The Distribution of Student and Parent Income
Across Colleges in the United States

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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.
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
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
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

Parents' Mean Household Income when Child is Age 15-19 ($1000)

- 20th Percentile = $25k
- Median = $60k
- 60th Percentile = $74k
- 80th Percentile = $111k
- 99th Percentile = $512k
Parent Income Distribution at Harvard
1980-82 Child Birth Cohorts

Parent Income Quintile

Percent of Students

- Quintile 1: 3.0%
- Quintile 2: 5.3%
- Quintile 3: 8.1%
- Quintile 4: 13.2%
- Quintile 5 (Top 1%): 70.3%

Total: 100.0%
Parent Income Distribution by Percentile
Ivy Plus Colleges

Note: “Ivy Plus” = Ivy League, Chicago, Stanford, MIT, Duke
14.5% of students from top 1%

Note: “Ivy Plus” = Ivy League, Chicago, Stanford, MIT, Duke
14.5% of students from top 1%

13.5% of students from bottom 50%
More students from the top 1% than the bottom 50%
3.8% of students from bottom 20%

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%.
Parent Income Distributions by Quintile for 1980-82 Birth Cohorts
At Selected Colleges

Harvard University
Parent Income Distributions by Quintile for 1980-82 Birth Cohorts
At Selected Colleges

- Harvard University
- UC Berkeley

Graph showing parent income quintile distributions.
Parent Income Distributions by Quintile for 1980-82 Birth Cohorts

At Selected Colleges

Parent Income Distributions by Quintile for 1980-82 Birth Cohorts

- Harvard University
- UC Berkeley
- SUNY-Stony Brook

Parent Income Quintile

Percent of Students

1
2
3
4
5

0
10
20
30
40
50
60
70
80

Parent Income Quintile

Percent of Students
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

Parent Income Quintile

Top 1%
Income Segregation across Colleges vs. Pre-College Neighborhoods
Children from Bottom Quintile

- **Peers' Parent Income Quintile**
  - **Pre-College Neighborhoods (ZIP Codes)**
  - **Colleges**

<table>
<thead>
<tr>
<th>Peers' Parent Income Quintile</th>
<th>Pre-College Neighborhoods</th>
<th>Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
Income Segregation across Colleges vs. Pre-College Neighborhoods
Children from Top Quintile

![Graph showing income segregation across colleges vs. pre-college neighborhoods.]
Income Segregation across Colleges vs. Pre-College Neighborhoods
Children from Top Quintile at Ivy-Plus Colleges

![Bar Chart]

Legend:
- Pre-College Neighborhoods (ZIP Codes)
- Colleges
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

Corr(Rank at 32, Rank at 36) = 0.986
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

20th Percentile = $1k
Median = $28k
80th Percentile = $58k
99th Percentile = $197k

Child's Individual Earnings at Age 34 ($1000)
Characterize children’s earnings ranks conditional on their parents’ rank by college
Mean Child Rank at Age 34 vs. Parent Income Rank

Full Population

National (Slope: 0.288)
Mean Child Rank at Age 34 vs. Parent Income Rank

UC-Berkeley

National (Slope: 0.288)
UC Berkeley (Slope: 0.060)
Mean Child Rank at Age 34 vs. Parent Income Rank

Elite Colleges

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 vs. 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 vs. 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

- National (Slope: 0.334)
- Elite Colleges (Slope: 0.091)
- Other 4-Year Colleges (Slope: 0.115)
- 2-Year Colleges (Slope: 0.127)
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.
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

Percent of Students

Parent Income Quintile

Columbia
SUNY-Stony Brook

0%
20%
40%
60%
80%
Mobility Report Cards
Columbia vs. SUNY-Stony Brook

Success Rates (Students' Outcomes)
Access (Parents' Incomes)
Define a college’s *mobility rate* (MR) as the fraction of its students who come from bottom quintile and end up in top quintile

\[
\text{Mobility Rate} = \frac{\text{Success Rate}}{\text{Access}} = \frac{P(\text{Child in Q5} \& \text{Parent in Q1})}{P(\text{Child in Q5}| \text{Parent in Q1}) \cdot P(\text{Parent in Q1})}
\]

