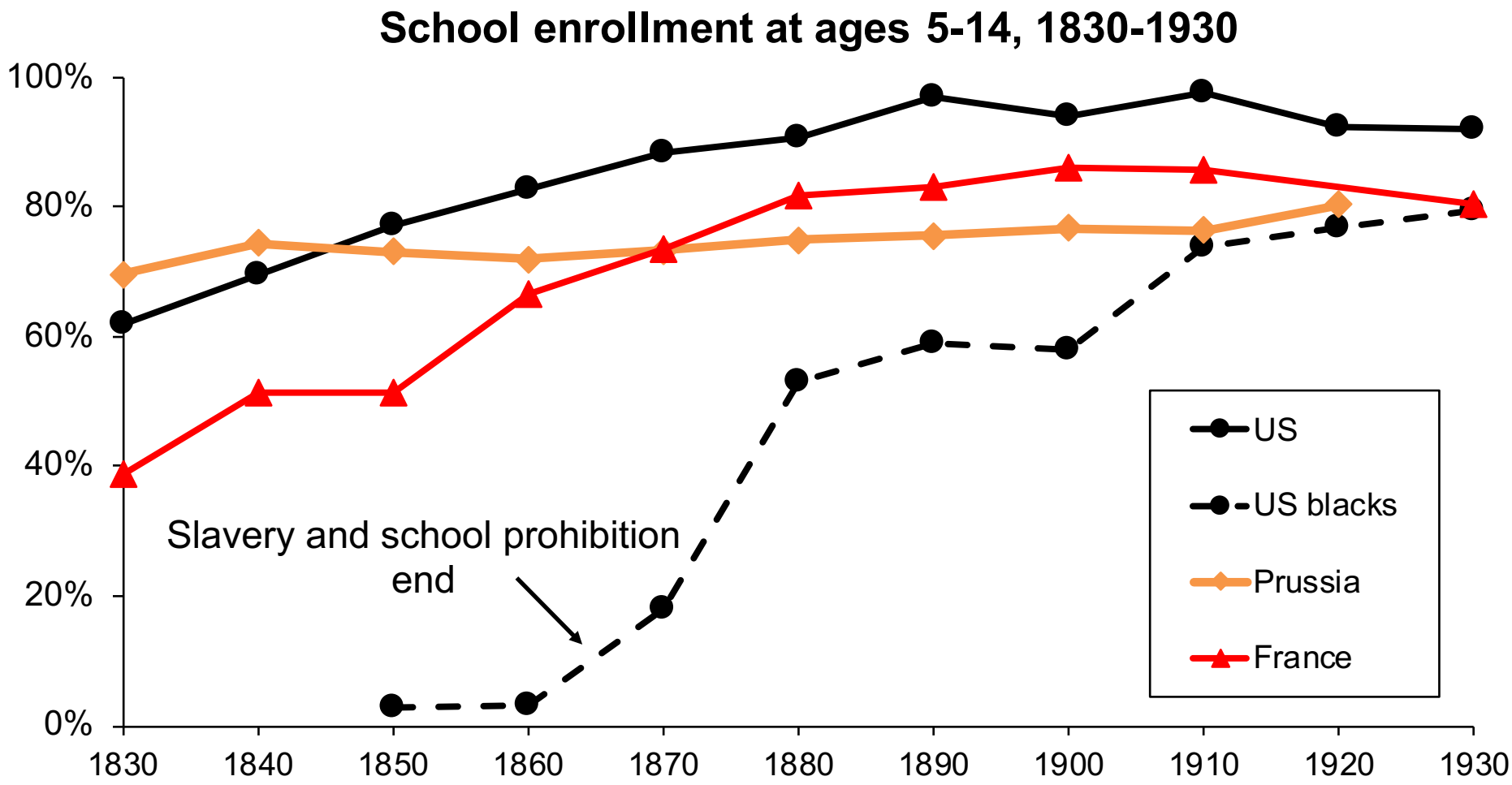
$\Rightarrow$ without govt provision, low income families would not be able to afford it for their kids (would hurt opportunity)

Governments created mass education in 19th-20th century [mandatory up to certain ages and hence publicly provided]

Played a big role in fostering economic development as modern economy requires an educated workforce



Fraction of children aged 5-14 enrolled in school (public or private).
Sources and series: Lindert (2004) Growing Public and Historical Statistics of the US



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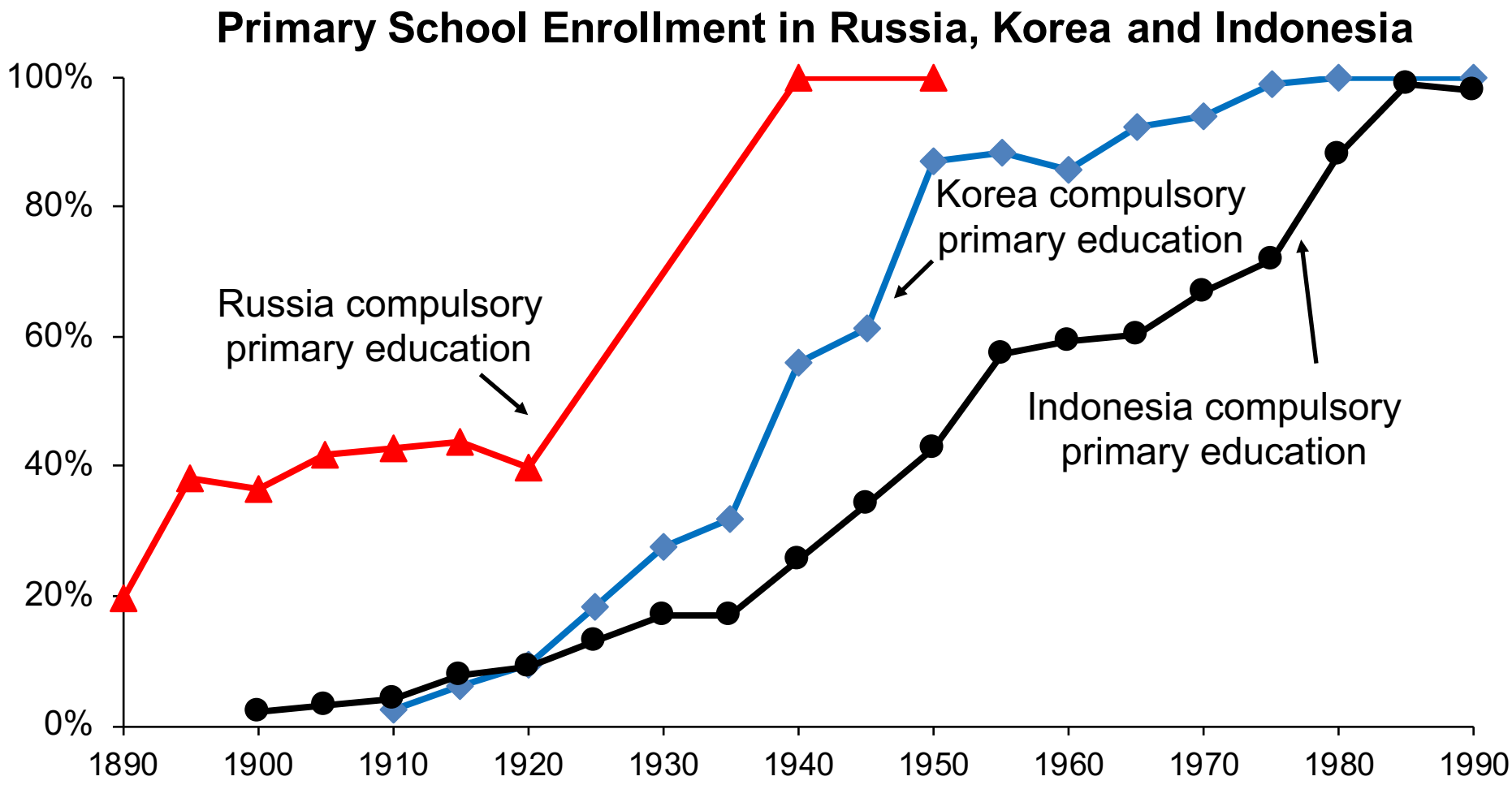


