Using Big Data to Solve Economic and Social Problems

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Spring 2023

HARVARD UNIVERSITY

OPPORTUNITY INSIGHTS

Common MTO Residential Locations in New York

Experimental
Wakefield
Bronx

Control
MLK Towers
Harlem
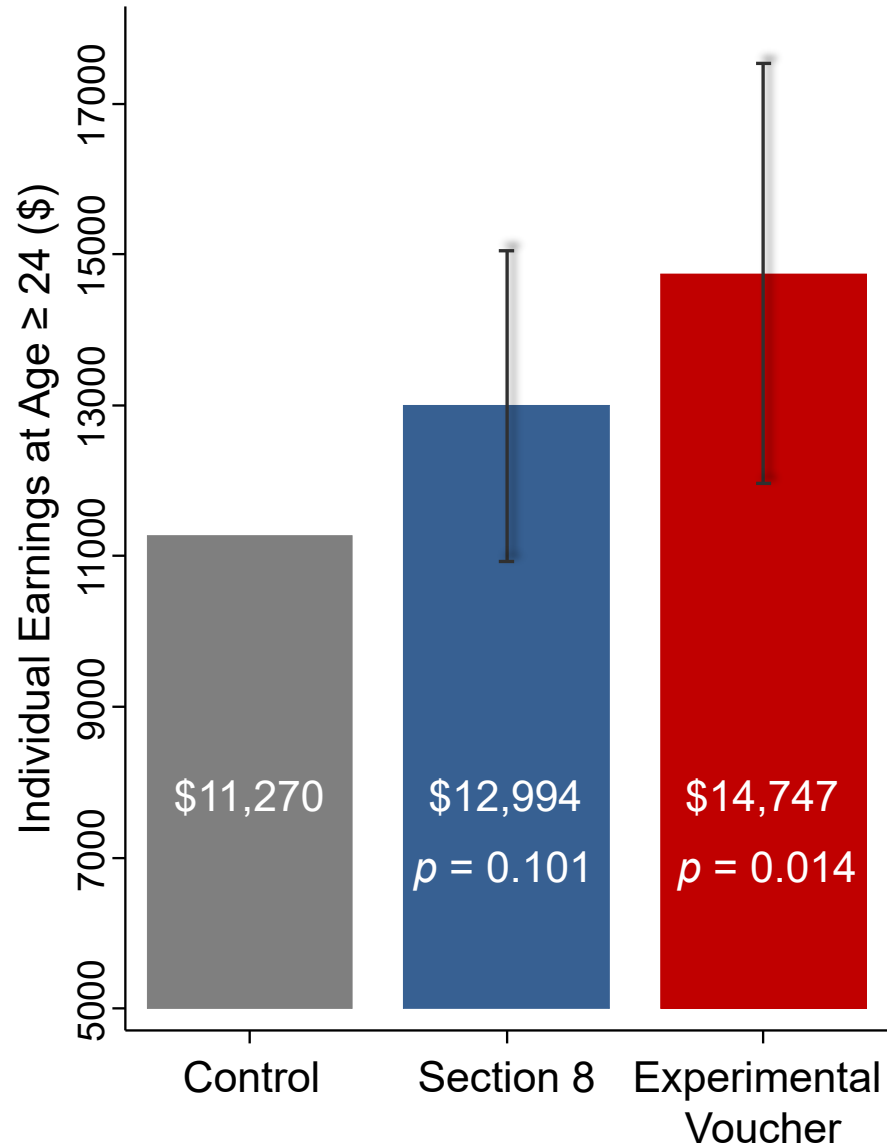
Section 8
Soundview
Bronx

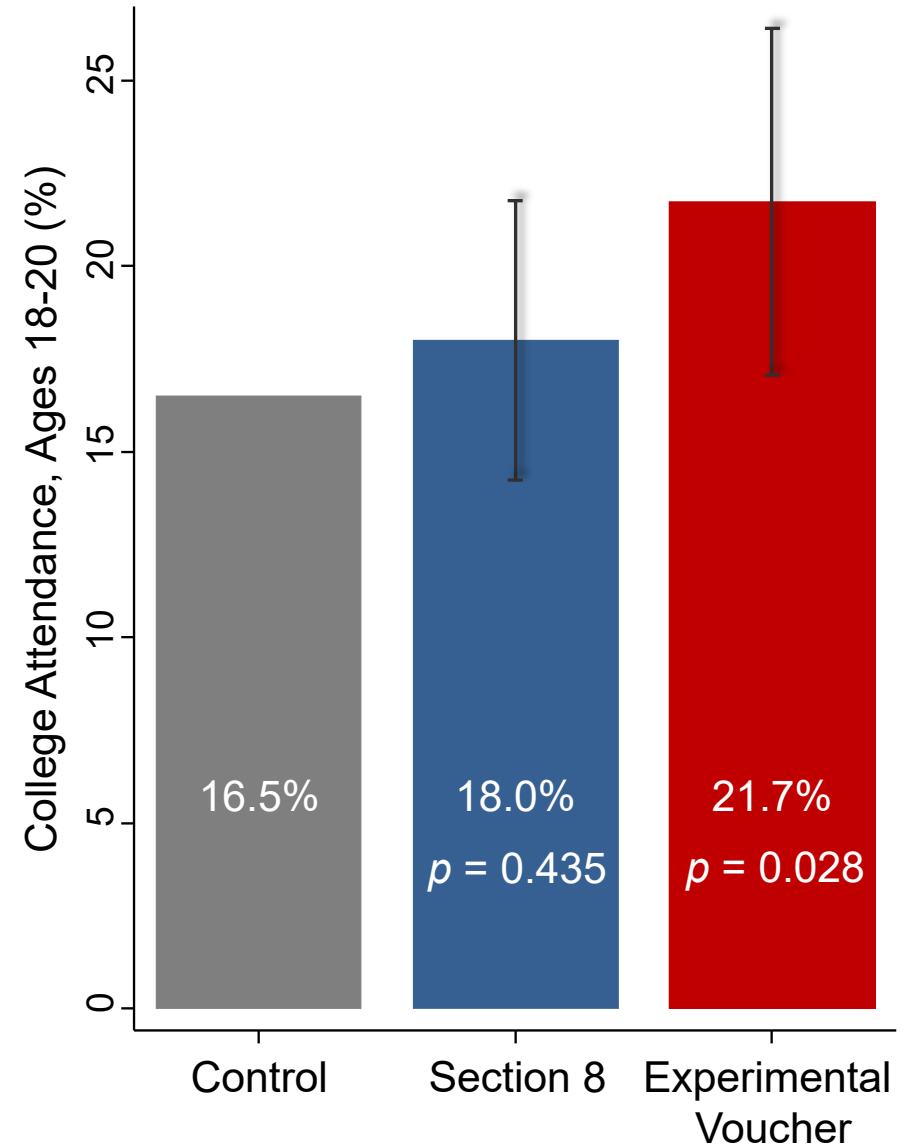# Analysis of MTO Experimental Impacts

- Initial research on MTO found little impact of moving to a better area on **adults'** economic outcomes such as earnings [e.g., Kling, Liebman, and Katz 2007]

- More recent literature looks at impacts on **kids**

  - Does MTO improve outcomes for children who moved when young?

  - Chetty, Hendren, Katz (2016) link MTO to tax data to study children's earnings outcomes in their mid-20's

Impacts of MTO on Children Below Age 13 at Random Assignment

Earnings

Individual Earnings at Age ≥ 24 ($)

Control: $11,270
Section 8: $12,994, $p = 0.101$
Experimental Voucher: $14,747, $p = 0.014$

College Attendance

College Attendance, Ages 18-20 (%)