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: \( P(\text{Child in Q5 | Par in Q1}) \)

Access: Percent of Parents in Bottom Quintile

SUNY-Stony Brook, Columbia
Mobility Rates: Success Rate vs. Access by College

Success Rate: $P(\text{Child in Q5} \mid \text{Par in Q1})$

Access: Percent of Parents in Bottom Quintile

Mobility Rates: Success Rate vs. Access by College

Success Rate: $P(\text{Child in Q5} \mid \text{Par in Q1})$

Access: Percent of Parents in Bottom Quintile

Columbia

SUNY-Stony Brook
Mobility Rates: Success Rate vs. Access by College

MR = 1.6% (50th Percentile)

MR = Success Rate x Access
Mobility Rates: Success Rate vs. Access by College

MR = Success Rate x Access
SD of MR = 1.30%

MR = 3.5% (90th Percentile)
MR = 1.6% (50th Percentile)
MR = 0.9% (10th Percentile)
Mobility Rates: Success Rate vs. Access by College

Success Rate: $P(\text{Child in Q5} \mid \text{Par in Q1})$

Access: Percent of Parents in Bottom Quintile

Ivy Plus Colleges (Avg. MR = 2.2%)
Mobility Rates: Success Rate vs. Access by College

Success Rate: $P(\text{Child in Q5} \mid \text{Par in Q1})$

Access: Percent of Parents in Bottom Quintile

- Ivy Plus Colleges (Avg. MR = 2.2%)
- Public Flagships (Avg. MR = 1.7%)
Mobility Rates: Success Rate vs. Access by College

Success Rate: $P(\text{Child in Q5 | Par in Q1})$

Access: Percent of Parents in Bottom Quintile

Community Colleges
<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Fraction Low-Income</th>
<th>Top-Quintile Outcome Rate</th>
<th>Mobility Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cal State University – LA</td>
<td>33.1%</td>
<td>29.9%</td>
<td>9.9%</td>
</tr>
<tr>
<td>2</td>
<td>Pace University – New York</td>
<td>15.2%</td>
<td>55.6%</td>
<td>8.4%</td>
</tr>
<tr>
<td>3</td>
<td>SUNY – Stony Brook</td>
<td>16.4%</td>
<td>51.2%</td>
<td>8.4%</td>
</tr>
<tr>
<td>4</td>
<td>University of Texas – Pan American</td>
<td>38.7%</td>
<td>19.8%</td>
<td>7.6%</td>
</tr>
<tr>
<td>5</td>
<td>CUNY System</td>
<td>28.7%</td>
<td>25.2%</td>
<td>7.2%</td>
</tr>
<tr>
<td>6</td>
<td>Glendale Community College</td>
<td>32.4%</td>
<td>21.9%</td>
<td>7.1%</td>
</tr>
<tr>
<td>7</td>
<td>South Texas College</td>
<td>52.4%</td>
<td>13.2%</td>
<td>6.9%</td>
</tr>
<tr>
<td>8</td>
<td>Cal State Polytechnic – Pomona</td>
<td>14.9%</td>
<td>45.8%</td>
<td>6.8%</td>
</tr>
<tr>
<td>9</td>
<td>University of Texas – El Paso</td>
<td>28.0%</td>
<td>24.4%</td>
<td>6.8%</td>
</tr>
<tr>
<td>10</td>
<td>St John’s University – Queens, NY</td>
<td>14.3%</td>
<td>47.4%</td>
<td>6.8%</td>
</tr>
</tbody>
</table>
Distribution of Majors: High-Mobility-Rate Colleges vs. All Other Colleges

- **All Other Colleges**
  - STEM = 14.9%
  - Business = 20.1%

- **High Mobility Rate Colleges**
  - STEM = 17.9%
  - Business = 19.9%

Categories:
- STEM
- Business
- Trades and Personal Services
- Public and Social Services
- Multi/Interdisciplinary Studies
- Health and Medicine
- Arts and Humanities
Mobility Rates: Colleges in Los Angeles

Success Rate: \( P(\text{Child in Q5} \mid \text{Par in Q1}) \)