Fraction of children enrolled in primary school (public or private).
Source: Lee and Lee (2016).

Why Should the Government Be Involved in Education?

For economists, ex-ante not obvious because education does not look like a public good

1) Returns to education are largely private

2) Education is excludable

$\Rightarrow$ we should expect students to invest roughly the optimal amount in their own education and market forces to supply education services

Why Should the Government Be Involved in Education?

Traditional motives pointed out by economists:

1) Externalities (productivity spillovers, crime, citizenship)

2) Borrowing constraints (poor but talented students may not be able to borrow against future earnings to get an education)

3) (MOST IMPORTANT) Family and individual failures (to conform to standard econ model):

a) Some parents may not be able to take good care of their children (public education provides opportunity for all)

b) Young adults might not do what is in their long-run interest due to self-control problems or lack of information

3) implies that education decisions are best made at social level (through govt) rather than individual level

1) Externalities of education on crime and voting

$$Crime_i = \alpha + \beta Educ_i + \varepsilon_i$$

Observational regression comparing the educated vs. not-educated likely biased because propensity to crime ε_i is negatively correlated with $Educ_i$.

Lochner and Moretti (2004) use as instrument changes in state compulsory attendance laws: State T increases compulsory attendance from 9 to 10 years at time t, State C does not.

Can look at effect on education, and then look at effect on crime using Difference-in-difference

They show that an extra year of schooling reduces incarceration rates significantly (by about 10%)

Moretti, Mulligan, Oreopoulos (2003) find positive effects of education on likelihood of voting using same strategy

2) Borrowing Constraints: effects of loans

If there are no borrowing constraints (and individuals are rational), current resources should not matter for educational decisions: invest in education only if PDV benefits $>$ costs

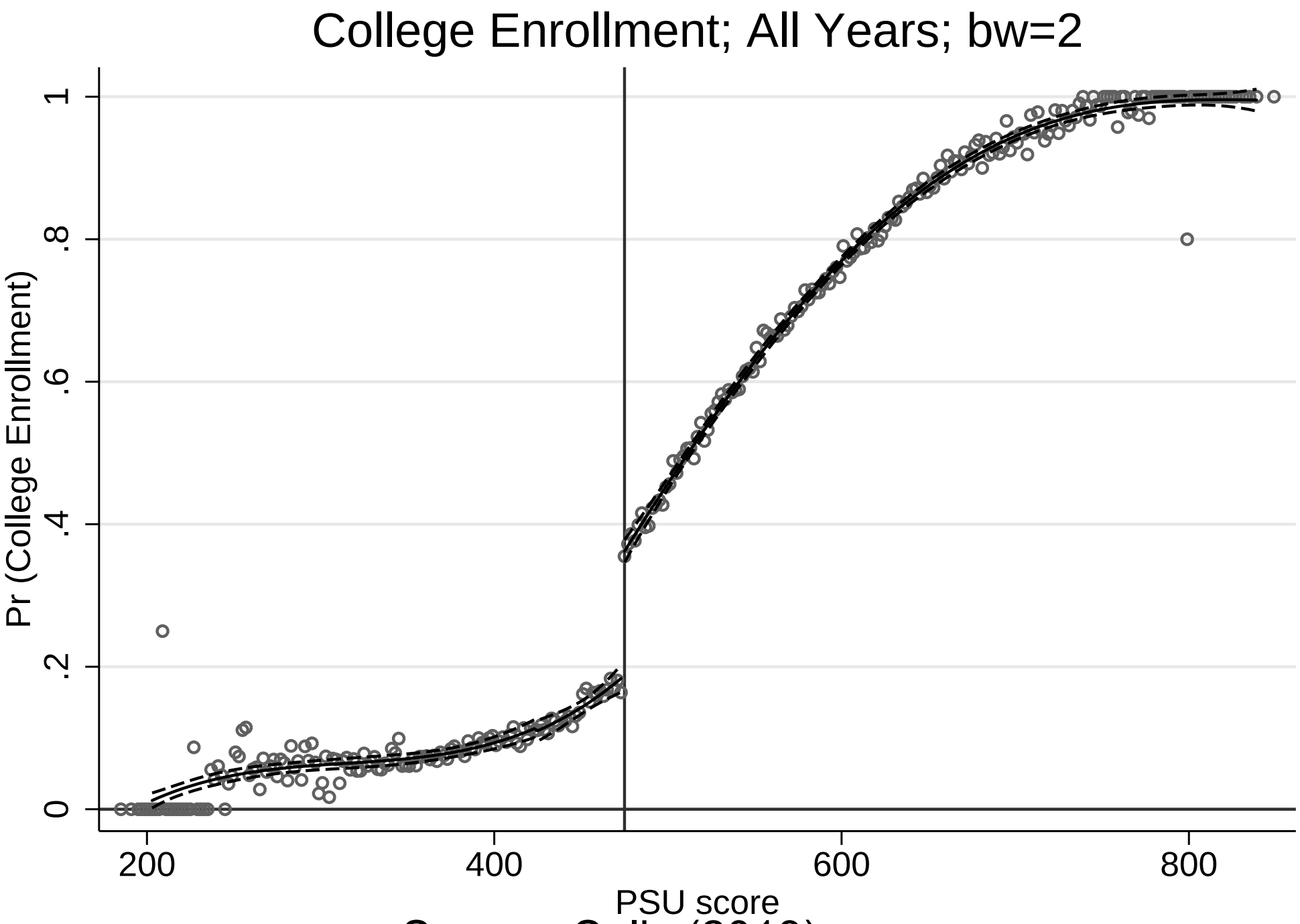
Empirical evidence shows that availability of loans do matter implying that borrowing constraints are an issue

Solis (2017) studies the effects of guaranteed loans on college attendance in Chile

Guaranteed loan is available if test score of student (equivalent of SAT for Chile) is above threshold equal to 475.