Control: 16.5%
Section 8: 18.0%, $p = 0.435$
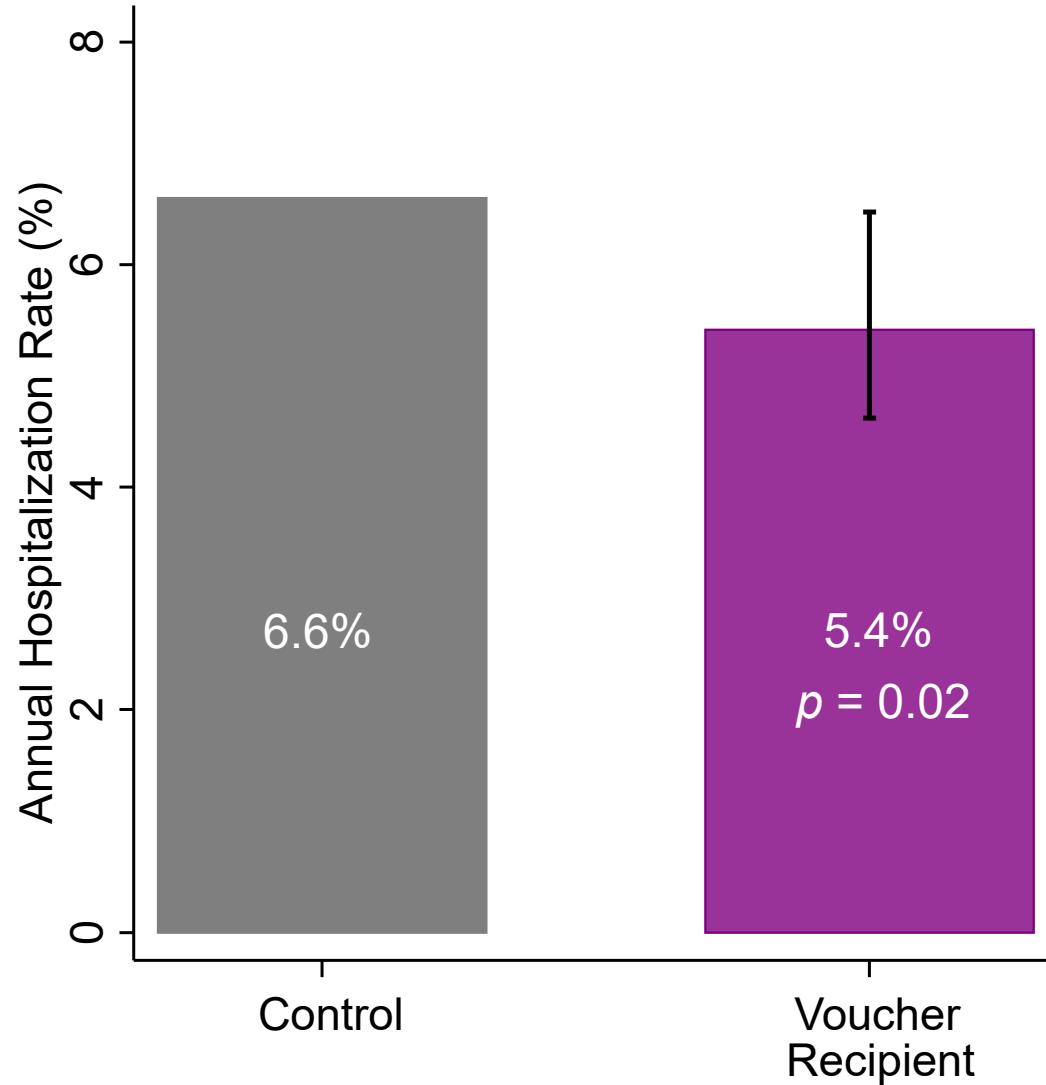Experimental Voucher: 21.7%, $p = 0.028$
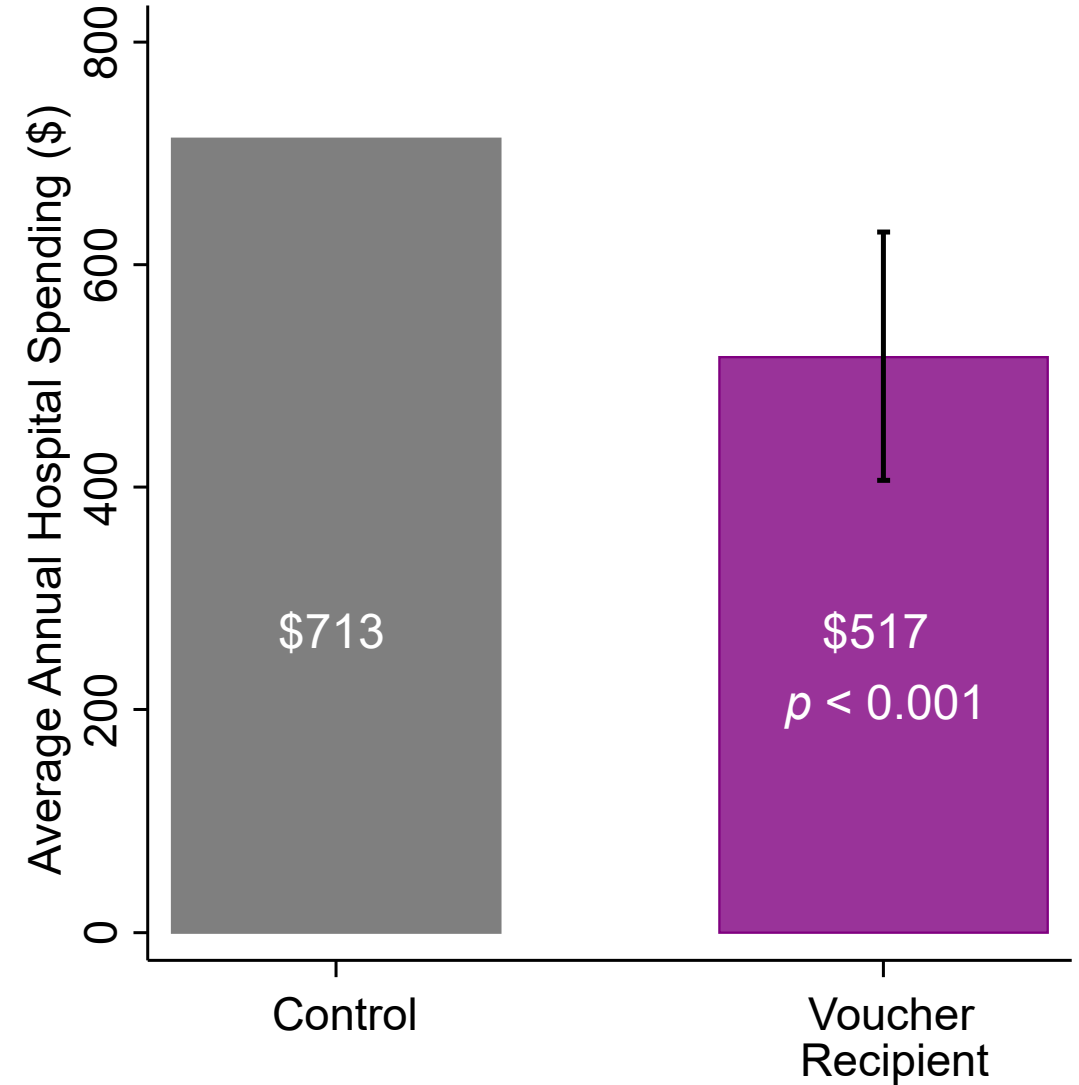
Analysis of MTO Experimental Impacts

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  - Chetty, Hendren, Katz (2016) link MTO to tax data to study children's earnings outcomes in their mid-20's

  - Pollack et al. (2019) link MTO to all-payer state health administrative records to study's children's and adults health in 15 years after randomization

Health Impact of MTO on Children Below Age 13 at Random Assignment
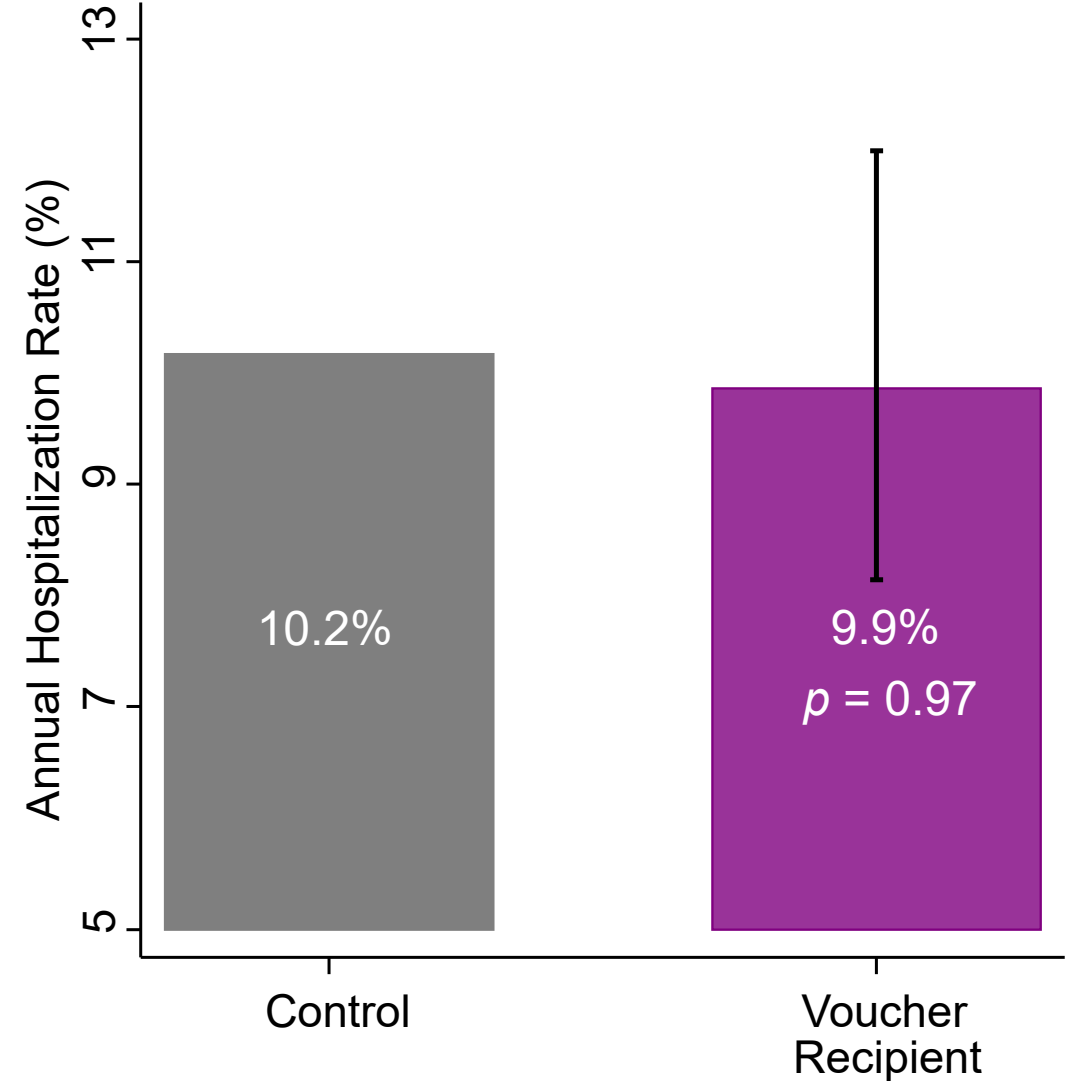
Hospitalization

