# Income Segregation and Intergenerational Mobility Across Colleges in the United States

Raj Chetty, Harvard University
John N. Friedman, Brown University
Emmanuel Saez, UC-Berkeley
Nicholas Turner, Federal Reserve Board
Danny Yagan, UC-Berkeley

February 2020

*The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and do not necessarily represent the views of the U.S. Department of Treasury, the Federal Reserve Board of Governors, or the College Board.*

# Introduction

- What role do colleges play in intergenerational income mobility?
  - Large returns to college attendance suggest that higher education can be an important pathway to upward mobility
  - But inequality in access between high- and low-income families may limit (or even reverse) this effect

# This Paper

- We analyze how changes in the colleges that students attend would affect rates of intergenerational mobility in the U.S. by estimating three sets of parameters:

  1. [Segregation] Parental income distributions by college
  2. [Outcomes] Students' earnings outcomes conditional on parental income by college
  3. [Causal share] Portion of variation in students' earnings outcomes that is due to colleges' causal effects ("value-added")

- Construct publicly available statistics on the first two elements using data on all college students from 1999-2013 (previously released as "Mobility Report Cards" in 2017)

- Combine those statistics with data on SAT and ACT scores and estimates of colleges' causal effects based on Dale-Krueger (2002) method

# Three Main Findings

1. Colleges are highly segregated by parent income, both across and within tiers

   - Students from the top 1% of family income are 77 times more likely to attend an Ivy-plus institution than those from the poorest quintile of families

   - Colleges are as segregated as neighborhoods in the average American city by parental income

# Three Main Findings

2. Gaps in earnings between children from rich and poor families who attend the same college are relatively small

   - Much of the gap in earnings between children from low vs. high income families is accounted for by variation between colleges
   - Most colleges with high levels of student earnings have few students from low-income families
   - Certain “high mobility” colleges, such as the City University of New York, have both a high share of low-income students and excellent outcomes

# Three Main Findings

3. Changing allocations of students across colleges could increase intergenerational mobility in the U.S. substantially

   - Currently, rich students are much more likely to attend highly selective colleges than students from low-income families even holding fixed SAT/ACT scores
   - Parental income segregation would thus fall substantially if rich and poor students attended similar colleges conditional on test scores
   - At elite private (Ivy-plus) colleges, middle-class children are under-represented relative to their test scores, but children from the bottom quintile are *not*
   - Giving low-income students a preference similar to that given to legacy students would equate parental income distributions across all colleges
   - Income-neutral allocations would reduce the intergenerational persistence of income by 15%; need-affirmative allocations would reduce it by 25%

# Outline

1. Segregation: Parents' Marginal Income Distributions by College

2. Outcomes: Distributions of Students' Earnings by College

3. Intergenerational Mobility: Counterfactual Student Allocations

# Data

- Data source: de-identified data from 1996-2014 income tax returns
  - Includes data on income of non-filers through information returns filed by employers (W-2 forms)
- Primary sample: all children in 1980-82 birth cohorts claimed as dependents by tax filers in the U.S.
  - Earliest cohorts where we can link almost all children to parents
  - Approximately 11 million children

# Measuring College Attendance

- All Title IV institutions report student attendance to IRS on Form 1098-T
  - 1098-T data cover 95% of enrolled students; students who pay no tuition sometimes not covered
  - Use Dept. of Ed data (NSLDS) on students receiving Pell grants to identify these students
- Baseline: define college attendance as most-attended college between ages 19-22
  - Similar results obtained with alternative definitions (e.g., college attended at age 20)
- Following established disclosure standards, all college-specific numbers are estimates (approx. +/- 1% measurement error)

# Measuring Test Scores

- Link data on SAT scores from the College Board and ACT scores to tax data to measure test scores at point of college application
    - Map ACT scores to SAT scores using a standard concordance table

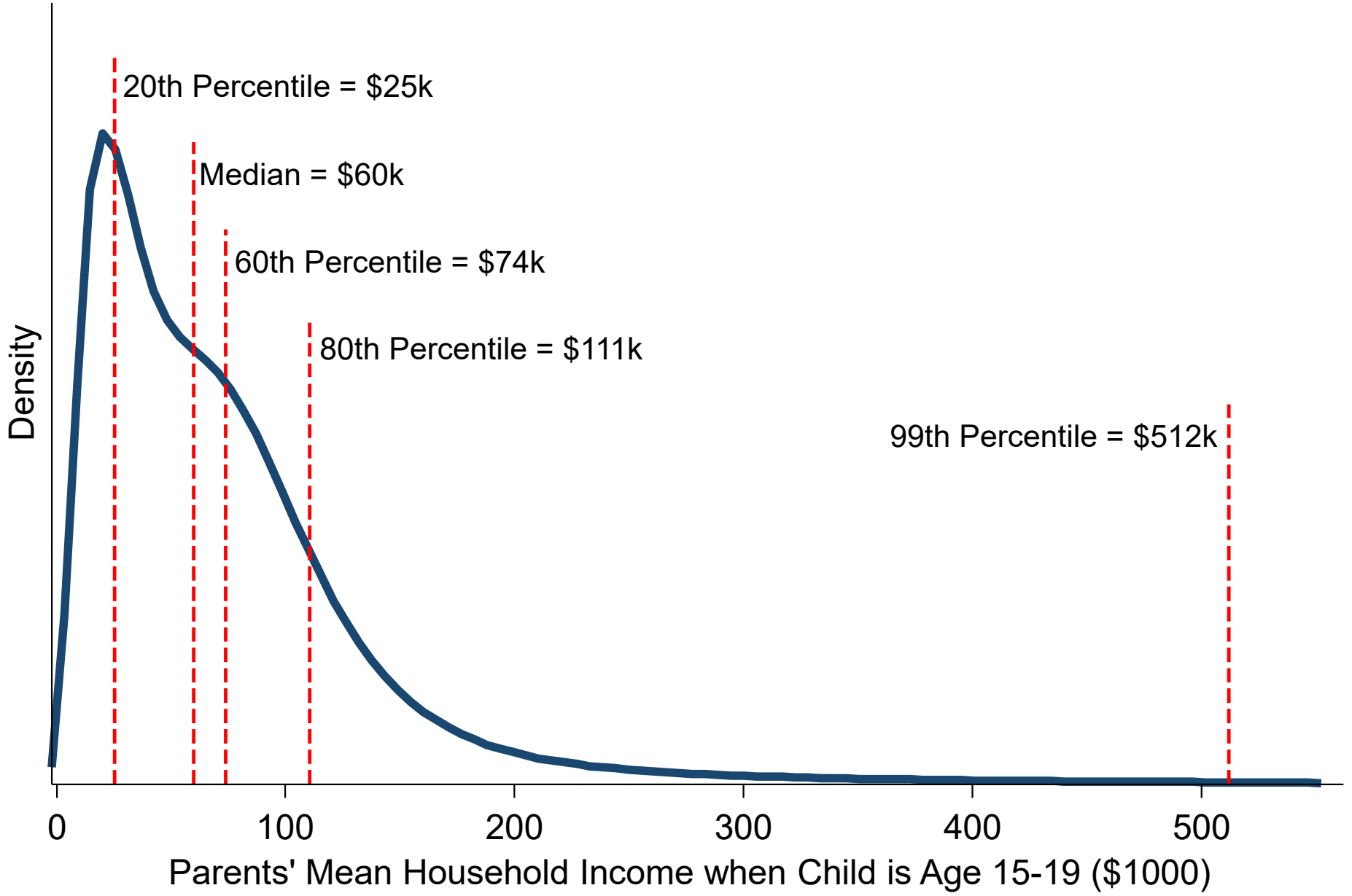
# Part 1
# Segregation: Parents' Income Distributions by College

# Measuring Parent Income

- Parent income: mean pre-tax **household** income during five year-period when child is aged 15-19
  - For filers, use Adjusted Gross Income reported on form 1040
  - For non-filers, use W-2 wage earnings + UI income
  - All incomes measured in 2015 dollars
- Focus on percentile ranks, ranking parents relative to other parents with children in same birth cohort

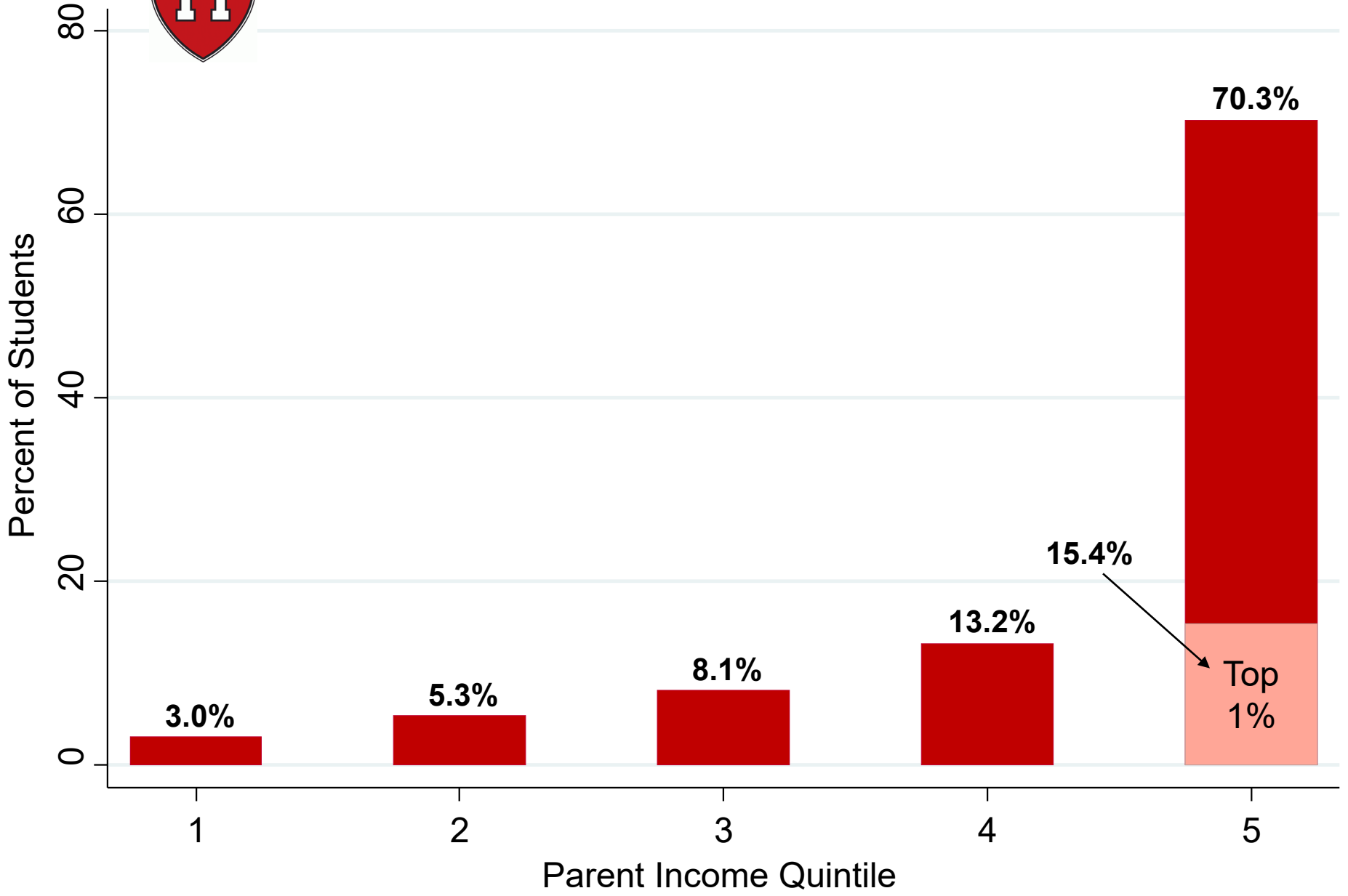
**Parent Household Income Distribution**

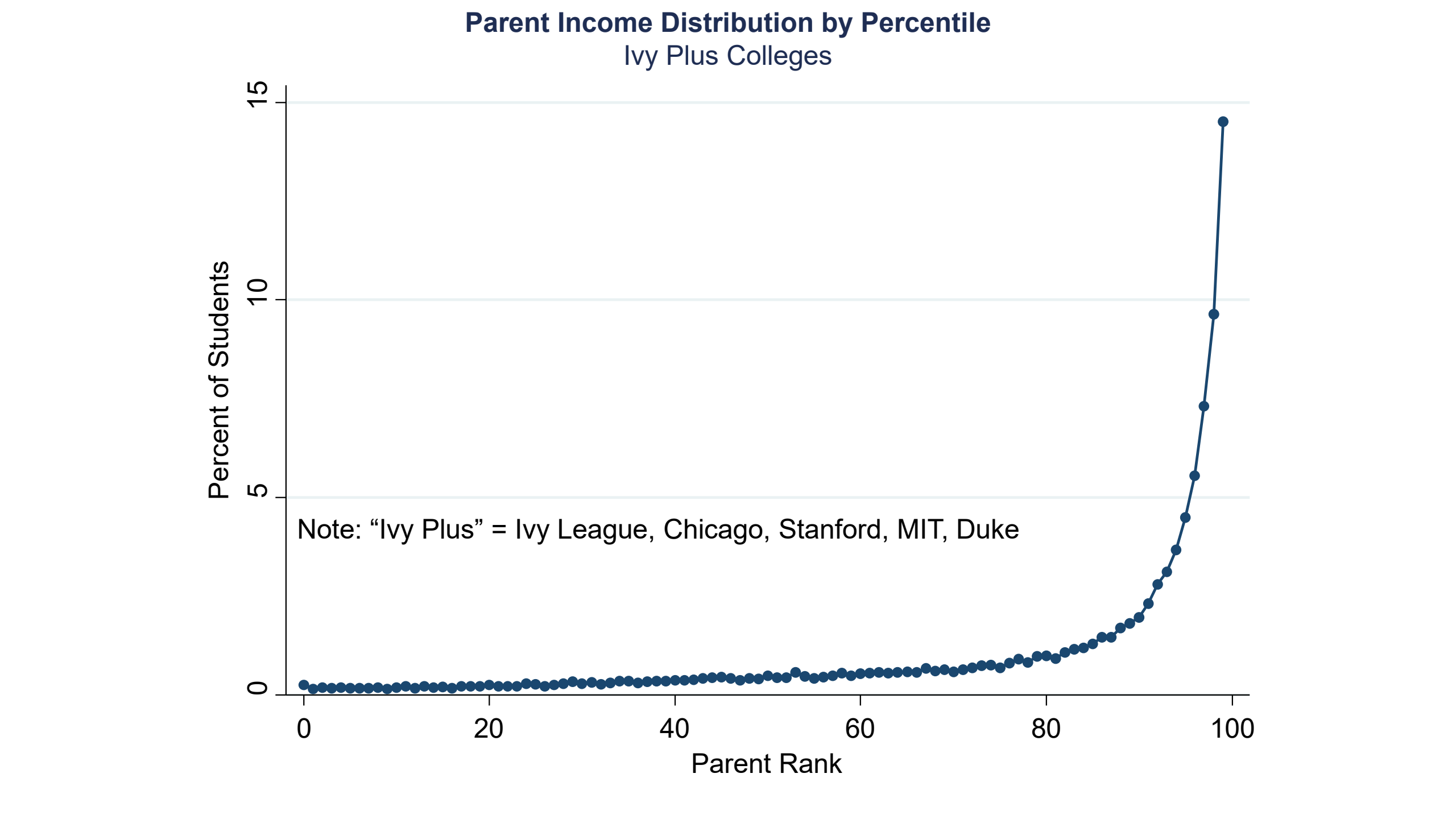
For Parents with Children in 1980 Birth Cohort

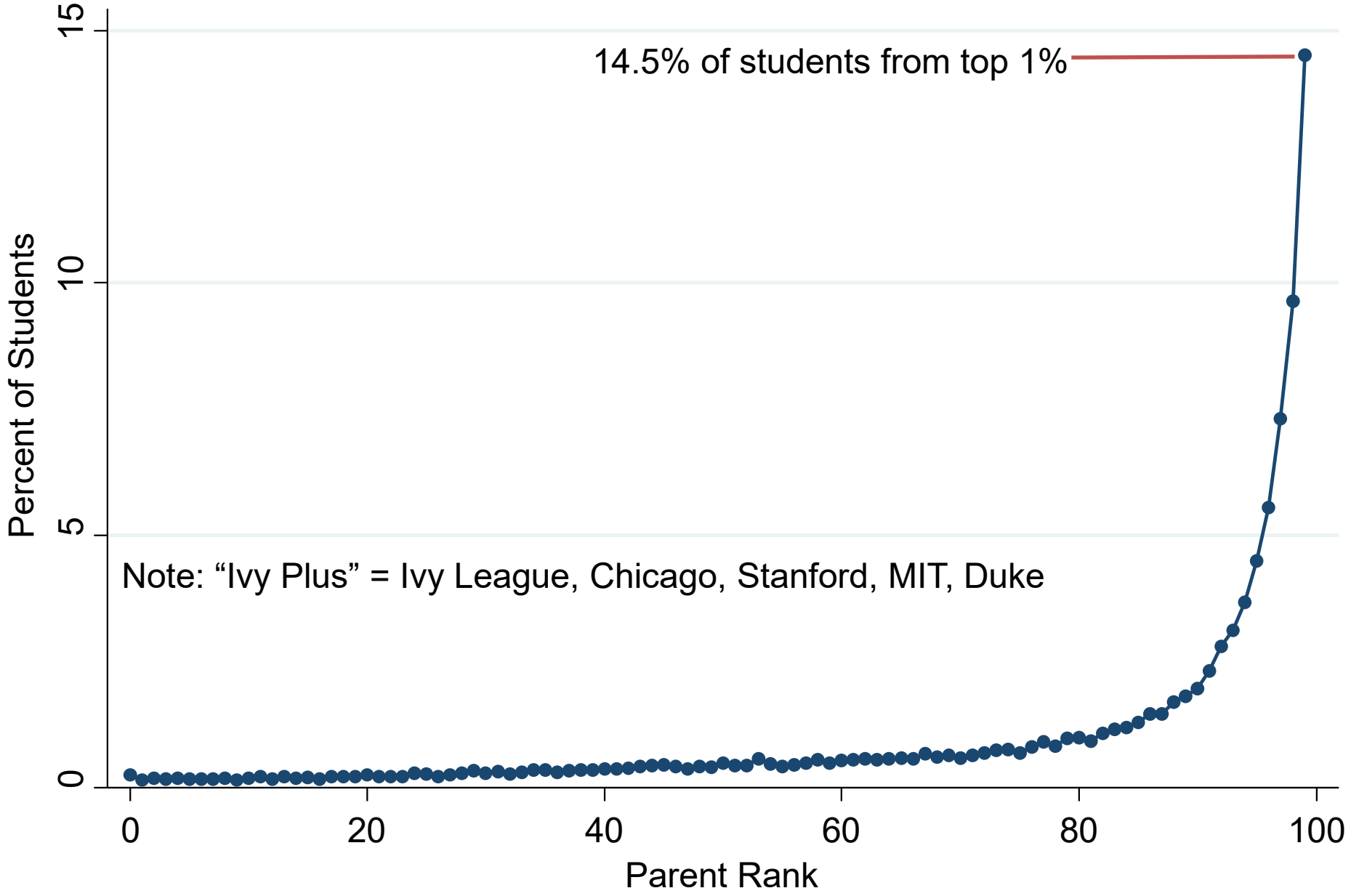


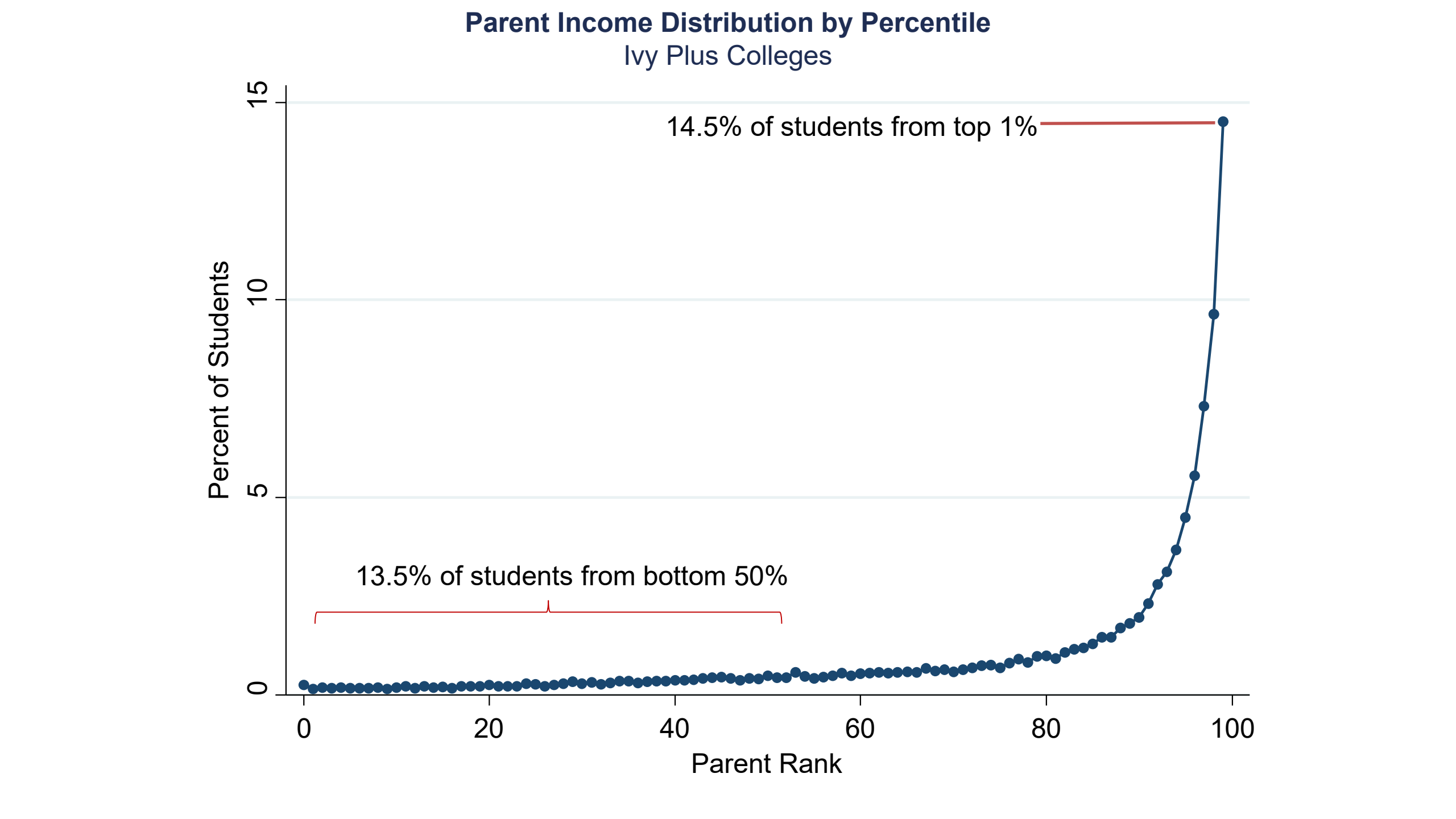
# Parent Income Distribution at Harvard

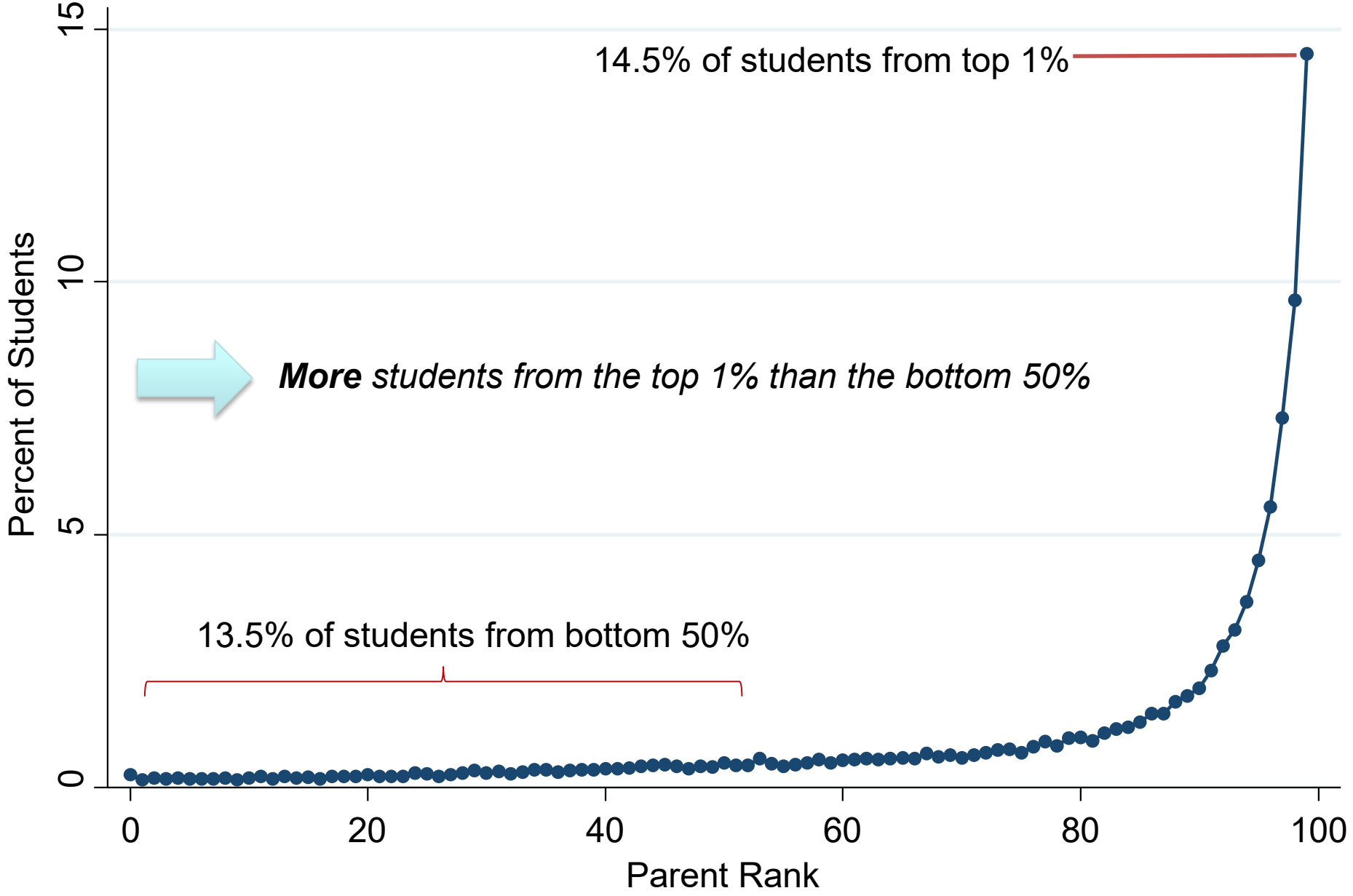
1980-82 Child Birth Cohorts

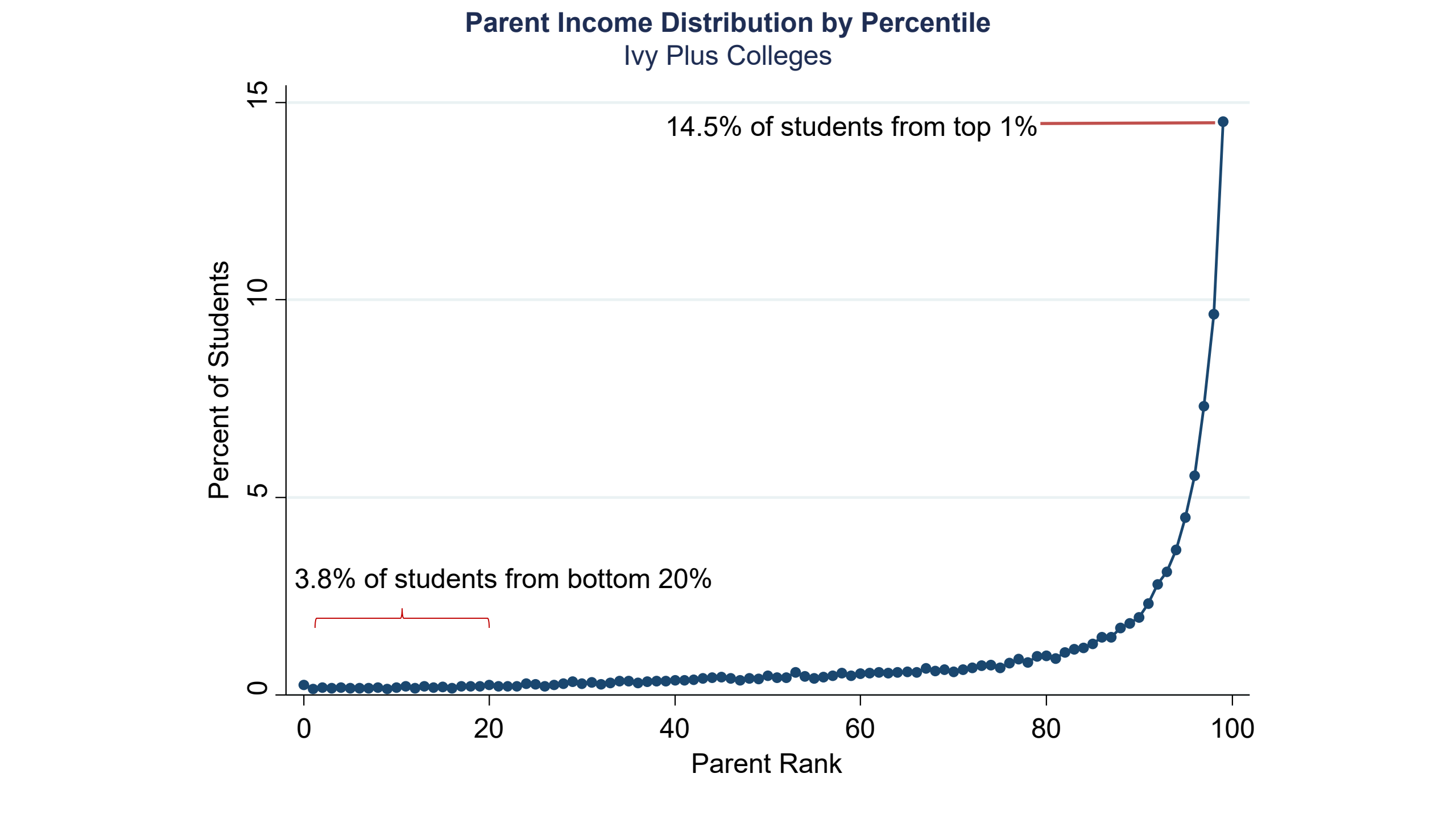


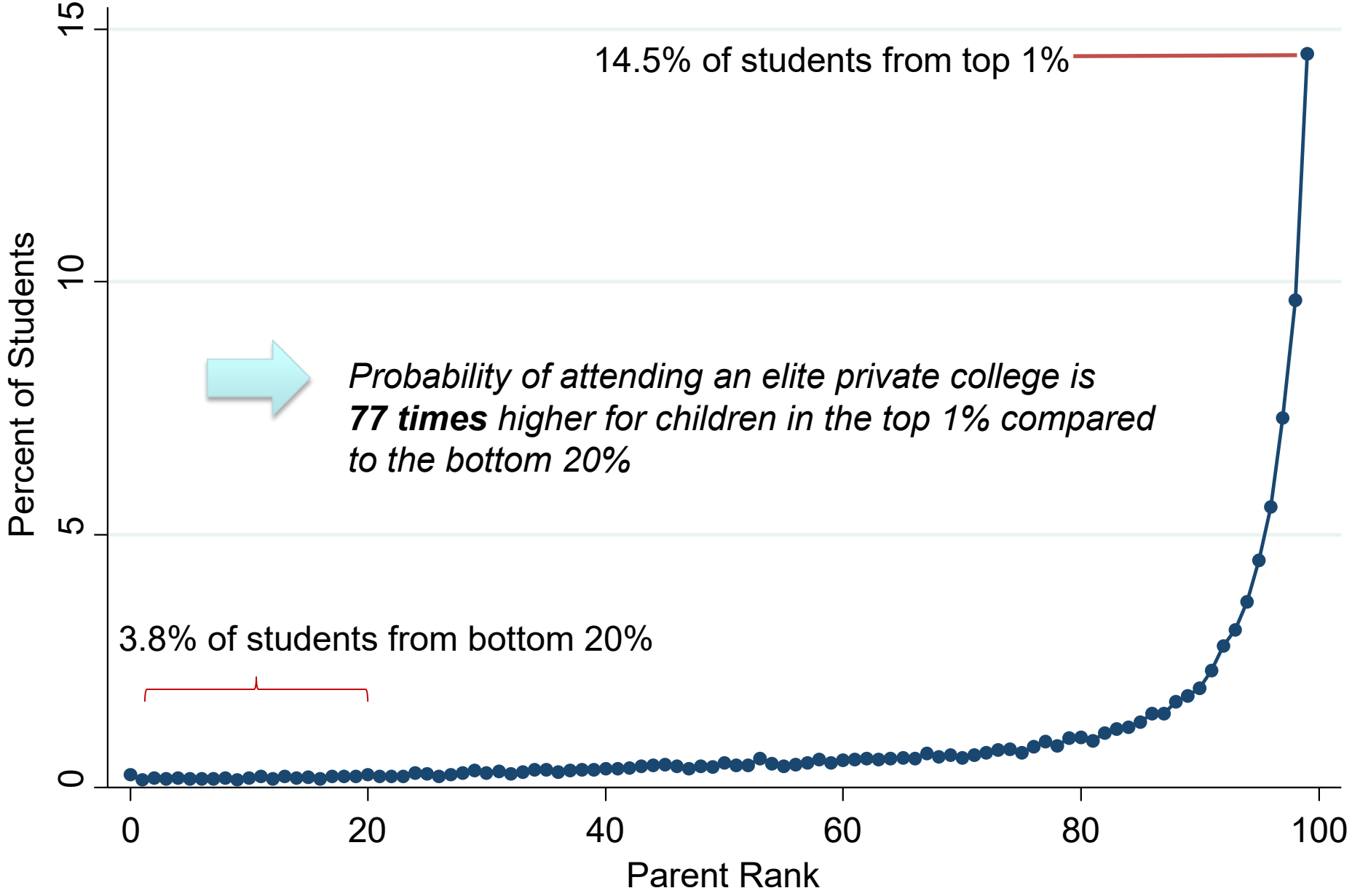

Parent Income Distribution by Percentile
Ivy Plus Colleges
Percent of Students
0
5
10
15
Note: “Ivy Plus” = Ivy League, Chicago, Stanford, MIT, Duke
0
20
40
60
80
100
Parent Rank