Regression discontinuity design: discontinuity in loan availability translates into discontinuity in college attendance

$\Rightarrow$ Very compelling evidence that loan availability matters



Source: Solis (2013)

3) Individual failures (college application tutoring)

Carrell-Sacerdote (2017) carry out a field experiment in New Hampshire high-schools

College students from Dartmouth help senior high-schoolers to apply to college (weekly meetings in Winter semester)

Randomization within high schools: select only 50% of seniors

Find large positive impact on women (+15 points likelihood of enrolling in college) but small effects on men

Also find a cash bonus for applying to colleges without tutorial does not have any impact $\Rightarrow$ Pure econ incentives not enough

$\Rightarrow$ Effects require time intensive tutorials (that parents/teachers typically should be providing)

Series of papers by Roland Fryer also show that paying K-12 kids to succeed does not work (kids don't know how to succeed without guidance)

Effects of Education on Earnings

Highly educated people earn more. Two explanations:

1) Education as Human Capital Accumulation

In that scenario, education raises earnings because it improves productivity of the educated person $\Rightarrow$ Education is economically valuable

2) Education as a Screening Device

In that scenario, education provides only a means of separating high-ability from low-ability individuals and does not actually improve skills $\Rightarrow$ education raises **individual** earnings but it does not improve productivity (rat-race)

Economists' findings: Most of the returns to education reflect primarily accumulation of human capital rather than screening. Simpler way to see this: broad increases in education by cohort translate into higher earnings by cohort

Causal Effect of Education on Earnings

Basic observational approach:

$$Earnings_i = \alpha + \beta \cdot Education_i + \varepsilon_i$$

Amounts to comparing the earnings of high vs. low ed people

Issue: ability to earn ε_i might be correlated with education

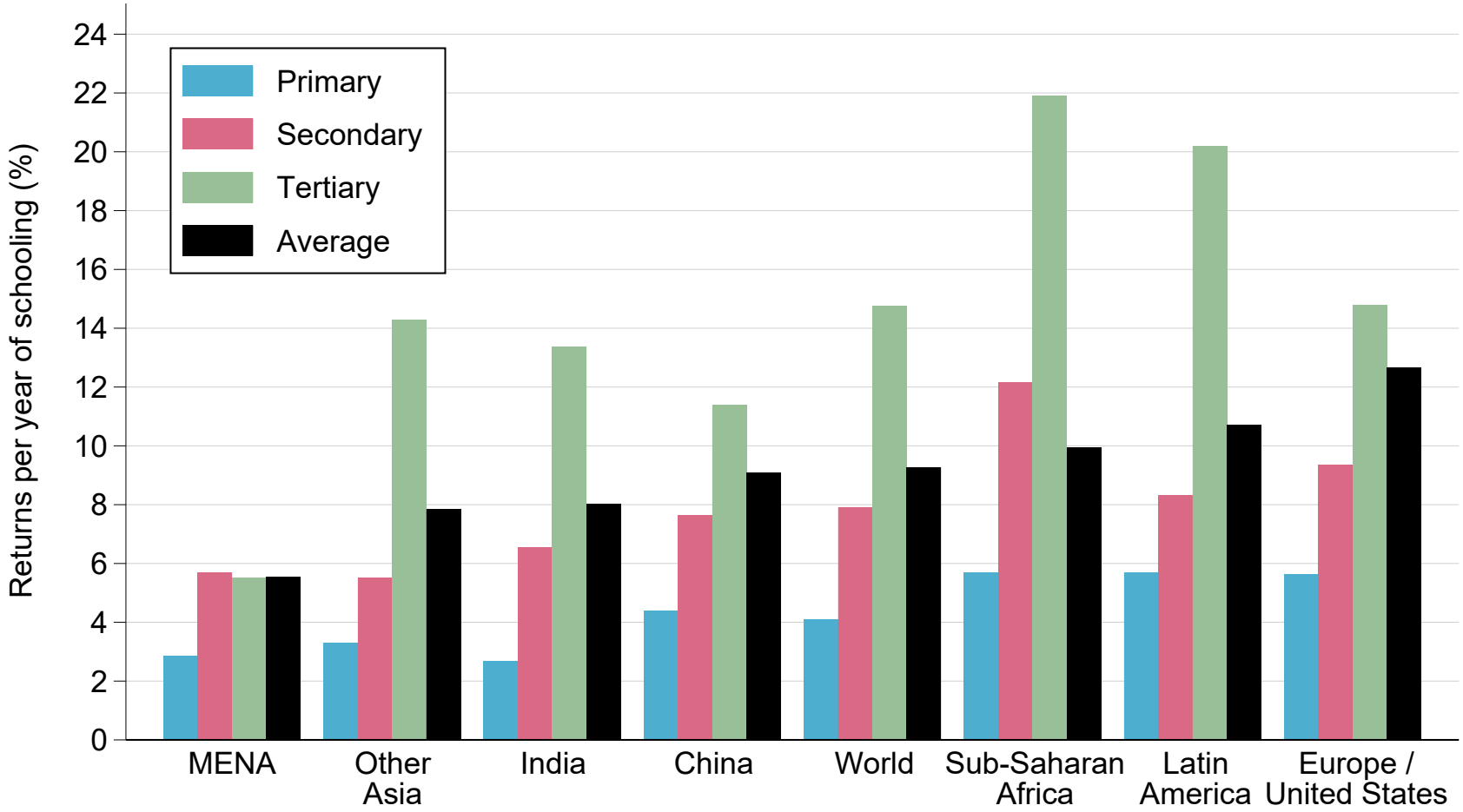
Two methods try to control for this bias in estimating the true human capital effects of education

1) Control for underlying ability by adding variables (e.g. SAT score) in the regression so that any remaining effect of education represents true productivity effects (omitted variable bias remains a concern)

2) Find exogenous variation in education (e.g., policy change induces more education for some group but not for another group, e.g. school construction in Indonesia 1970s, Duflo 2001)

Results: 1 additional year of education raises wages by 7-10%: college ed increases earnings by about 40% relative to high school

Figure 4 – Returns to Schooling by World Region



Notes. The figure plots returns to a year of schooling by education level and world region. Estimates correspond to the effect of an additional year of schooling on the log of personal income, estimated using modified Mincerian equations that control for an experience quartic, gender, and interactions between the experience quartic and gender. Primary: return to an additional year of primary education. Secondary: return to an additional year of secondary education. Tertiary: return to an additional year of tertiary education. Population-weighted averages of coefficients estimated in each country.

Source: Gethin 2024

Example: Causal Effect of Majoring in Economics

Descriptive: Economics majors BAs earn more ($90K) than non-econ BAs ($66K) at age 40. Is this causal?