Hospital Spending
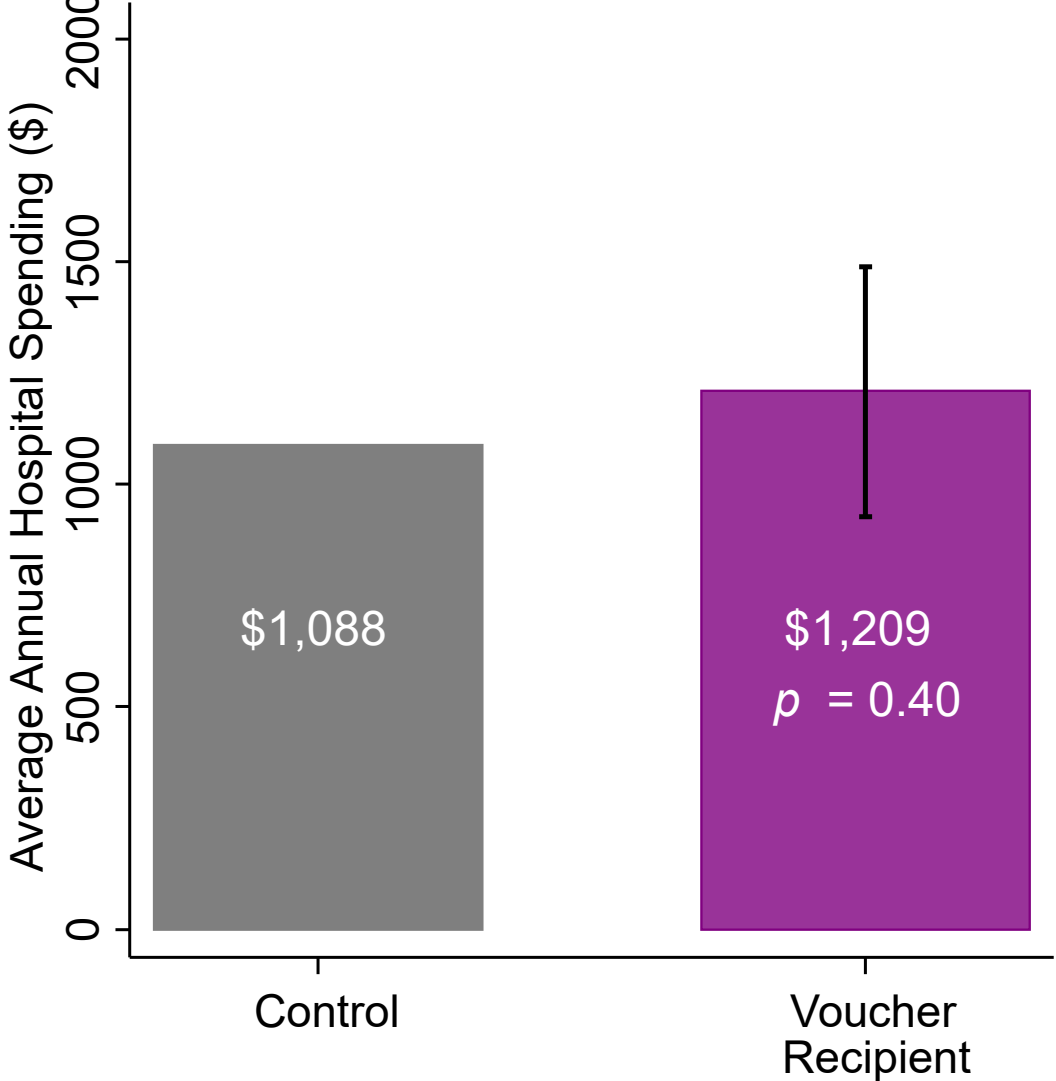
Annual Hospitalization Rate (%)

6.6%

5.4%
$p = 0.02$

Control

Voucher Recipient

Average Annual Hospital Spending ($)

$713

$517
$p < 0.001$

Control

Voucher Recipient

Source: Pollack, Blackford, Du, Deluca, Thornton, Herring (2016)

Health Impact of MTO on Children Above Age 13 at Random Assignment

Hospitalization

Hospital Spending

Annual Hospitalization Rate (%)

Average Annual Hospital Spending ($)

10.2%

9.9%
p = 0.97

$1,088

$1,209
p = 0.40

Control

Voucher
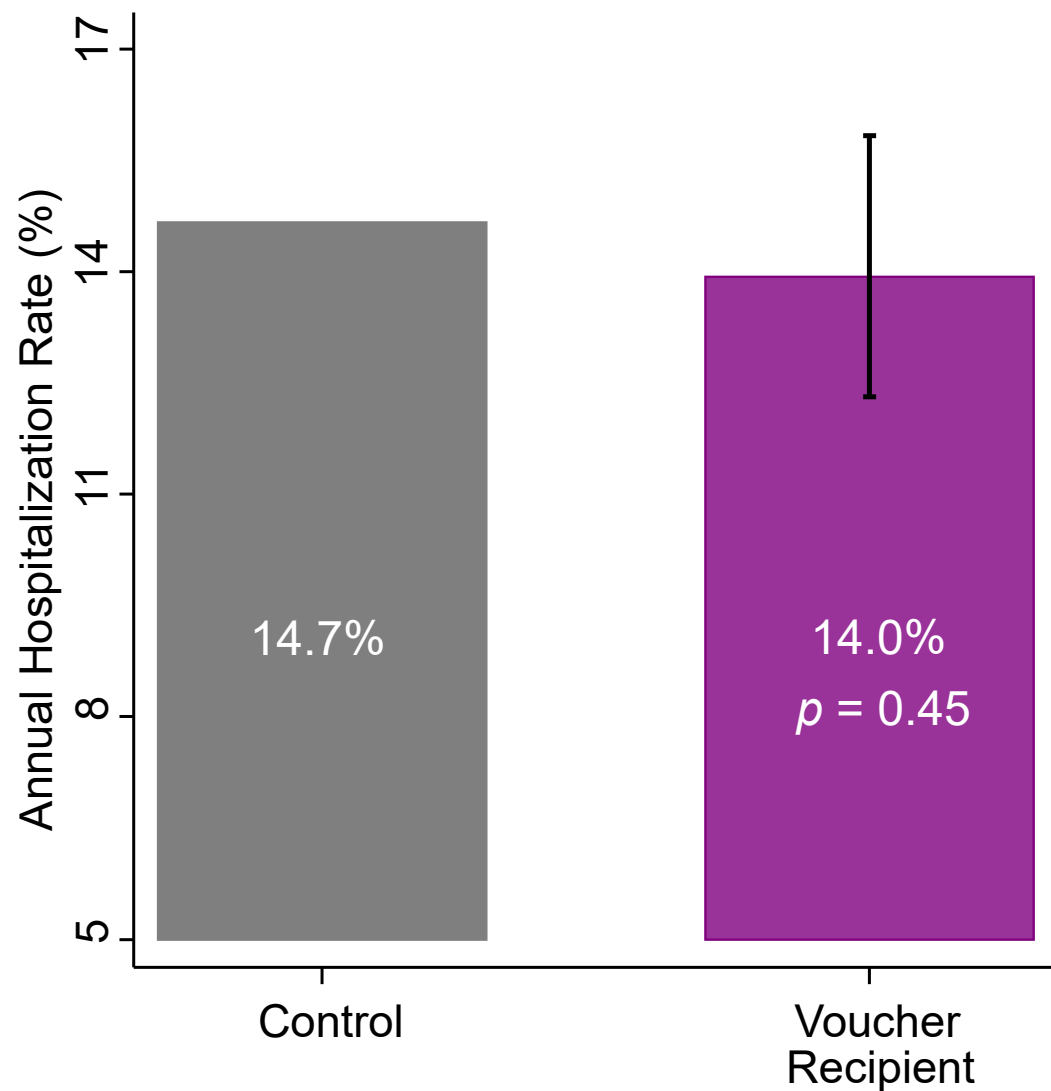Recipient

Control
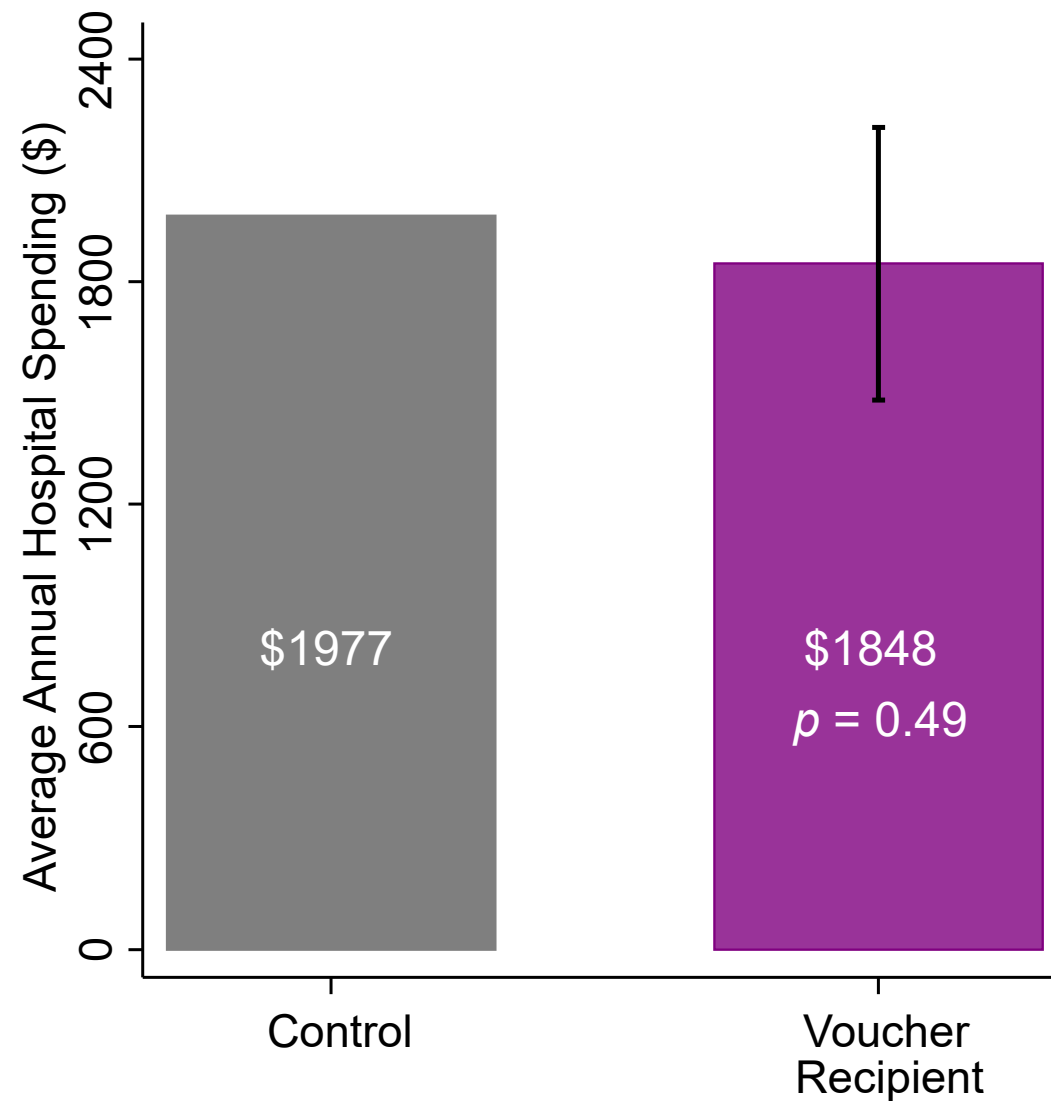
Voucher
Recipient

Health Impact of MTO on <u>Adults</u> at Random Assignment

Hospitalization

Hospital Spending

Impacts of MTO Experiment

- Key lesson from MTO research: neighborhoods have causal effects in proportion to duration of exposure (analogous to a "dosage effect" in medicine)