Parent Income Distribution by Percentile
Ivy Plus Colleges
14.5% of students from top 1%
Note: “Ivy Plus” = Ivy League, Chicago, Stanford, MIT, Duke
Percent of Students
0
5
10
15
0
20
40
60
80
100
Parent Rank


Parent Income Distribution by Percentile
Ivy Plus Colleges
14.5% of students from top 1%
13.5% of students from bottom 50%
Percent of Students
0
5
10
15
0
20
40
60
80
100
Parent Rank

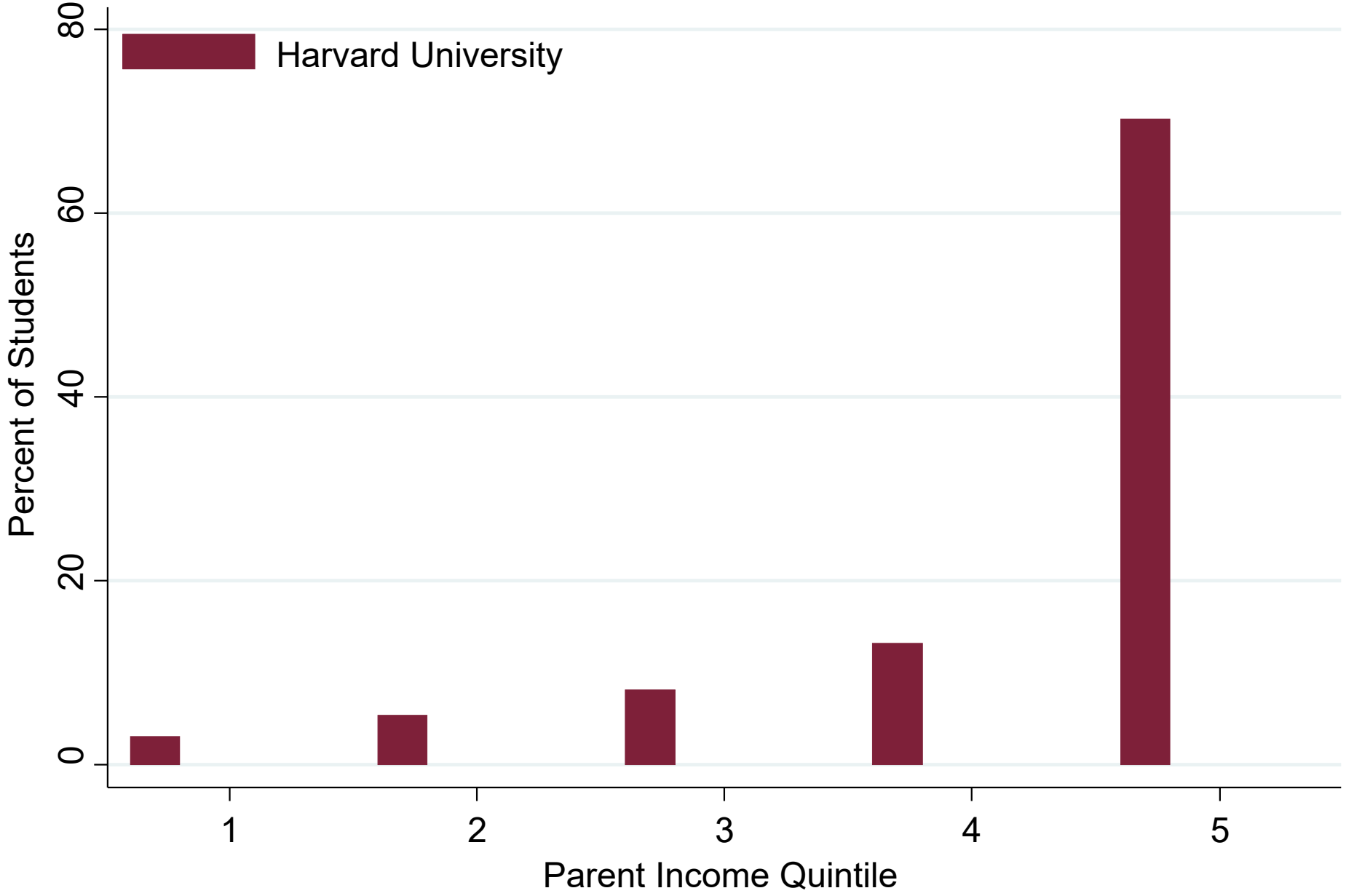

Parent Income Distribution by Percentile
Ivy Plus Colleges
Percent of Students
0
5
10
15
14.5% of students from top 1%
More students from the top 1% than the bottom 50%
13.5% of students from bottom 50%
0
20
40
60
80
100
Parent Rank

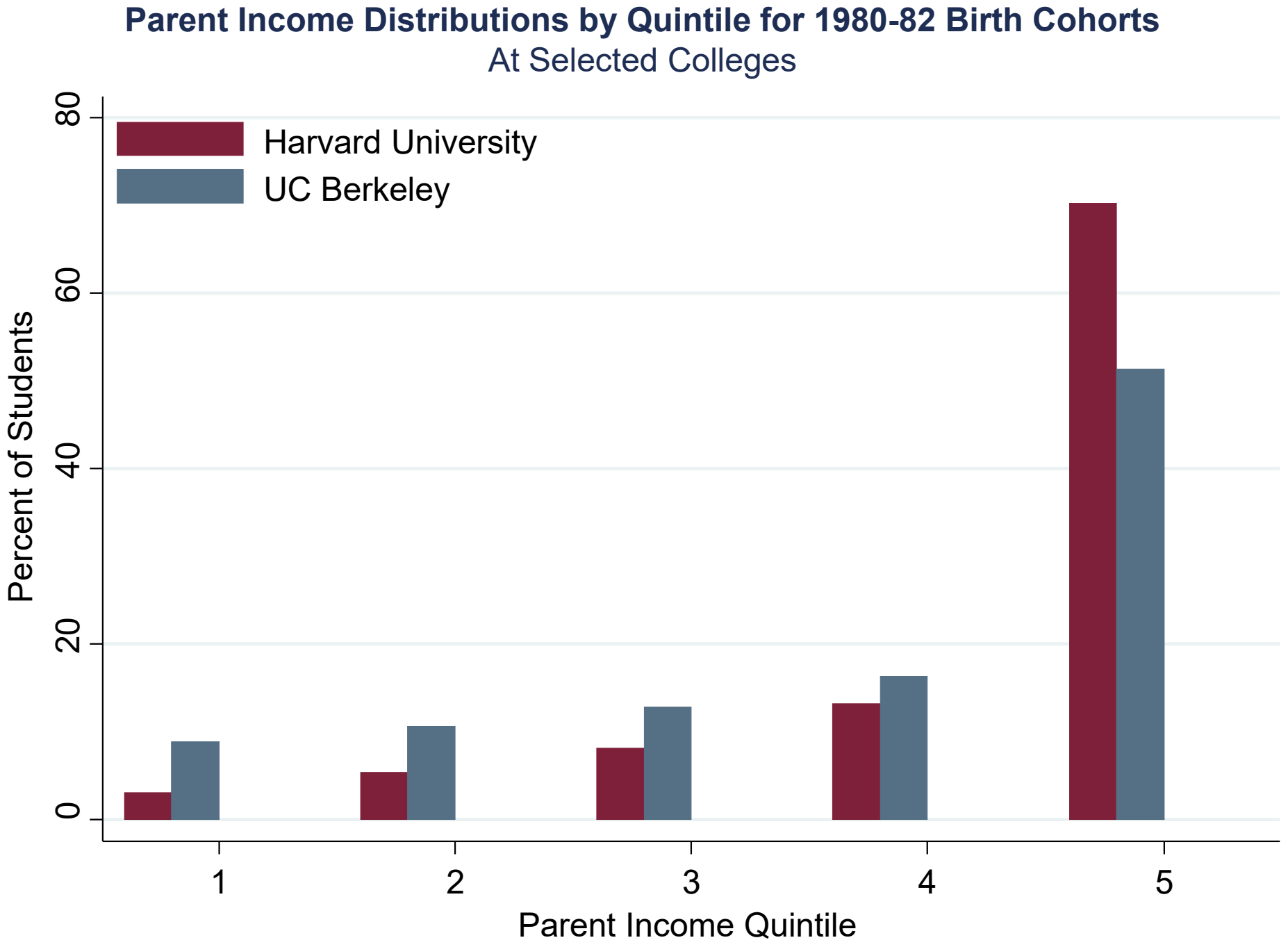

Parent Income Distribution by Percentile
Ivy Plus Colleges
14.5% of students from top 1%
3.8% of students from bottom 20%
Percent of Students
0
5
10
15
0
20
40
60
80
100
Parent Rank

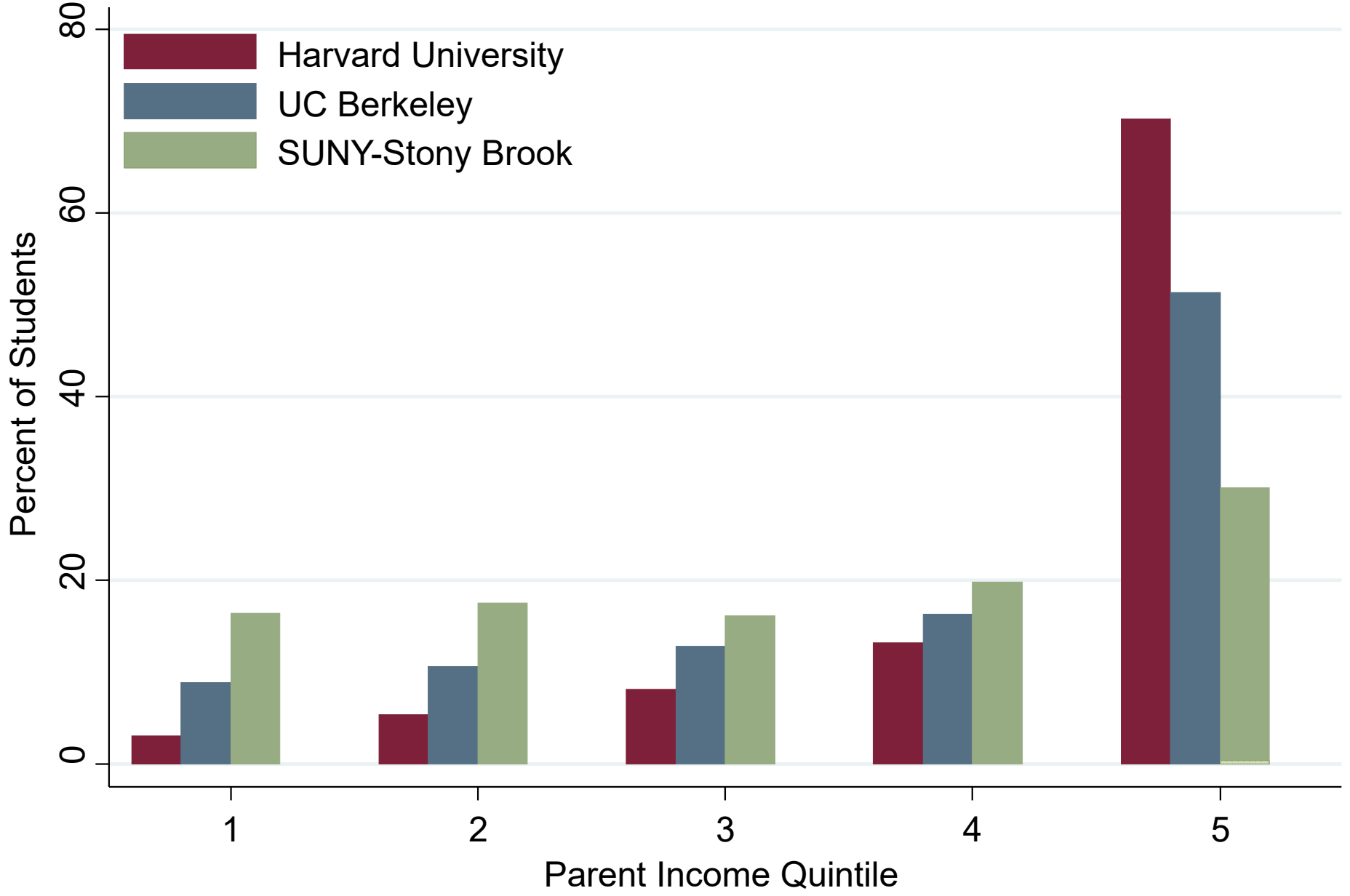

Parent Income Distribution by Percentile
Ivy Plus Colleges
Percent of Students
0
5
10
15
14.5% of students from top 1%
Probability of attending an elite private college is
77 times higher for children in the top 1% compared
to the bottom 20%
3.8% of students from bottom 20%
0
20
40
60
80
100
Parent Rank

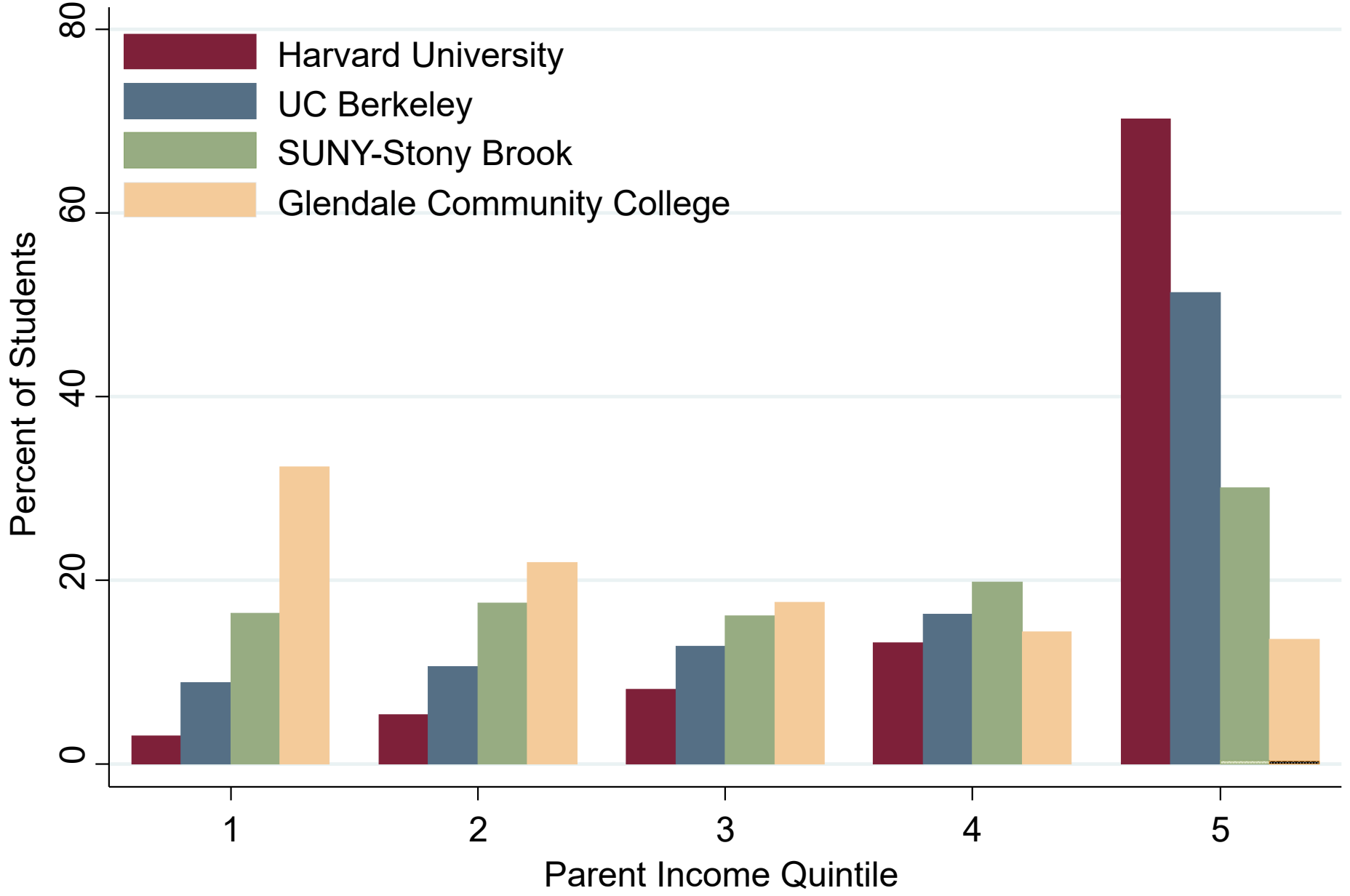
**Parent Income Distributions by Quintile for 1980-82 Birth Cohorts**

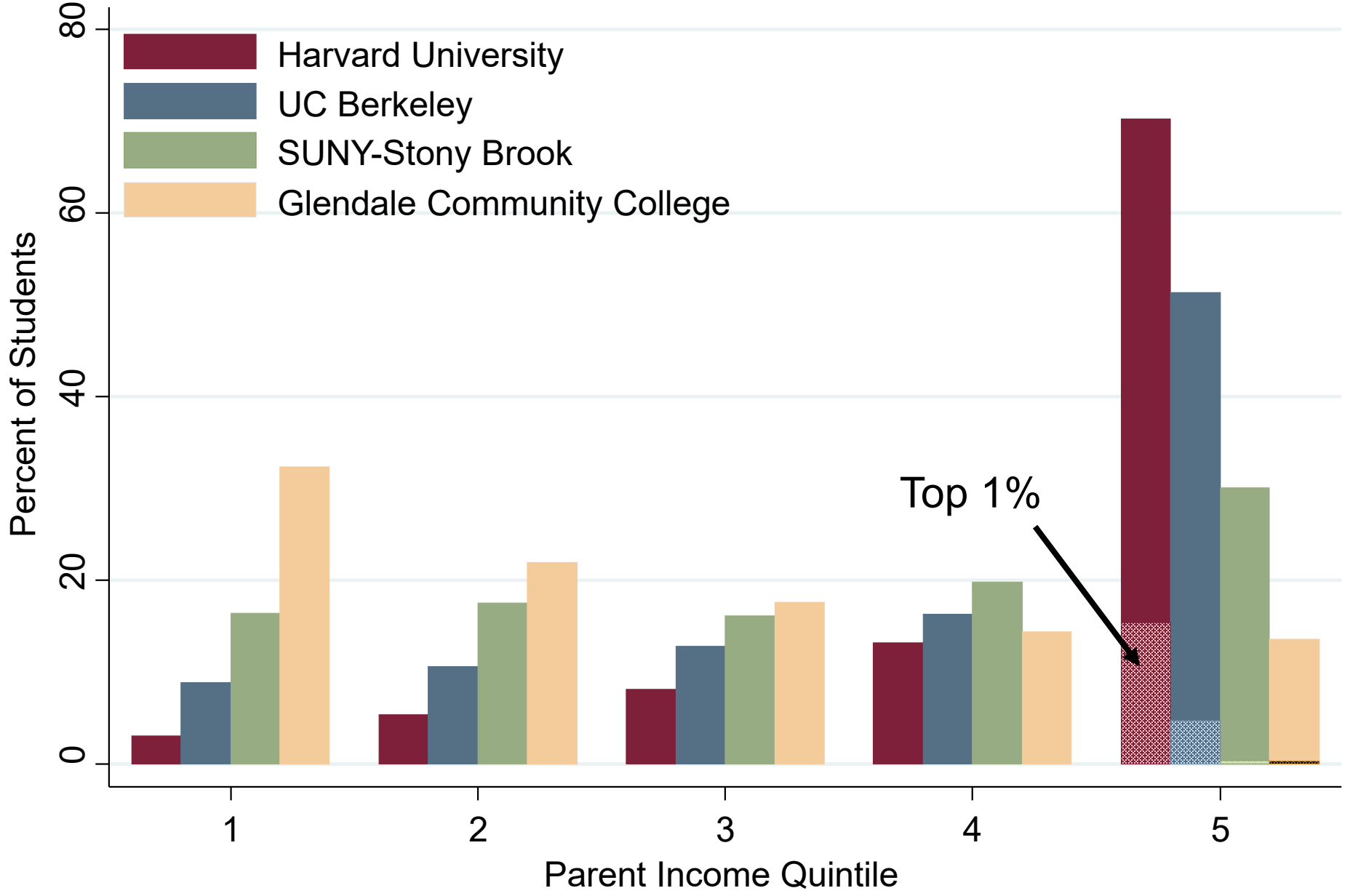
At Selected Colleges

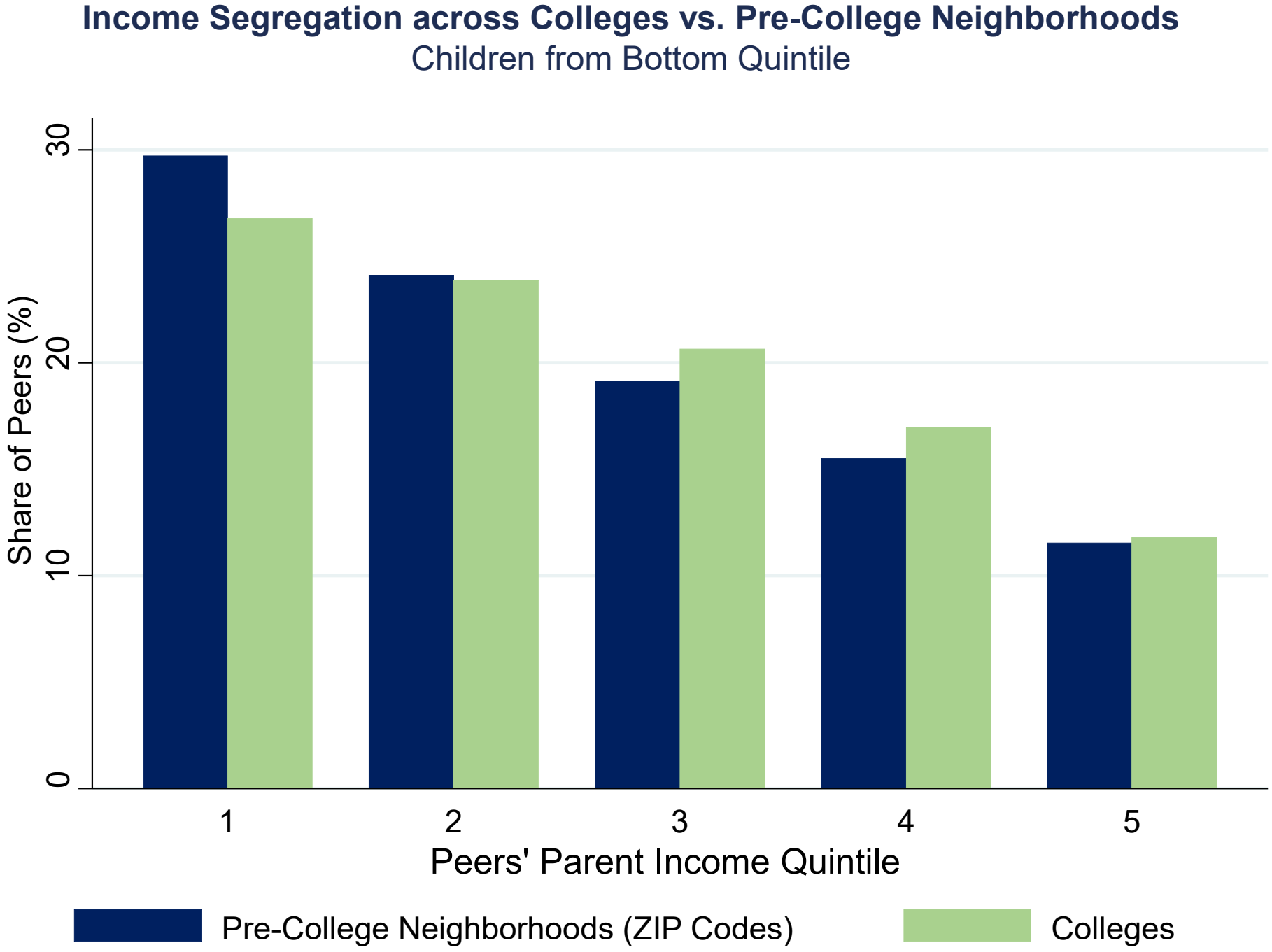


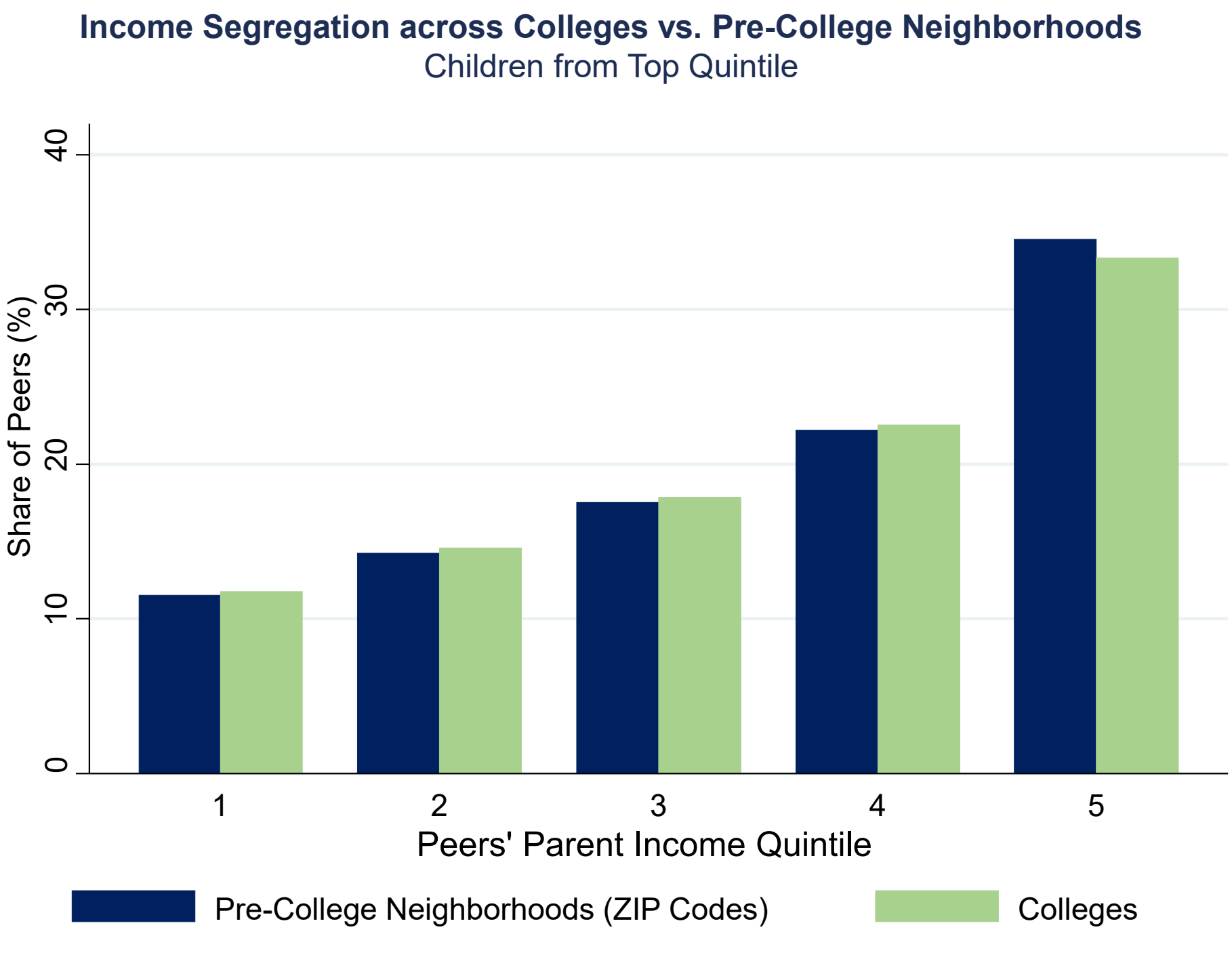

Parent Income Distributions by Quintile for 1980-82 Birth Cohorts
At Selected Colleges
Harvard University
UC Berkeley
Percent of Students
0
20
40
60
80
1
2
3
4
5
Parent Income Quintile