Bleemer and Mehta (2022) use GPA threshold requirement (2.8 in Econ 1 and 2) to major in economics at UC Santa Cruz to estimate the causal effect of majoring in economics

Regression Discontinuity Design: compare students just below vs. just above 2.8 threshold

1) Crossing the threshold increases Econ major likelihood by 36 points

2) Crossing the threshold increases wage earnings 5 years after graduation from $47K to $55K

$\Rightarrow$ Causal effect of majoring in economics is ($55K-$47K)/.36=$22K which is an almost 50% earnings premium

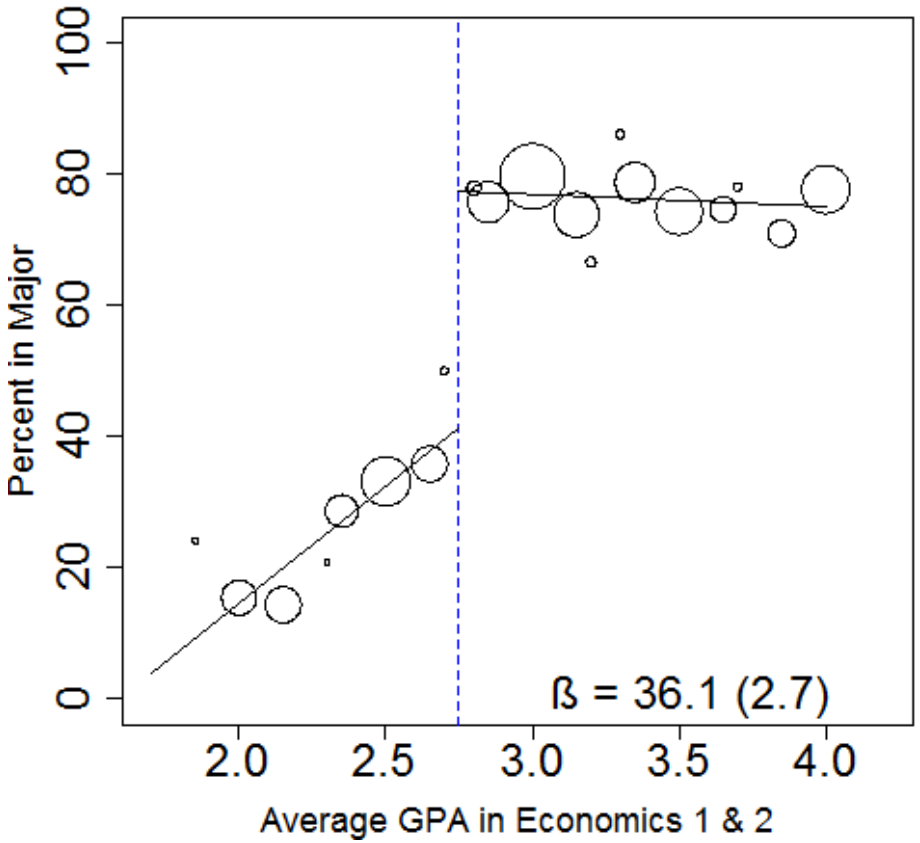


FIGURE 1. THE EFFECT OF THE UCSC ECONOMICS GPA THRESHOLD ON MAJORING IN ECONOMICS

Note: Each circle represents the percent of economics majors (y axis) among 2008-2012 UCSC students who earned a given $EGPA$ in Economics 1 and 2 (x axis). The size of each circle corresponds to the proportion of students who earned that $EGPA$. $EGPA$s below 1.8 are omitted, leaving 2,839 students in the sample. Fit lines and beta estimate (at the 2.8 GPA threshold) from linear regression discontinuity specification; standard error (clustered by $EGPA$) in parentheses. Source: The UC-CHP Student Database.

Source: Bleemer and Metha AEJ:Applied 2021

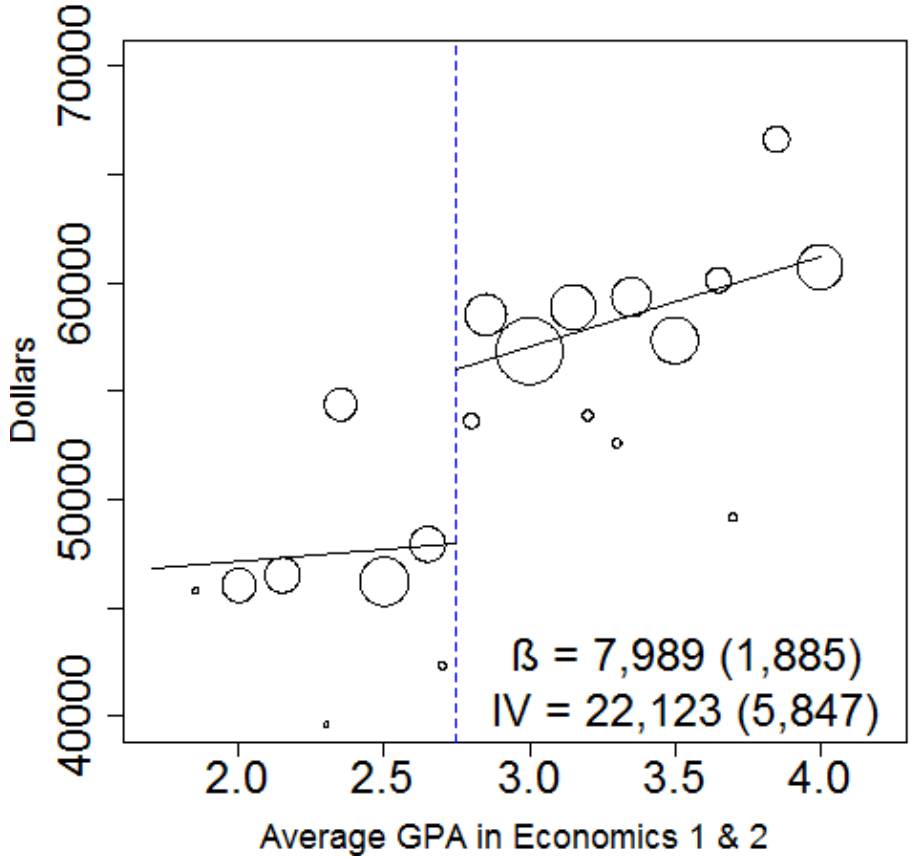


FIGURE 2. THE EFFECT OF THE UCSC ECONOMICS GPA THRESHOLD ON ANNUAL WAGES

Note: Each circle represents the mean 2017-2018 wages (y axis) among 2008-2012 UCSC students who earned a given $EGPA$ in Economics 1 and 2 (x axis). The size of each circle corresponds to the proportion of students who earned that $EGPA$. 2017-2018 wages are the mean EDD-covered California wages in those years, omitting zeroes. Wages are CPI-adjusted to 2018 and winsorized at 2% above and below. $EGPA$s below 1.8 are omitted, leaving 2,446 students with observed wages. Fit lines and beta estimate (at the 2.8 GPA threshold) from linear regression discontinuity specification and instrumental variable specification (with majoring in economics as the endogenous variable); standard errors (clustered by $EGPA$) in parentheses. Sources: The UC-CHP Student Database and the CA Employment Development Department.

THE IMPACT OF SCHOOL QUALITY

A number of approaches have been taken to estimate the impact of school quality on student test scores.

Two approaches have been used to address this issue: experimental data, and quasi-experimental using policy changes

Findings suggest that the outcomes of efforts to improve school quality can be very dependent on the approach taken to improvements

Estimating the Effects of Class Size

Experimental example: The state of Tennessee implemented Project STAR in 1985, randomly assigning 11,000 students (grades K–3) to small classes (13–17 students) or regular classes (22–25 students)

Krueger and Whitmore 2001 shows positive effects of small class size on test scores

Chetty et al. 2011 linked students to college enrollment and adult earnings data: finds small positive effects on college enrollments and adult earnings.