- This finding has been very important in changing public policy discussions

  - MTO **final impacts evaluation** issued in 2011 concluded that neighborhoods had little impacts on economic outcomes

  - Big data approach of linking MTO data to administrative records (tax, health) permitted longer-term follow-up that showed substantial effects for young children

- Led to widespread public discussion and bipartisan legislative change

The Washington Post

MAY 6, 2015

How Baltimore and Cities Like it Hold Back Poor Black Children as They Grow Up

The Washington Post, Emily Badger

The Washington Post

MAY 5, 2015

Learning About Upward Mobility by Studying People who Moved in Childhood

The Washington Post, Andrew Gelman

Vox

MAY 8, 2015

Want to Help Poor Kids? Help Their Parents Move to a Better Neighborhood

Vox, Matthew Iglesias

The New York Times

MAY 4, 2015

Mapping the American Dream: The Best Places to Grow Up

The New York Times

The New York Times

MAY 4, 2015

An Atlas of Upward Mobility Shows Paths Out of Poverty

The New York Times, David Leonhardt

The Atlantic

MAY 5, 2015

The Curse of Segregation

The Atlantic, Derek Thompson

PBS NEWS HOUR

MAY 4, 2015

Why the Place You Grow Up Can Limit Earning Power for Life

PBS News Hour

The New York Times

MAY 4, 2015

Why the New Research on Mobility Matters: An Economist's View

The New York Times, Justin Wolfers

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npr

MAY 4, 2015

Where Poor Kids Grow Up Makes A Huge Difference

NPR, Jacob Goldstein

Housing Choice Voucher Mobility Demonstration Act of 2018

115TH CONGRESS
2D SESSION

H. R. 5793

_____

IN THE SENATE OF THE UNITED STATES

JULY 11, 2018

Received; read twice and referred to the Committee on Banking, Housing, and Urban Affairs

_____

AN ACT

To authorize the Secretary of Housing and Urban Development to carry out a housing choice voucher mobility demonstration to encourage families receiving such voucher assistance to move to lower-poverty areas and expand access to opportunity areas.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Housing Choice Voucher Mobility Demonstration Act of 2018".

SEC. 2. HOUSING CHOICE VOUCHER MOBILITY DEMONSTRATION.

(a) AUTHORITY.—The Secretary of Housing and Urban Development (in this section referred to as the "Secretary") may carry out a mobility demonstration program to enable public housing agencies to administer housing choice voucher assistance under section 8(o) of the United States Housing Act of 1937 (42 U.S.C. 1437f(o)) in a manner designed to encourage families receiving such voucher assistance to move to lower-poverty areas and expand access to opportunity areas.

(b) SELECTION OF PHAS.—

(1) REQUIREMENTS.—The Secretary shall establish requirements for public housing agencies to participate in the demonstration program under this section, which rovide that the following public housing agencies may participate:

Limitations of Randomized Experiments

- Why not use randomized experiments to answer all policy questions?

- Three problems, even in the era of big data:

1. Feasibility: MTO cost $80 million and took 20+ years to deliver compelling results

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2. Sample size: small samples make estimates imprecise, especially for long-term impacts

    - Cost of data has fallen, but cost of experimentation has not

Limitations of Randomized Experiments

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- Three problems, even in the era of big data:

1. Feasibility: MTO cost $80 million and took 20+ years to deliver compelling results

2. Sample size: small samples make estimates imprecise, especially for long-term impacts

3. Generalizability: results of an experiment may not apply to other subgroups or areas

   – Difficult to run experiments in all subgroups and areas → "scaling up" can be challenging
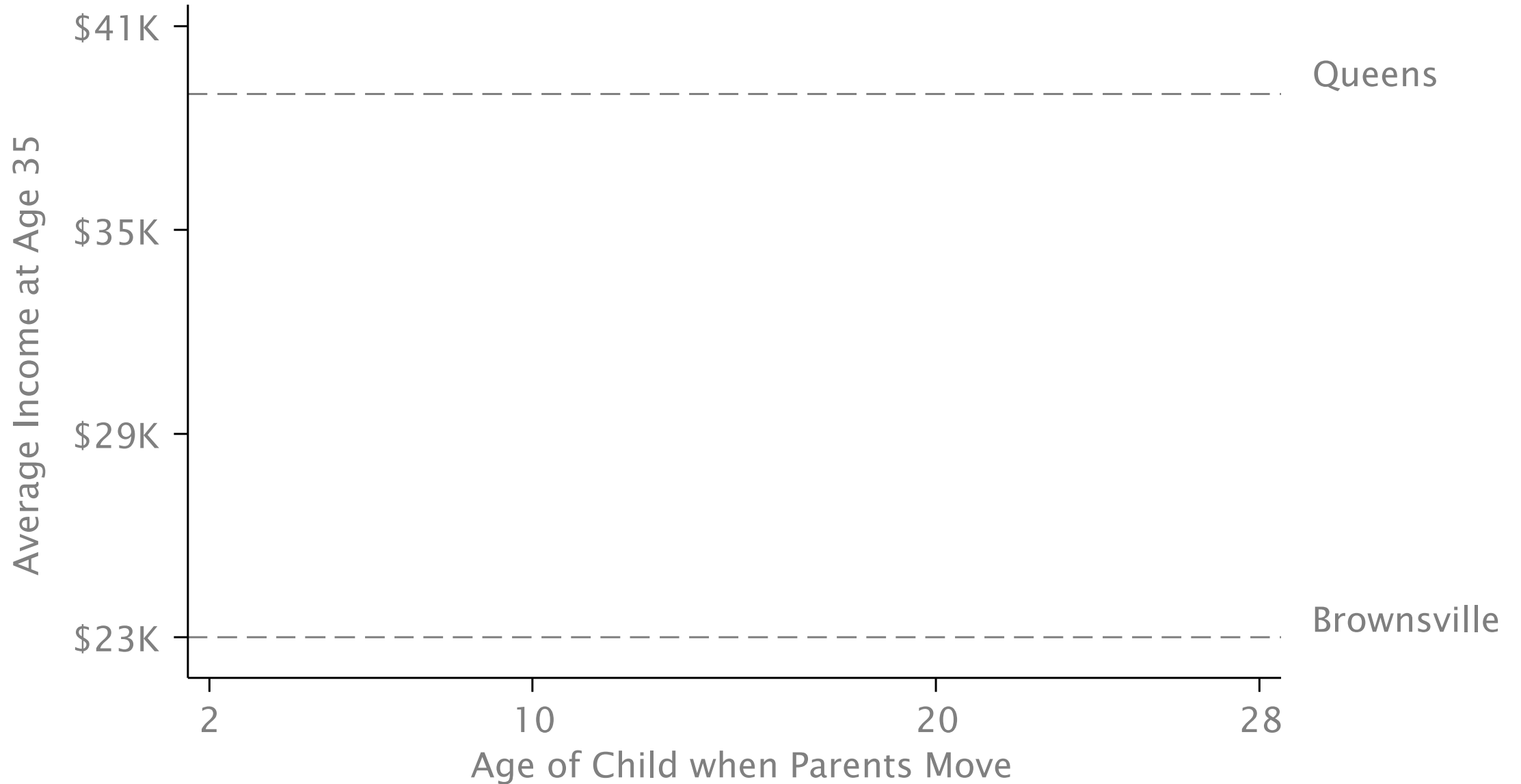
Quasi-Experimental Methods

- Quasi-experimental methods can help us resolve these issues and provide a complement to randomized experiments

- Core idea: approximate randomized experiment using specific sources of variation in observational data

  - Every quasi-experiment relies on an **identification assumption** that makes it as good as a randomized experiment

  - We will discuss different quasi-experimental methods and identification assumptions at several points in this class

- First illustration: quasi-experimental evidence on causal effects of neighborhoods

Quasi-Experimental Evidence on Causal Effects of Neighborhoods

- ▪ Ideal experiment: randomly assign children to neighborhoods and compare outcomes in adulthood

- ▪ We approximate this experiment by studying 3 million families who move across Census tracts in observational data

  - – **Research design**: exploit variation in *age of child* when family moves to identify causal effects of environment