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


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

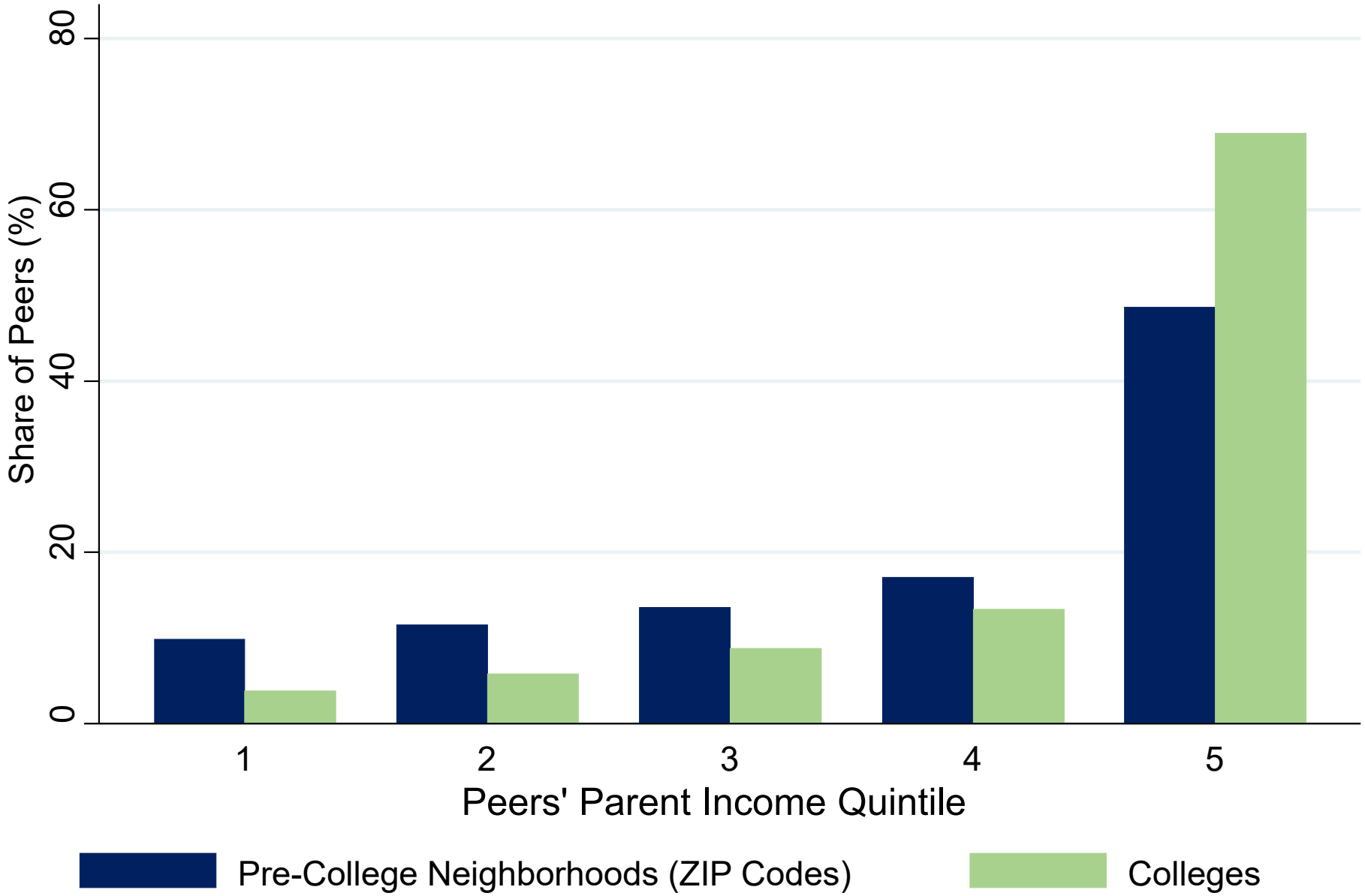

Parent Income Distributions by Quintile for 1980-82 Birth Cohorts
At Selected Colleges
Harvard University
UC Berkeley
SUNY-Stony Brook
Glendale Community College
Top 1%
Percent of Students
0
20
40
60
80
1
2
3
4
5
Parent Income Quintile


Income Segregation across Colleges vs. Pre-College Neighborhoods
Children from Bottom Quintile
Share of Peers (%)
0
10
20
30
1
2
3
4
5
Peers' Parent Income Quintile
Pre-College Neighborhoods (ZIP Codes)
Colleges


Income Segregation across Colleges vs. Pre-College Neighborhoods
Children from Top Quintile
Share of Peers (%)
0
10
20
30
40
1
2
3
4
5
Peers' Parent Income Quintile
Pre-College Neighborhoods (ZIP Codes)
Colleges

**Income Segregation across Colleges vs. Pre-College Neighborhoods**

Children from Top Quintile at Ivy-Plus Colleges



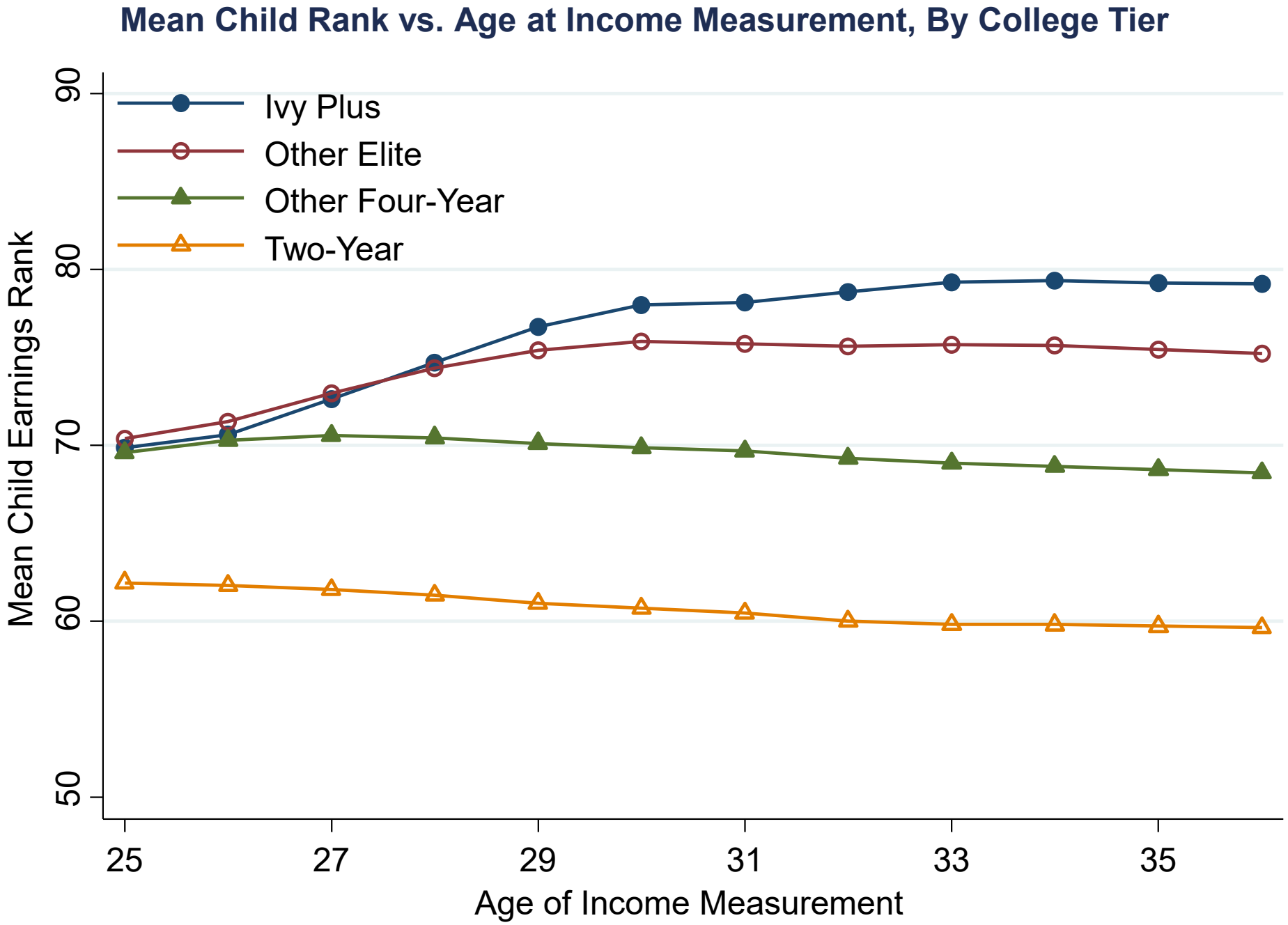
# Lessons on Access

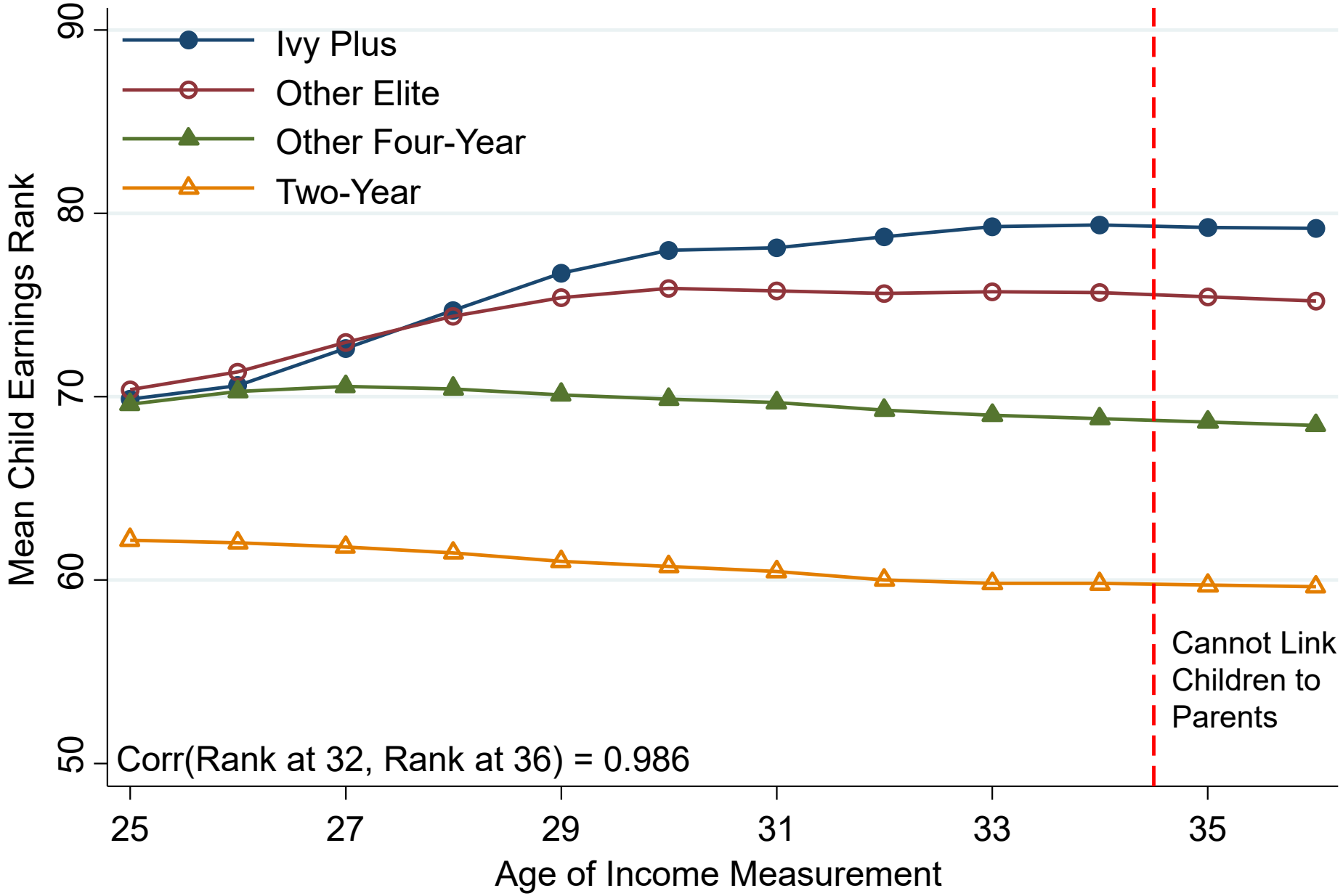
- **Fact #1**: Income segregation across colleges is comparable to segregation across Census tracts in the average American city
- Even at the student level, peers in college are not substantially different than those in the home neighborhood
- Income is especially concentrated at elite private schools

# Part 2
# Outcomes: Distributions of Student's Earnings by College

# Measuring Student Earnings

- Individual labor earnings = wages + self-emp. income + foreign wages
- Compute percentile ranks by ranking children within birth cohorts
- Using data going back to 1978 cohort, we see that ranks stabilize by age 32 at all colleges


Mean Child Rank vs. Age at Income Measurement, By College Tier
Ivy Plus
Other Elite
Other Four-Year
Two-Year
Mean Child Earnings Rank
90
80
70
60
50
25
27
29
31
33
35
Age of Income Measurement


Mean Child Rank vs. Age at Income Measurement, By College Tier
Ivy Plus
Other Elite
Other Four-Year
Two-Year
Mean Child Earnings Rank
90
80
70
60
50
Cannot Link Children to Parents
Corr(Rank at 32, Rank at 36) = 0.986
25
27
29
31
33
35
Age of Income Measurement

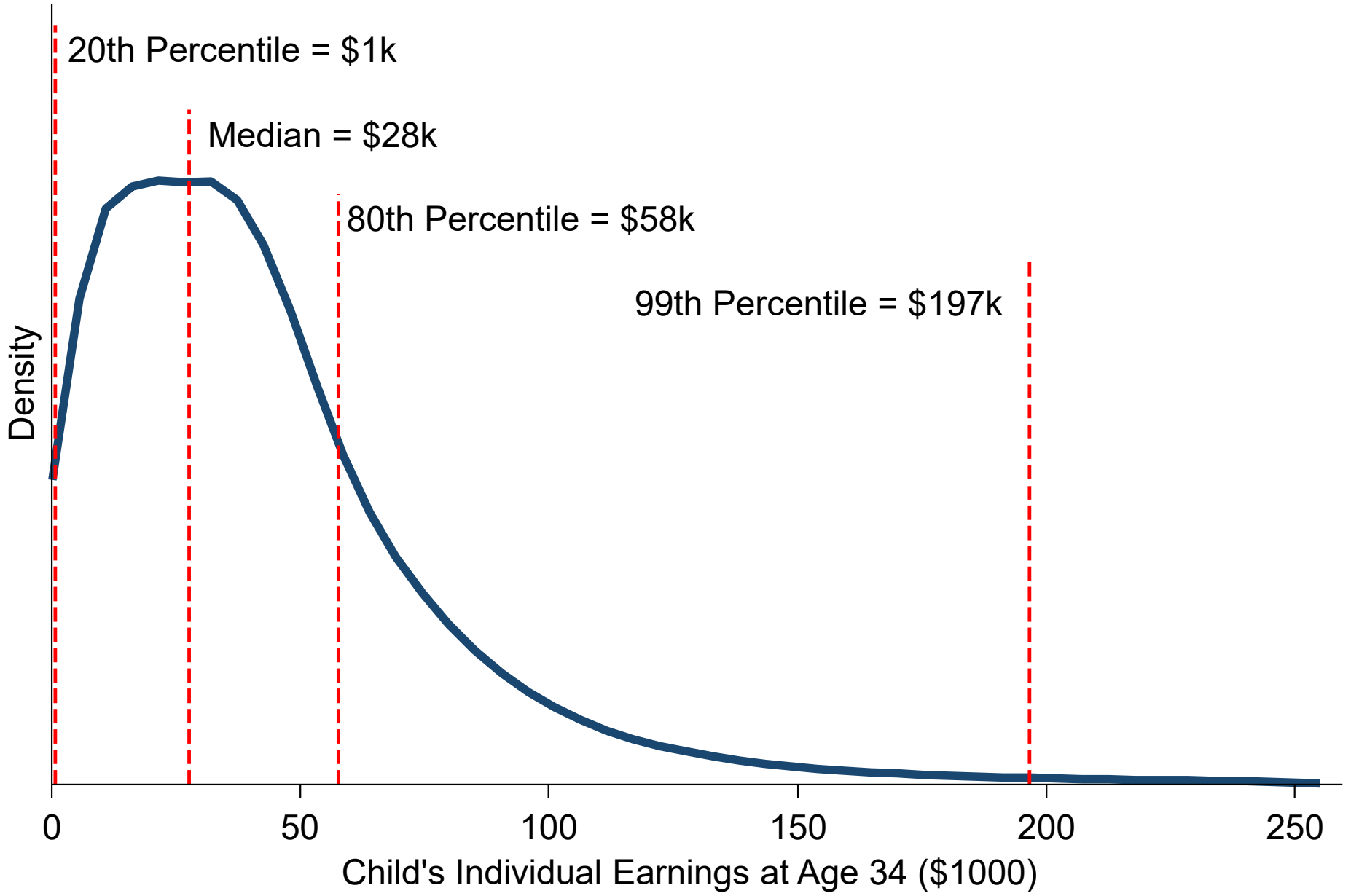
# Measuring Student Earnings

- Individual labor earnings = wages + self-emp. income + foreign wages
- Compute percentile ranks by ranking children within birth cohorts
- Using data going back to 1978 cohort, we see that ranks stabilize by age 32 at all colleges
- Broader income concepts (e.g., AGI) differ from individual labor earnings primarily because of marriage

→ Baseline definition: individual earnings in 2014, measured at ages 32-34 for 1980-82 birth cohorts

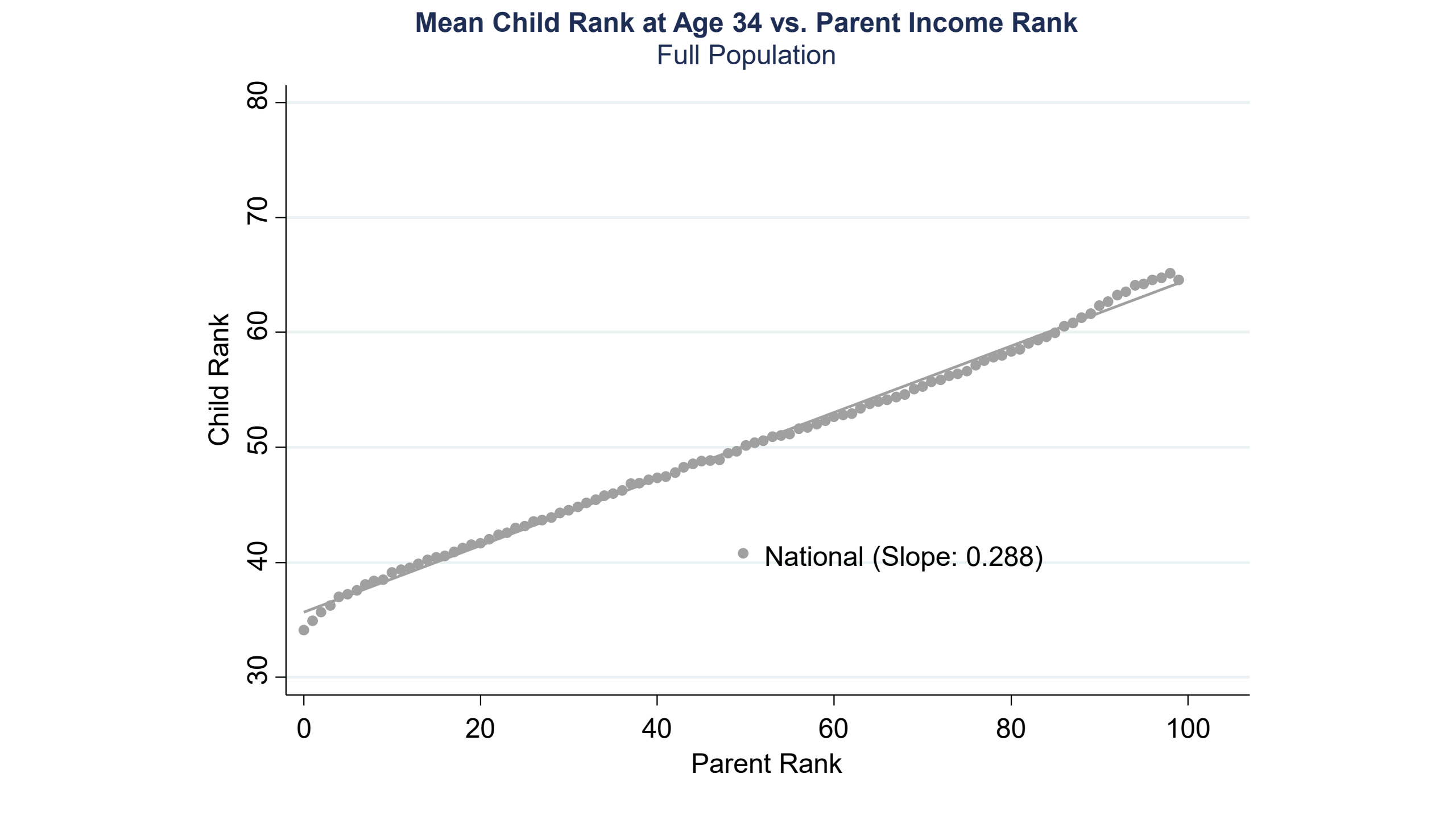
**Distribution of Children's Individual Labor Earnings at Age 34**