Note: kids and teachers also randomly assigned across classes: strong class effects are visible (due to teachers or peers) and they have long-term effects on college and earnings

Estimating the Effects of Charter Schools

Charter schools not subject to all state regulations for schools (flexibility to recruit teachers / adjust hours / curriculum)

Oversubscribed charter schools use lottery for admissions

Creates randomized experiment to estimate the causal effect of charter schools by comparing lottery winners vs. losers

Angrist, Pathak, Walters AEJ'13 carry out a comprehensive analysis of charter schools effects in Massachusetts

Find that urban charter schools boost achievement well beyond that of urban public school students, while non-urban charters reduce achievement from a higher baseline

$\Rightarrow$ Charter schools can have a positive or negative impact depending on what they do

Most effective approach to education: focus on instruction time, pupil comportment, selective teacher hiring, and focus on traditional math and reading skills.

Preschool

Most advanced countries have universal govt provided preschool (before age 5).

US is notable exception (with variation across states). Biden had proposed developing universal preschool but did not pass

Private market for preschool: affordable only for the top 10% richest, otherwise informal family/friends networks, or mothers' have to reduce labor supply

$\Rightarrow$ Technology less efficient than guaranteed govt preschools

Gray-Lobe, Pathak, Walters '21 use admissions lotteries to estimate the effects of large-scale public preschool in Boston

$\Rightarrow$ strong positive effects on high-school graduation and college attendance (5 points) and reductions in incarceration

Role of Government in supply of Higher Education

Private non-profit universities have inelastic supply (e.g., fixed student bodies at top schools such as Harvard)

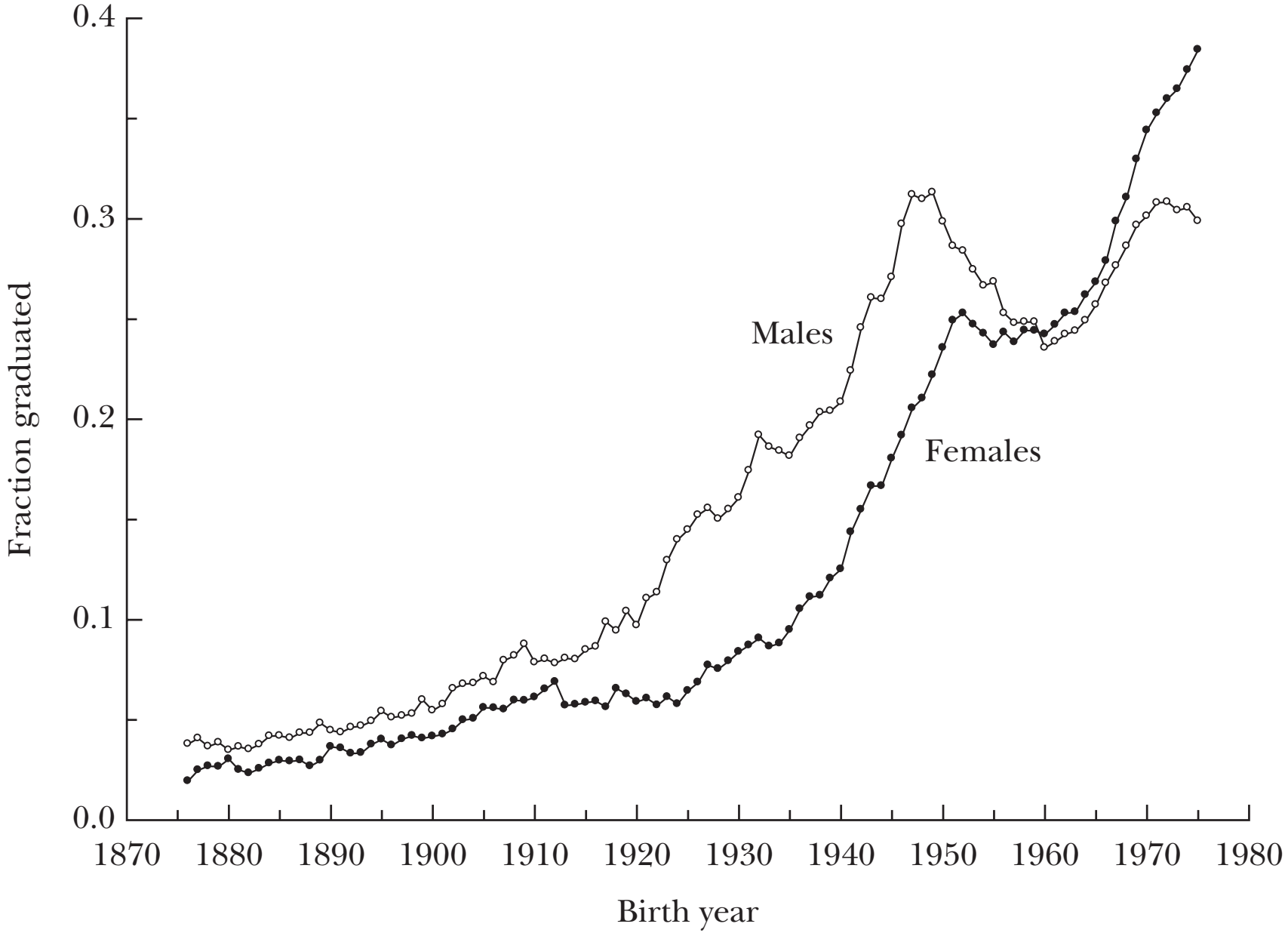
Historically, expansion of supply was carried out by public institutions (state universities and community colleges): Example: 1960 Master plan for California with 3-tier system (Community Colleges, State Universities, University of California campuses)

Government push also central to increase attendance: GI Bill after WWII/Korea War increased college attendance by 15-20 points for men born 1921-1933 (Stanley QJE'03)

3/4 of US higher-ed students are in public institutions

Figure 1

College Graduation Rates (by 35 years) for Men and Women: Cohorts Born from 1876 to 1975



Sources: 1940 to 2000 Census of Population Integrated Public Use Micro-data Samples (IPUMS).

Retrenchment of govt funding in higher education

In recent decades, US states have reduced their spending and tuition at public institutions has increased enormously

$\Rightarrow$ Student loans have exploded, saddling young people with debt that often cannot be repaid

$\Rightarrow$ For-profit schools have mushroomed (get about 10% of total enrollment today)

For-profit schools provide little benefits, charge a lot, advertise aggressively, are savvy at exploiting Fed Pell Grants and saddle students with debt (Deming-Goldin-Katz '12)