  - – First show what we see in the data, then return to the identification assumption under which this approach identifies causal effects
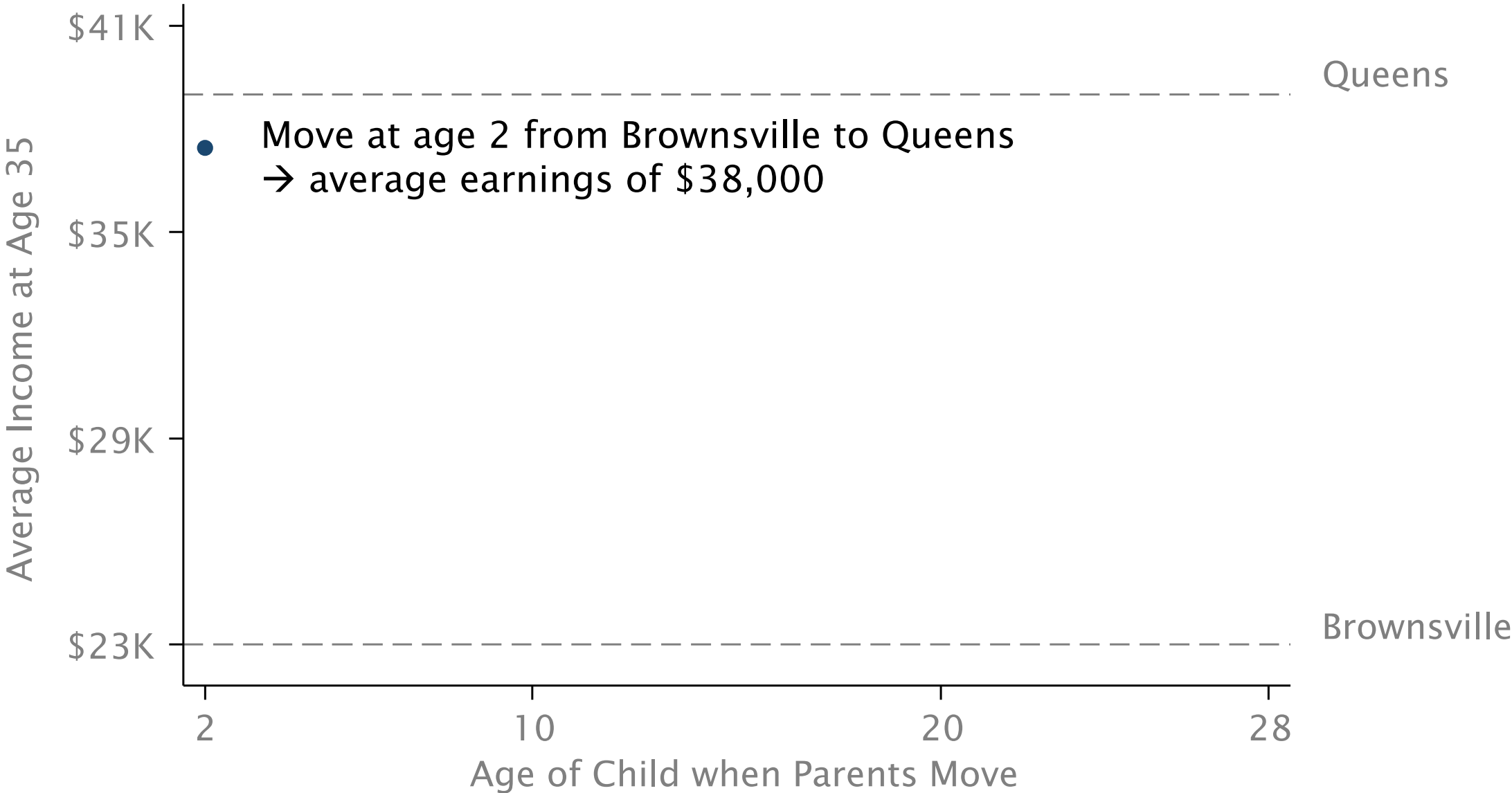
Source: Chetty and Hendren 2018; Chetty, Friedman, Hendren, Jones, Porter 2018

Income Gain from Moving to a Better Neighborhood
By Child's Age at Move

Average Income at Age 35

$41K

$35K

$29K

$23K

Queens

Brownsville

2

10

20

28

Age of Child when Parents Move

Income Gain from Moving to a Better Neighborhood
By Child's Age at Move

$41K —

Queens

Move at age 2 from Brownsville to Queens
→ average earnings of $38,000

$35K —

$29K —

Brownsville
$23K —

Average Income at Age 35

2   10   20   28

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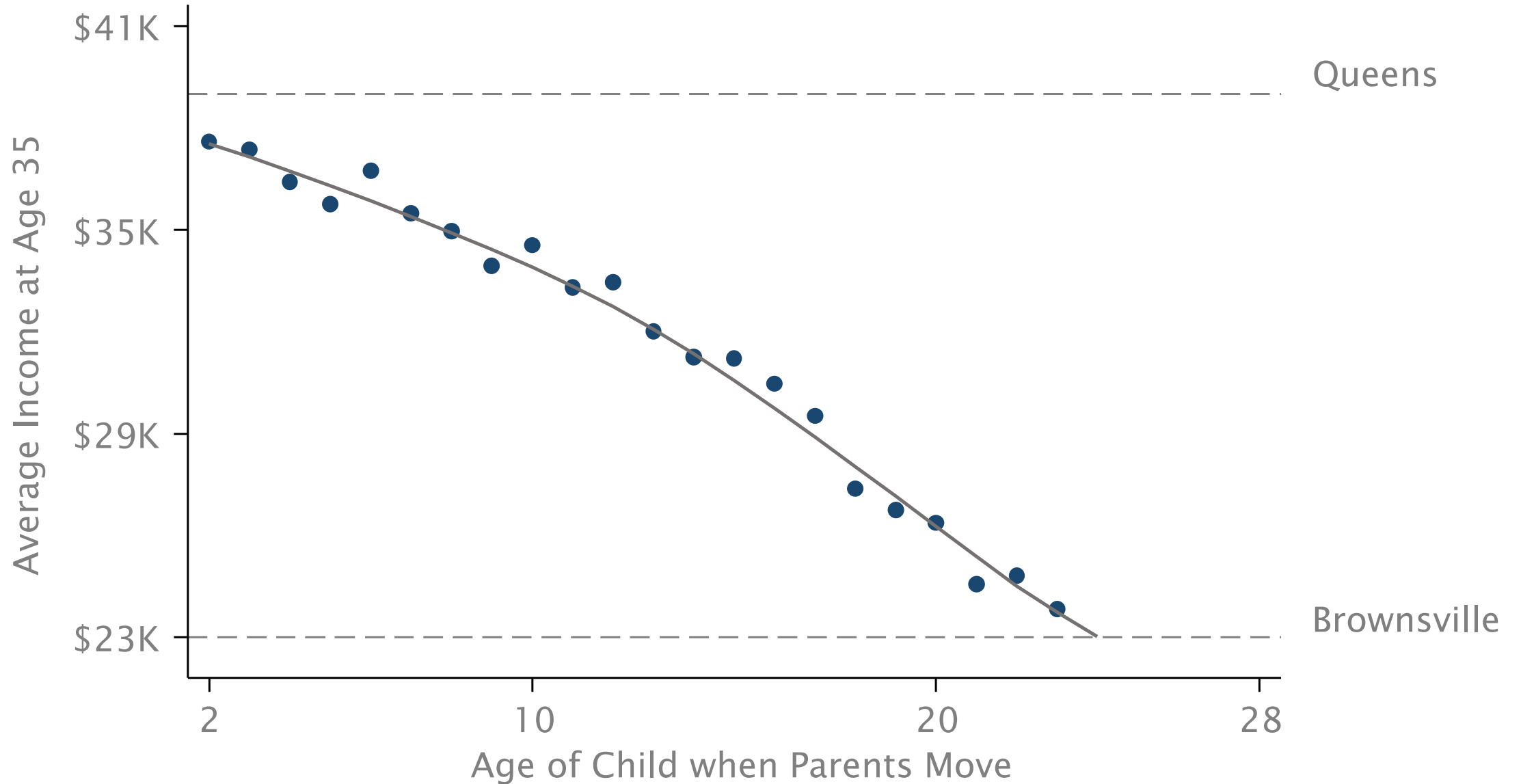
Age of Child when Parents Move
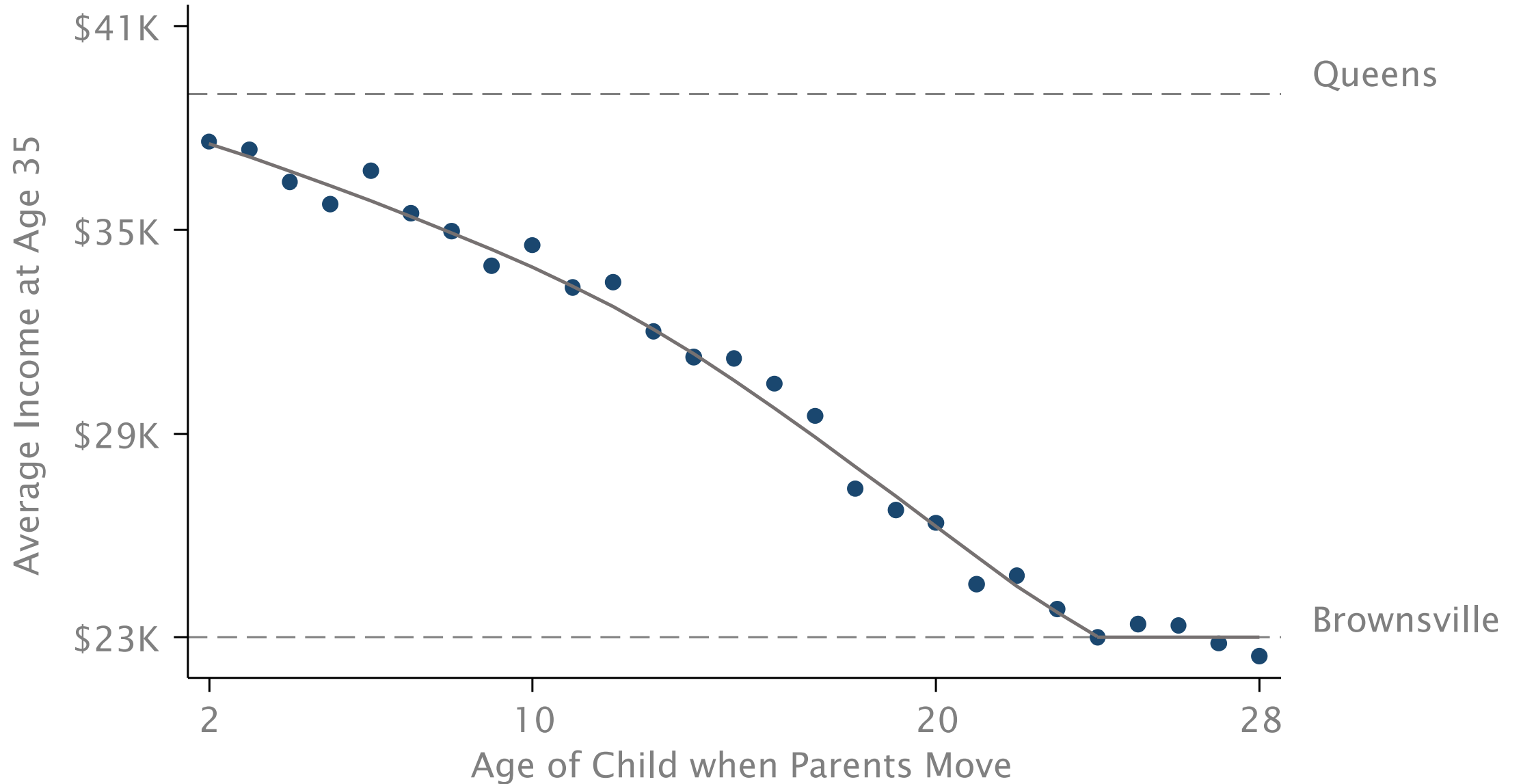
Identifying Causal Effects of Neighborhoods