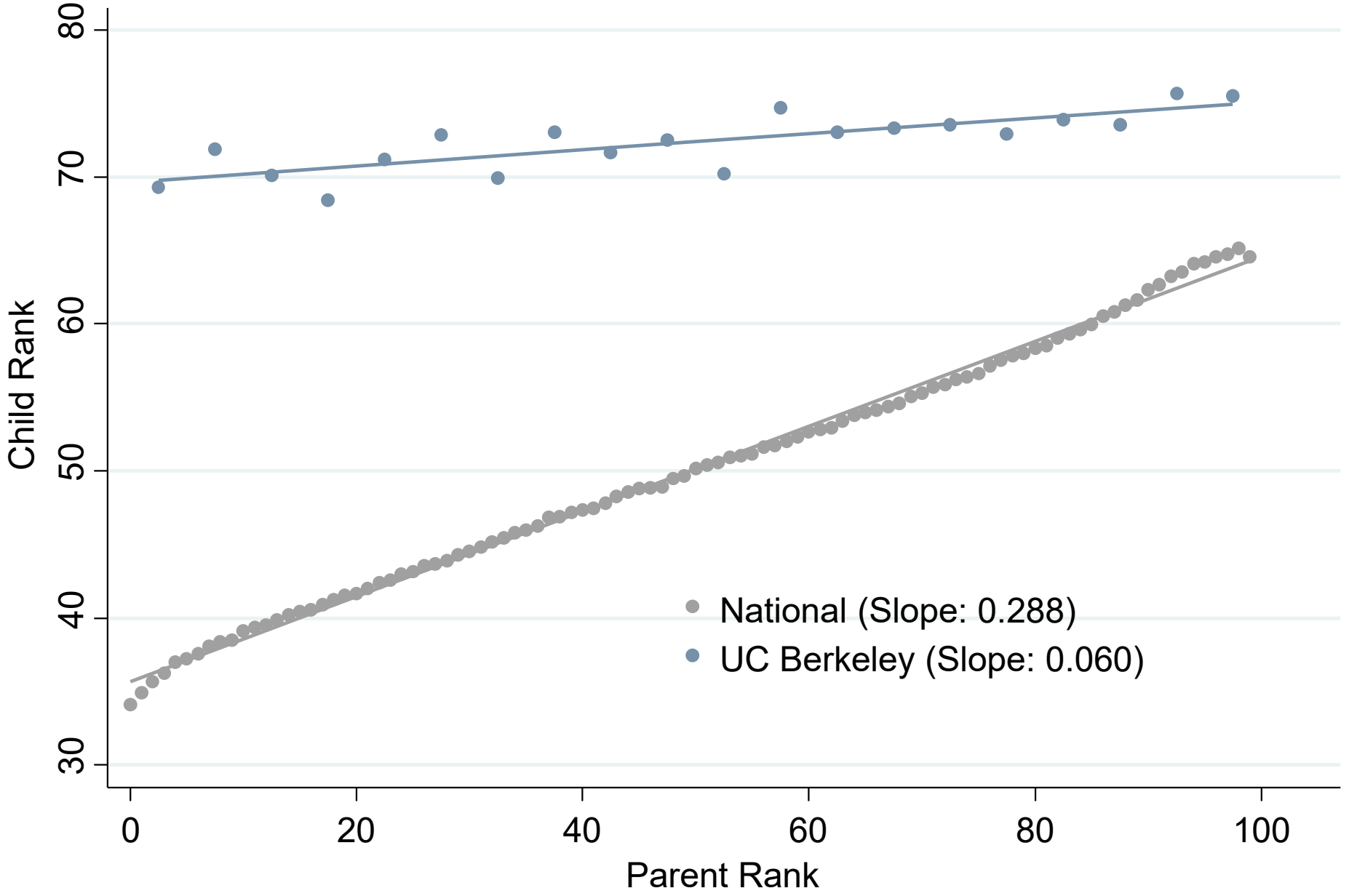
1980 Birth Cohort

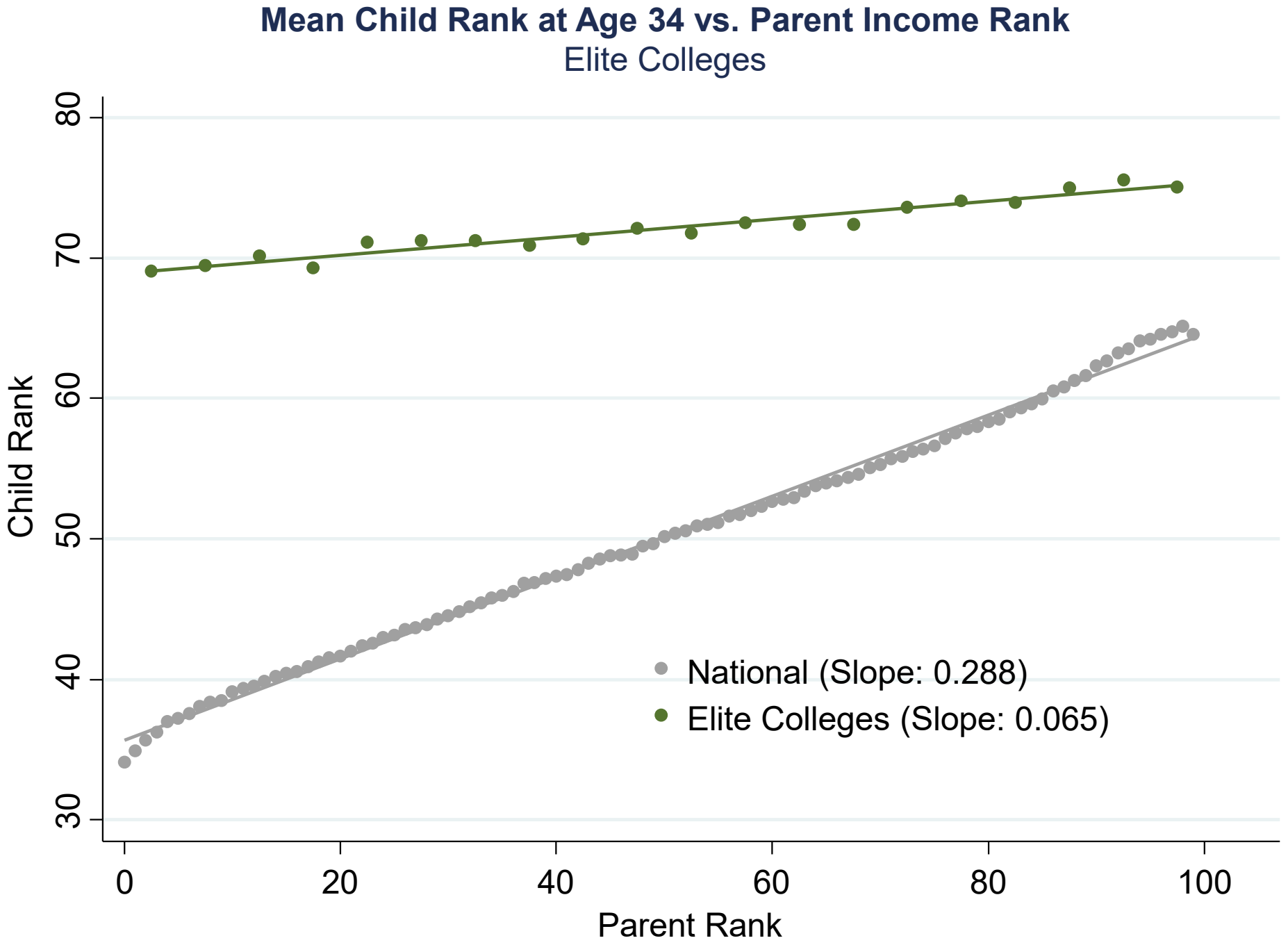


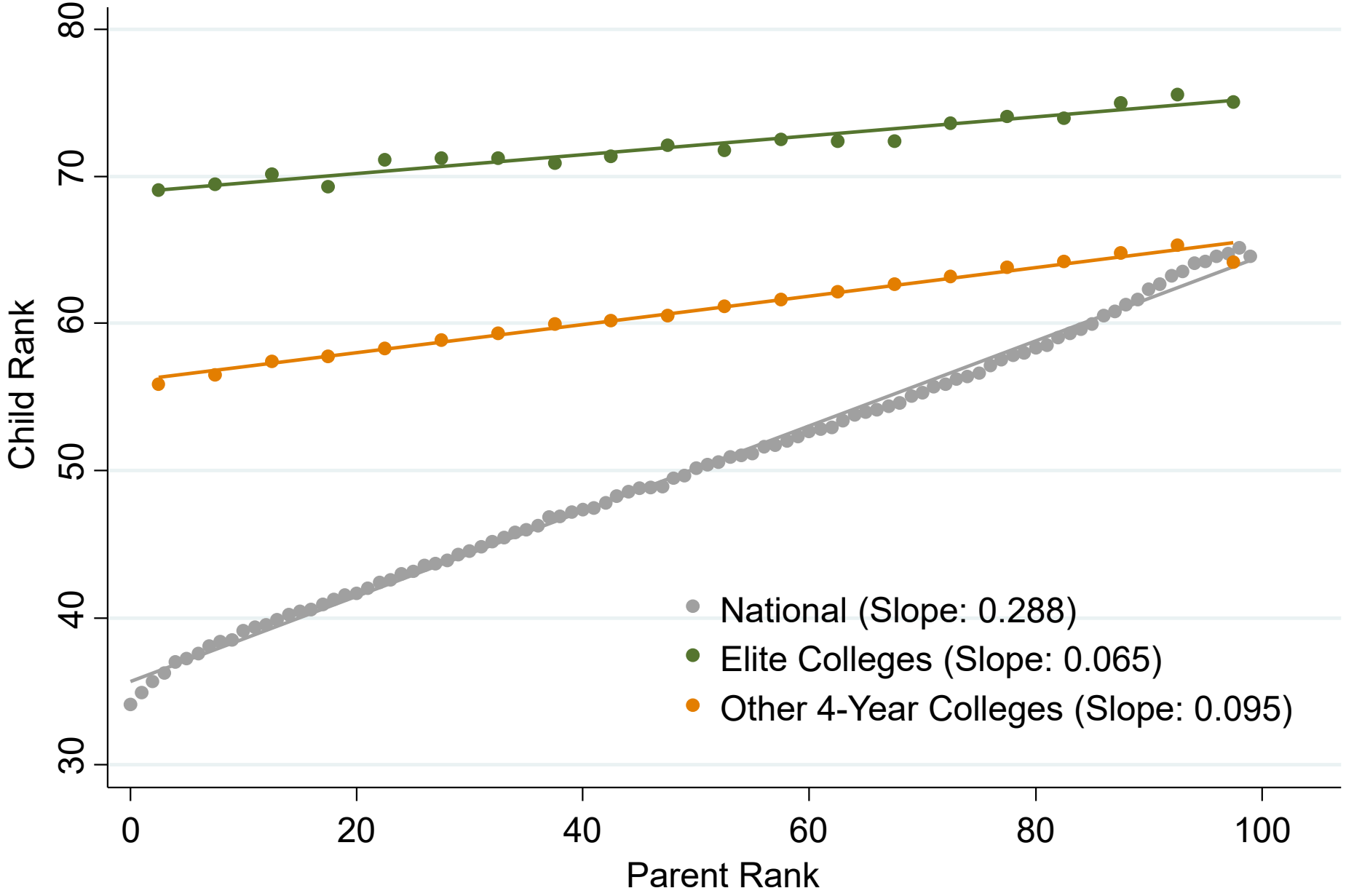
# Measuring Student Earnings

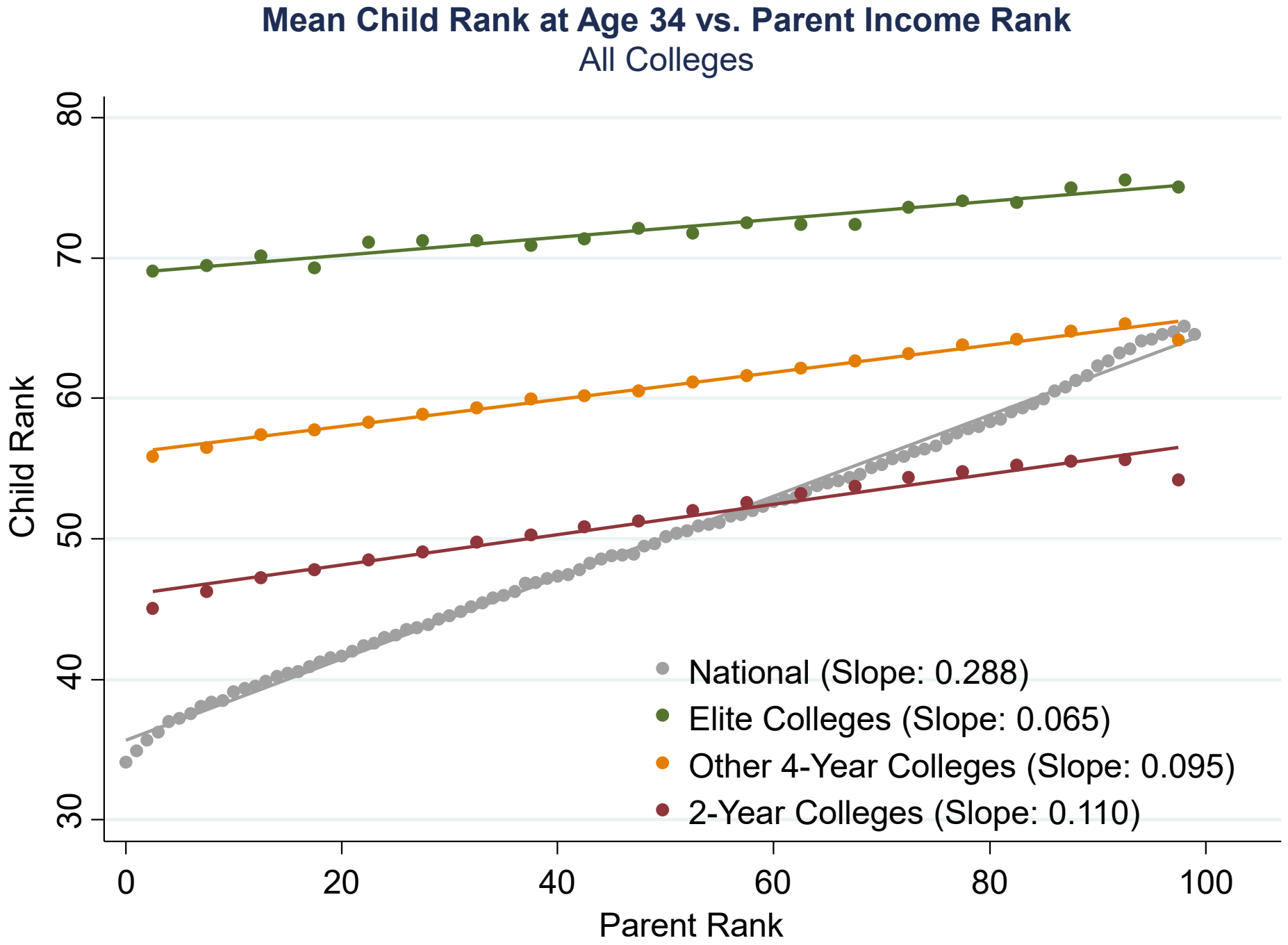
- Characterize children's earnings ranks conditional on their parents' rank by college

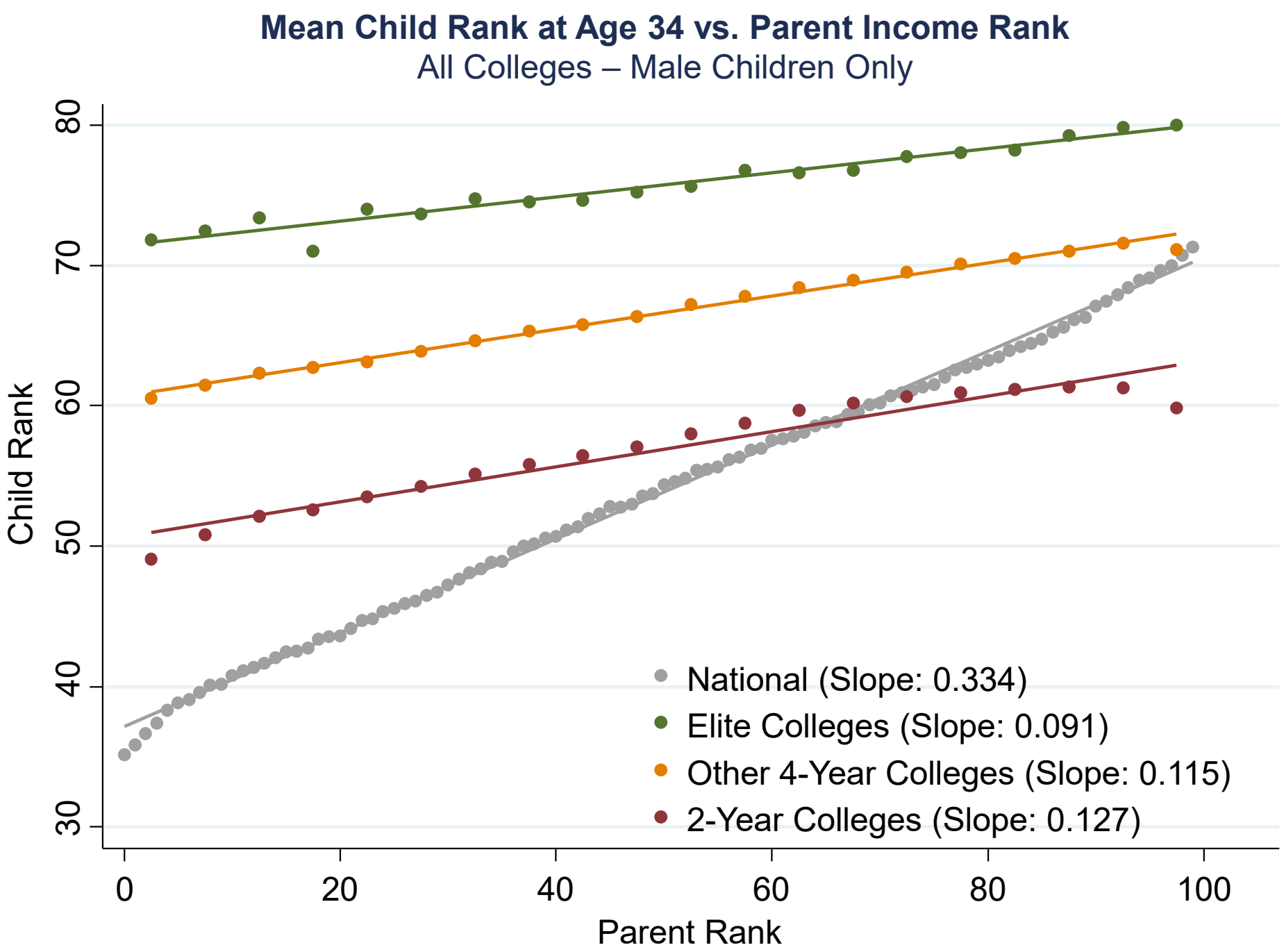

Mean Child Rank at Age 34 vs. Parent Income Rank
Full Population
Child Rank
30
40
50
60
70
80
0
20
40
60
80
100
Parent Rank
National (Slope: 0.288)


Mean Child Rank at Age 34 vs. Parent Income Rank
UC-Berkeley
Child Rank
30
40
50
60
70
80
0
20
40
60
80
100
Parent Rank
National (Slope: 0.288)
UC Berkeley (Slope: 0.060)


Mean Child Rank at Age 34 vs. Parent Income Rank
Elite Colleges
Child Rank
30
40
50
60
70
80
0
20
40
60
80
100
Parent Rank
National (Slope: 0.288)
Elite Colleges (Slope: 0.065)


Mean Child Rank at Age 34 vs. Parent Income Rank
All 4-Year Colleges
Child Rank
30
40
50
60
70
80
0
20
40
60
80
100
Parent Rank
National (Slope: 0.288)
Elite Colleges (Slope: 0.065)
Other 4-Year Colleges (Slope: 0.095)


Mean Child Rank at Age 34 vs. Parent Income Rank
All Colleges
Child Rank
30
40
50
60
70
80
0
20
40
60
80
100
Parent Rank
National (Slope: 0.288)
Elite Colleges (Slope: 0.065)
Other 4-Year Colleges (Slope: 0.095)
2-Year Colleges (Slope: 0.110)


Mean Child Rank at Age 34 vs. Parent Income Rank
All Colleges – Male Children Only
Child Rank
30
40
50
60
70
80
0
20
40
60
80
100
Parent Rank
National (Slope: 0.334)
Elite Colleges (Slope: 0.091)
Other 4-Year Colleges (Slope: 0.115)
2-Year Colleges (Slope: 0.127)

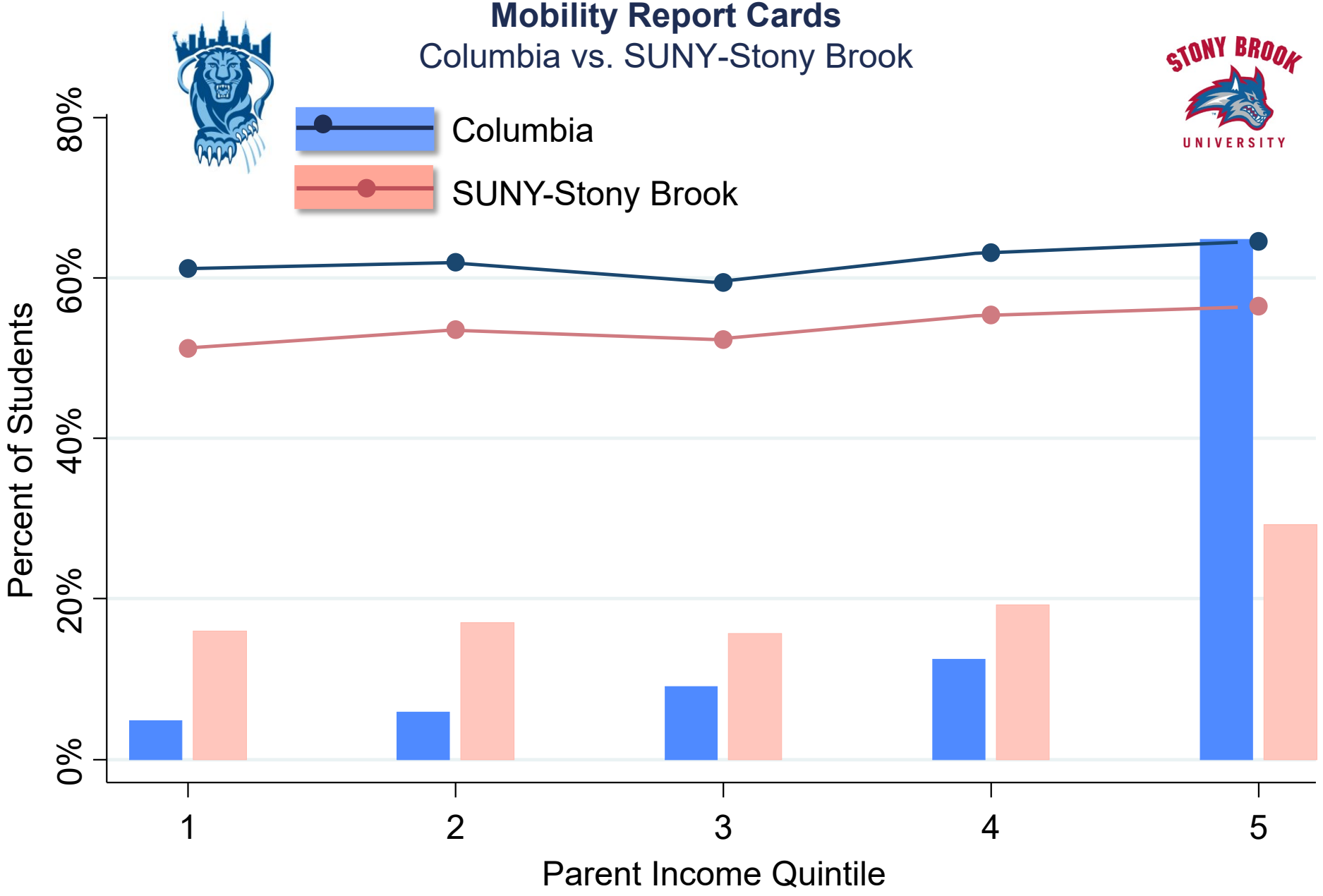
# Measuring Student Earnings

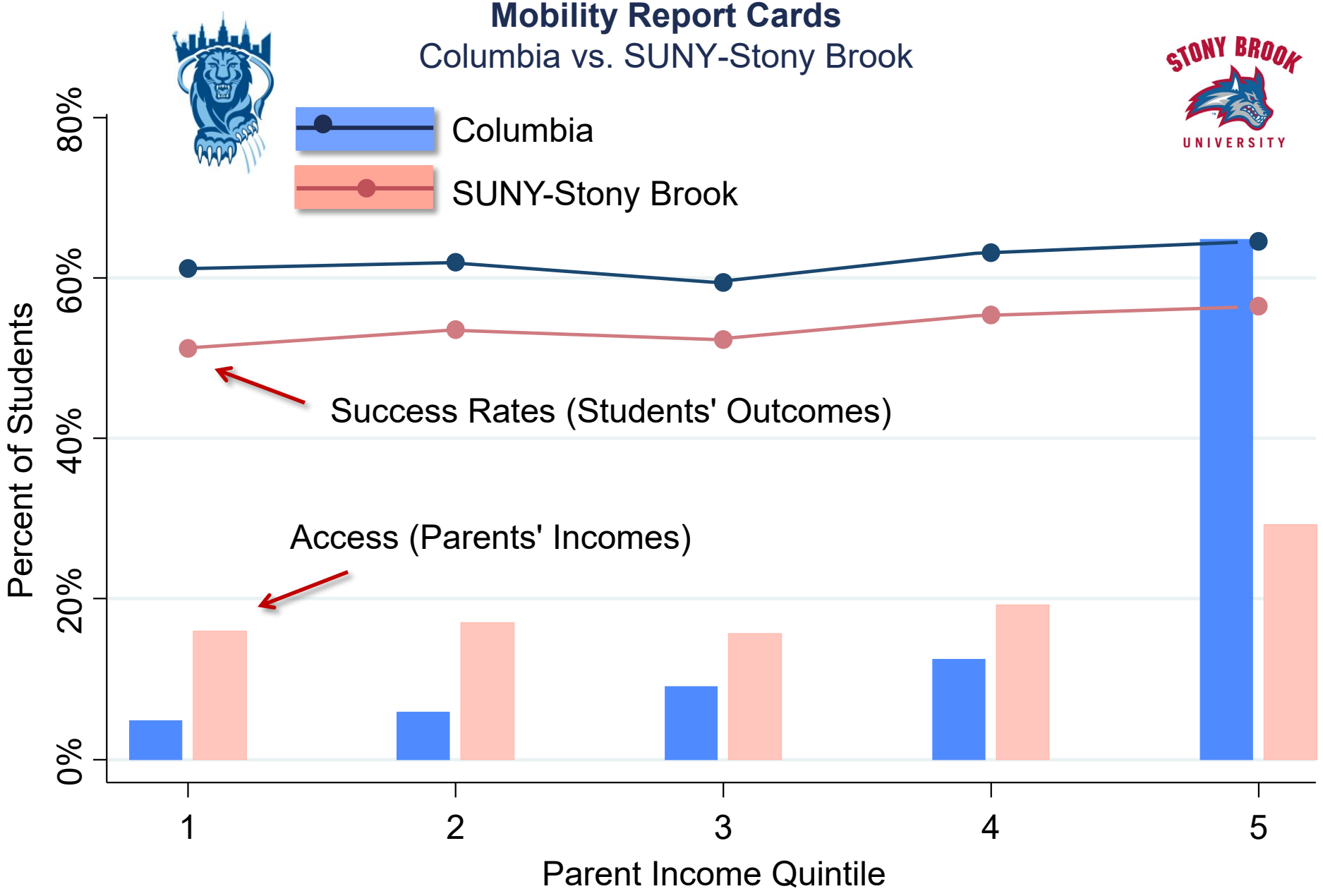
- **Fact #2**: Students from low- and high- income families at a given college have fairly similar earnings outcomes, especially at highly selective colleges
    - Elite colleges almost “level the playing field” across students with different socioeconomic backgrounds whom they admit

# Mobility Report Cards

- Combine data on parents' incomes and students' outcomes to characterize colleges' mobility rates

- Begin by measuring upward mobility as reaching top quintile
  - Turn to upper-tail success (reaching top 1%) later


Mobility Report Cards
Columbia vs. SUNY-Stony Brook
Columbia
SUNY-Stony Brook
Percent of Students
0%
20%
40%
60%
80%
1
2
3
4
5
Parent Income Quintile


Mobility Report Cards
Columbia vs. SUNY-Stony Brook
Columbia
SUNY-Stony Brook
Success Rates (Students' Outcomes)
Access (Parents' Incomes)
Percent of Students
0%
20%
40%
60%
80%
1
2
3
4
5
Parent Income Quintile

# Rates of Mobility

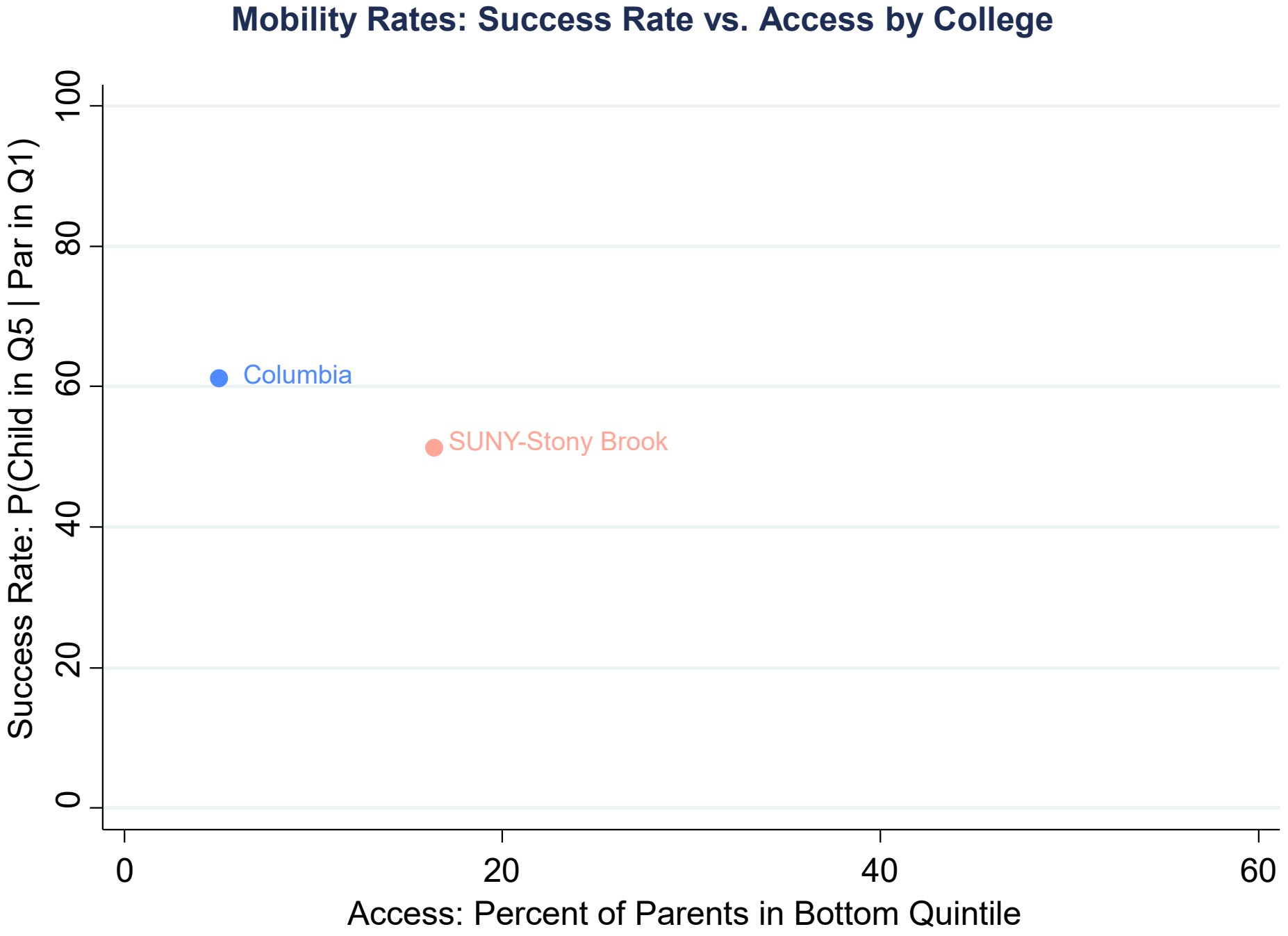
- Define a college's *mobility rate* (MR) as the fraction of its students who come from bottom quintile and end up in top quintile

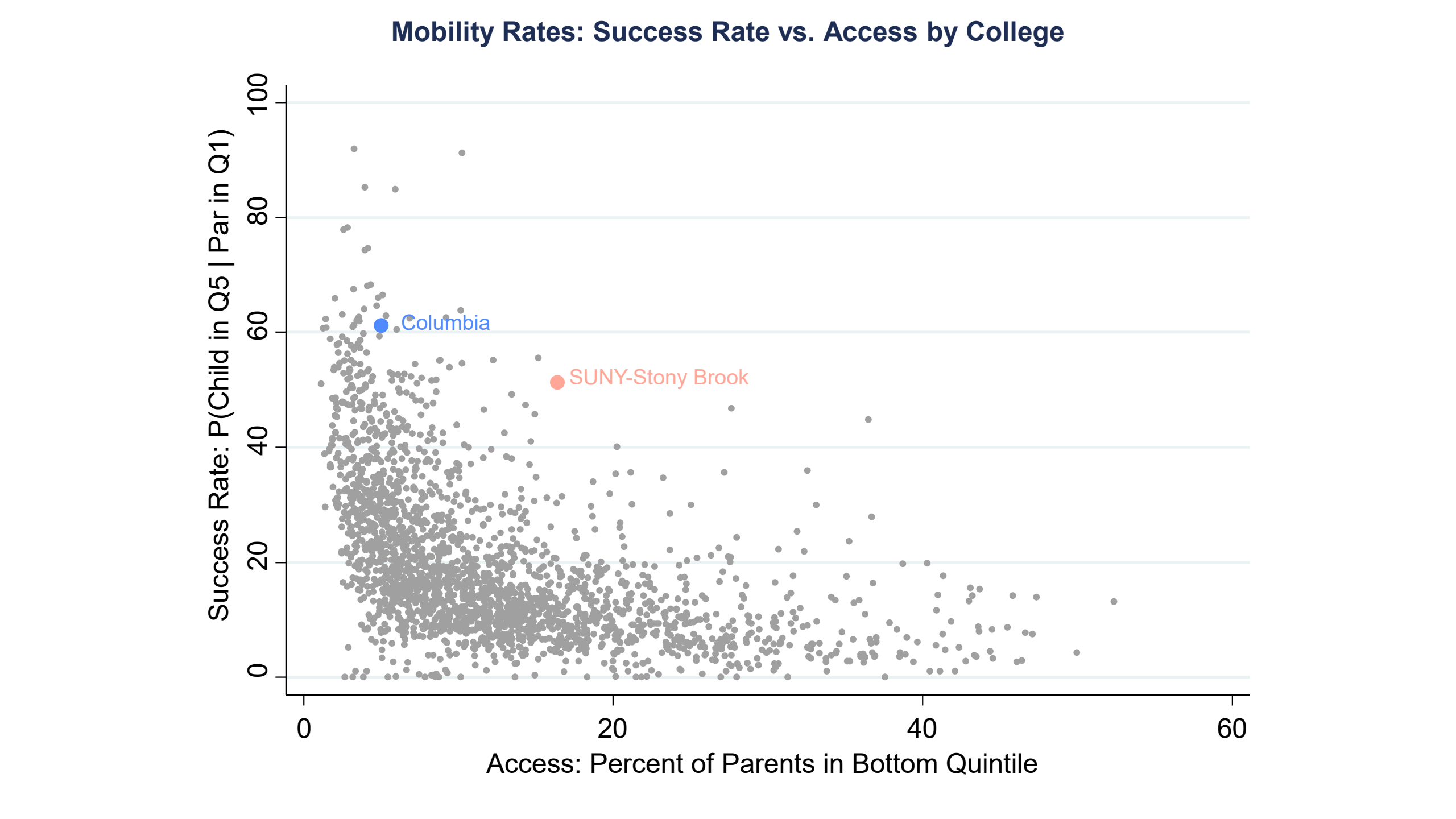
Mobility Rate = Success Rate **x** Access

P(Child in Q5 & Parent in Q1) = P(Child in Q5| Parent in Q1) **x** P(Parent in Q1)

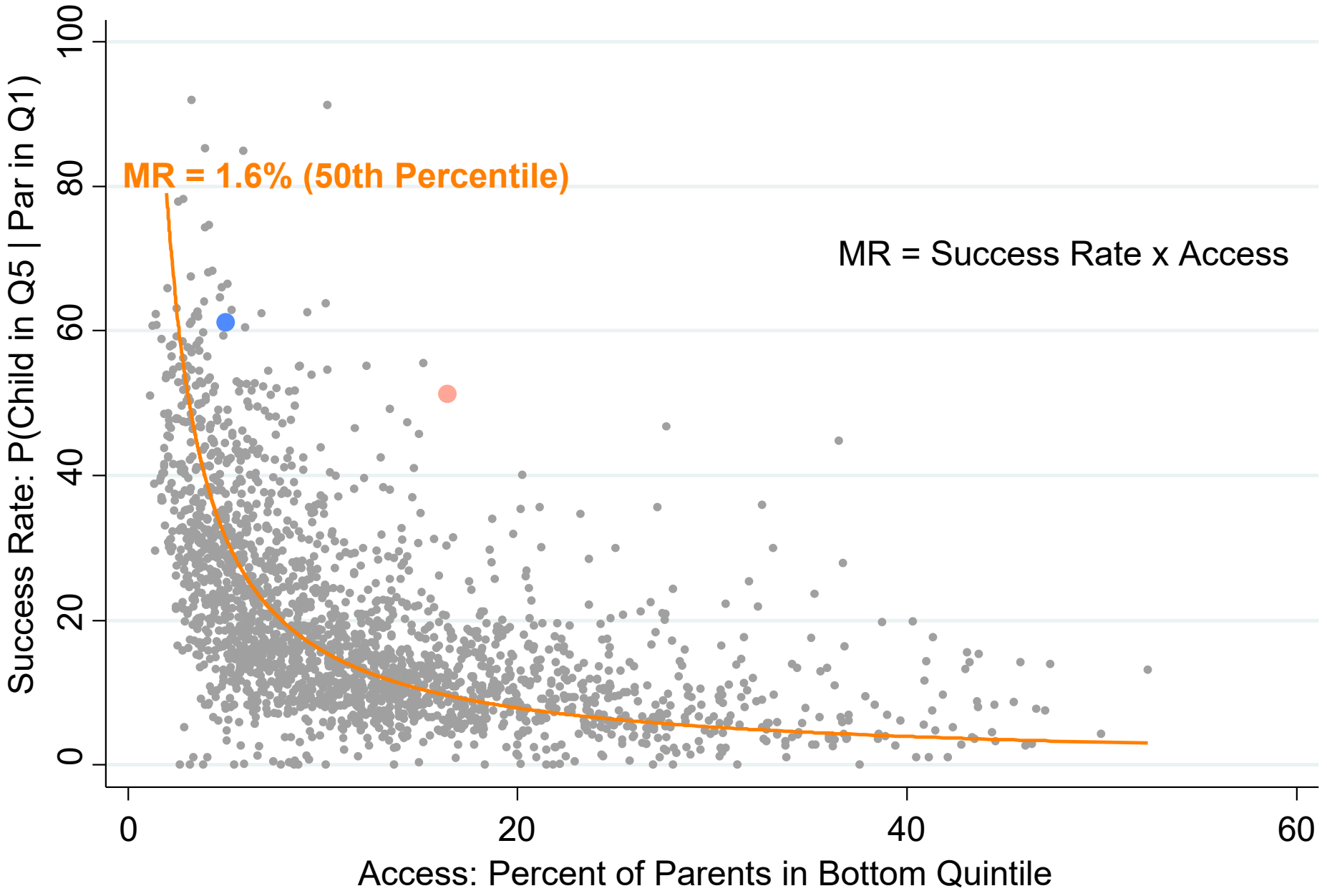
- E.g., SUNY-Stony Brook: 8.4% = 51.2% **x** 16.4%

- The mobility rate should be interpreted as an accounting measure rather than a causal effect

