## Improving Equality of Opportunity 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 Increase Upward Mobility?

- Empirical evidence on the determinants of economic mobility across generations has been limited because of a lack of longitudinal data
  - Most empirical work on inequality has used cross-sectional data to study poverty or income differences within a single generation
- This talk presents an overview of recent research on economic mobility using longitudinal administrative data (based on work with John Friedman, Nathan Hendren, and many others)
  - Trace the roots of outcomes such as poverty and incarceration back to the environment in which people grew up
- Focus here on variation across neighborhoods as a lens to understand determinants of opportunity

## **Data and Methods**

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## The Geography of Opportunity

## **Causal Effects of Neighborhoods**

## Data and Methods

2 The Geography of Opportunity

**3** Causal Effects of Neighborhoods

## **Data Sources and Sample Definitions**

 Data sources: Census data (2000, 2010, ACS) covering U.S. population linked to federal income tax returns from 1989-2015

Link children to parents based on dependent claiming on tax returns

 Target sample: Children in 1978-83 birth cohorts who were born in the U.S. or are authorized immigrants who came to the U.S. in childhood

Analysis sample: 20.5 million children, 96% coverage rate of target sample

## **Income Definitions**

 Parents' pre-tax household incomes: mean Adjusted Gross Income from 1994-2000, assigning non-filers zeros

Children's pre-tax incomes measured in 2014-15 (ages 31-37)

- To mitigate lifecycle bias, focus on percentile ranks in **national** distribution:
  - Rank children relative to others in their birth cohort and parents relative to other parents

#### Intergenerational Mobility in the United States Mean Child Household Income Rank vs. Parent Household Income Rank



Source: Chetty, Friedman, Hendren, Jones, Porter (2018)

## **1** Data and Methods

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## The Geography of Opportunity

**3** Causal Effects of Neighborhoods

## The Geography of Opportunity and Policy Targeting

- Begin with a descriptive characterization of the geography of opportunity: how rates of upward income mobility vary across areas
- Why is this descriptive analysis useful?
  - Many policies target areas based on characteristics such as the poverty rates
  - Tax policies (e.g., Opportunity zones), local services (e.g., pre-school programs), ...
- For such "tagging" applications, observed outcomes are of direct interest in standard optimal tax models [Akerlof 1978]

- Isolating causal effects of neighborhoods not necessarily relevant

#### The Geography of Upward Mobility in the United States

Average Household Income for Children with Parents Earning \$27,000 (25<sup>th</sup> percentile)



#### Two Americas: The Geography of Upward Mobility for Black vs. White Men

Average Household Income for Men with Parents Earning \$27,000 (25<sup>th</sup> percentile)





Note: Blue = More Upward Mobility, Red = Less Upward Mobility Source: Chetty, Hendren, Jones, Porter 2018

#### The Geography of Upward Mobility for Black vs. White Women

Average Household Income for Women with Parents Earning \$27,000 (25<sup>th</sup> percentile)





*Note: Blue* = *More Upward Mobility, Red* = *Less Upward Mobility 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 WHITE MEN MEN ,411 852 Grew up rich **Rich adult** 26% 43% 741 705 Upper-middle-class adult 22% 23% 646 488 Middle-class adul 20% 15% 541 298 Lower-middle-class adult 17% 9% Black men White men 554 254 Poor adu 17% 8%

#### The Geography of Upward Mobility in the United States

Average Household Income for Children with Parents Earning \$27,000 (25<sup>th</sup> percentile)





#### Upward Mobility vs. Job Growth in the 30 Largest Metro Areas







**Spatial Decay of Correlation with Tract-Level Poverty Rate** Mean Child Household Income Rank (Parents p=25), White Children 0.0 Regression Coefficient -0.1 -0.2





**Spatial Decay of Correlation with Block-Level Poverty Rate** Mean Child Household Income Rank (Parents p=25), White Children











**Do Cities Offer Greater Opportunities for Upward Mobility?** Average Income for White Children with Parents Earning \$25,000 in North Carolina



#### **Do Cities Offer Greater Opportunities for Upward Mobility?** Average Income for White Children with Parents Earning \$25,000 in Iowa



#### Illustrative Application: Currently Designated Opportunity Zones in Los Angeles County



#### Hypothetical Opportunity Zones using Upward Mobility Estimates



## **1** Data and Methods

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## 2 The Geography of Opportunity

## **Causal Effects of Neighborhoods**

## **Neighborhood Choice and Causal Effects of Place**

Where should a family seeking to improve their children's outcomes live?

