Restoring the American Dream
New Insights from Big Data

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The Fading American Dream
Percent of Children Earning More than Their Parents, by Year of Birth

Source: Chetty, Grusky, Hell, Hendren, Manduca, Narang 2017
How Can We Restore the American Dream?

Opportunity Insights

- Use **big data** to study how to increase upward mobility
- Analyze a **broad range** of interventions, from childhood to adulthood
- Study roots of the problem **locally** to develop tailored solutions
A Precision-Medicine Approach to Improving Opportunity
Using Big Data to Provide Targeted Diagnoses and Advice

1. Assessment
   Identify areas where opportunity is lacking

2. Policy Pilots
   Work with local stakeholders on interventions

3. Evaluation
   Evaluate impact and disseminate lessons

Upward Mobility
Scalable policies to increase mobility
A Precision-Medicine Approach to Improving Opportunity
Using Big Data to Provide Targeted Diagnoses and Advice

The Opportunity Atlas

- Measure upward mobility across America using anonymized data from Census Bureau covering 20 million children linked to their parents
- Assign children to locations where they grew up and measure their average incomes at age 35
- Key innovation relative to existing information: trace the roots of poverty and incarceration back to childhood neighborhoods
The Geography of Upward Mobility in the United States
Average Household Income for Children with Parents Earning $25,000 (25th percentile)

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

- **High mobility, low growth**
  - San Jose
  - San Francisco
  - Minneapolis
  - Seattle
  - Sacramento

- **Low mobility, high growth**
  - New York
  - Los Angeles
  - Chicago
  - Washington
  - Portland
  - Houston
  - Denver
  - Riverside

- **Low mobility, low growth**
  - Philadelphia
  - Cleveland
  - Cincinnati
  - Nashville
  - St. Louis
  - Baltimore
  - Tampa
  - Atlanta

- **High mobility, high growth**
  - Boston
  - Minneapolis
  - San Diego
  - San Diego
  - Kansas City
  - Sacramento
  - Charlotte
  - Phoenix

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

Job Growth Rate (%) from 1990-2010

- **High mobility, low growth**
- **Low mobility, high growth**
- **Low mobility, low growth**
- **High mobility, high growth**
The Geography of Upward Mobility in the United States
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Source: Chetty, Friedman, Hendren, Jones, Porter 2018

Note: Green = More Upward Mobility, Red = Less Upward Mobility
Two Americas: The Geography of Upward Mobility For Black vs. White Men
Average Earnings at Age 35 For Men Whose Parents Earned $25,000 (25th percentile)

Note: Green = More Upward Mobility, Red = Less Upward Mobility; Grey = Insufficient Data
Source: Chetty, Hendren, Jones, Porter (2018)
Income Mobility for Black vs. White Men Raised in High-Income Families

Follow the lives of these 19,940 Americans and see where they end up as adults:

- **Black men**
- **White men**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Black Men</th>
<th>White Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grew up rich</td>
<td>852</td>
<td>1,411</td>
</tr>
<tr>
<td>Rich adult</td>
<td>705</td>
<td>741</td>
</tr>
<tr>
<td>Upper-middle-class adult</td>
<td>646</td>
<td>488</td>
</tr>
<tr>
<td>Middle-class adult</td>
<td>541</td>
<td>298</td>
</tr>
<tr>
<td>Lower-middle-class adult</td>
<td>554</td>
<td>254</td>
</tr>
<tr>
<td>Poor adult</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Chetty, Hendren, Jones, Porter 2018; New York Times 2018
The Geography of Upward Mobility in Seattle

Average Household Income for Children with Parents Earning $25,000 (25th percentile)

- Central District: $30K
- Delridge: $33K
- Normandy Park: $43K

Source: Bergman, Chetty, DeLuca, Hendren, Katz, Palmer 2018
Income Gain from Moving to a Better Neighborhood, by Child’s Age at Move

Source: Chetty, Friedman, Hendren, Jones, Porter 2018
Income Gain from Moving to a Better Neighborhood, by Child’s Age at Move

- Move at age 2 from Central District to Normandy Park
  → average earnings of $39,000

Source: Chetty, Friedman, Hendren, Jones, Porter 2018
Income Gain from Moving to a Better Neighborhood, by Child’s Age at Move

Source: Chetty, Friedman, Hendren, Jones, Porter 2018
Income Gain from Moving to a Better Neighborhood, by Child’s Age at Move

Source: Chetty, Friedman, Hendren, Jones, Porter 2018
Is Affordable Housing Maximizing Opportunities for Upward Mobility?

Most Common Current Locations of Families Receiving Housing Vouchers in Seattle
Pilot study to help families with housing vouchers move to high-opportunity areas in Seattle using three approaches:

- Providing information to tenants
- Recruiting landlords
- Offering housing search assistance
Moving to Opportunity approach has **limits to scalability**

How can we increase upward mobility **within low-opportunity areas**?