- **I**dentification assumption: *timing* of moves to a better/worse area unrelated to other determinants of child's outcomes

    – Under this assumption, differences in earnings by age of move are the same as what we'd see in an experiment where we randomly move kids at different ages

Identifying Causal Effects of Neighborhoods

- Identification assumption: *timing* of moves to a better/worse area unrelated to other determinants of child's outcomes

  - Under this assumption, differences in earnings by age of move are the same as what we'd see in an experiment where we randomly move kids at different ages

- But this assumption might not hold, for two reasons:

  1. Parents who move to good areas when their children are young might be different from those who move later

  2. Moving may be related to other factors (e.g., change in parents' job) that affect children directly

Identifying Causal Effects of Neighborhoods

- Two approaches to evaluating validity of identification assumption:

    1. Compare siblings' outcomes to control for family effects

Identifying Causal Effects of Neighborhoods

- Two approaches to evaluating validity of identification assumption:

  1. Compare siblings' outcomes to control for family effects

  2. Use differences in neighborhood effects across subgroups to implement "placebo" tests

     – Ex: some places (e.g., low-crime areas) have better outcomes for boys than girls

     – Move to a place where boys have high earnings → son improves in proportion to exposure but daughter does not

Quasi-Experimental vs. Experimental Approach

- Recap: how did we achieve comparability across groups in our quasi-experimental study of movers?

    - People who move to different areas are not comparable to each other

    - But people who move when children are younger vs. older are more likely to be comparable, an assumption we worked to verify

    → We approximated experimental conditions by comparing children who move to a new area at different ages

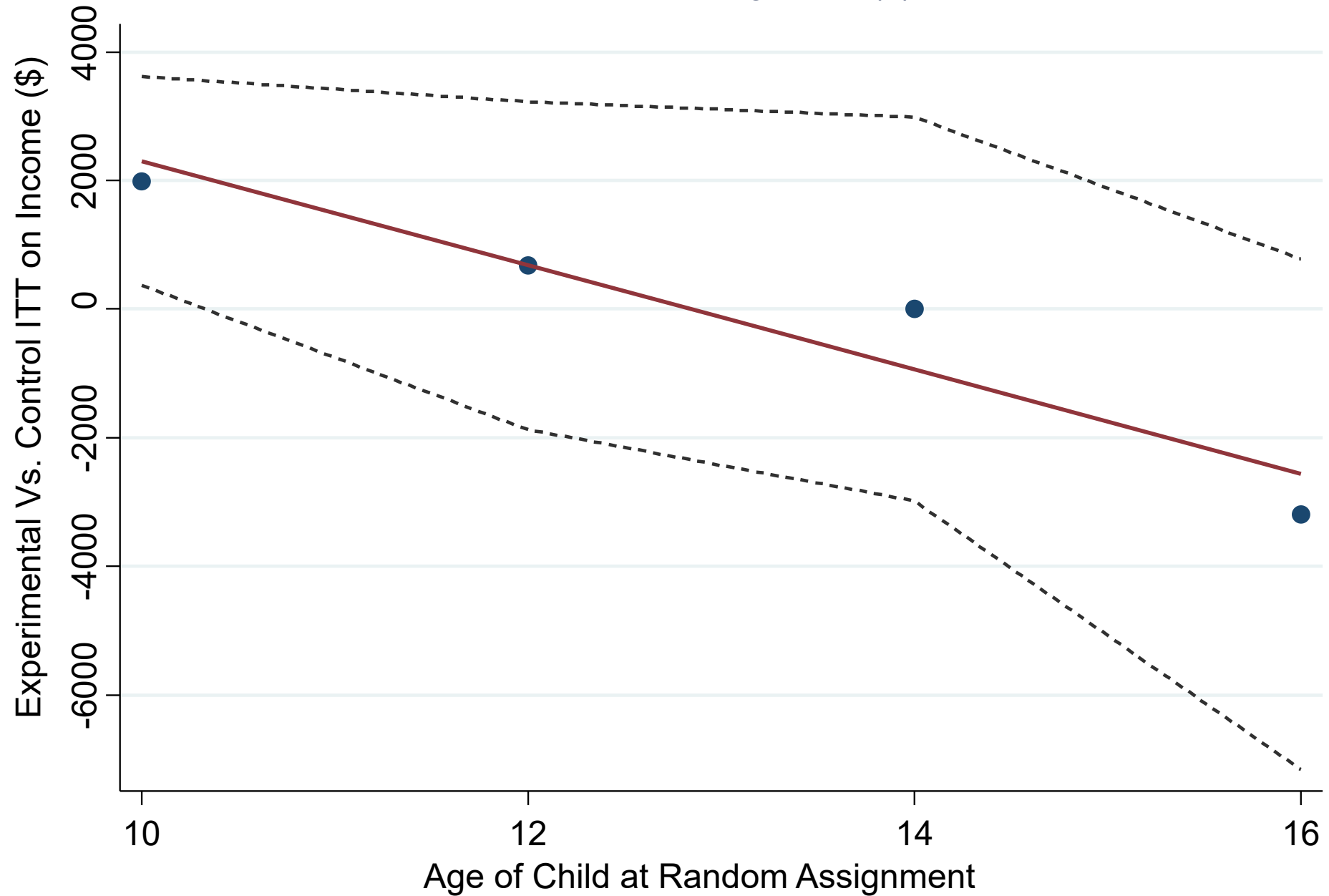# Quasi-Experimental Evidence on Neighborhood Effects

- Quasi-experimental approach addresses limitations of MTO experiment:

  1. Feasibility: does not require experimental intervention and results are available immediately

Quasi-Experimental Evidence on Neighborhood Effects

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  2. Sample size: much larger samples yield precise estimates of childhood exposure effects (4% convergence per year)
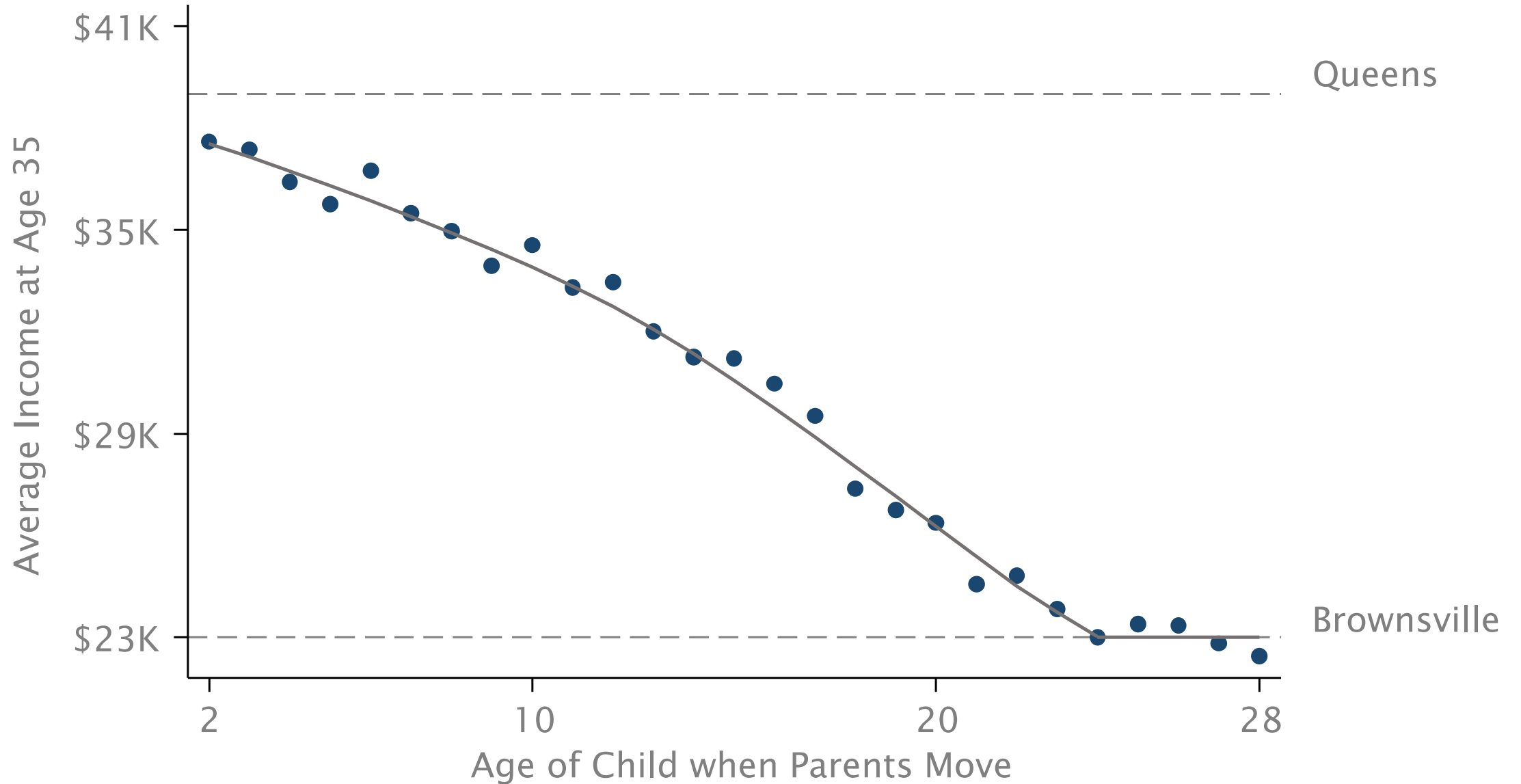
Impacts of Experimental Voucher by Age of Random Assignment
Household Income, Age ≥ 24 ($)