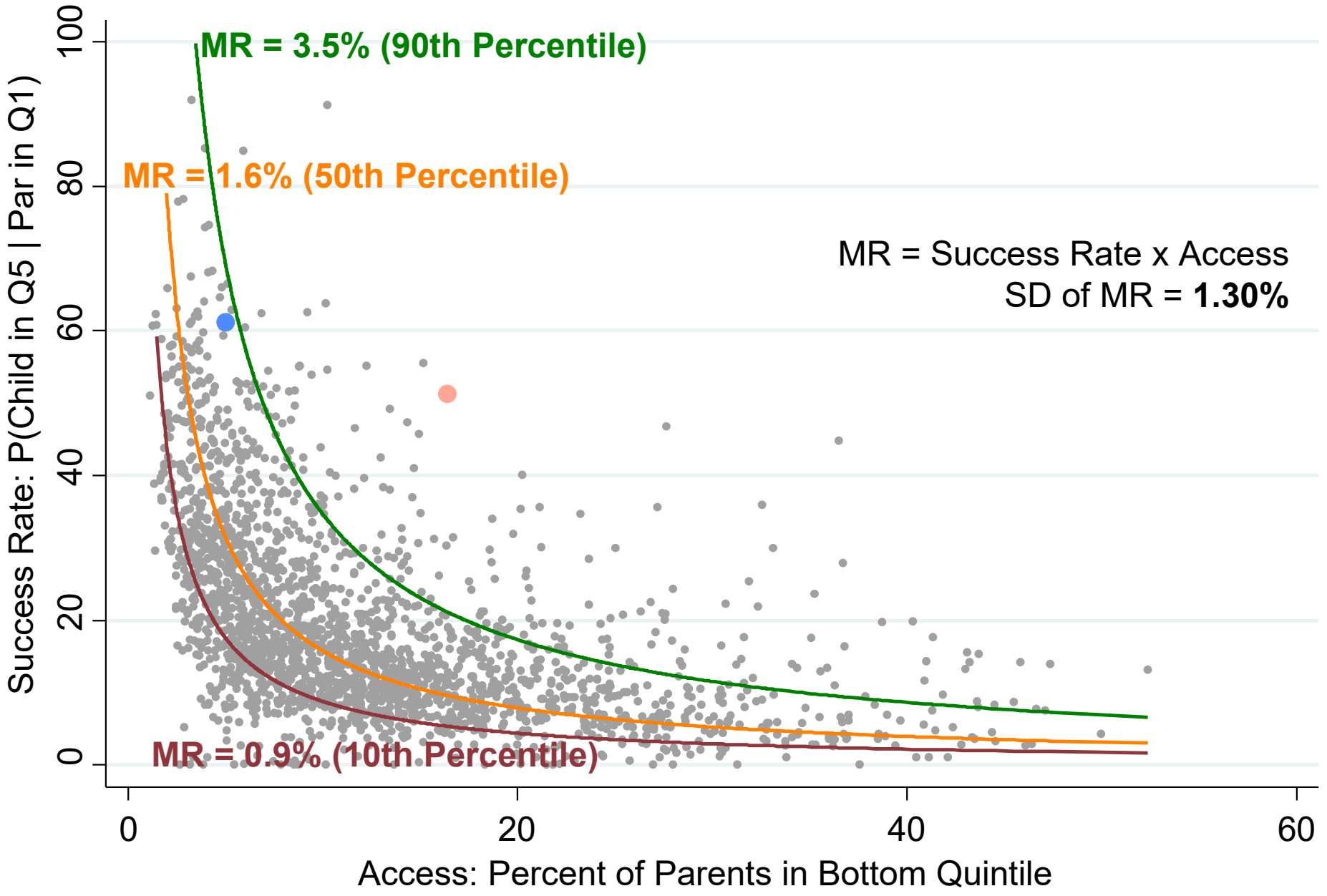

Mobility Rates: Success Rate vs. Access by College
Success Rate: P(Child in Q5 | Par in Q1)
0
20
40
60
80
100
Columbia
SUNY-Stony Brook
0
20
40
60
Access: Percent of Parents in Bottom Quintile

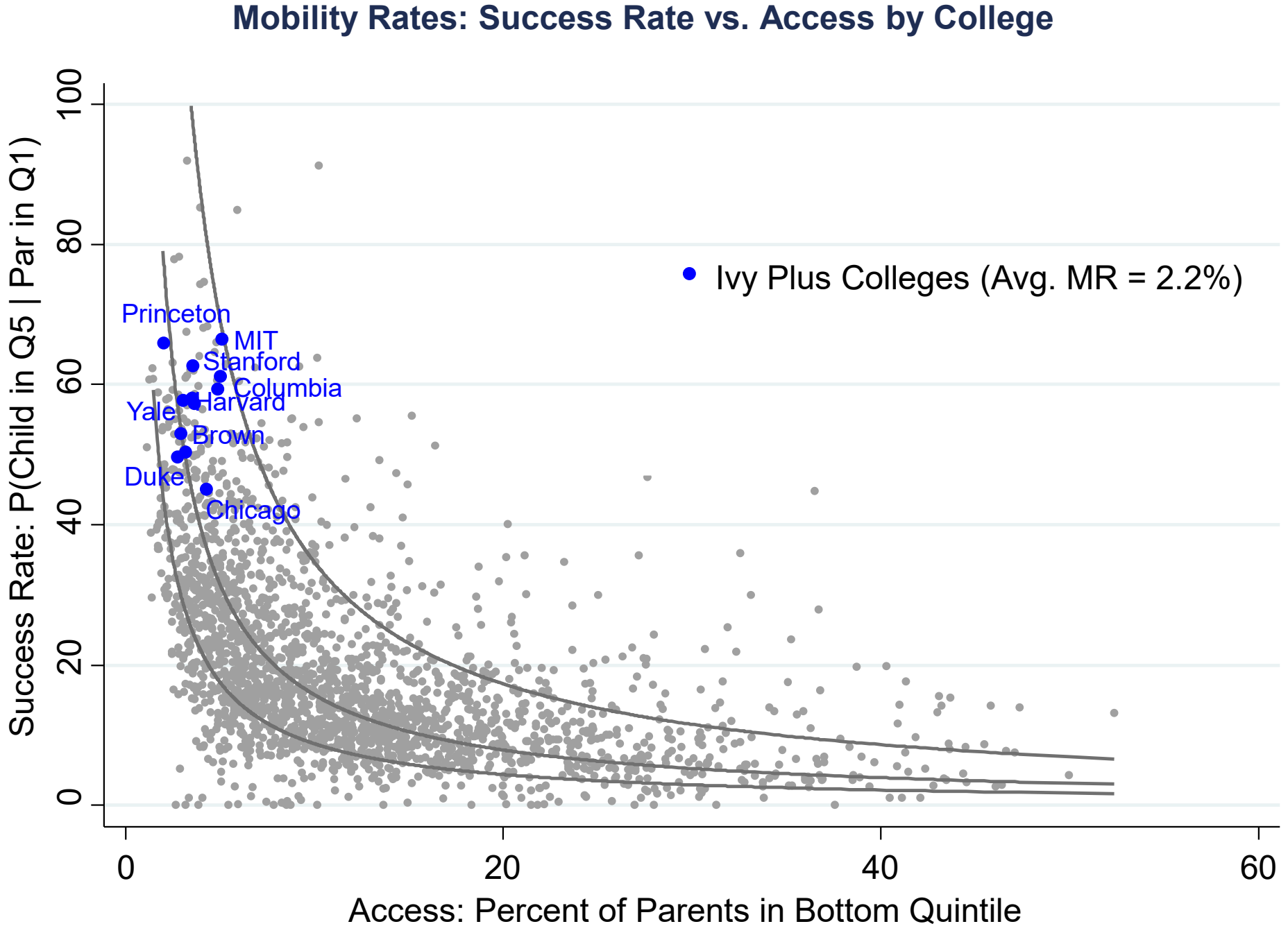

Mobility Rates: Success Rate vs. Access by College
Success Rate: P(Child in Q5 | Par in Q1)
0
20
40
60
80
100
Columbia
SUNY-Stony Brook
0
20
40
60
Access: Percent of Parents in Bottom Quintile

# Mobility Rates: Success Rate vs. Access by College

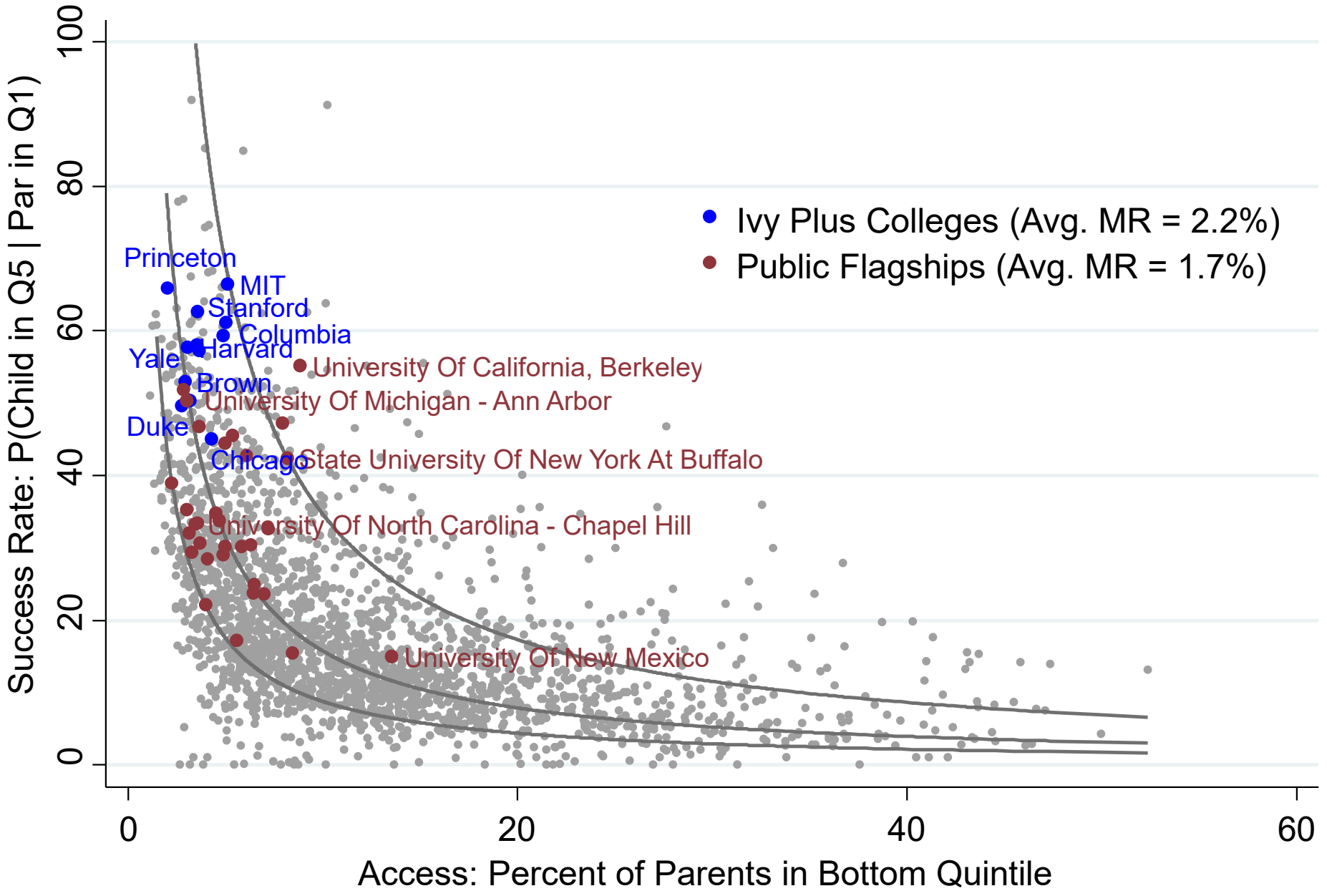


# Mobility Rates: Success Rate vs. Access by College

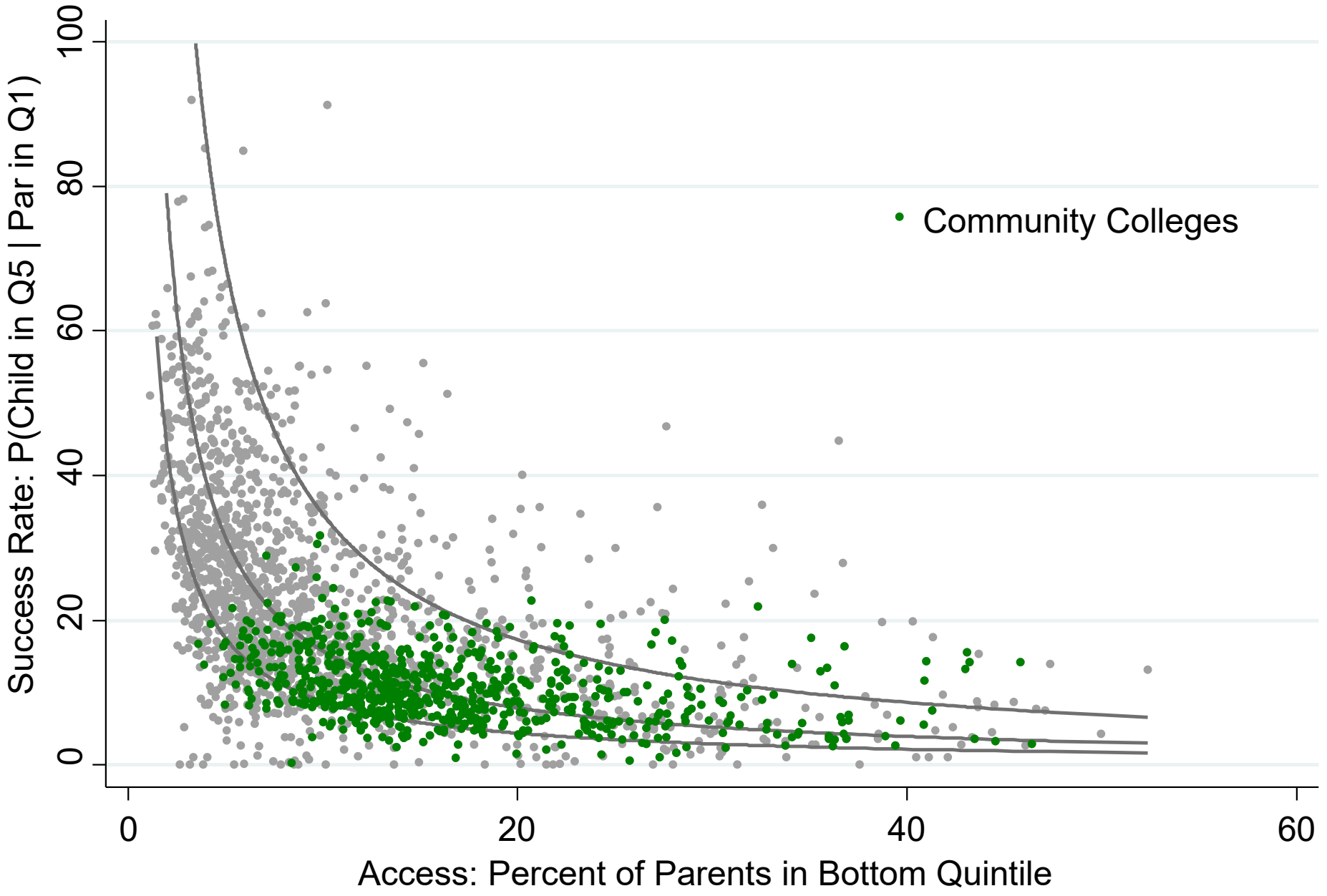



Mobility Rates: Success Rate vs. Access by College
Success Rate: P(Child in Q5 | Par in Q1)
0
20
40
60
80
100
Access: Percent of Parents in Bottom Quintile
0
20
40
60
Ivy Plus Colleges (Avg. MR = 2.2%)
Princeton
MIT
Stanford
Columbia
Harvard
Yale
Brown
Duke
Chicago

# Mobility Rates: Success Rate vs. Access by College

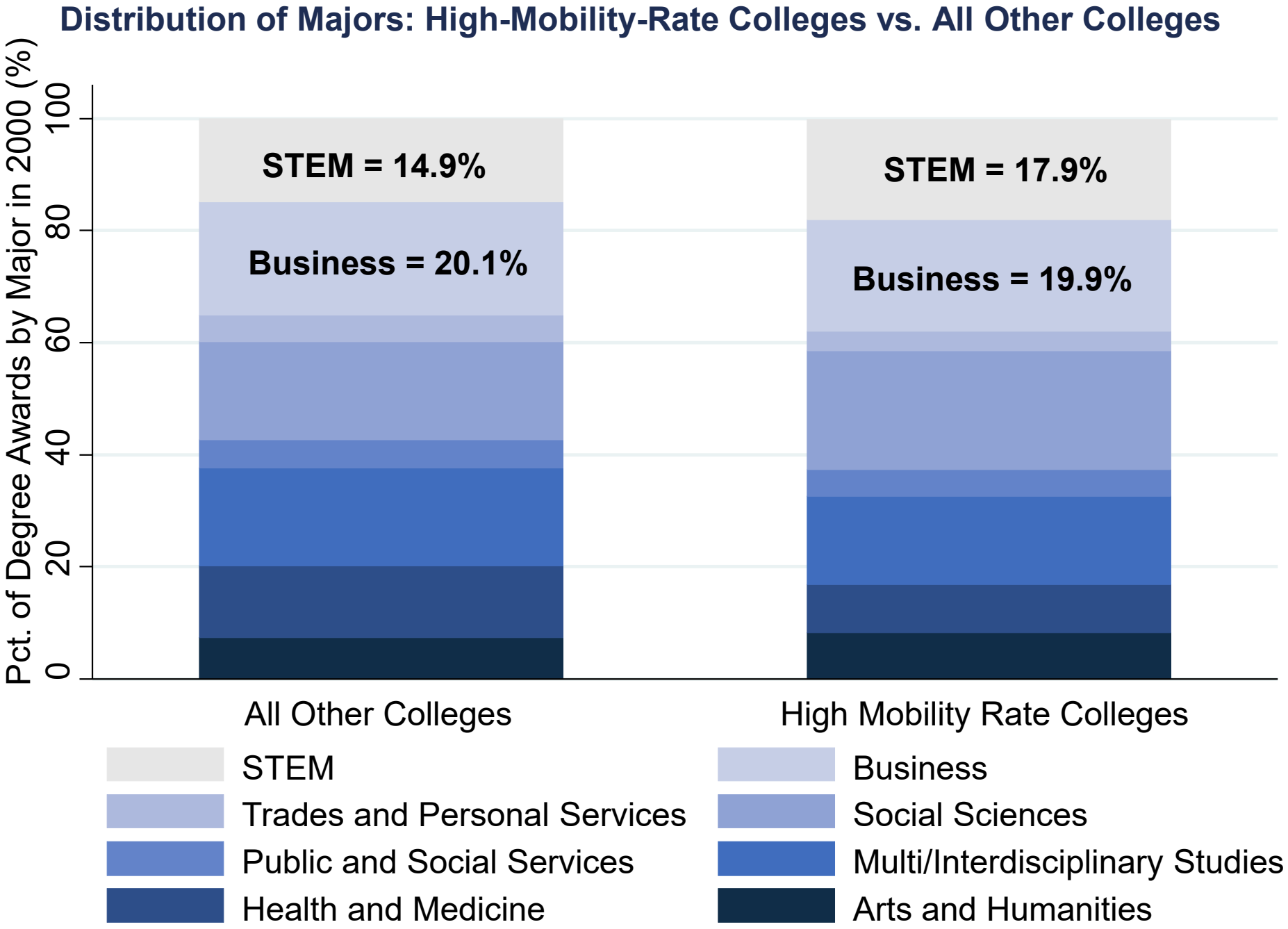


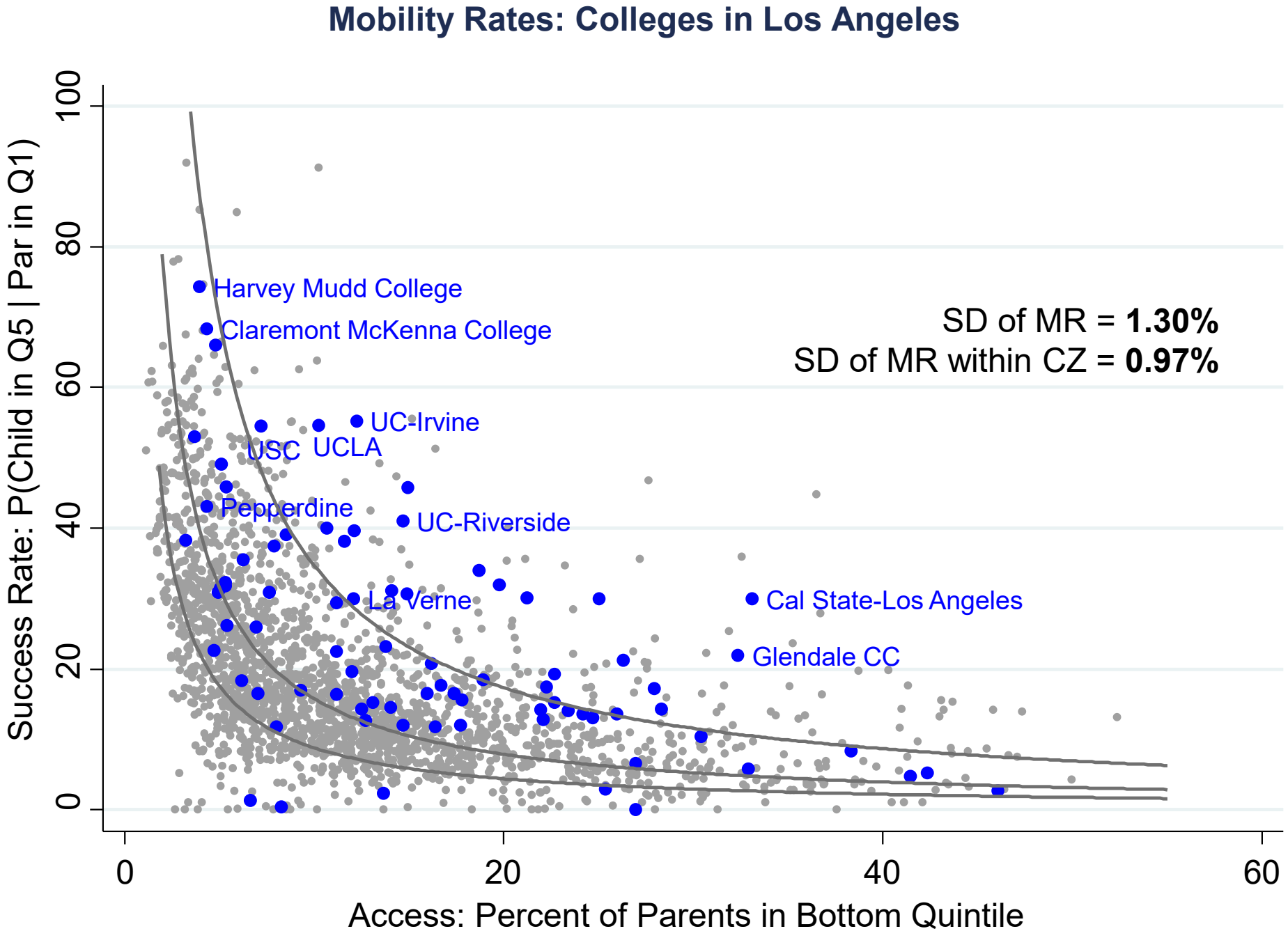
# Mobility Rates: Success Rate vs. Access by College



## Top 10 Colleges by Mobility Rate (Bottom to Top 20%)

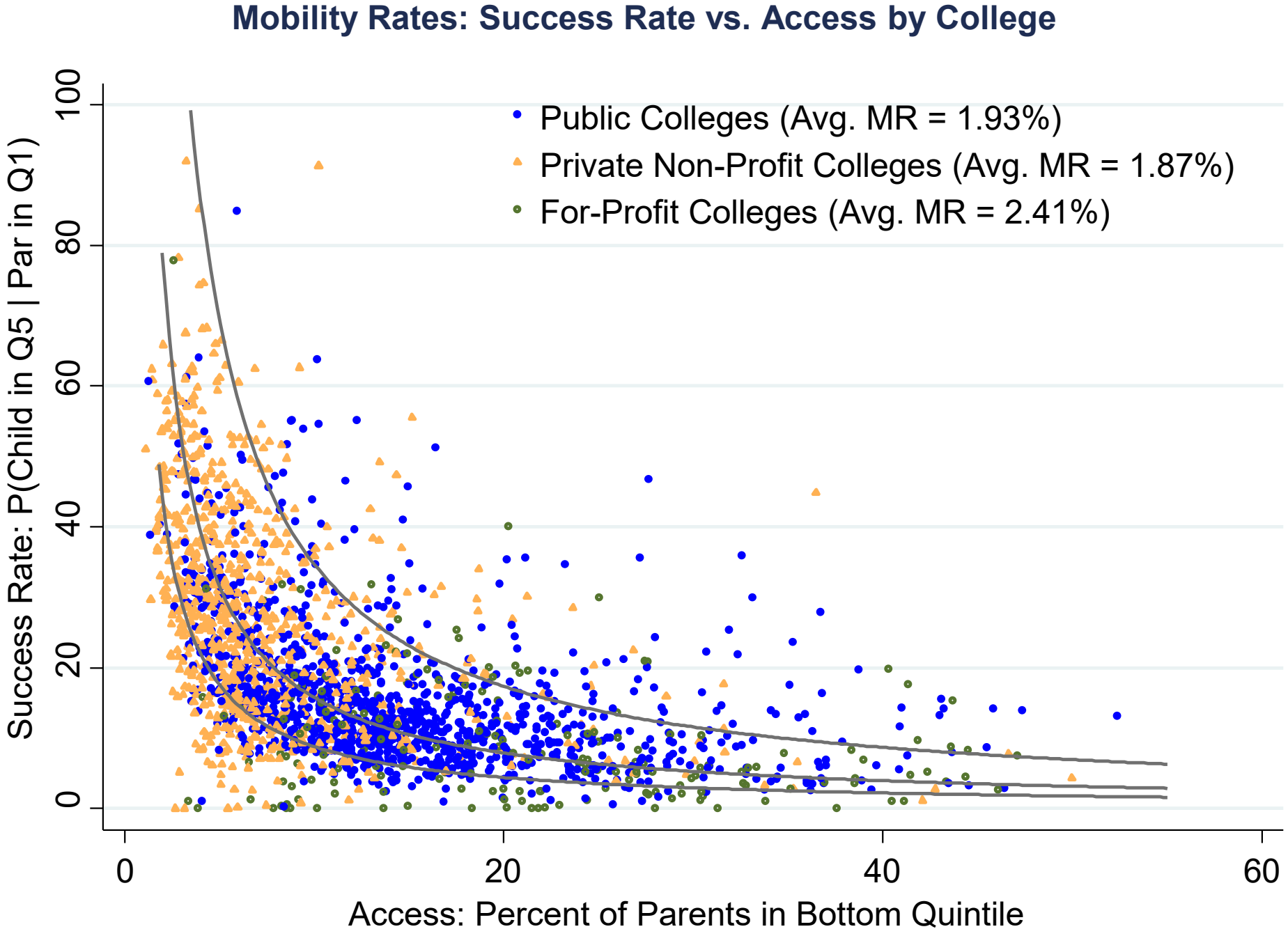
| Rank | Name | Fraction Low-Income | x | Top-Quintile Outcome Rate | = | Mobility Rate |
|---|---|---|---|---|---|---|
| 1 | Cal State University – LA | 33.1% | | 29.9% | | 9.9% |
| 2 | Pace University – New York | 15.2% | | 55.6% | | 8.4% |
| 3 | SUNY – Stony Brook | 16.4% | | 51.2% | | 8.4% |
| 4 | University of Texas – Pan American | 38.7% | | 19.8% | | 7.6% |
| 5 | CUNY System | 28.7% | | 25.2% | | 7.2% |
| 6 | Glendale Community College | 32.4% | | 21.9% | | 7.1% |
| 7 | South Texas College | 52.4% | | 13.2% | | 6.9% |
| 8 | Cal State Polytechnic – Pomona | 14.9% | | 45.8% | | 6.8% |
| 9 | University of Texas – El Paso | 28.0% | | 24.4% | | 6.8% |
| 10 | St John’s University – Queens, NY | 14.3% | | 47.4% | | 6.8% |


Distribution of Majors: High-Mobility-Rate Colleges vs. All Other Colleges
Pct. of Degree Awards by Major in 2000 (%)
0
20
40
60
80
100
STEM = 14.9%
Business = 20.1%
STEM = 17.9%
Business = 19.9%
All Other Colleges
High Mobility Rate Colleges
STEM
Business
Trades and Personal Services
Social Sciences
Public and Social Services
Multi/Interdisciplinary Studies
Health and Medicine
Arts and Humanities

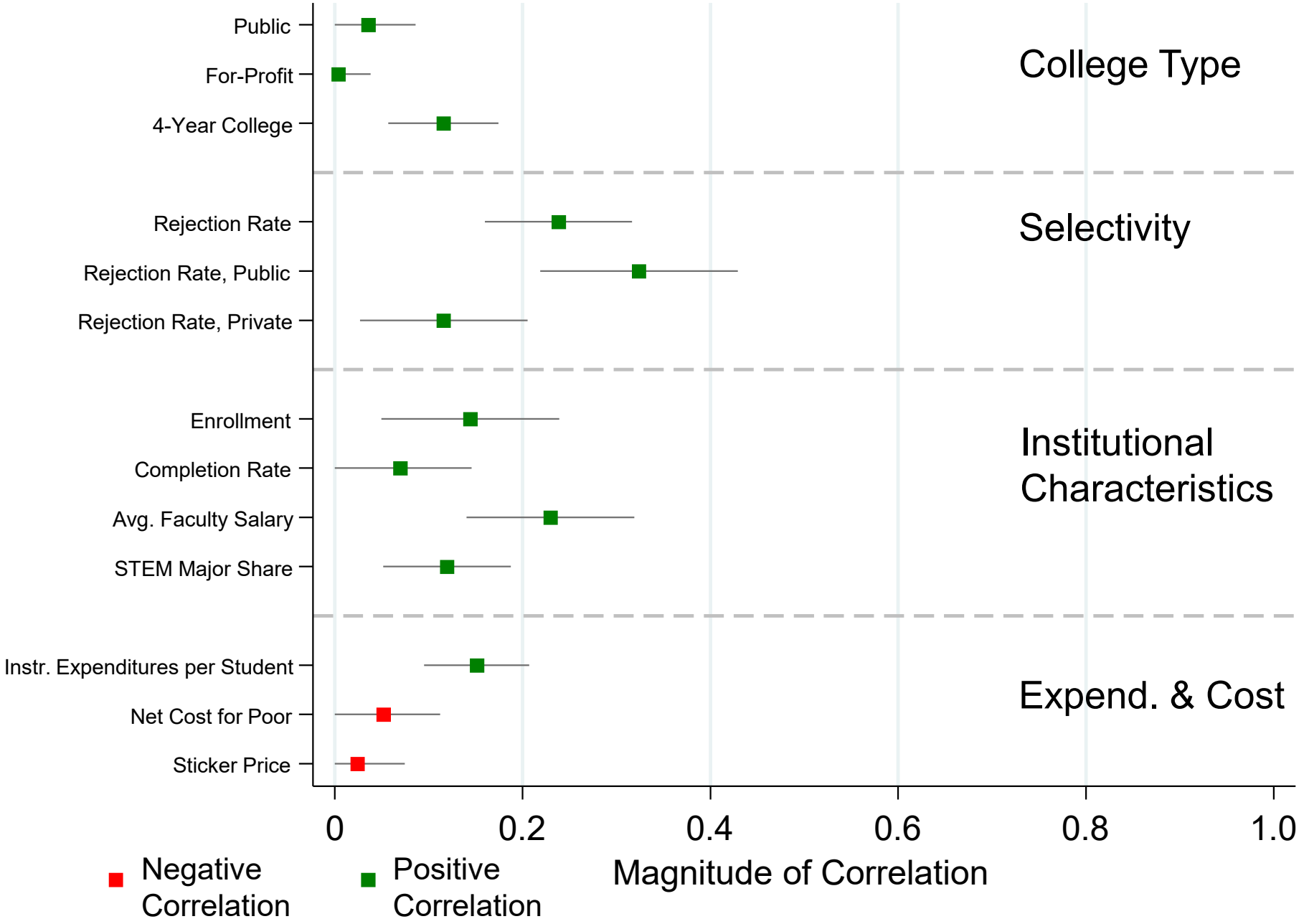

Mobility Rates: Colleges in Los Angeles
Success Rate: P(Child in Q5 | Par in Q1)
0
20
40
60
80
100
Access: Percent of Parents in Bottom Quintile
0
20
40
60
Harvey Mudd College
Claremont McKenna College
UC-Irvine
USC
UCLA
Pepperdine
UC-Riverside
La Verne
Cal State-Los Angeles
Glendale CC
SD of MR = 1.30%
SD of MR within CZ = 0.97%

