Colleges and Upward Mobility: Evidence from Big Data

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Brown University
The American Dream?
Chance that a child born to parents in the bottom fifth of the income distribution reaches the top fifth:

<table>
<thead>
<tr>
<th>Country</th>
<th>Chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>7.5%</td>
</tr>
<tr>
<td>UK</td>
<td>9.0%</td>
</tr>
<tr>
<td>Denmark</td>
<td>11.7%</td>
</tr>
<tr>
<td>Canada</td>
<td>13.5%</td>
</tr>
<tr>
<td>Sweden</td>
<td>15.7%</td>
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Chances of achieving the “American Dream” are **twice as high in Sweden as in the U.S.**
How Can We Restore the American Dream?

We use big data to study how to increase upward mobility.

Translate results from research to policy action.

Starting point: sharp local differences in rates of upward mobility.
The Geography of Upward Mobility in the United States
Average Income at Age 35 for Children whose Parents Earned $25,000 (25th percentile)

Note: Blue = More Upward Mobility, Red = Less Upward Mobility
Source: Chetty, Hendren, Jones, Porter 2018
Upward Mobility vs. Job Growth in the 30 Largest Metro Areas

Average Income at Age 35 of Children who Grew up in Low-Income Families

- High mobility, low growth
  - San Jose
  - San Francisco
  - Minneapolis
  - Seattle
  - Sacramento
  - Washington
  - Portland
  - Denver
  - Riverside

- Low mobility, low growth
  - New York
  - Los Angeles
  - San Diego
  - Philadelphia
  - Chicago
  - Kansas City
  - Baltimore
  - Detroit
  - Cincinnati
  - Cleveland
  - St. Louis

- High mobility, high growth
  - Houston
  - Dallas
  - San Antonio
  - Phoenix

- Low mobility, high growth
  - Atlanta

Job Growth Rate (%) from 1990-2010

- High mobility, low growth
- Low mobility, low growth
- High mobility, high growth
- Low mobility, high growth
What are the Characteristics of High-Mobility Neighborhoods?

- Lower Poverty Rates
- More stable family structure
- Greater social capital
- Better school quality
Higher Education and Upward Mobility

Higher education is widely thought to provide a pathway to upward mobility. But inequality in access to colleges between low- and high-income families could limit or even reverse this effect.

We construct publicly available mobility report cards for every college in America to analyze how colleges shape mobility.
Parent Incomes and Student Outcomes

Use attendance and income data on all college students from 1999-2013 from Treasury and Dept. of Education

- **Parents:** Measure household incomes when students are teenagers

- **Students:** Measure earnings in the mid-30s for enrolled students

Rank students and parents relative to others in the same cohort
Mobility Report Cards: Community Colleges in CUNY System

Access: Fraction of Parents from Bottom Fifth = 33%

Success Rate: Fraction of Students who Reach Top Fifth from Parents in Bottom Fifth = 17.6%
Measure a college’s *mobility rate* (MR) as the fraction of its students who come from bottom fifth and end up in top fifth.

Mobility rate equals access times success rate:

\[
\text{Mobility Rate} = \text{Access} \times \text{Success Rate}
\]

At CUNY CCs:

\[
5.7\% = 33.0\% \times 17.6\%
\]
Mobility Rates: Success Rate vs. Access by Community College

Access: Percent of Parents in Bottom Quintile

Success Rate: Percent Top 20% for Poor Students

CUNY
Mobility Rates: Success Rate vs. Access by Community College

Access: Percent of Parents in Bottom Quintile

Success Rate: Percent Top 20% for Poor Students
Mobility Rates: Success Rate vs. Access in Houston Metro

Access: Percent of Parents in Bottom Quintile

Success Rate: Percent Top 20% for Poor Students

Institutions:
- Brazosport
- Galveston Coll.
- Houston CC
- Lee
- San Jacinto
- Wharton
- Alvin
- Lone Star
- Blinn
- Coll. of the Mainland
- Galveston
Changes Over Time

- How have access and mobility rates changed in recent years?
- Substantial expansions in financial aid and outreach at elite private colleges
- Have these changes led to increases in access?
Trends in Low-Income Access
2000-2011

Access:
Percent of Parents in the Bottom Quintile

High Mobility-Rate Colleges
All Colleges
Trends in Low-Income Access: Community Colleges
2000-2011

Access:
Percent of Parents in the Bottom Quintile

High Mobility-Rate Community Colleges
All Community Colleges
Key Questions for Policy

• **Why** are some colleges “engines of upward mobility”?