Access: Percent of Parents in Bottom Quintile

SD of MR = 1.30%
SD of MR within CZ = 0.97%
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%)
Correlates of Top 20% Mobility Rate

College Type
- Public
- For-Profit
- 4-Year College

Selectivity
- Rejection Rate
- Rejection Rate, Public
- Rejection Rate, Private

Institutional Characteristics
- Enrollment
- Completion Rate
- Avg. Faculty Salary
- STEM Major Share
- Instr. Expenditures per Student
- Net Cost for Poor
- Sticker Price

Expend. & Cost

Magnitude of Correlation
- Positive Correlation
- Negative Correlation

Expenditure & Cost
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

Access: Percent of Parents in Bottom Quintile

Upper Tail Success Rate: $P(\text{Child in Top 1} \mid \text{Par in Q1})$
Upper Tail Success Rate (Top 1%) vs. Access by College

Upper Tail MR = Upper Tail Success Rate \times \text{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%)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Mobility Rate</th>
<th>Access</th>
<th>Upper-Tail Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University of California – Berkeley</td>
<td>0.76%</td>
<td>8.8%</td>
<td>8.6%</td>
</tr>
<tr>
<td>2</td>
<td>Columbia University</td>
<td>0.75%</td>
<td>5.0%</td>
<td>14.9%</td>
</tr>
<tr>
<td>3</td>
<td>MIT</td>
<td>0.68%</td>
<td>5.1%</td>
<td>13.4%</td>
</tr>
<tr>
<td>3</td>
<td>Stanford University</td>
<td>0.66%</td>
<td>3.6%</td>
<td>18.5%</td>
</tr>
<tr>
<td>4</td>
<td>Swarthmore College</td>
<td>0.61%</td>
<td>4.7%</td>
<td>13.0%</td>
</tr>
<tr>
<td>6</td>
<td>Johns Hopkins University</td>
<td>0.54%</td>
<td>3.7%</td>
<td>14.7%</td>
</tr>
<tr>
<td>7</td>
<td>New York University</td>
<td>0.52%</td>
<td>6.9%</td>
<td>7.5%</td>
</tr>
<tr>
<td>8</td>
<td>University of Pennsylvania</td>
<td>0.51%</td>
<td>3.5%</td>
<td>14.5%</td>
</tr>
<tr>
<td>9</td>
<td>Cornell University</td>
<td>0.51%</td>
<td>4.9%</td>
<td>10.4%</td>
</tr>
<tr>
<td>10</td>
<td>University of Chicago</td>
<td>0.50%</td>
<td>4.3%</td>
<td>11.5%</td>
</tr>
</tbody>
</table>
Fraction of Success Stories by School Type

- Share Among Children in Top 1% with Parents in Bottom 20%
- Share Among Children in Top 20% with Parents in Bottom 20%
- Share Among All Children

College Tier:
- Ivy Plus
- Other Highly Selective Private
- Highly Selective Public
- Selective Private
- Selective Public
- Non-selective Private
- Non-selective Public
- Two-year and Less
- For Profit
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

The scatter plot shows the relationship between SAT/ACT scores and child rank in adulthood. Two lines are plotted: one for 'No Controls' and another for 'Controlling for race x sex x cubic in parent rank and HS FE's'. The line for controls shows a stronger positive correlation compared to the line without controls.

- **Y-axis**: Child Rank
- **X-axis**: SAT/ACT Score
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)

Parent Income Quintile

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Attendance Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51%</td>
</tr>
<tr>
<td>2</td>
<td>55%</td>
</tr>
<tr>
<td>3</td>
<td>57%</td>
</tr>
<tr>
<td>4</td>
<td>62%</td>
</tr>
<tr>
<td>5</td>
<td>74.5%</td>
</tr>
</tbody>
</table>
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
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

Parent Income Quintile

Nationwide 1300+ SAT-scores

Ivy-Plus actual

Top 1%
Ivy-Plus Attendance Rates by Parental Income Conditional on SAT/ACT Scores
Students with Scores of 1400 or 1500 on SAT/ACT