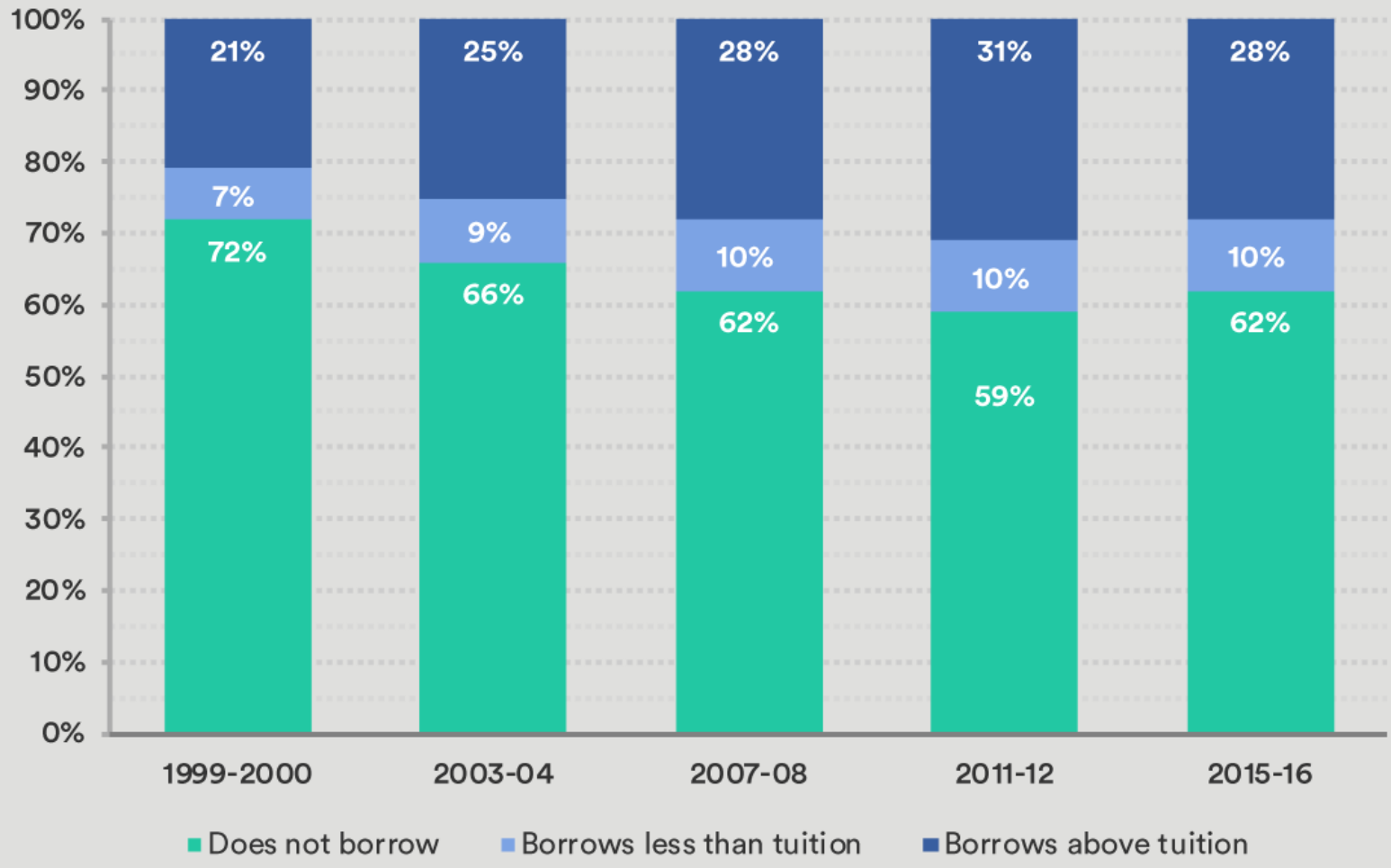
Worse when for-profits are taken over by private equity (Eaton-Howell, Yannelis 20. Eaton 22).

$\Rightarrow$ Symptom of market failure due to individual failures/lack of information exploited by for-profit schools

Figure 2a | Trends in Borrowing and Costs Over Time

Source: Dancy and Barrett (2018)

Share Borrowing



Source: New America analysis of data from the National Postsecondary Student Aid Study, 1999-2000 through 2015-16.

Role of Higher Education in Intergenerational Mobilily

Chetty et al. '20 compile college level statistics on parental income and student earnings outcomes. Data online at (web).

1) Access: Huge variation in access across schools: Ivy league has more kids from top 1% families than from bottom 50% Giving poor kids an SAT point boost in admissions (as done for legacy students) could close gap and increase intergenerational mobility

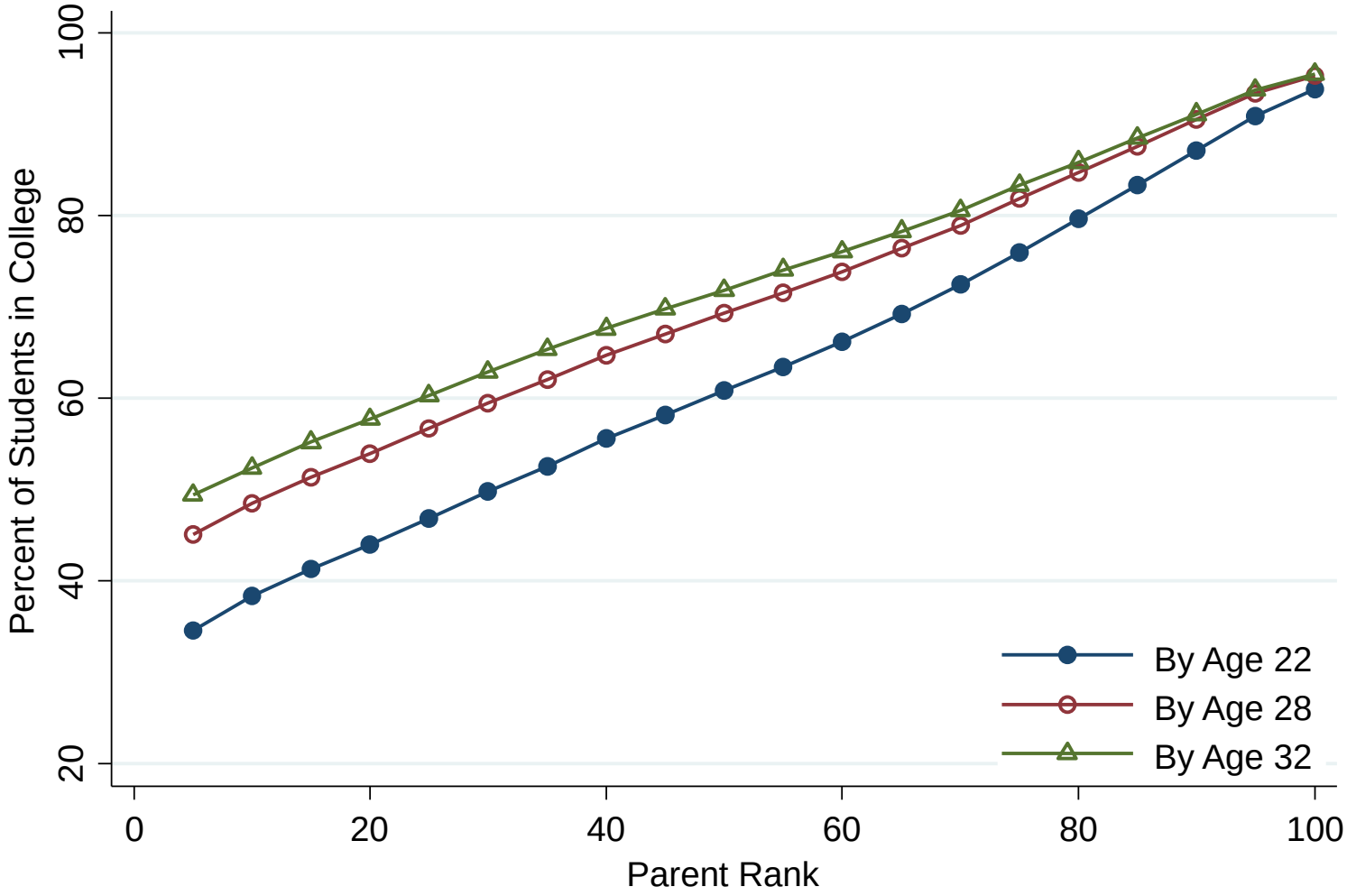
2) Trends: fraction poor kids stagnated in top schools (in spite of more financial aid) and dropped at best public schools and community colleges