As a first step, learn from characteristics of high-opportunity areas
Characteristics of High Upward Mobility Areas

Less residential segregation
Racial Segregation in Atlanta, Georgia

Source: Cable (2013) based on Census 2010 data
Racial Segregation in Sacramento, California

Source: Cable (2013) based on Census 2010 data
Characteristics of High Upward Mobility Areas

- Less residential segregation
- Larger middle class
- More stable family structure
- Greater social capital
- Higher quality education
Education Policy: Using Big Data to Study Teachers’ Impacts

**School district records**
- 2.5 million children
- 18 million test scores

**Tax records**
- Earnings, College Attendance, Teen Birth

Source: Chetty, Friedman, Rockoff (AER 2014a,b)
Measuring Teacher Quality: Test-Score Based Metrics

One prominent measure of teacher quality: teacher *value-added*

How much does a teacher raise her/his students’ test scores on average?
A Quasi-Experiment: Entry of High Value-Added Teacher

Entry of Teacher with VA in top 5%

Scores in 4th Grade
Scores in 3rd Grade
The Value of Improving Teacher Quality

Teacher Quality (Value-Added) Percentile

5th 95th Median
The Value of Improving Teacher Quality

+$50,000$ lifetime earnings per child

= $1.4$ million per classroom of $28$ students

= $250,000$ in present value at $5\%$ int. rate
Increasing Access and Opportunity at Colleges

- The pipeline to upward mobility does not end when children leave home

- Big data can also help us analyze and amplify the **impacts of colleges** on upward mobility

- Use data on 30 million students from 1999-2013 to study mobility at each college in America
Parental Income Distribution of Students at Stanford

Source: Chetty, Friedman, Saez, Turner, Yagan (2017)
Parental Income Distribution of Students at Stanford

- **Top 1%**
  - > $111K: 69.0%

- Quintiles:
  1. < $25K: 3.6%
  2. 25-47K: 5.8%
  3. 47-74K: 8.6%
  4. 74-111K: 13.0%
  5. > $111K: 14.5%
Parental Income Distribution of Students at Selected Colleges

- Stanford
- UC Berkeley
- SUNY-Stony Brook
- Glendale Community College

The chart shows the distribution of students across different quintiles of parental income for the selected colleges.
Parental Income Distribution of Students at Selected Colleges

- Stanford
- UC Berkeley
- SUNY-Stony Brook
- Glendale Community College

Income Segregation Across Colleges is Comparable to Segregation Across Census Tracts in Average American City
Students’ Earnings Outcomes at Stanford

Children’s Outcomes: percentage of students who reach top fifth (>$60K at age 34)
A college’s mobility rate (MR) is the fraction of students who come from bottom quintile and end up in top quintile.

**Mobility Rates**

**Mobility Rate = Access x Success Rate**

At Stanford:

- Access: 3.6%
- Success Rate: 62.7%
- **Mobility Rate: 2.2%**
Top 10 Colleges in America By Bottom-to-Top Quintile Mobility Rate
Fraction of Students who come from Bottom Fifth and End up in Top Fifth

- Cal State-Los Angeles: 9.9%
- Pace University: 8.4%
- SUNY-Stony Brook: 8.4%
- Technical Career Institutes: 8.0%
- U. Texas-Pan American: 7.6%
- CUNY System: 7.2%
- Glendale Comm. Coll.: 7.1%
- South Texas College: 6.9%
- Cal State Poly-Pomona: 6.8%
- U. Texas-El Paso: 6.8%
- Ivy League: 2.2%

Average College in the US
Value-added earnings (12.5%). To see if a school is helping launch students to better-paying jobs than competitors that take in students with similar academic and economic backgrounds, we adjusted PayScale.com’s earnings data for the student body’s average test scores and the percentage of low-income students at each school; for early career earnings (7.5%) and mid-career earnings (5%).

Job meaning (5%). We used the average score of each school’s alumni on PayScale.com’s survey question of “Does your work make the world a better place?”

Socio-economic mobility index (20%). For the first time, we included new data provided by the Equality of Opportunity Project that reveals the percentage of students each school move from low-income backgrounds to upper-middle class jobs by the time the student is 34 years old.
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 2017
Patent Rates vs. Parent Income

No. of Inventors per Thousand Children

Parent Household Income Percentile

Graph showing the relationship between the number of inventors per thousand children and the parent household income percentile.
Patent Rates vs. Parent Income

Patent rate for top 1% parent income: 8.3 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)

90th percentile
Inventors per 1000 Children vs. 3rd Grade Math Test Scores

Patent Rates vs. 3rd Grade Math Test Scores

- 90th percentile
- Parent Income Above 80th Percentile
- Parent Income Below 80th Percentile
High-scoring children are much more likely to become inventors if they are from high-income families.
## The Origins of Inventors in America

### Patent Rates by Childhood Commuting Zone

<table>
<thead>
<tr>
<th>City</th>
<th>Patent Rate per 1000 Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minneapolis</td>
<td>4.9</td>
</tr>
<tr>
<td>Madison</td>
<td>4.3</td>
</tr>
<tr>
<td>Detroit</td>
<td>3.8</td>
</tr>
<tr>
<td>San Jose</td>
<td>5.4</td>
</tr>
<tr>
<td>San Francisco</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**Legend:**
- **>3.1**
- **1.5**
- **<0.4**
- **Insufficient Data**

The map illustrates the distribution of inventors per 1000 children across the United States, with higher rates indicated in darker blue. The table shows specific rates for cities mentioned on the map.
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.
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