# Which Colleges Have the Highest Mobility Rates?

- Characterize the types of colleges with high vs. low rates of mobility
  - Correlate Mobility Rate, P(Child in Q5 and Parent in Q1), with various college characteristics
- Analysis in this section is purely descriptive; explore causal effects of colleges toward the end of the talk

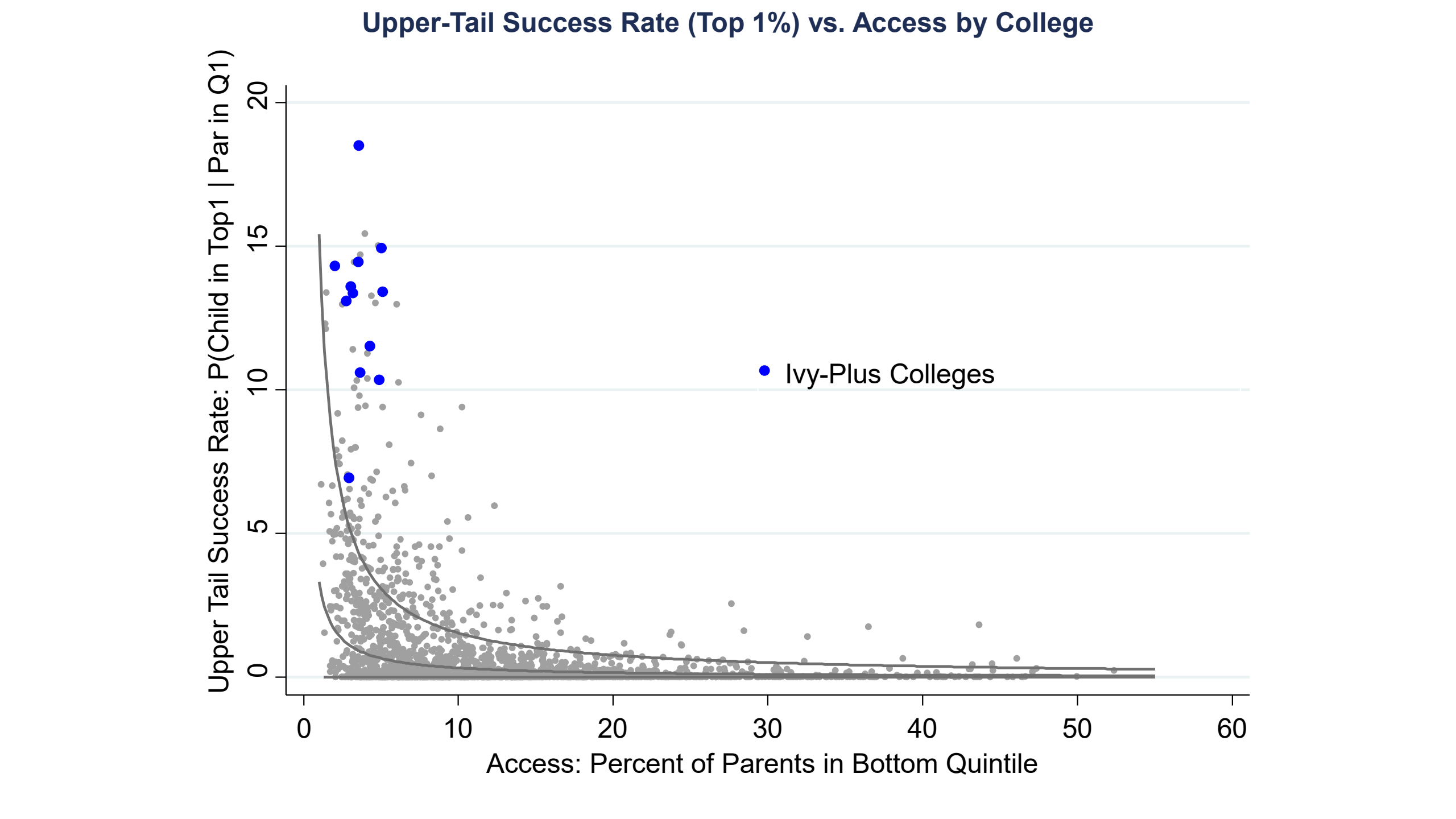

Mobility Rates: Success Rate vs. Access by College
Public Colleges (Avg. MR = 1.93%)
Private Non-Profit Colleges (Avg. MR = 1.87%)
For-Profit Colleges (Avg. MR = 2.41%)
Success Rate: P(Child in Q5 | Par in Q1)
0
20
40
60
80
100
Access: Percent of Parents in Bottom Quintile
0
20
40
60

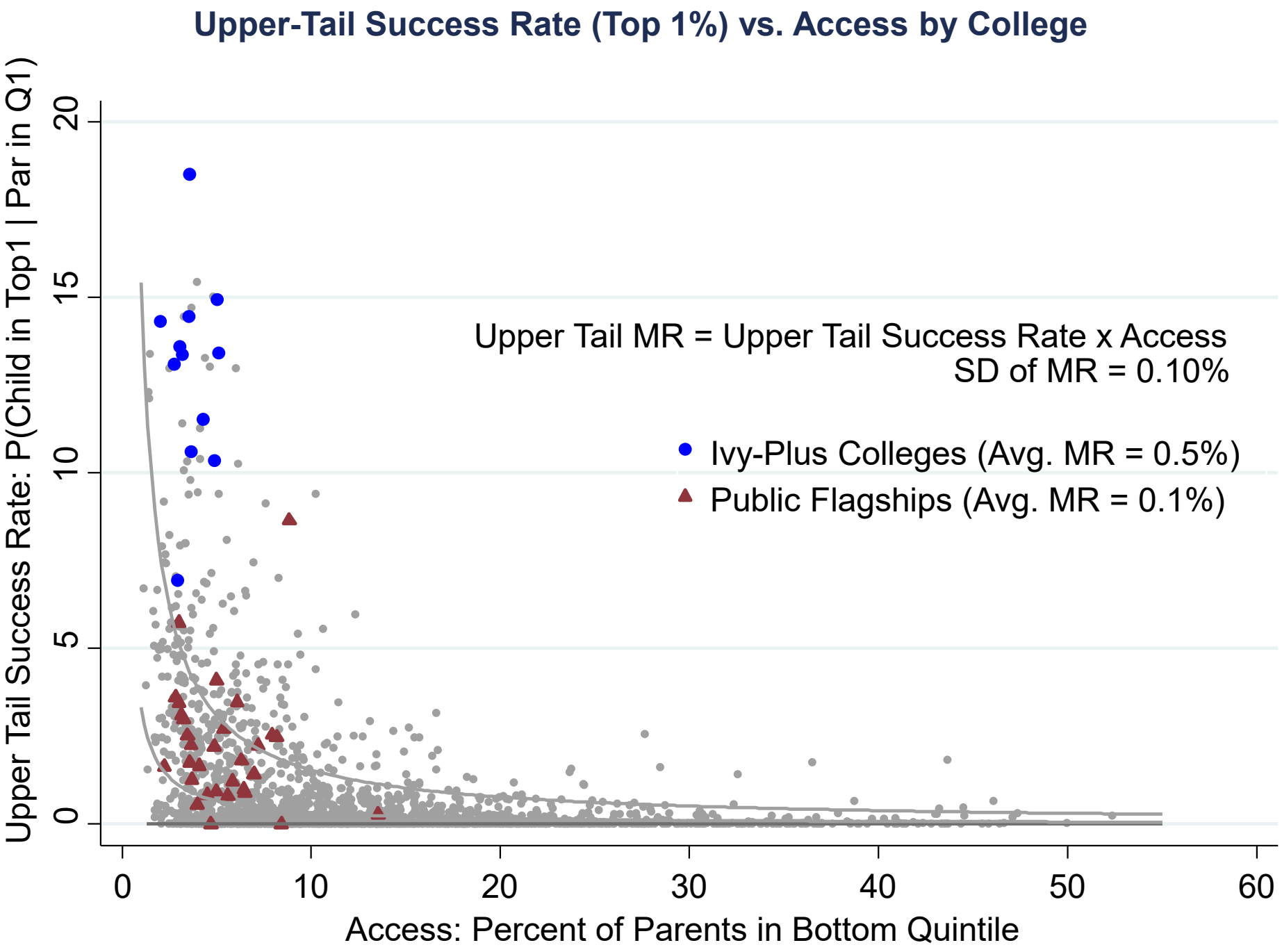
# Correlates of Top 20% Mobility Rate



# Mobility Rates for Upper-Tail Success

- Now examine mobility rates for upper tail success: fraction of students who come from bottom quintile and reach top 1%

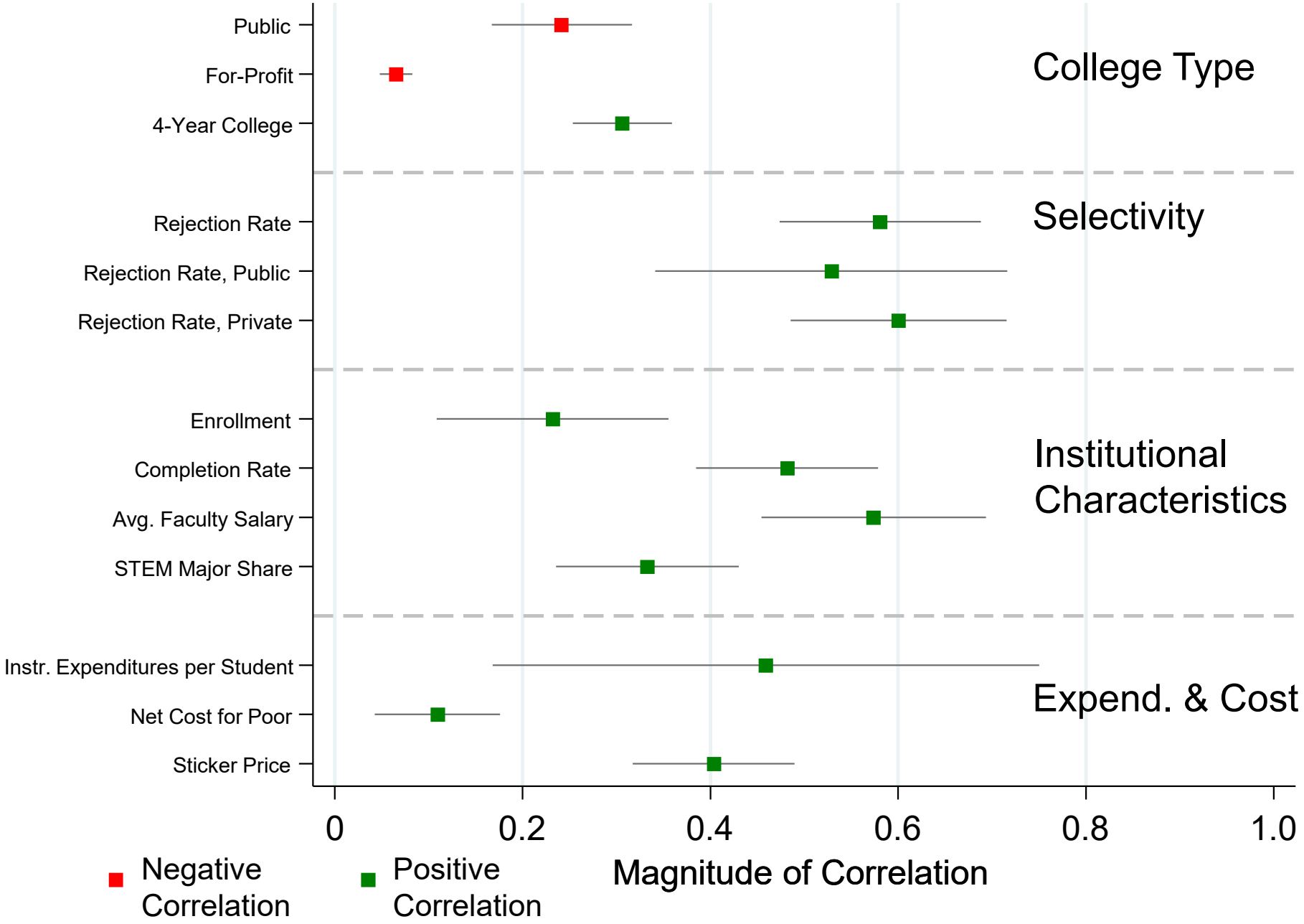

Upper-Tail Success Rate (Top 1%) vs. Access by College
Upper Tail Success Rate: P(Child in Top1 | Par in Q1)
0
5
10
15
20
Ivy-Plus Colleges
0
10
20
30
40
50
60
Access: Percent of Parents in Bottom Quintile


Upper-Tail Success Rate (Top 1%) vs. Access by College
Upper Tail Success Rate: P(Child in Top1 | Par in Q1)
0
5
10
15
20
0
10
20
30
40
50
60
Access: Percent of Parents in Bottom Quintile
Upper Tail MR = Upper Tail Success Rate x Access
SD of MR = 0.10%
Ivy-Plus Colleges (Avg. MR = 0.5%)
Public Flagships (Avg. MR = 0.1%)

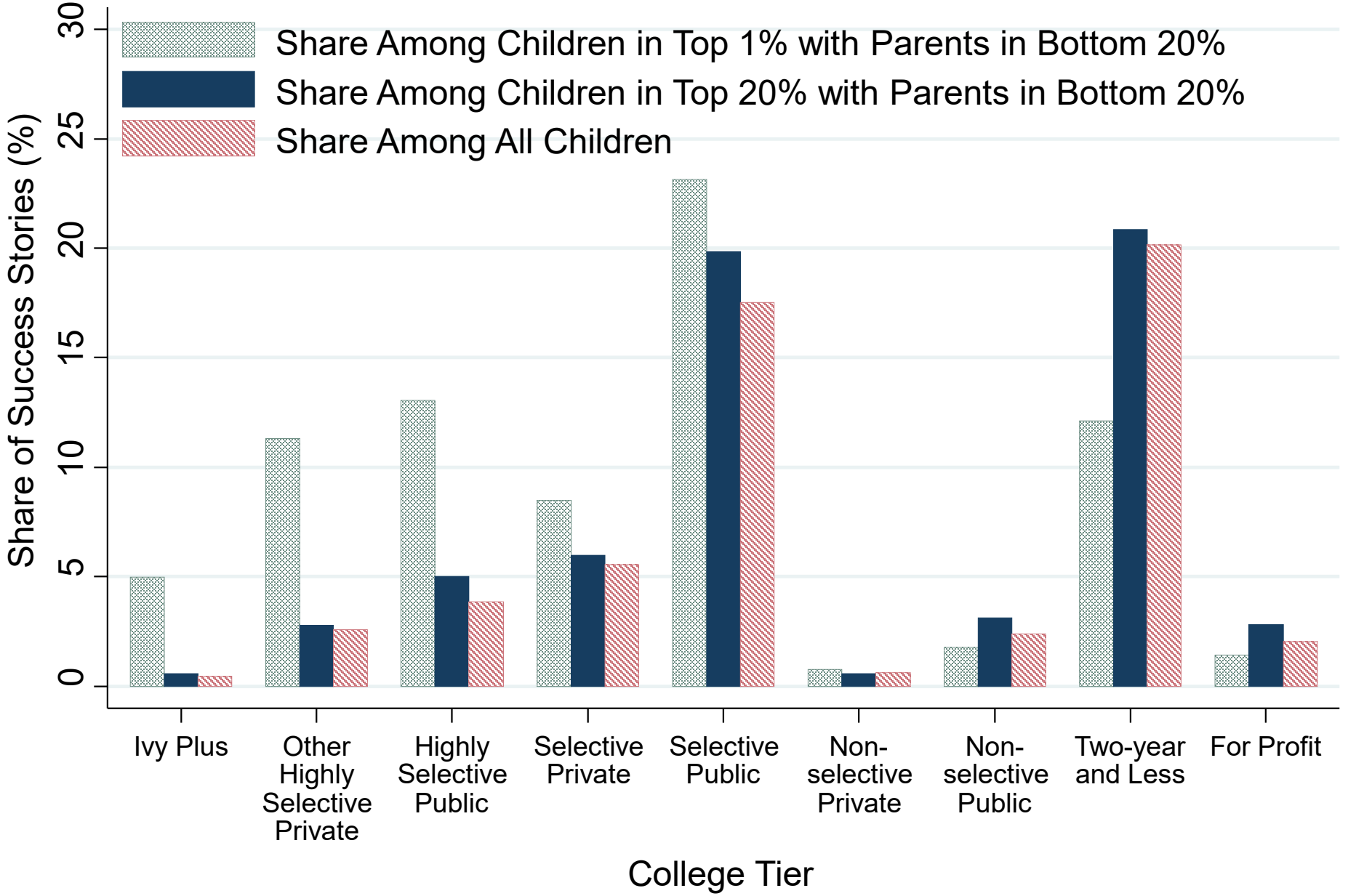
## Top 10 Colleges by Mobility Rates for Upper-Tail Success (Top 1%)

| Rank | Name | Mobility Rate | = | Access | x | Upper-Tail Success |
|---|---|---|---|---|---|---|
| 1 | University of California – Berkeley | 0.76% | | 8.8% | | 8.6% |
| 2 | Columbia University | 0.75% | | 5.0% | | 14.9% |
| 3 | MIT | 0.68% | | 5.1% | | 13.4% |
| 3 | Stanford University | 0.66% | | 3.6% | | 18.5% |
| 4 | Swarthmore College | 0.61% | | 4.7% | | 13.0% |
| 6 | Johns Hopkins University | 0.54% | | 3.7% | | 14.7% |
| 7 | New York University | 0.52% | | 6.9% | | 7.5% |
| 8 | University of Pennsylvania | 0.51% | | 3.5% | | 14.5% |
| 9 | Cornell University | 0.51% | | 4.9% | | 10.4% |
| 10 | University of Chicago | 0.50% | | 4.3% | | 11.5% |

# Correlates of Top 1% Mobility Rate



# Fraction of Success Stories by School Type



# Lessons on Mobility Rates

- **Fact #3**: Certain mid-tier public institutions (e.g., CUNY, Cal-State) have the highest bottom-to-top quintile mobility rates

- But highly selective institutions (e.g., Berkeley) have the highest bottom-to-top-1% mobility rates

# Part 3
# Counterfactual Student Allocations: Undermatching and Intergenerational Mobility

# Income-Neutral Student Allocation

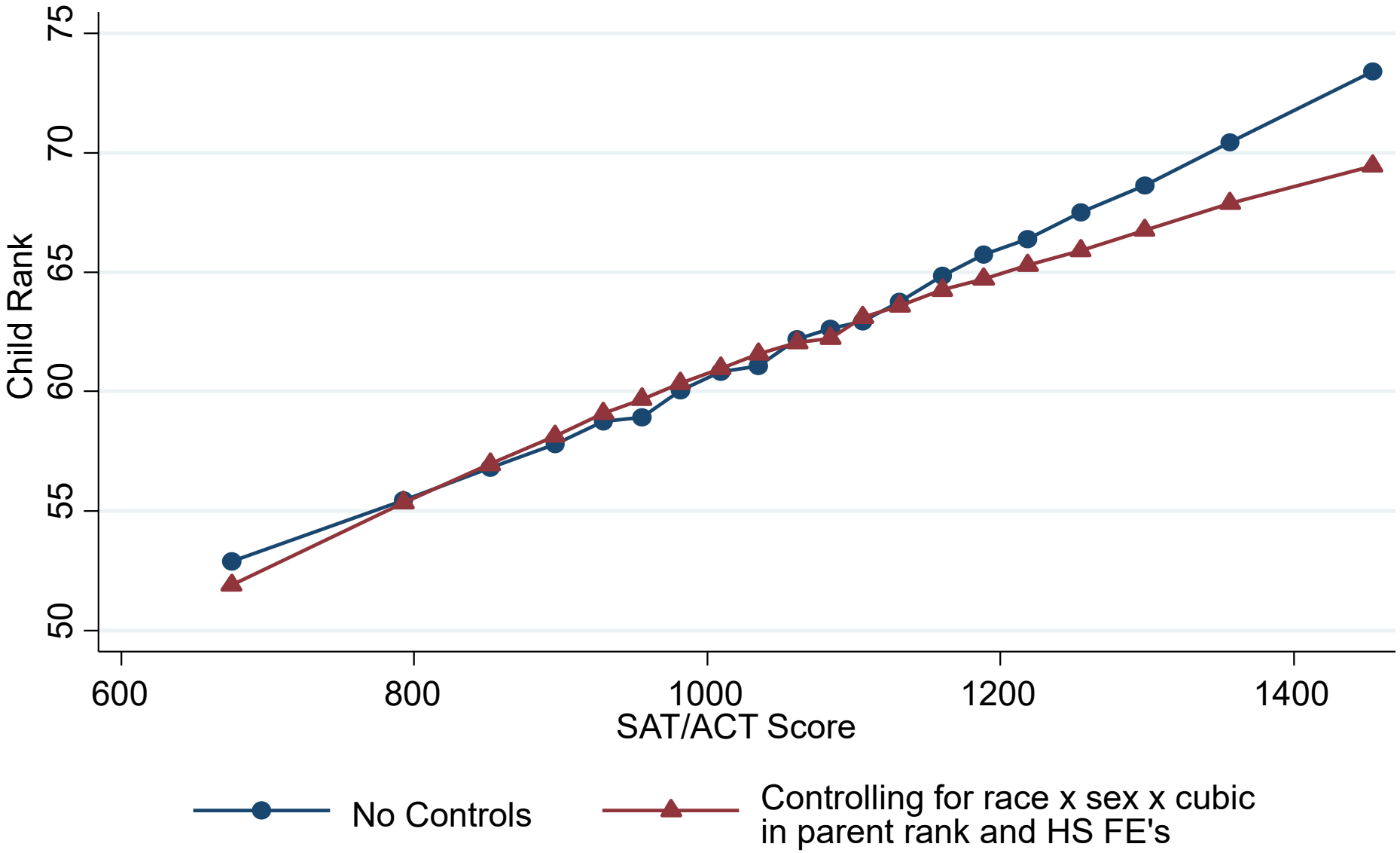
- Now simulate how income segregation across colleges and intergenerational mobility would change if students were allocated to colleges differently

- Begin by evaluating the extent to which differences in parental income distributions across colleges can be explained by differences in academic preparation at point of application

# Test Score Data

- Use data on SAT/ACT scores for 1980-82 cohorts as a proxy for pre-college academic qualifications
  - Impute scores for college students who do not register a test by matching within parent income quintile, state, selectivity tier, and earnings level in adulthood
  - Validate using out-of-sample testing
- Test scores are a useful proxy for academic qualification as relevant for college enrollment
  - 100 SAT points is associated with a $5,307 (2.2 percentiles) annual increase in earnings, controlling for race, gender, parent income, and HS fixed effects

# Relationship Between SAT Scores and Earnings in Adulthood

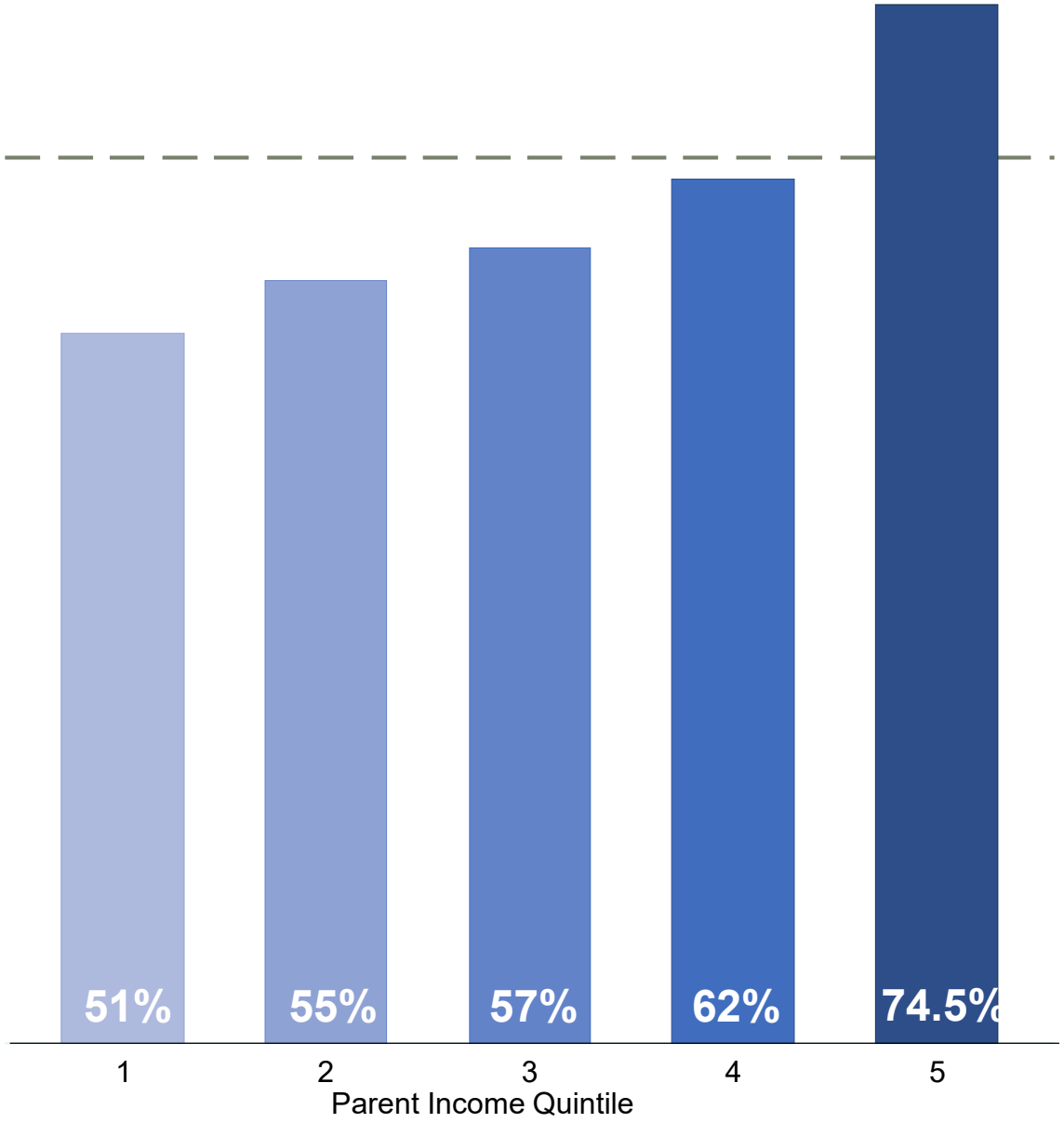


# Undermatching

- First step: observe that at any given level of SAT/ACT scores, children from higher-income families attend more selective colleges

## Attendance Rates at Selective Colleges

Among All Students with Median Selective College SAT (1080)



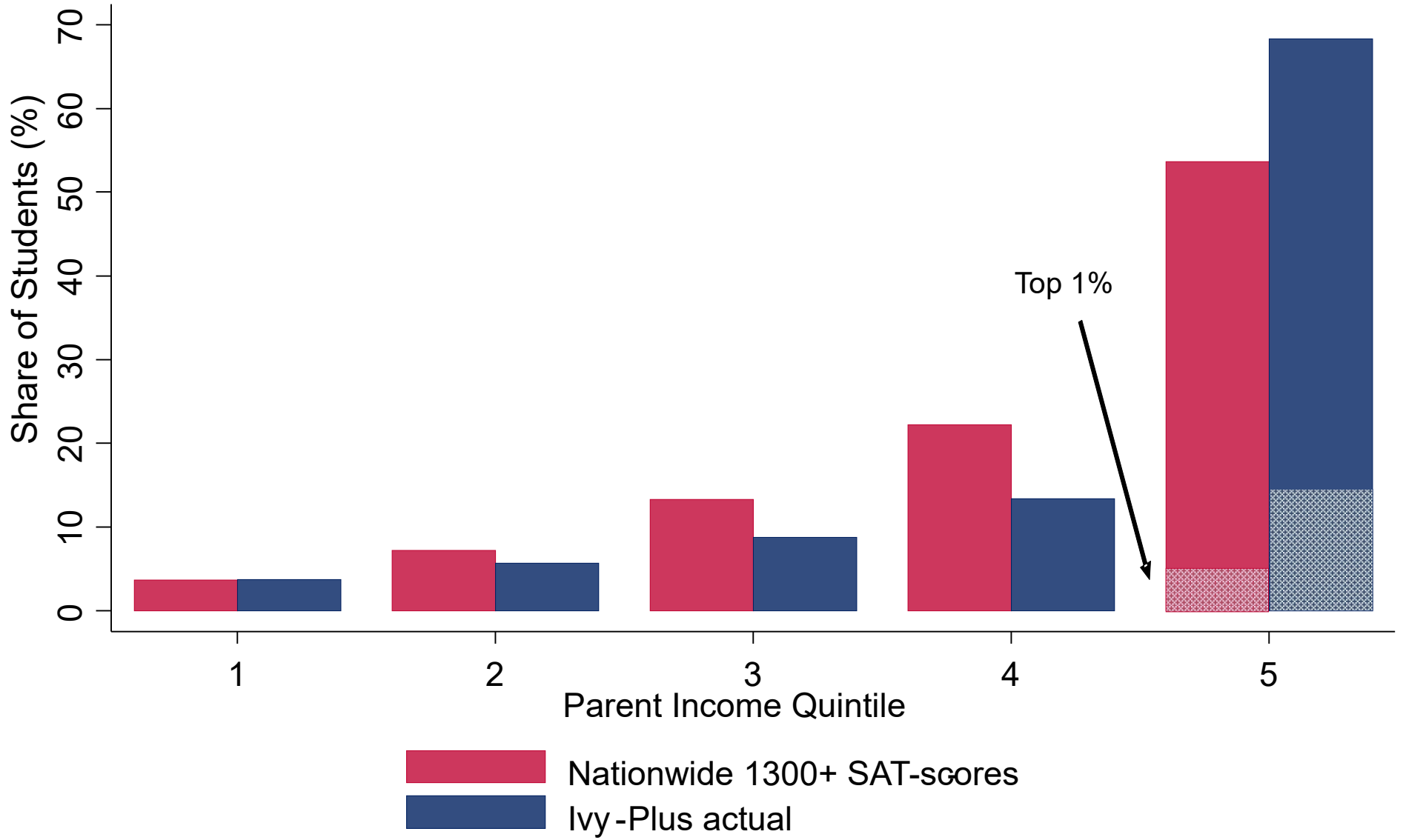
# Income-Neutral Student Allocation

- To quantify degree of undermatching, consider reallocating students to equalize attendance rates between students from all parent income backgrounds, conditional on scores
    - Hold number of students, distribution of scores, home state mix, and racial diversity constant at each school
- Such a reallocation would substantially reduce parental income segregation across colleges
    - Closes 38% of gap in bottom-quintile share relative to benchmark in which all colleges have the same bottom-quintile share