3) Outcomes: Within good colleges, outcomes of poor vs. rich kids are similar $\Rightarrow$ college is the ticket to opportunity

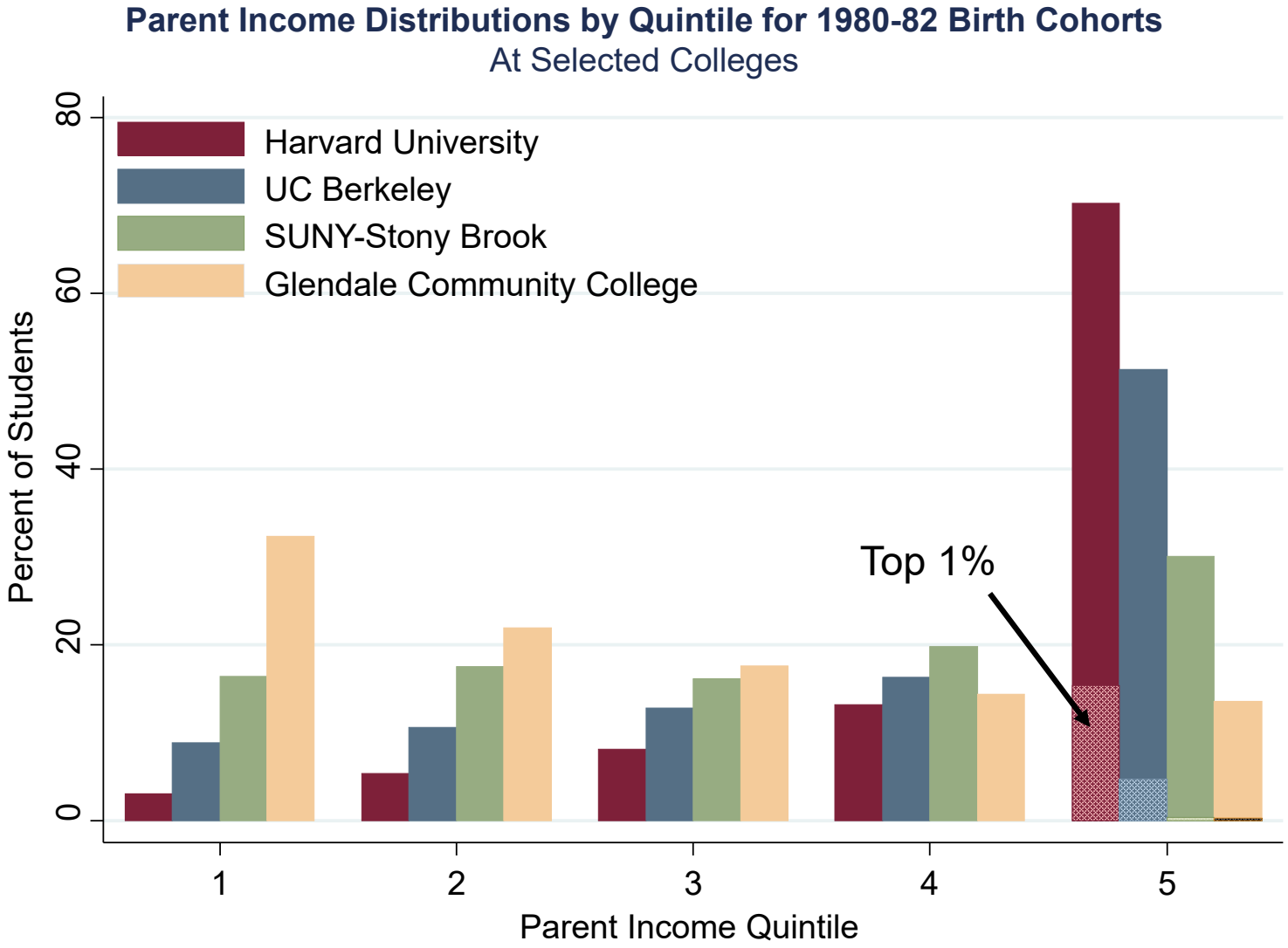
4) Mobility rates: Large discrepancies across colleges in fraction of students who come from bottom 20% and reach top 20% (=mobility rate)

ONLINE APPENDIX FIGURE I

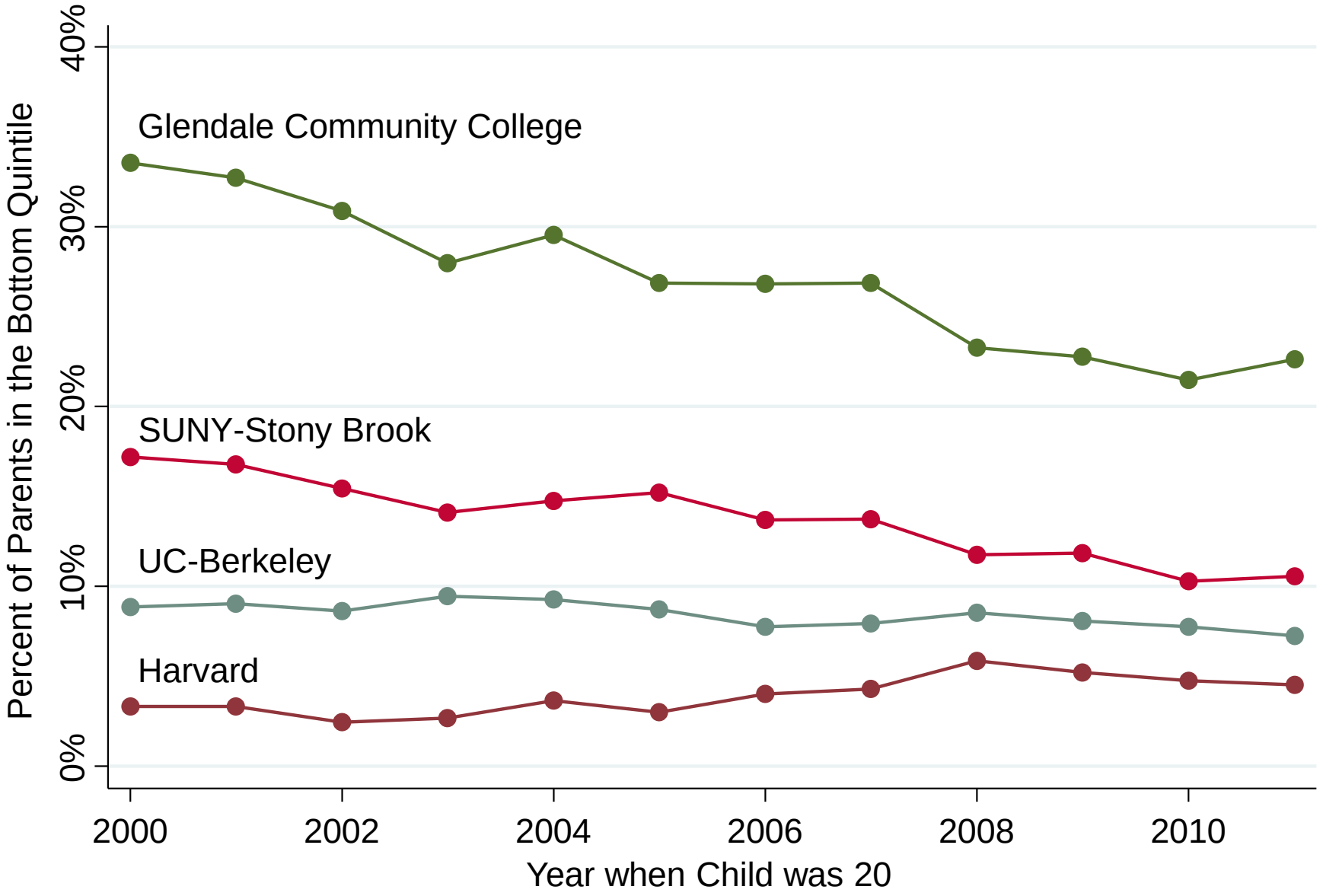
College Attendance Rates by Parent Income and Age