![Graph showing attendance rates by parental income percentile for students with SAT/ACT scores of 1400 and 1500. The graph illustrates the relationship between parental income percentile and the share of students attending an Ivy-Plus college. The data points for children with a 1500 SAT/ACT score are marked with red triangles, and those with a 1400 SAT/ACT score are marked with dark blue circles.](image-url)
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

- Share attending an Ivy-Plus college
- Parent Income Percentile
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
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.
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

- Income-Neutral Student Allocations
- Need-Affirmative Student Allocations
- Counterfactual

Increment to SAT Scores

Share of Ivy-Plus Students from Bottom 20%
Share of Ivy-Plus Students from Bottom 60%

Actual Bottom-20%
Actual Bottom-60%
Impacts of Counterfactuals on Income Segregation and Intergenerational Mobility

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

- Random allocation benchmark
- Share of Students with Bottom-Quintile Parents (%)

- Children from Bottom Quintile
- Children from Top Quintile

- Actual
- Income-Neutral Student Allocations counterfactual (0-point SAT increment)
- Need-Affirmative Student Allocations counterfactual (160-point SAT increment)
Impacts of Counterfactuals on Income Segregation and Intergenerational Mobility

Fraction of Students with Low-Income Parents in Selected Tiers

- Actual
- Income-Neutral Student Allocations counterfactual (0-point SAT increment)
- Need-Affirmative Student Allocations counterfactual (160-point SAT increment)
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

<table>
<thead>
<tr>
<th></th>
<th>Race, Gender * SAT/ACT (1)</th>
<th>HS FE's * Race (2)</th>
<th>HS FE's * (3)</th>
<th>Application Set and HS FEs (4)</th>
<th>Application Set, HS FE's * Race (5)</th>
<th>Bottom Quintile Only (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>College fixed effect (conditional on parent inc., race, SAT/ACT)</td>
<td>1.003 (0.006)</td>
<td>0.907 (0.010)</td>
<td>0.903 (0.010)</td>
<td>0.857 (0.012)</td>
<td>0.850 (0.012)</td>
<td>0.850 (0.015)</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.968</td>
<td>0.886</td>
<td>0.883</td>
<td>0.889</td>
<td>0.886</td>
<td>0.750</td>
</tr>
</tbody>
</table>

### Controls

- **Interactions of race, gender w/SAT/ACT**: X X X X X X X
- **High school FE’s**: X 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

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*College fixed effect, conditional on parental income, race and SAT/ACT*
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

Rich-Poor Gap in Top Quintile Outcomes among College-Goers (pp)

- Actual
- Income-Neutral Student Allocations counterfactual (0-point SAT increment)
- Need-Affirmative Student Allocations counterfactual (160-point SAT increment)

14.6% reduction in gap
26.5% reduction in gap
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

Percentage Attended College

Parent Rank

[Graph showing a positive correlation between parent rank and percentage of college attendance.]
Relationship Between Children’s and Parents’ Ranks within Colleges

- National (slope: .288)
- with College Fixed Effects (slope: .139)
- with College*SAT/ACT Fixed Effects (slope: .125)
College Attendance Rates by Parental Income and Age

By Age 22
By Age 28
By Age 32
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

Age

Correlation of Mean Rank at Age x with Mean Rank at Age 36

25 27 29 31 33 35
Distribution of Majors: Ivy-Plus Colleges vs. High-Mobility-Rate Colleges with Comparable Top-Quintile Outcome Rates

- **Ivy-Plus Colleges**
  - STEM: 32.3%
  - Business: 6.2%

- **High Mobility Rate Colleges with Success Rate Similar to Ivy-Plus**
  - STEM: 31.2%
  - Business: 10.8%
Validation of SAT/ACT Imputation

The graph shows the relationship between actual SAT/ACT scores (de-meaned) and imputed SAT/ACT scores (de-meaned). The data points align closely with a straight line, indicating a strong linear relationship. This suggests that the imputation method effectively captures the distribution of actual scores.
College Attendance Rates in 1098-T and Pell Records by Parental Income

[Graph showing the percentage of children in college for different parental income ranks, comparing IRS data, Pell Grant data, and combined IRS + Pell data.]