Income Gain from Moving to a Better Neighborhood
By Child's Age at Move

Queens

Brownsville

$41K

$35K

$29K

$23K

Average Income at Age 35

2
10
20
28

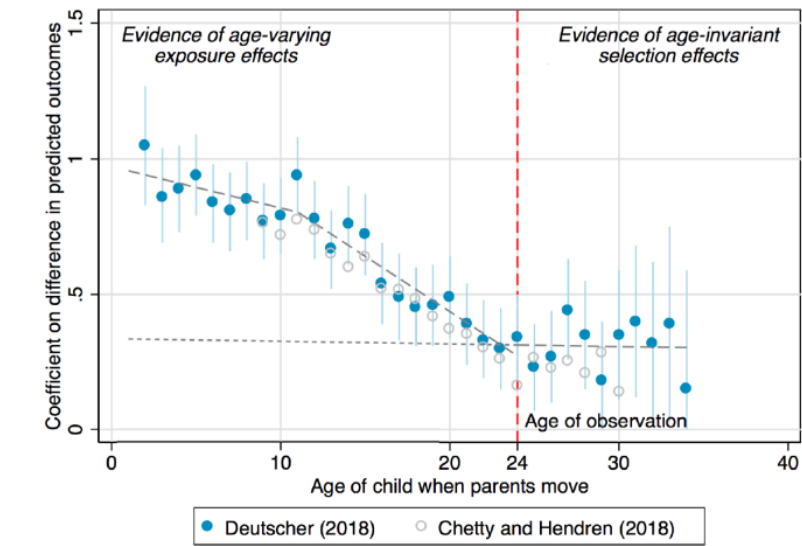Age of Child when Parents Move

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  3. Generalizability: results are based on all areas of the U.S. and same method can be applied more broadly
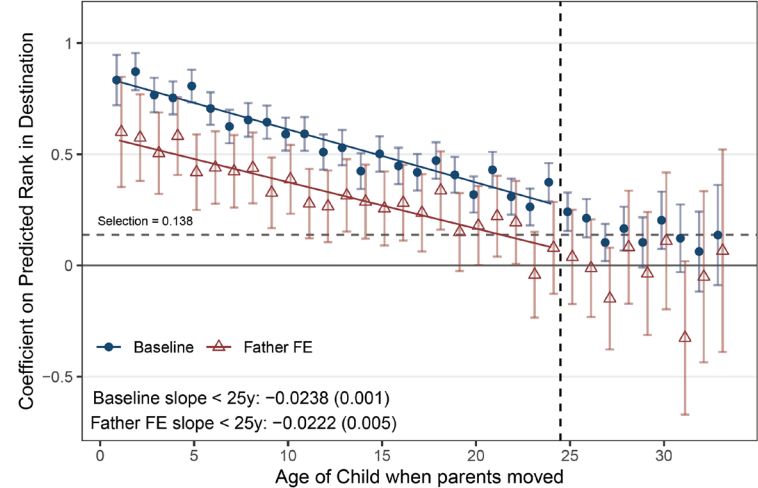
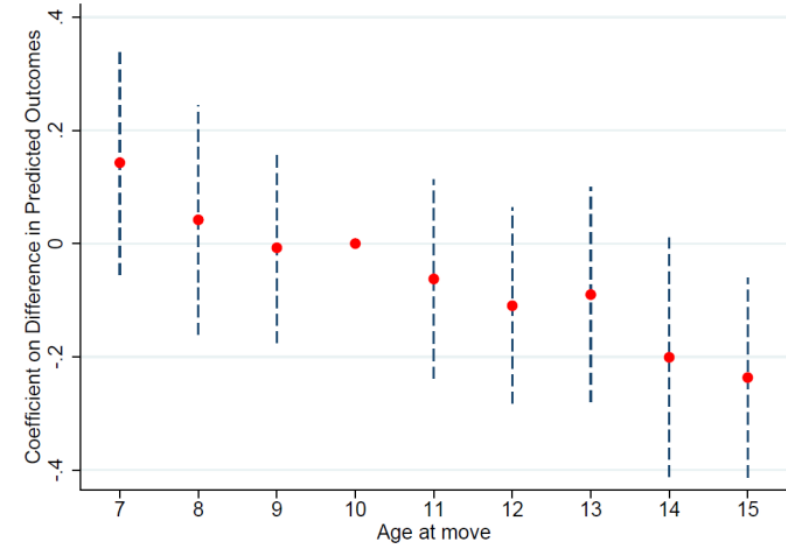# Childhood Exposure Effects Around the World

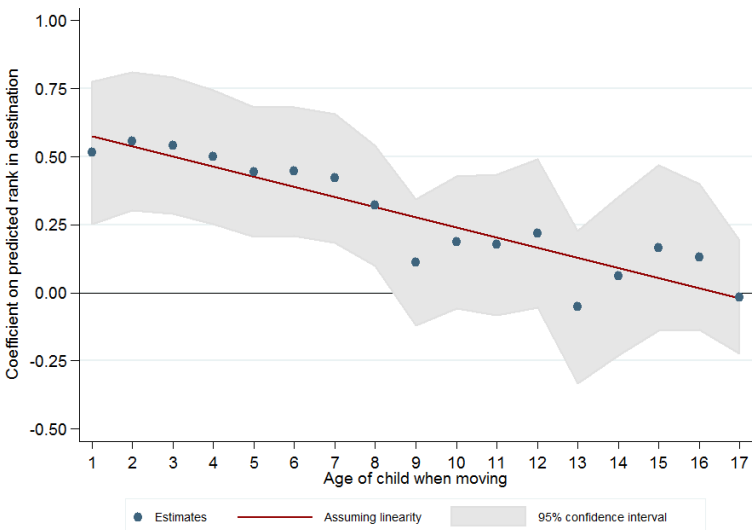## Australia

Source: Deutscher (AEJ Applied 2019)

Brazil

Source: Britto, Fonseca, Pinotti, Sampaio, Warwar (2022)
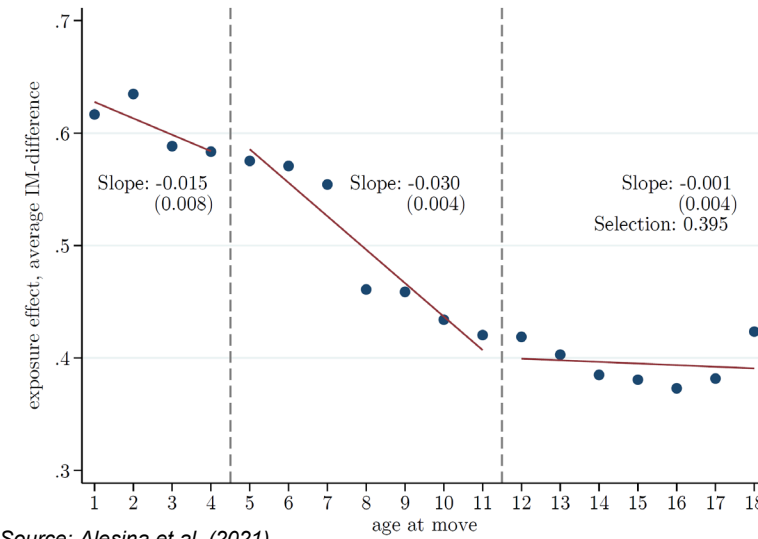
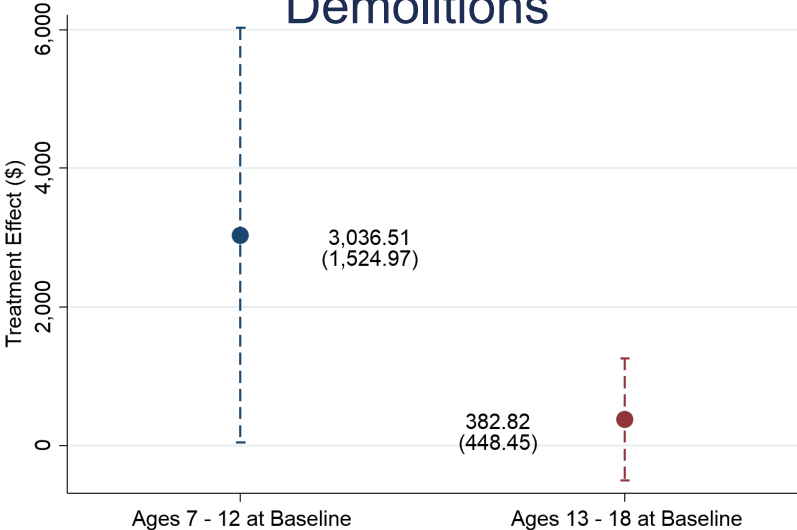## Montreal, Canada

Source: Laliberté (2018)

Denmark

Source: Faurschou (2018)

Africa

Source: Alesina et al. (2021)

Chicago Public Housing Demolitions

Source: Chyn (AER 2018)

Quasi-Experimental Evidence on Neighborhood Effects

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  2. Sample size: much larger samples yield precise estimates of childhood exposure effects (4% convergence per year)

  3. Generalizability: results are based on all areas of the U.S. and same method can be applied more broadly

- **Limitation** of quasi-experimental approach: relies on stronger assumptions

  → Valuable to have evidence from many empirical approaches

Causal Effects vs. Sorting: What Have We Learned?

- Both MTO experiment and quasi-experimental studies imply that about **60%** of the variation in upward mobility across areas is due to **causal effects**

- Moving at birth from birth from tract at 25th percentile of distribution of upward mobility to a tract at 75th percentile within county → **$200,000 gain** in lifetime earnings

- This evidence has led to a focus on childhood development at a local level to increase upward mobility

IMPORTANCE OF PLACE

An Atlas of Upward Mobility Shows Paths Out of Poverty

By **DAVID LEONHARDT, AMANDA COX and CLAIRE CAIN MILLER**   MAY 4, 2015

f y ✉ ↗   🔖   484

Income in adulthood for **children whose families moved** to a better place

The same as kids from the **new place**

75-25 mix

Children who moved at age 10 ended up with incomes that were about halfway between the average incomes of kids who spent their entire childhoods in one of the two places.

income

50-50 mix

25-75 mix

The later families moved, the less their children were affected.

The same as kids from the **old place**

Moved when children were 9   13   17   21

In the wake of the Los Angeles riots more than 20 years ago, Congress created an anti-poverty experiment called Moving to Opportunity. It gave vouchers to help poor families move to better neighborhoods and awarded them on a random basis, so researchers could study the effects.