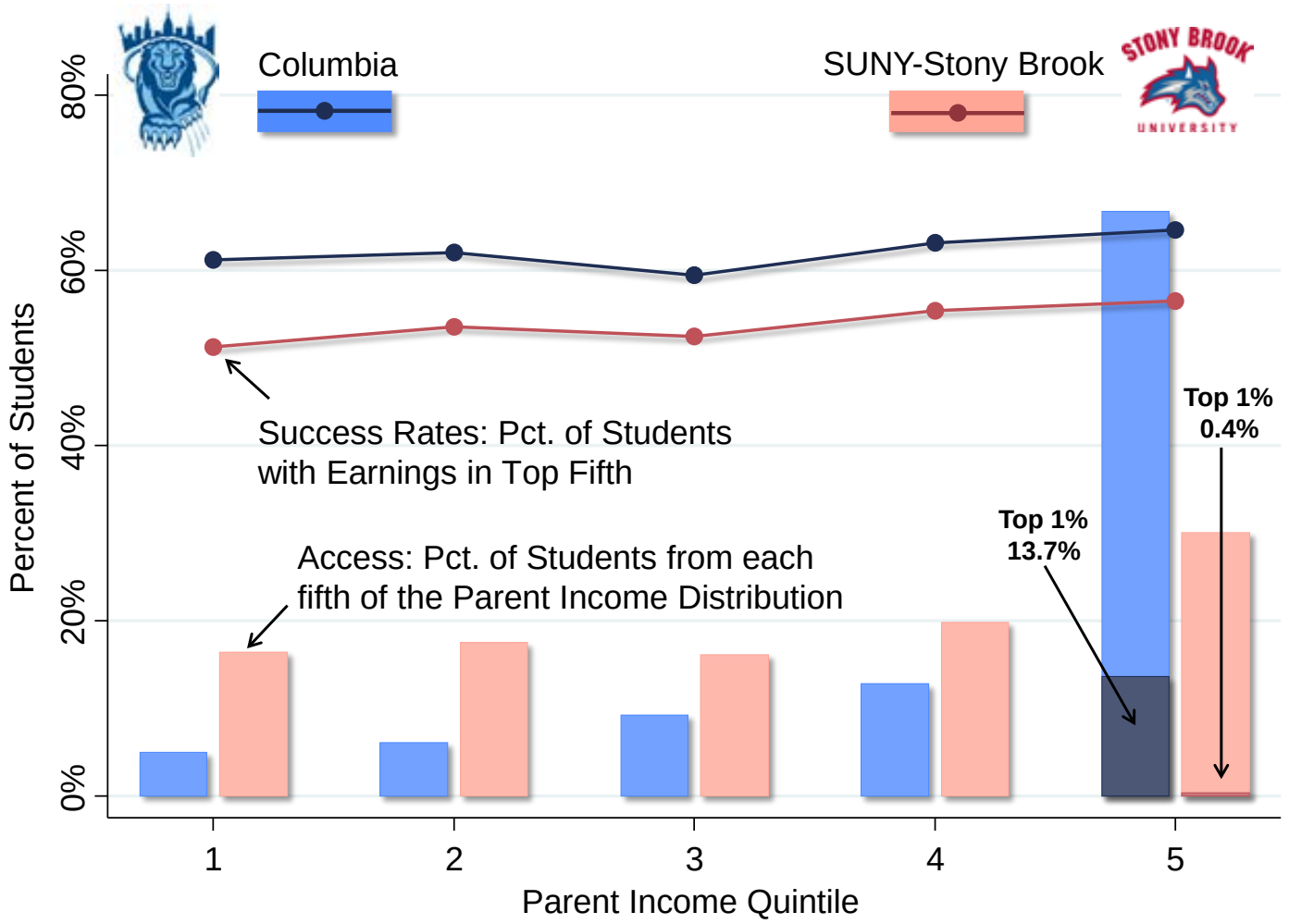
Notes: This figure plots the fraction of children in the 1980-82 birth cohorts in our analysis sample who attend college at any time during or before the year in which they turn ages 22, 28, and 32, by parent income ventile. This figure is constructed directly from the individual-level microdata.


Parent Income Distributions by Quintile for 1980-82 Birth Cohorts
At Selected Colleges
Harvard University
UC Berkeley
SUNY-Stony Brook
Glendale Community College
Top 1%
Percent of Students
0
20
40
60
80
1
2
3
4
5
Parent Income Quintile

Trends in Low-Income Access from 2000-2011 at Selected Colleges



Mobility Report Cards for Columbia and SUNY-Stony Brook



Note: Bars show estimates of the fraction of parents in each quintile of the income distribution. Lines show estimates of the fraction of students from each of those quintiles who reach the top quintile as adults.

Top 10 Colleges by Mobility Rate (from Bottom to Top Quintile)

Rank	Name	Mobility Rate	=	Access	x	Success Rate
1	Cal State University – LA	9.9%		33.1%		29.9%
2	Pace University – New York	8.4%		15.2%		55.6%
3	SUNY – Stony Brook	8.4%		16.4%		51.2%
4	Technical Career Institutes	8.0%		40.3%		19.8%
5	University of Texas – Pan American	7.6%		38.7%		19.8%
6	City Univ. of New York System	7.2%		28.7%		25.2%
7	Glendale Community College	7.1%		32.4%		21.9%
8	South Texas College	6.9%		52.4%		13.2%
9	Cal State Polytechnic – Pomona	6.8%		14.9%		45.8%
10	University of Texas – El Paso	6.8%		28.0%		24.4%

Note: Table lists highest-mobility-rate colleges with more than 300 students per cohort.

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