- Answer matters both to individual families and potentially for policy design
  - Ex: Many affordable housing programs (e.g., Housing Choice Vouchers) have explicit goal of helping low-income families access "higher opportunity" areas

 For these questions, critical to understand whether observational variation is driven by causal effects of place or selection

## **Identifying Causal Effects of Place**

- Identify causal effects using two research designs:
  - 1. <u>Moving-to-Opportunity (MTO) Experiment</u>: Compare observational predictions to treatment effects of MTO experiment on children's earnings [Chetty, Hendren, Katz 2016]
  - 2. <u>Movers Quasi-Experiment:</u> Analyze outcomes of children who move at different ages across all tracts [Chetty and Hendren 2018]

#### Moving To Opportunity Experiment: Origin (Control Group) Locations in Chicago



#### Moving To Opportunity Experiment: Origin and Destination Locations in Chicago



#### Earnings of <u>Young</u> Children in MTO Experiment vs. Observational Predictions from Opportunity Atlas





## **Quasi-Experimental Estimates**

 MTO experiment shows that observational estimates predict causal effects of moving in a small set of neighborhoods

Now extend this approach to all areas using a quasi-experimental design in observational data

## **Estimating Exposure Effects in Observational Data**

 To begin, consider families who move across Census tracts when child is exactly 5 years old

 Regress child's income rank in adulthood y<sub>i</sub> on mean rank of children with same parental income level in destination tract:

$$y_i = \alpha_{qo} + b_m \bar{y}_{pd} + \eta_i$$

• Include parent decile (q) by origin (o) fixed effects to identify  $b_m$  purely from differences in destinations

Movers' Income Ranks vs. Mean Ranks of Children in Destination For Children Who Move at Age 5











## **Identifying Causal Exposure Effects**

- Use two approaches to evaluate validity of key assumption, following Chetty and Hendren (2018):
  - 1. Sibling comparisons to control for family fixed effects

- 2. Outcome-based placebo tests exploiting heterogeneity in place effects by gender, quantile, and outcome
  - Ex: moving to a place where boys have high earnings → son improves in proportion to exposure but daughter does not

#### Gender-Specific Childhood Exposure Effects on Household Income Rank Regression Estimates Based on One-Time Movers Across Tracts

| Outcome:               | Child Household Income Rank at Age 24 |           |
|------------------------|---------------------------------------|-----------|
|                        | Males                                 | Females   |
|                        | (1)                                   | (2)       |
| Prediction for Males   | -0.025                                | -0.003    |
|                        | (0.002)                               | (0.002)   |
| Prediction for Females | -0.001                                | -0.026    |
|                        | (0.003)                               | (0.003)   |
| Num. of Obs.           | 1,146,000                             | 1,082,000 |
|                        | 4                                     |           |

Note: Standard errors in parentheses

### **Childhood Exposure Effects Around the World**



## **Improving Childhood Environments**

• Moving at birth from tract at 25th percentile of distribution of upward mobility to a tract at 75th percentile within county  $\rightarrow$  \$206,000 gain in lifetime earnings

- Two paths to improving neighborhoods in which children in low-income families grow up:
  - 1. Reduce segregation by helping families move to higher opportunity areas
  - 2. Place-based investments to improve outcomes in low-opportunity areas

## **Moving to Opportunity**

 Feasibility of moving to opportunity approach relies on being able to find affordable housing in high-opportunity neighborhoods

How does the housing market price the amenity of better outcomes for children?

The Price of Opportunity in Chicago

Children's Mean Income Ranks in Adulthood vs. Median Rents in Chicago, by Tract



#### **Opportunity Bargain Neighborhoods in Chicago**



#### Predicted Impacts of Moving to Opportunity Bargain Neighborhoods in Chicago



## Creating Moves to Opportunity in Seattle

Randomized trial to help families with vouchers move to "opportunity bargain" areas using three approaches:

- Information + financial assistance
- Landlord recruitment
- Brokerage services

Bergman, Chetty, DeLuca, Hendren, Katz, Palmer (in progress)



## **Place-Based Investments**

- Moving to opportunity can be helpful in reducing segregation, but ultimately is not a fully scalable approach
- In parallel, important to invest in low-opportunity places
  - Many place-based efforts focus on the labor market (e.g., tax credits for employers)
  - Our results call for a place-based focus on human-capital development instead
- We do not yet know which place-based investments (schools, mentoring programs, crime reduction, physical infrastructure) are most effective
  - Currently studying impacts of historical place-based policies on prior residents using longitudinal data

## **Equality of Opportunity and Economic Growth**

- Traditional interest in 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. by linking universe of patent applications to tax data [Bell, Chetty, Jaravel, Petkova, van Reenen 2018]

#### Patent Rates vs. Parent Income Percentile



#### Patent Rates vs. 3<sup>rd</sup> Grade Math Test Scores









#### The Origins of Inventors in America Patent Rates per 1000 Children by Area where Child Grew Up



## **Lost Einsteins**



If women, minorities, and children from low-income families invent at the same rate as high-income white men, the number of inventors in America would quadruple

## **Supporting Future Work on Equality of Opportunity**

1. Publicly available data: Local area statistics discussed here are all publicly available and can be used to study a variety of questions

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- 2. Global network: Supporting other researchers who are constructing and analyzing analogous statistics in other countries

#### The Geography of Intergenerational Mobility in India



Source: Asher and Novosad (2018)

Note: Figure shows mean educational rank attained by sons born to fathers born in bottom half of education distribution

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- 3. Training the next generation of researchers and policy makers

#### **Online Course: Using Big Data to Solve Economic and Social Problems**





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