# Undermatching at Ivy-Plus Colleges

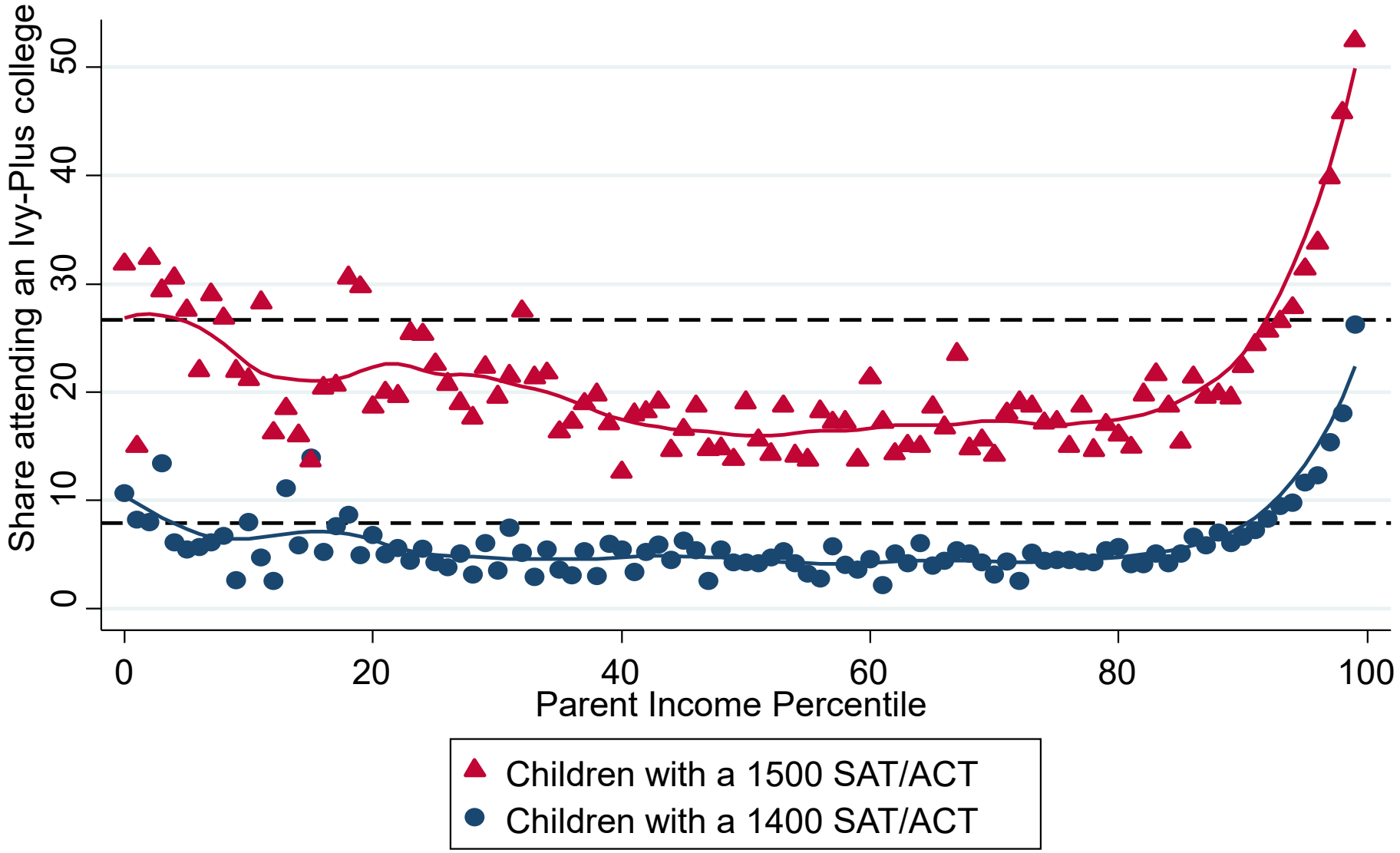
- At Ivy-plus schools, we find substantial undermatching of middle-income students, but little undermatching of low-income students
  - There are very few students from low-income families with sufficiently high test scores to get into such colleges
  - Among students scoring 1300+ on the SAT/ACT, only 3.7% come from the lowest quintile of parent income

# Parental Income among High-SAT Scorers vs. Ivy-Plus Colleges



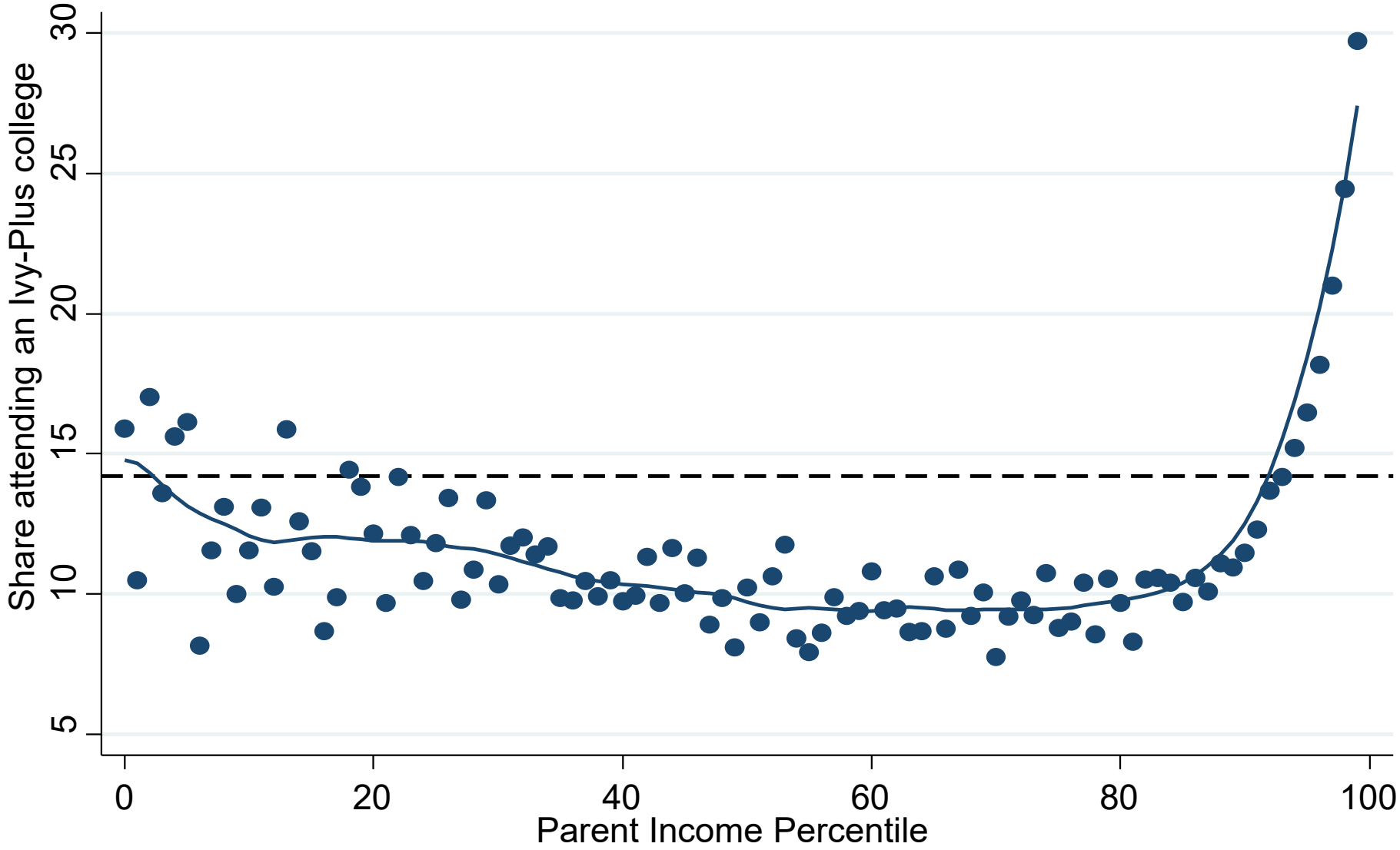
## Ivy-Plus Attendance Rates by Parental Income Conditional on SAT/ACT Scores

Students with Scores of 1400 or 1500 on SAT/ACT



**Ivy-Plus Attendance Rates by Parental Income Conditional on SAT/ACT Scores**

All SAT/ACT Scores, Reweighted to Match Ivy-Plus SAT/ACT Score Distribution



# Undermatching at Ivy-Plus Colleges

- At Ivy-plus schools, we find substantial undermatching of middle-income students, but little undermatching of low-income students
  - There are very few students from low-income families with sufficiently high test scores to get into such colleges
  - Among students scoring 1300+ on the SAT/ACT, only 3.7% come from the lowest quintile of parent income
- Why do we find fewer high-achieving, low-income children relative to Hoxby and Avery (2013)?
  - Individual measurement of parent income (rather than tract-based imputation)
  - Measure income and percentile cutoffs in the same dataset

# Need-Affirmative Counterfactual Allocation

- To further increase representation of lowest-income students at elite private colleges, need to give them some preference in application/admissions process

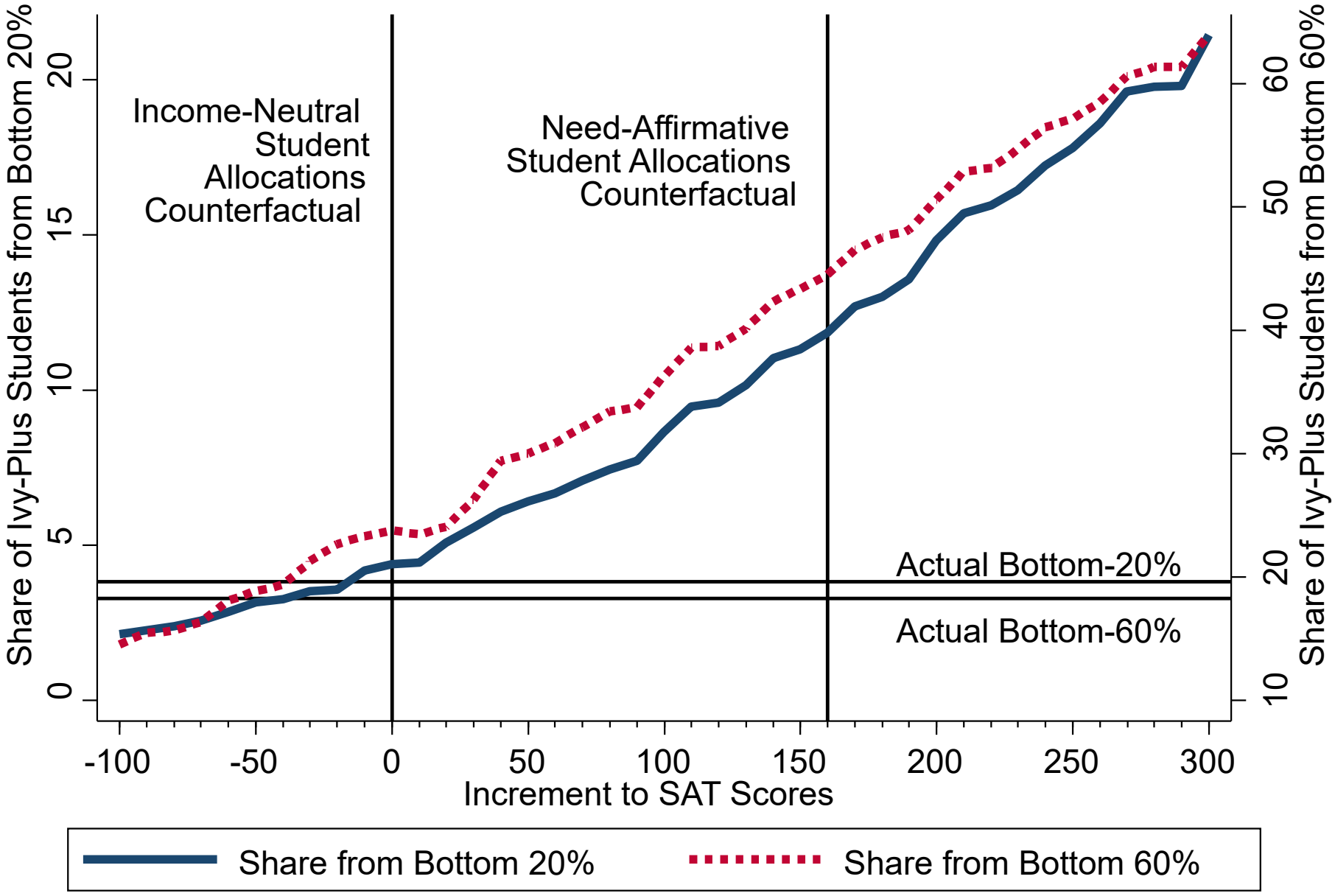
- We model this by giving students from low-income families an increment to their SAT score
  - Sliding-scale increment by income: increase SAT scores by 80%, 60%, and 40% as much in 2nd-4th parent income quintiles
  - Hold number of students, home state mix, and racial diversity constant at each school

# Need-Affirmative Counterfactual Allocation

- Finding: Adding 160 points to the SAT scores of students from the bottom quintile would desegregate higher education system
  - Roughly the same distribution of parent income across all college selectivity tiers

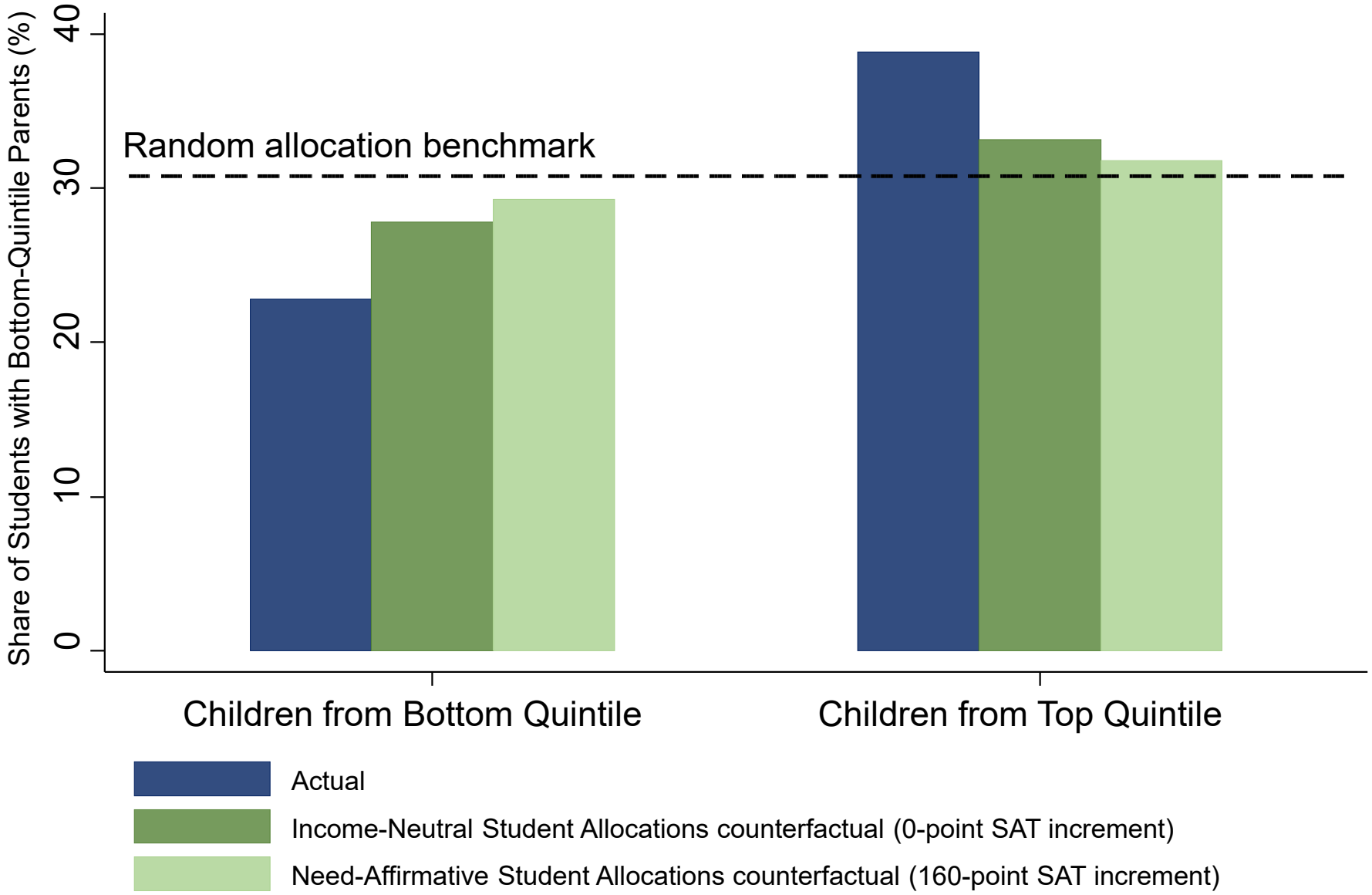
- At Ivy-Plus colleges, this would require increasing attendance rate for bottom-quintile students from 7.3% to 35.8%
  - Similar to the preference given to legacies, athletes, minority students at elite private colleges [Espenshade et al. 2004, Arcidiacono et al. 2019]

## Counterfactual Low-Income Shares at Ivy-Plus Colleges



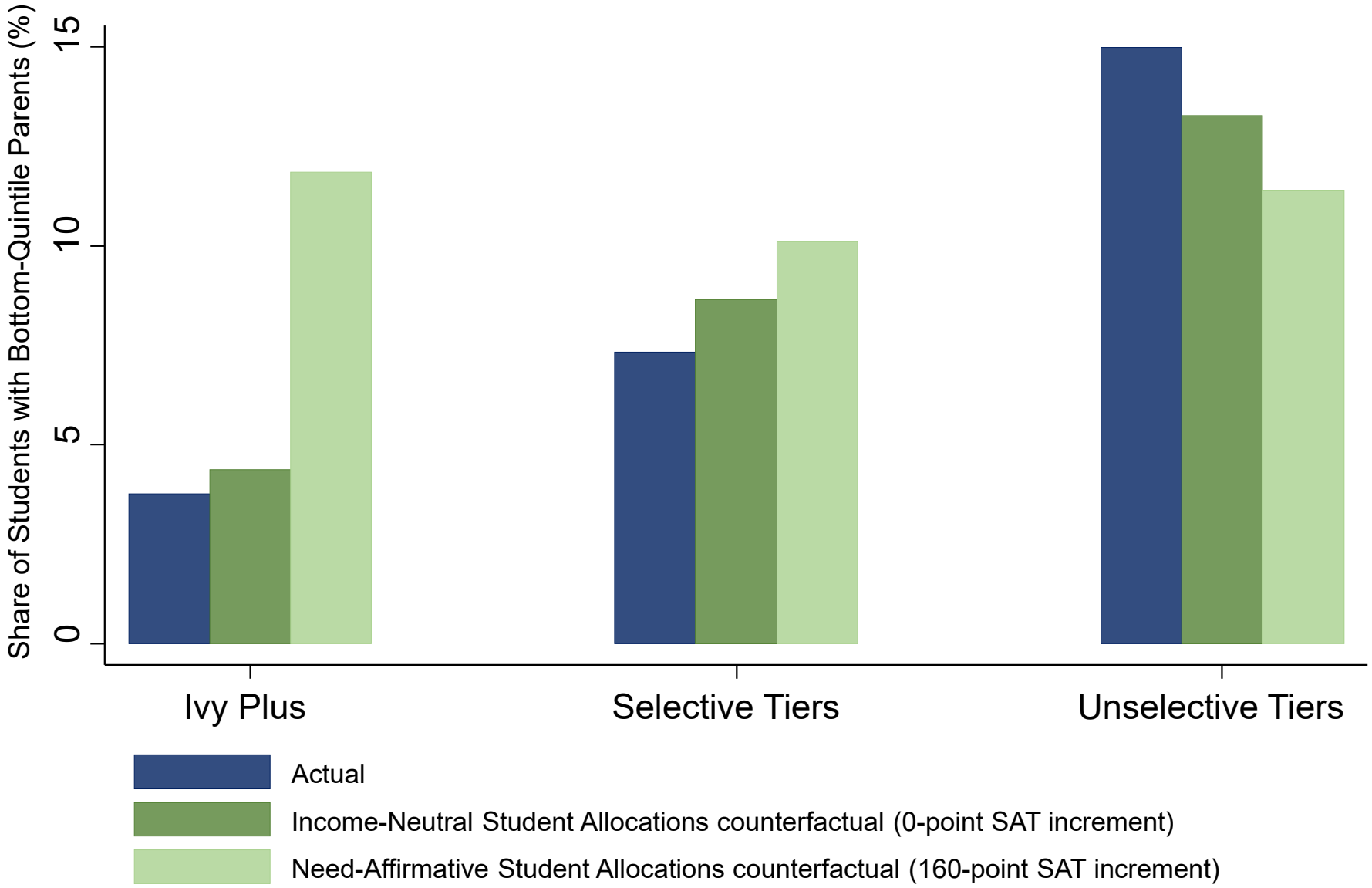
## Impacts of Counterfactuals on Income Segregation and Intergenerational Mobility

Fraction of Peers from Top-Quintile for Students from Bottom vs. Top Quintiles



# Impacts of Counterfactuals on Income Segregation and Intergenerational Mobility

## Fraction of Students with Low-Income Parents in Selected Tiers



# Potential Effect on Intergenerational Mobility

- Estimate causal effect of each school following Dale and Krueger (2002):
  - Begin with differences in earnings across colleges that control flexibly only for SAT and parent income
  - Adjusting for race, gender, location, and application set only reduces differences by 10-15%
  - We conservatively assume 80% of SAT-controlled differences are causal

# Fraction of Differences in Earnings Across Colleges Due to Causal Effects

*Dependent Variable:* college fixed effect, conditional on parental income, race and SAT/ACT

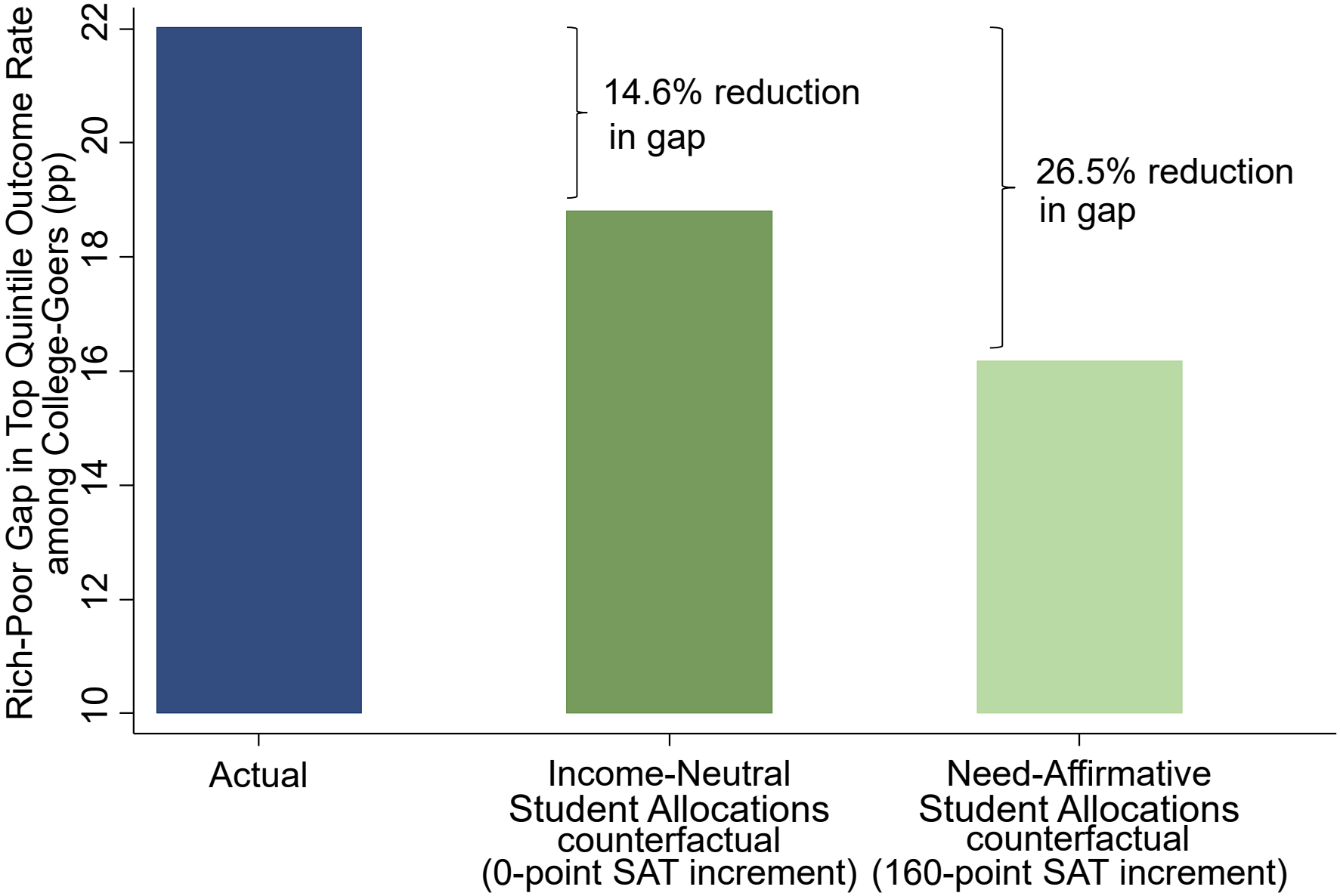
| | Race, Gender * SAT/ACT (1) | HS FE's (2) | HS FE's * Race (3) | Application Set and HS FEs (4) | Application Set, HS FEs * Race (5) | Bottom Quintile Only (6) |
|---|---|---|---|---|---|---|
| College fixed effect (conditional on parent inc., race, SAT/ACT) | 1.003 (0.006) | 0.907 (0.010) | 0.903 (0.010) | 0.857 (0.012) | 0.850 (0.012) | 0.850 (0.015) |
| Adj. R-squared | 0.968 | 0.886 | 0.883 | 0.889 | 0.886 | 0.750 |
| *Controls* | | | | | | |
| Interactions of race, gender w/SAT/ACT | X | X | X | X | X | X |
| High school FE's | | X | X | X | X | X |
| High school FE's interacted with race | | | X | | X | X |
| Mean SAT of schools to which scores were sent | | | | X | X | X |

# Potential Effect on Intergenerational Mobility

- Estimate causal effect of each school following Dale and Krueger (2002):
  - Begin with differences in earnings across colleges that control flexibly only for SAT and parent income
  - Adjusting for race, gender, location, and application set only reduces differences by 10-15%
  - We conservatively assume 80% of SAT-controlled differences are causal
- Income-neutral counterfactual would reduce top-quintile student earnings gap by 14.6%
  - Need-affirmative counterfactual would reduce top-quintile student earnings gap by 26.5%

## Impacts of Counterfactuals on Income Segregation and Intergenerational Mobility

Gaps in Chance of Reaching Top Earnings Quintile

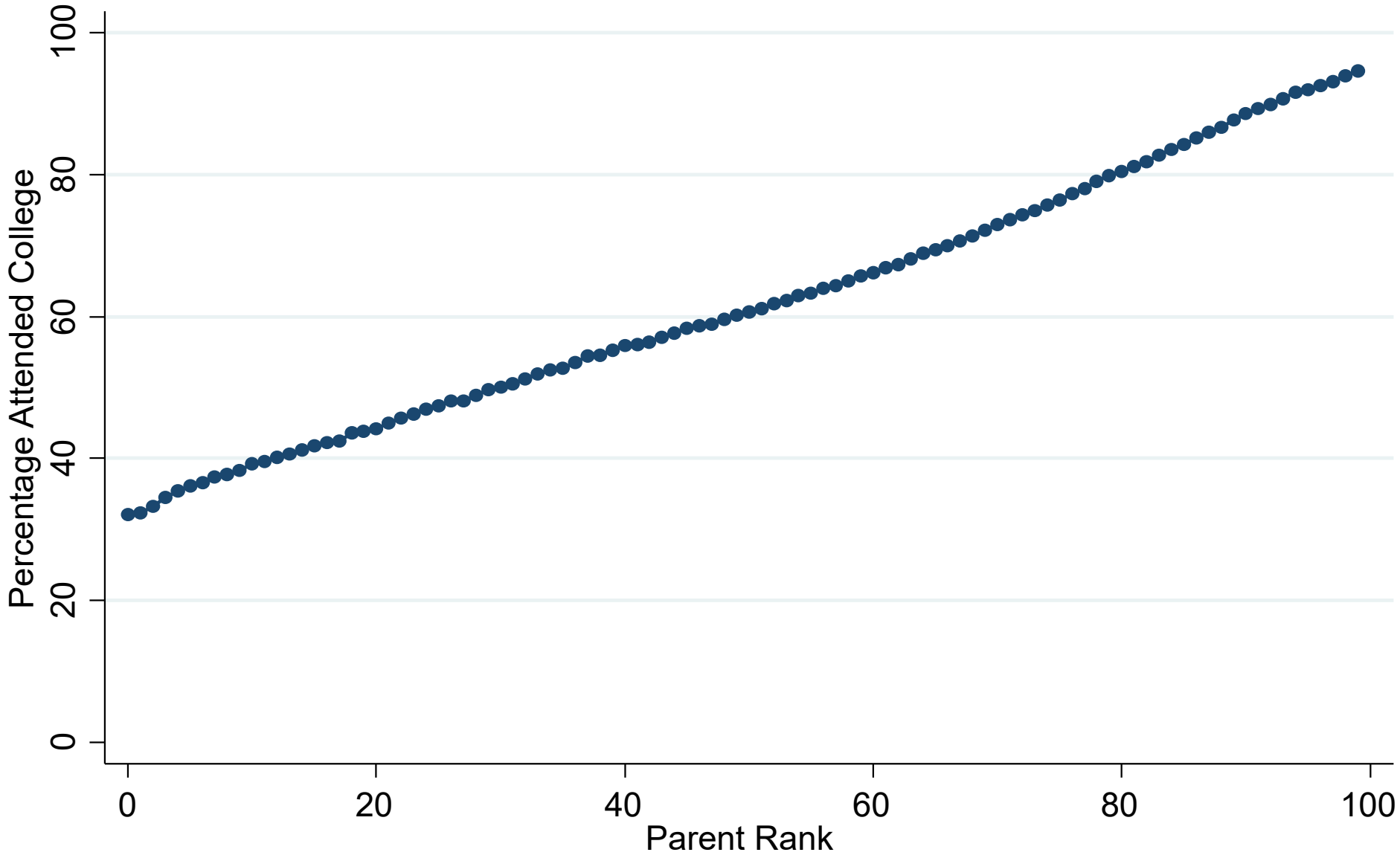


# Conclusion

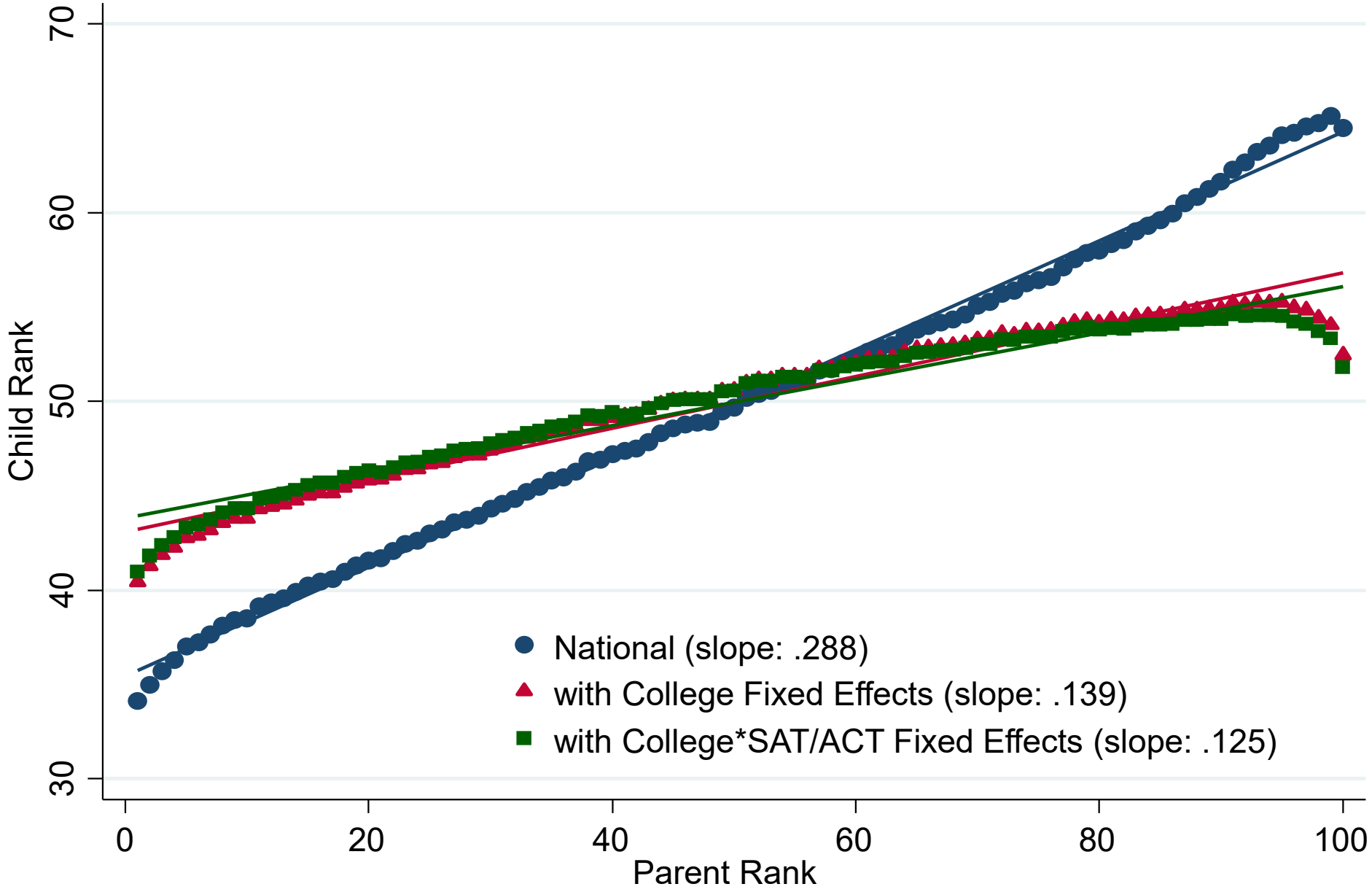
- Feasible changes in the allocation of students to colleges could change segregation across colleges substantially and increase intergenerational mobility significantly
    - Even without any changes in “value-added” of colleges (or national expenditure on higher education) or in pre-college environmental disparities
- Studying precisely how to increase the representation of students from lower-income families at more selective colleges is of great value
    - Do disparities arise due to differences in applications, admissions, or matriculation rates?
    - How can these disparities be tackled most effectively?