• **How** can we expand upward mobility across higher education in America?
Partnership between researchers and colleges to link “big data” and enhance mobility in higher education.
CLIMB currently includes 300 colleges and 4.2 million students.
Promoting Success

Many colleges offer **special programs** to help low-income students succeed

- Additional tutoring, summer prep, different admissions cutoffs
- Are these programs effective?
- Very similar to the **ASAP** program in CUNY community colleges

Today we ask:

- What are the long-term outcomes of students in the SEEK program at CUNY?
SEEK Program Structure

1. Students
   - 250k students
   - 11 CUNY campuses
SEEK Program Structure

1. Students
   - 250k students
   - 11 CUNY campuses

2. Program Eligibility
   - Admission to 4 year CUNY based on Academic Index (AI) – GPA, SAT, coursework
   - Eligible only if below AI and income cutoffs (~$45k for a family of 4)
## SEEK Program Structure

<table>
<thead>
<tr>
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<th>Students</th>
<th>Program Eligibility</th>
<th>Academic Supports</th>
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<tr>
<td>1</td>
<td>250k students</td>
<td>Admission to 4 year CUNY based on Academic Index (AI) – GPA, SAT, coursework</td>
<td>6 week summer program prior to entry</td>
</tr>
<tr>
<td></td>
<td>11 CUNY campuses</td>
<td>Eligible only if below AI and income cutoffs (~$45k for a family of 4)</td>
<td>Individual/small group tutoring</td>
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<td>Access to “opportunity counselors”</td>
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Parent Incomes and Children’s SAT Scores
SEEK vs. Other CUNY Students

Parent Income Percentile

Parent Income

SAT Score

SEEK Students

$27K

805

Parent Income Percentile

SAT Score

Parent Income

SAT Score

SEEK Students

Parent Income

SAT Score
Parent Incomes and Children’s SAT Scores
SEEK vs. Other CUNY Students

Control Group 1: Parent incomes too high for SEEK

- SEEK Students: $27K, SAT Score 805
- Higher Income Not Admitted: $77K, SAT Score 819

Parent Income Percentile
- 0%
- 20%
- 40%
- 60%
- 80%
- 100%

SAT Score
- 700
- 750
- 800
- 850
- 900

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Parent Incomes and Children’s SAT Scores
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Control Group 2: SAT scores too high for SEEK

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Parent Incomes and Children’s SAT Scores
SEEK vs. Other CUNY Students

Control Group 2: SAT scores too high for SEEK

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Children’s Earnings Outcomes
SEEK vs. Other CUNY Students

Control Group 1:
Parent incomes too high for SEEK

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<td>SEEK Students</td>
<td>$50K</td>
</tr>
<tr>
<td>Higher Income Not Admitted</td>
<td>$46K</td>
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Children's Earnings Outcomes
SEEK vs. Other CUNY Students

Control Group 2:
SAT scores too high for SEEK

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What We've Learned So Far

- **Students in the SEEK program do very well** compared to peers with higher incomes and SAT scores.

Key Questions Going Forward

- **What aspects of SEEK** (admissions process, academic support, summer programs) are **responsible for its success**?
- **Which types of students** benefit most from SEEK and whom should the **program be targeted** to in order to maximize returns?
Equality of Opportunity and Economic Growth

• Traditional argument for equality of opportunity is based on principles of justice

• But improving opportunities for upward mobility can also increase economic growth

• To illustrate, focus on innovation

  • Study the lives of 750,000 patent holders in the U.S.

Source: Bell, Chetty, Jaravel, Petkova, van Reenen (QJE 2018)
Patent Rates vs. Parent Income

No. of Inventors per Thousand Children

Parent Household Income Percentile
Patent Rates vs. Parent Income

No. of Inventors per Thousand Children

Patent rate for below median parent income: 0.84 per 1,000
Patent Rates vs. Parent Income

Patent rate for top 1% parent income: 8.3 per 1,000

Patent rate for below median parent income: 0.84 per 1,000
Patent Rates vs. 3rd Grade Math Test Scores

Inventors per 1000 Children

3rd Grade Math Test Score (Standardized)
Inventors per 1000 Children

Parent Income Above 80th Percentile

Parent Income Below 80th Percentile

Patent Rates vs. 3rd Grade Math Test Scores
High-scoring children are much more likely to become inventors if they are from high-income families.
Gender-Specific Innovation Effects
Change in Number of Inventors per 1000 Children

- Effect of Male Inventors on Boys’ Innovation Rates: 1.1
- Effect of Female Inventors on Boys’ Innovation Rates: -0.2
- Effect of Male Inventors on Girls’ Innovation Rates: 0.1
- Effect of Female Inventors on Girls’ Innovation Rates: 1.5
If women, minorities, and children from low-income families invent at the same rate as high-income white men, the innovation rate in America would quadruple.
Increasing Mobility in Higher Education

**Challenge**
- Increasing mobility requires institution-specific action
- How to prescribe treatments when diagnoses differ across settings?
- No “one size fits all” solution

**Solution**
- Use big data to diagnose barriers in each school
- Partner with schools to design customized solutions
- Social science analog of precision medicine
Increasing Access and Promoting Success Using Big Data

300 Colleges

4.2 Million Students

climbinitiative.org