# Supplementary Figures

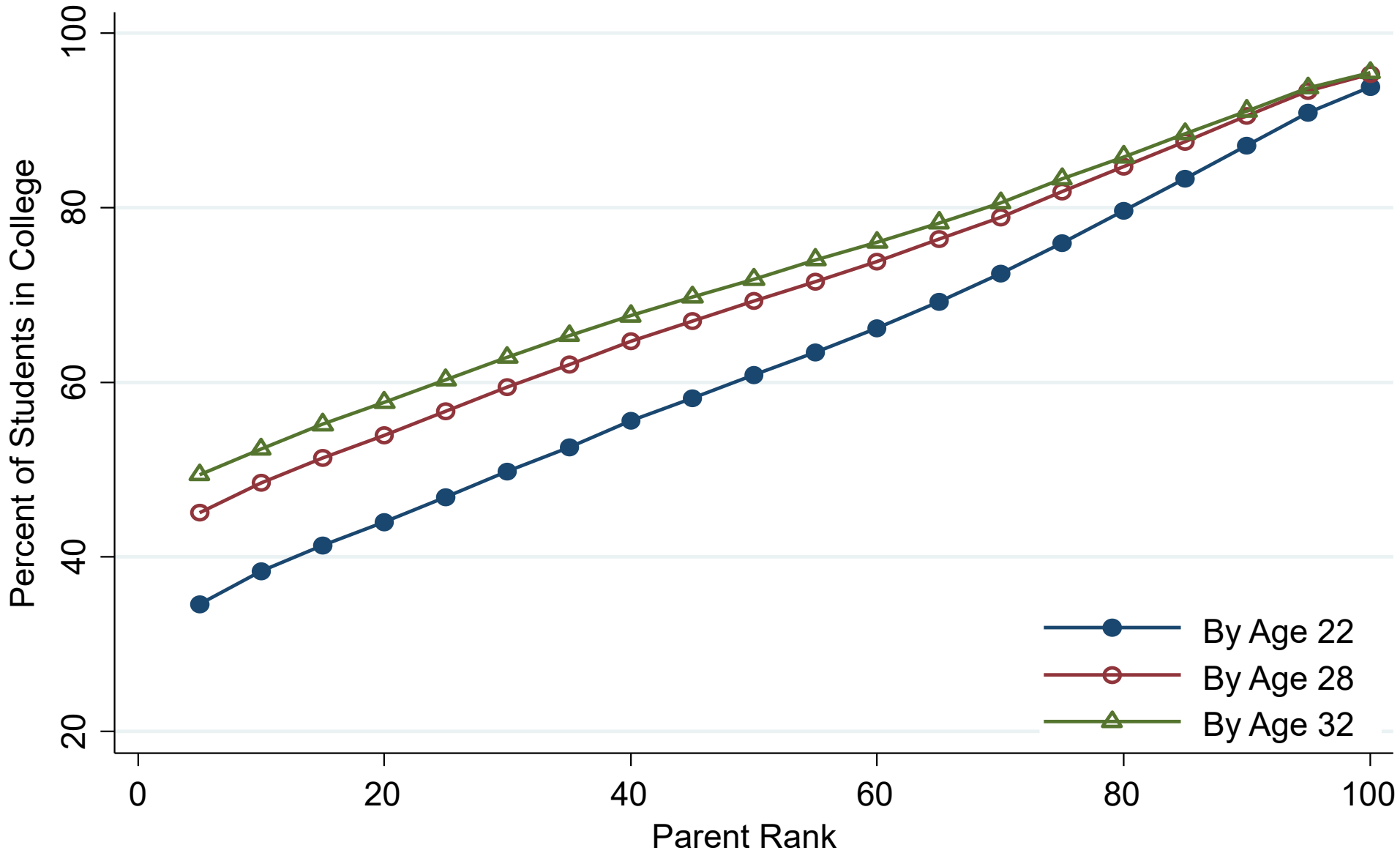
# College Attendance Rates by Parent Income Percentile

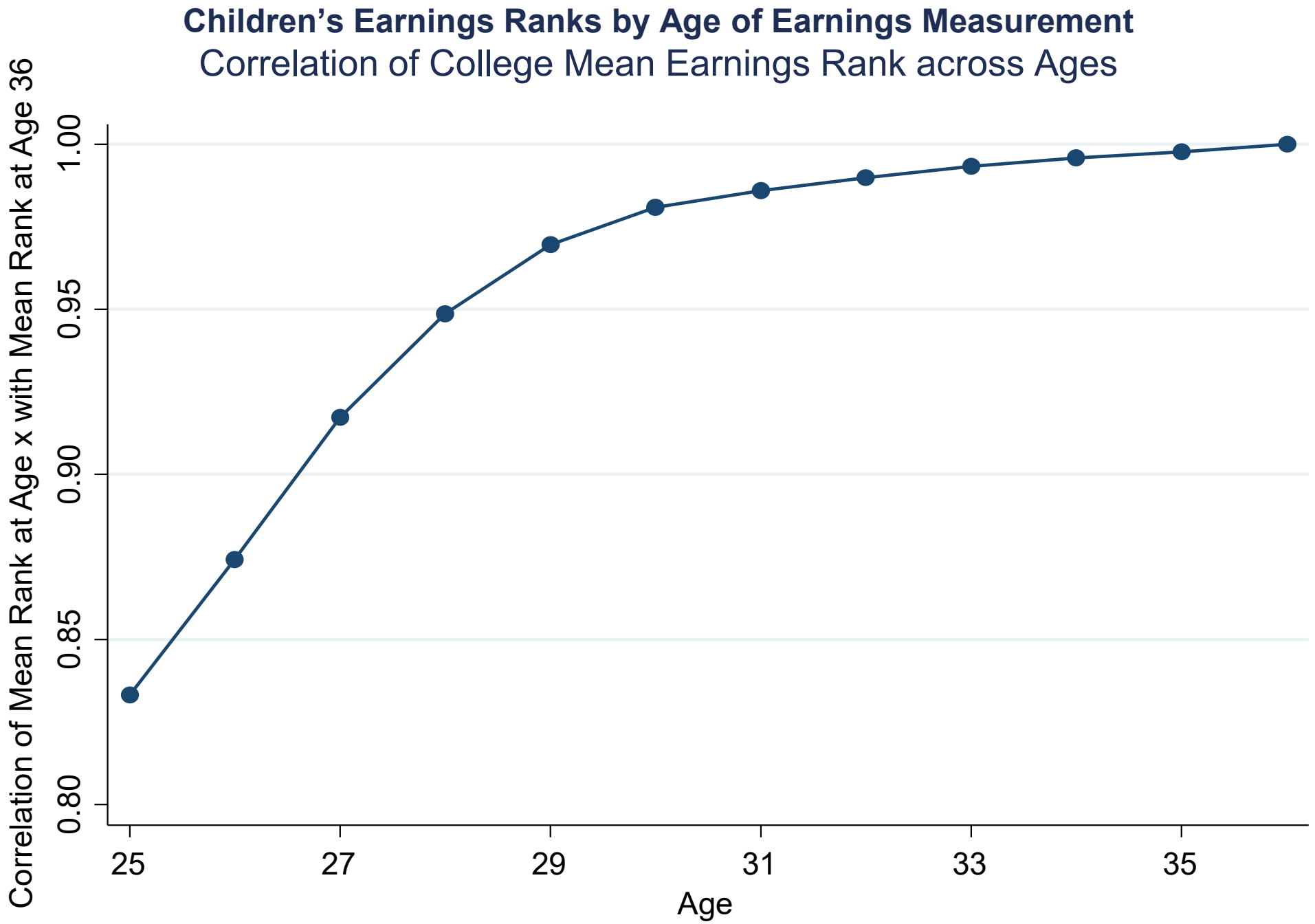


## Relationship Between Children's and Parents' Ranks within Colleges



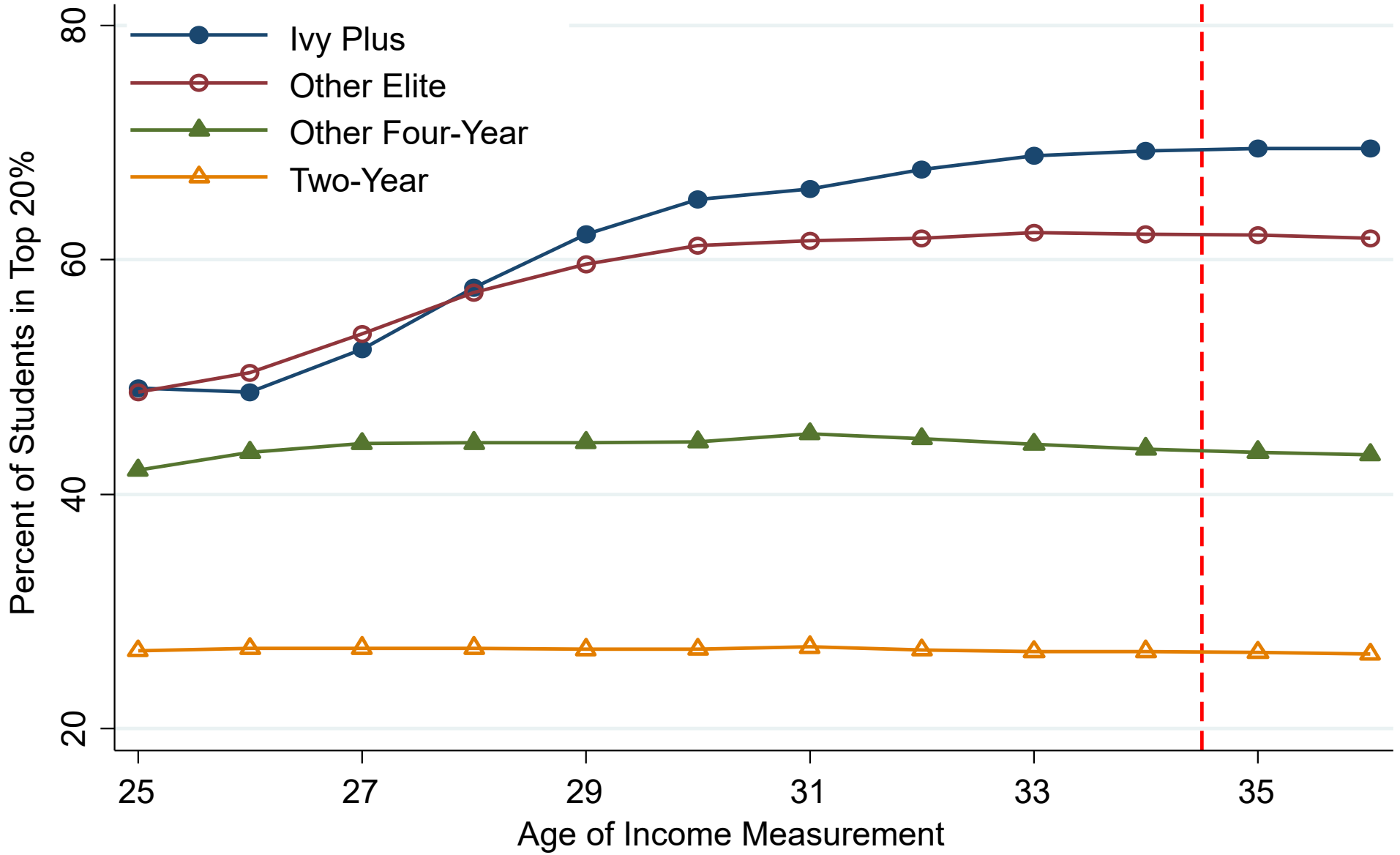
# College Attendance Rates by Parental Income and Age




Children's Earnings Ranks by Age of Earnings Measurement
Correlation of College Mean Earnings Rank across Ages
Correlation of Mean Rank at Age x with Mean Rank at Age 36
0.80
0.85
0.90
0.95
1.00
25
27
29
31
33
35
Age

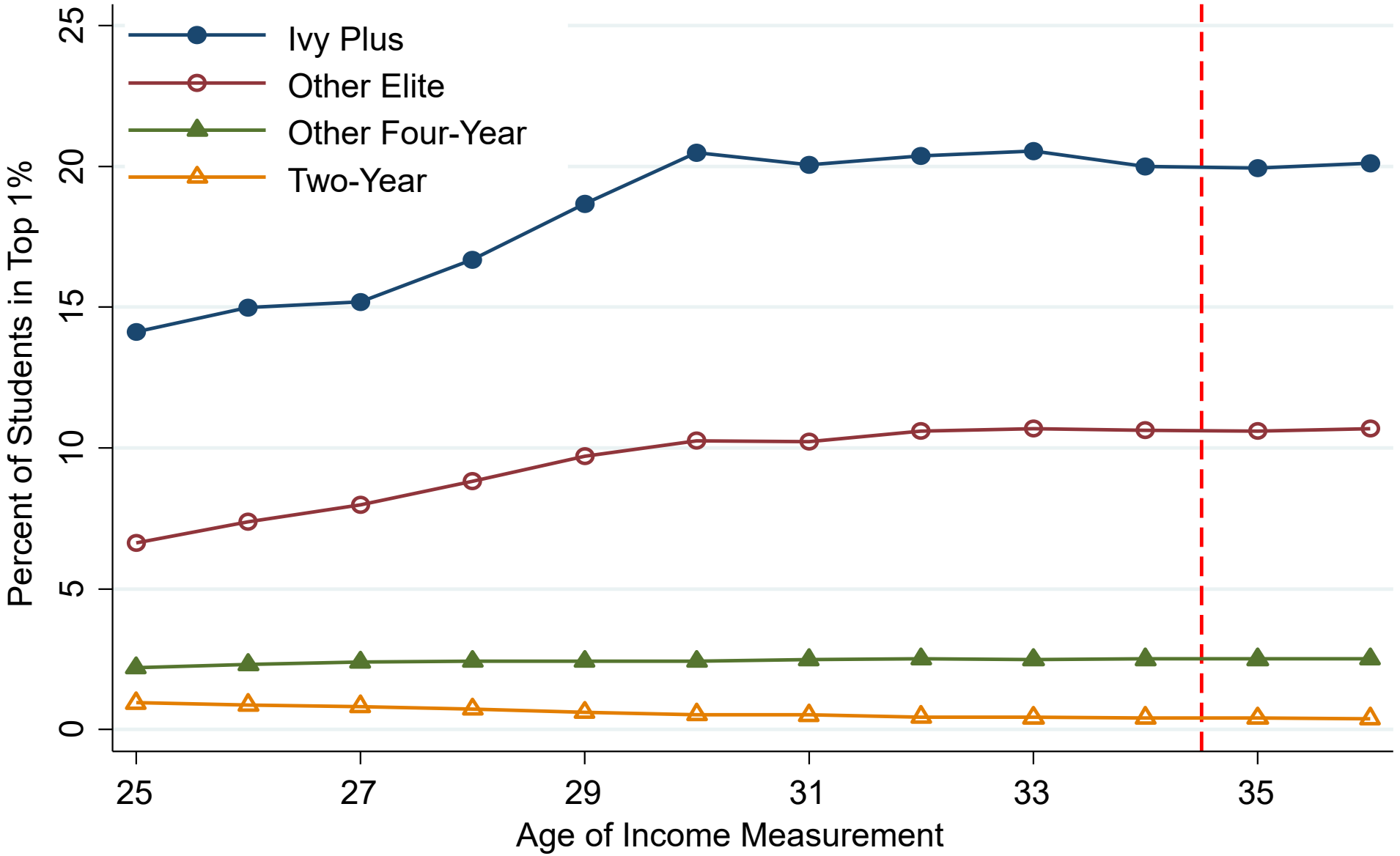
**Children's Earnings Ranks by Age of Earnings Measurement**

Fraction of Children in Top Quintile

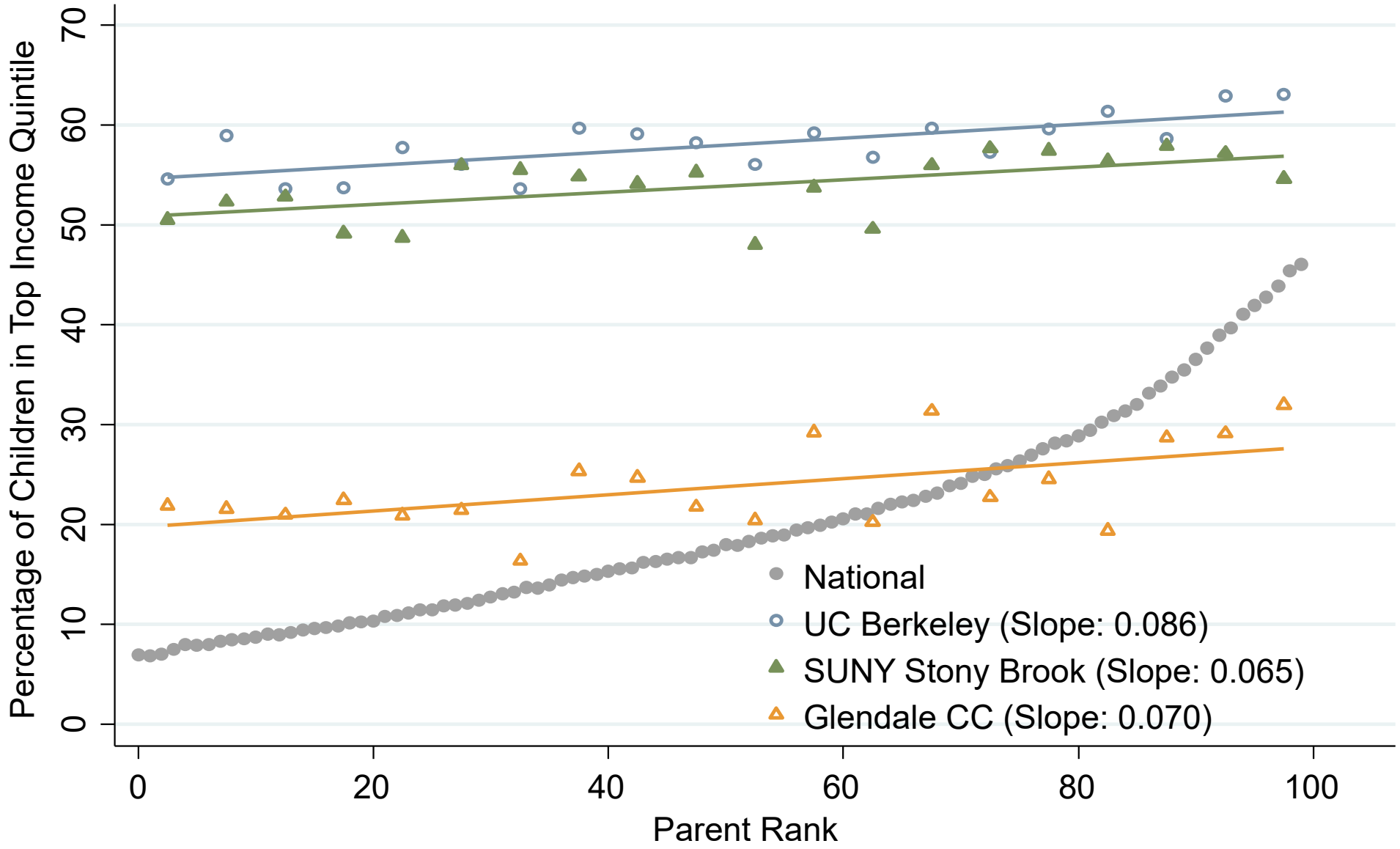


**Children's Earnings Ranks by Age of Earnings Measurement**

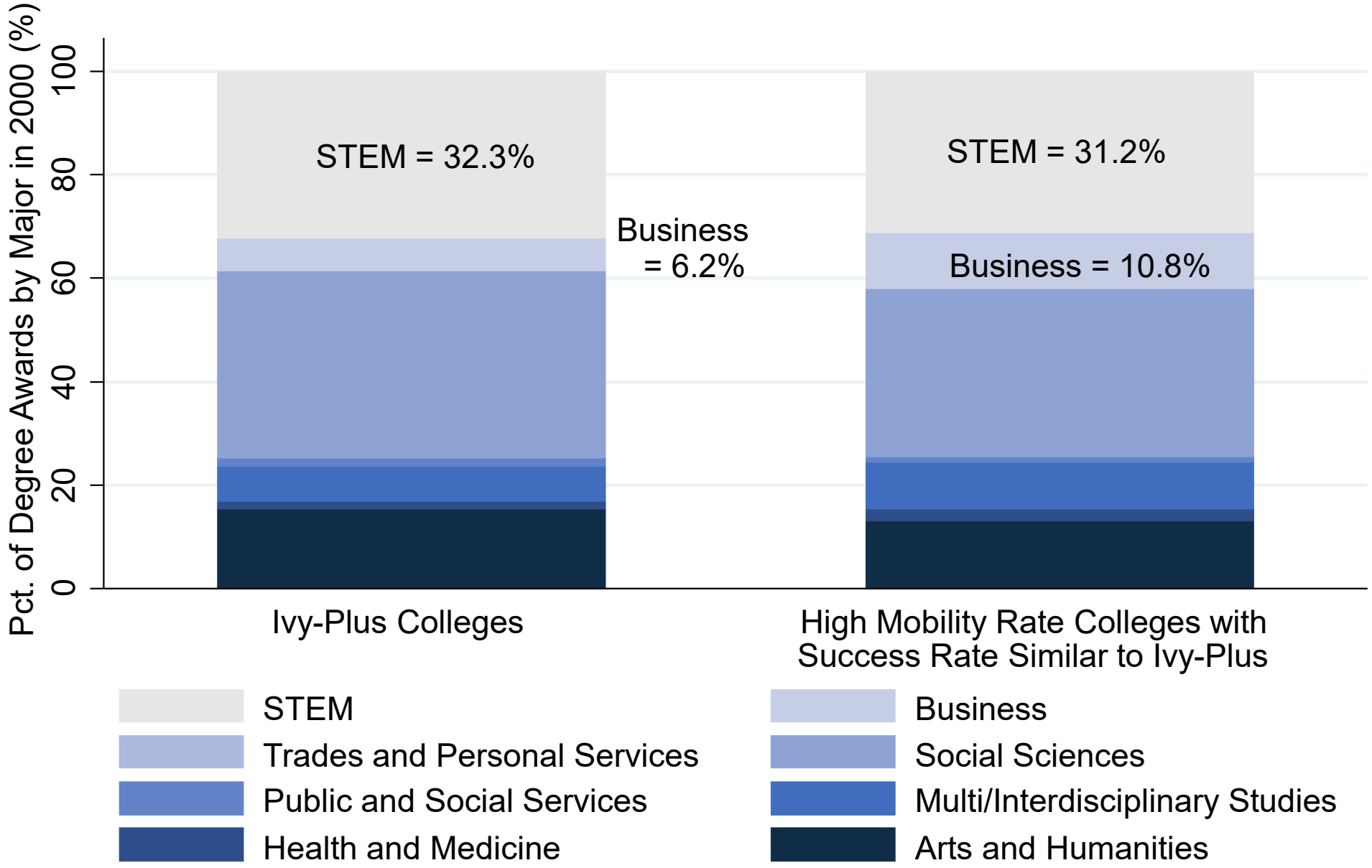
Fraction of Children in Top 1% by Age and College Tier

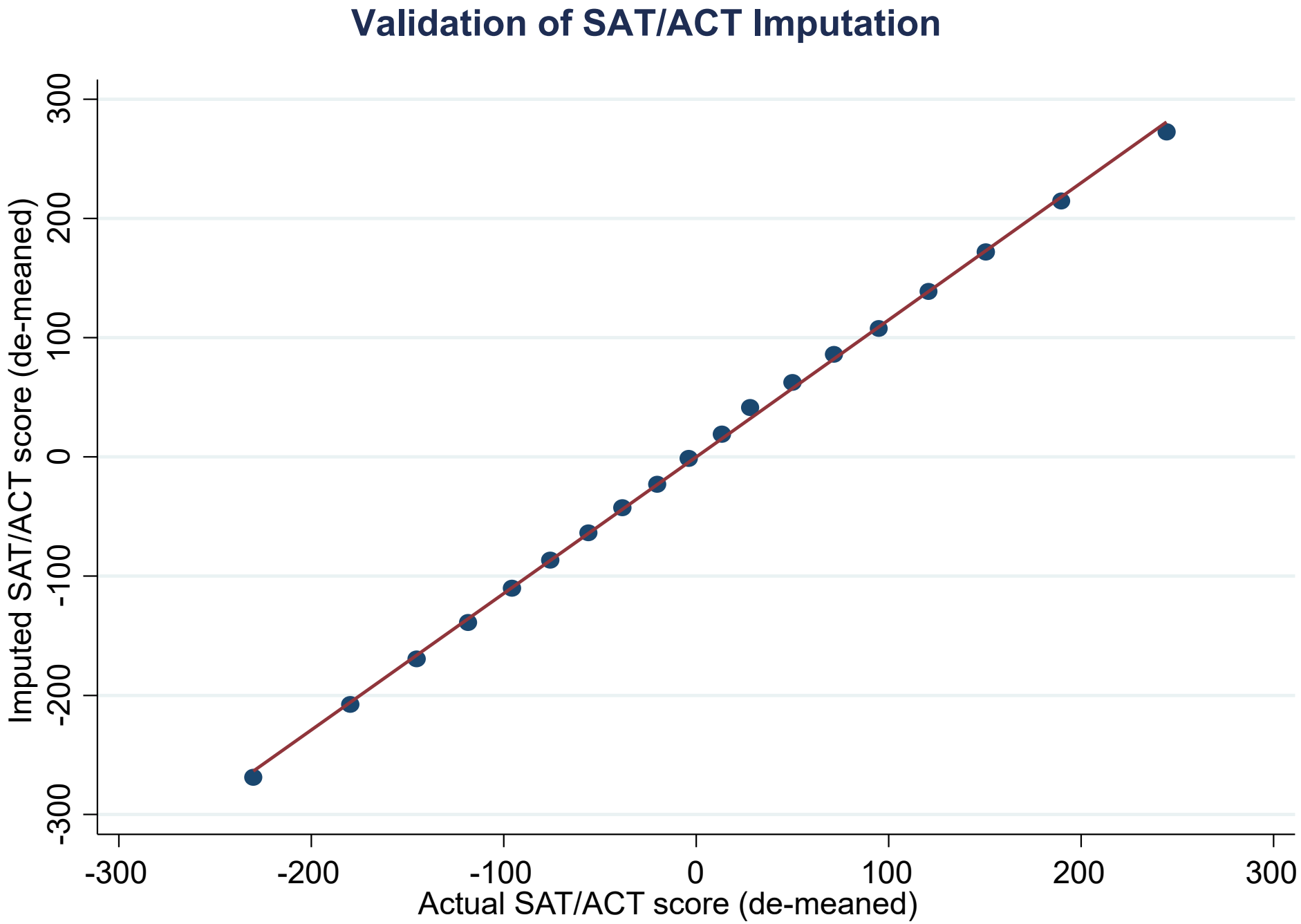


# Fraction of Children who Reach Top Quintile by Parent Income Rank



# Distribution of Majors: Ivy-Plus Colleges vs. High-Mobility-Rate Colleges with Comparable Top-Quintile Outcome Rates




Validation of SAT/ACT Imputation
Imputed SAT/ACT score (de-meaned)
300
200
100
0
-100
-200
-300
-300
-200
-100
0
100
200
300
Actual SAT/ACT score (de-meaned)

# College Attendance Rates in 1098-T and Pell Records by Parental Income