The results were deeply disappointing. Parents who received the vouchers did not seem to earn more in later years than otherwise similar adults, and children did not seem to do better in school. The program's apparent failure has haunted social scientists and policy makers, making poverty seem all

Detailed Maps Show How Neighborhoods Shape Children for Life

Some places lift children out of poverty. Others trap them there. Now cities are trying to do something about the difference.

By **Emily Badger** and **Quoctrung Bui**

Oct. 1, 2018

225

A Wake-Up Call for Charlotte-Mecklenburg

January 25, 2014

Land of opportunity? Not by a long shot

Charlotte is nation's worst big city for climbing out of poverty

The Charlotte Observer

Over the last several decades, Charlotte-Mecklenburg has transformed from a small southern town to one of the country's largest and most dynamic communities. We continue to attract people—nearly 50 a day— who move here to take advantage of our strong business climate, favorable weather and geographic location, and our reputation as a great place to live and raise a family. Accolades from the outside regularly tell us how tall we stand among other communities. As recently as February 7, 2017, U.S. News and World Report ranked us as the 14th best place to live in the country.[i]

Yet, in 2013 when the headline broke about the Harvard University/UC Berkeley study that ranked Charlotte-Mecklenburg 50th out of 50 in upward mobility[ii] for children born into our lowest income quintile, many in our community responded with disbelief. **How, on the one hand, can we be such a vital and opportunity-rich community, and on the other, be ranked dead last in the odds that our lowest income children and youth will be able to move up the economic ladder as they become adults?**

The Geography of Opportunity in Charlotte

New 'Atlas' of mobility shows how kids from different Charlotte neighborhoods have done

October 1, 2018

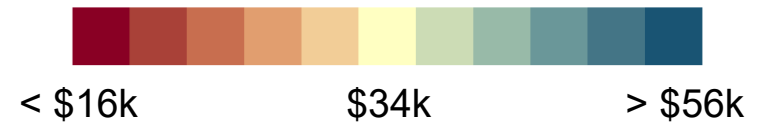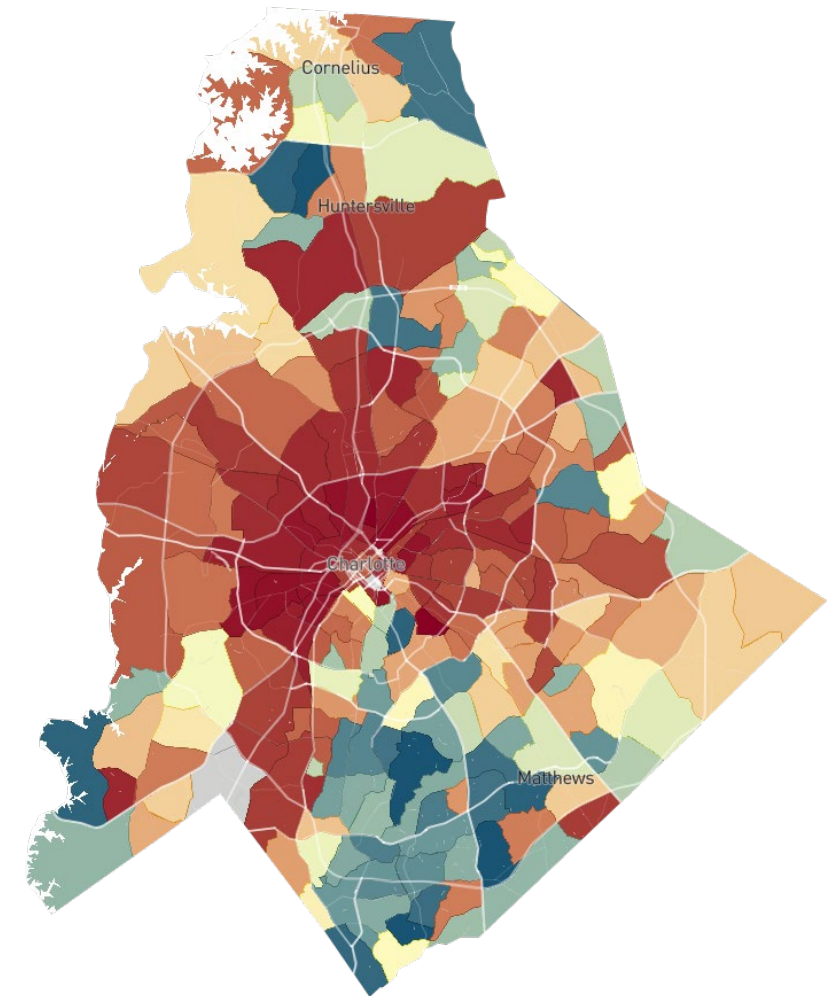Mobility 'Atlas' shows city kids' progress

The Charlotte Observer

It's hard to imagine a bigger gulf than the one between academic researchers crunching data at Harvard and families trapped by poverty and hopelessness in Charlotte.

The two came together in the public imagination four years ago, when professors labeled Charlotte the worst of the country's 50 biggest commuting areas at giving children of poverty a chance to move into affluence. The sting of that label has driven sweeping change in the way local leaders talk about public policy, social justice and daily life.

Now the research team that shamed Charlotte into action has signed on to work with the city's public and private officials to see whether data can help policy and philanthropy bring real-life change. They bring a massive database compiled by academics — with information on income, family status, rent, race, immigration and more — and are sharing it with the public as well as the experts.
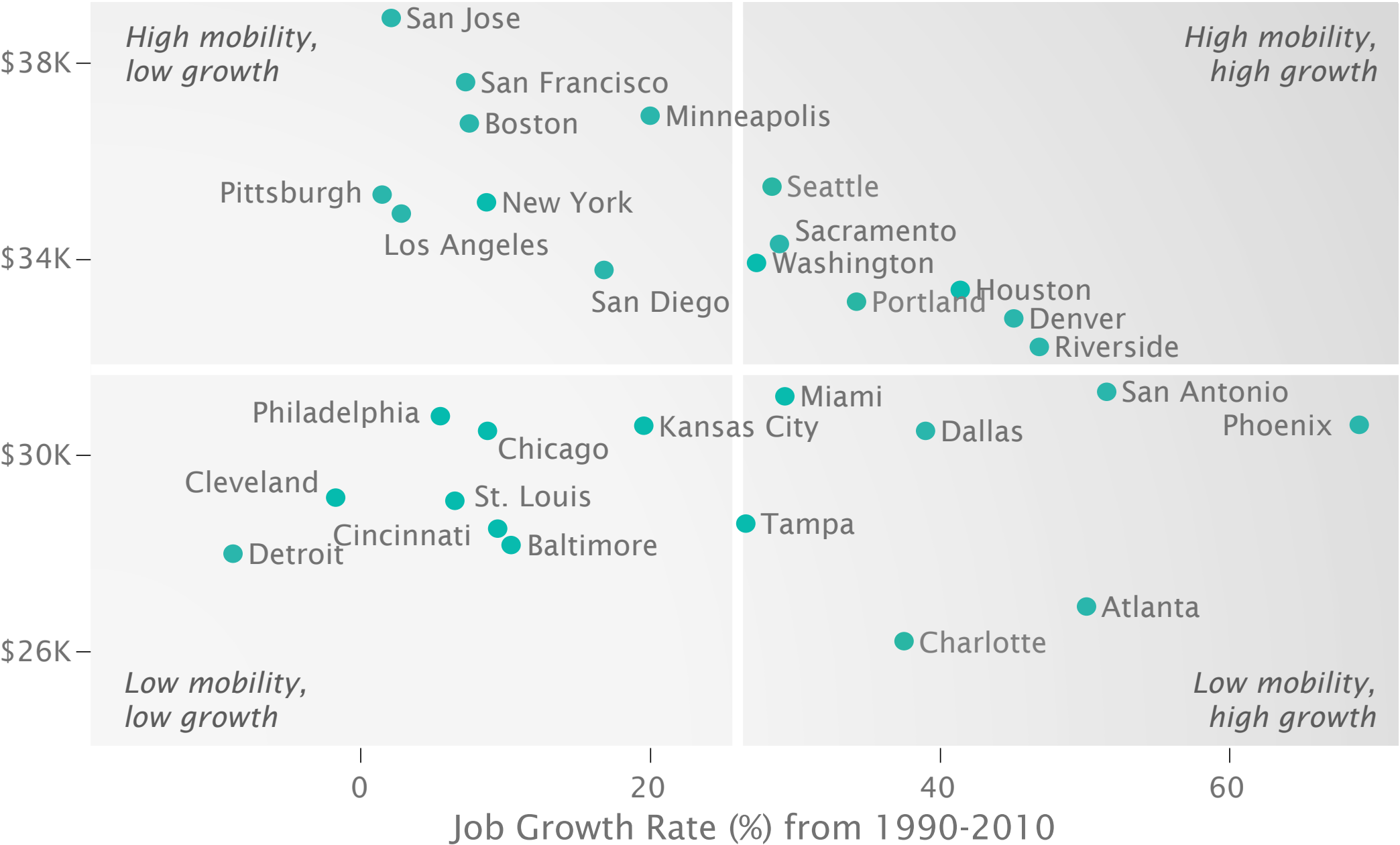
< $16k $34k   > $56k

Why Do Some Place Generate More Upward Mobility than Others?

- First step: characterize the properties of areas with high rates of upward mobility using correlational analysis

- Do places with higher mobility tend to have better jobs, schools, different institutions, …?

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

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

X-axis: Job Growth Rate (%) from 1990-2010

High mobility, low growth

High mobility, high growth

Low mobility, low growth

Low mobility, high growth

Data points: San Jose, San Francisco, Boston, Minneapolis, Pittsburgh, New York, Los Angeles, San Diego, Seattle, Sacramento, Washington, Portland, Houston, Denver, Riverside, Miami, San Antonio, Phoenix, Philadelphia, Chicago, Kansas City, Dallas, Cleveland, St. Louis, Cincinnati, Baltimore, Tampa, Detroit, Charlotte, Atlanta

Y-axis labels: $38K, $34K, $30K, $26K

X-axis labels: 0, 20, 40, 60

Five Strongest Correlates of Upward Mobility

1. Segregation

   – Greater racial and income segregation associated with less mobility
   – Concentrated poverty (e.g., public housing) associated with lowest levels of mobility
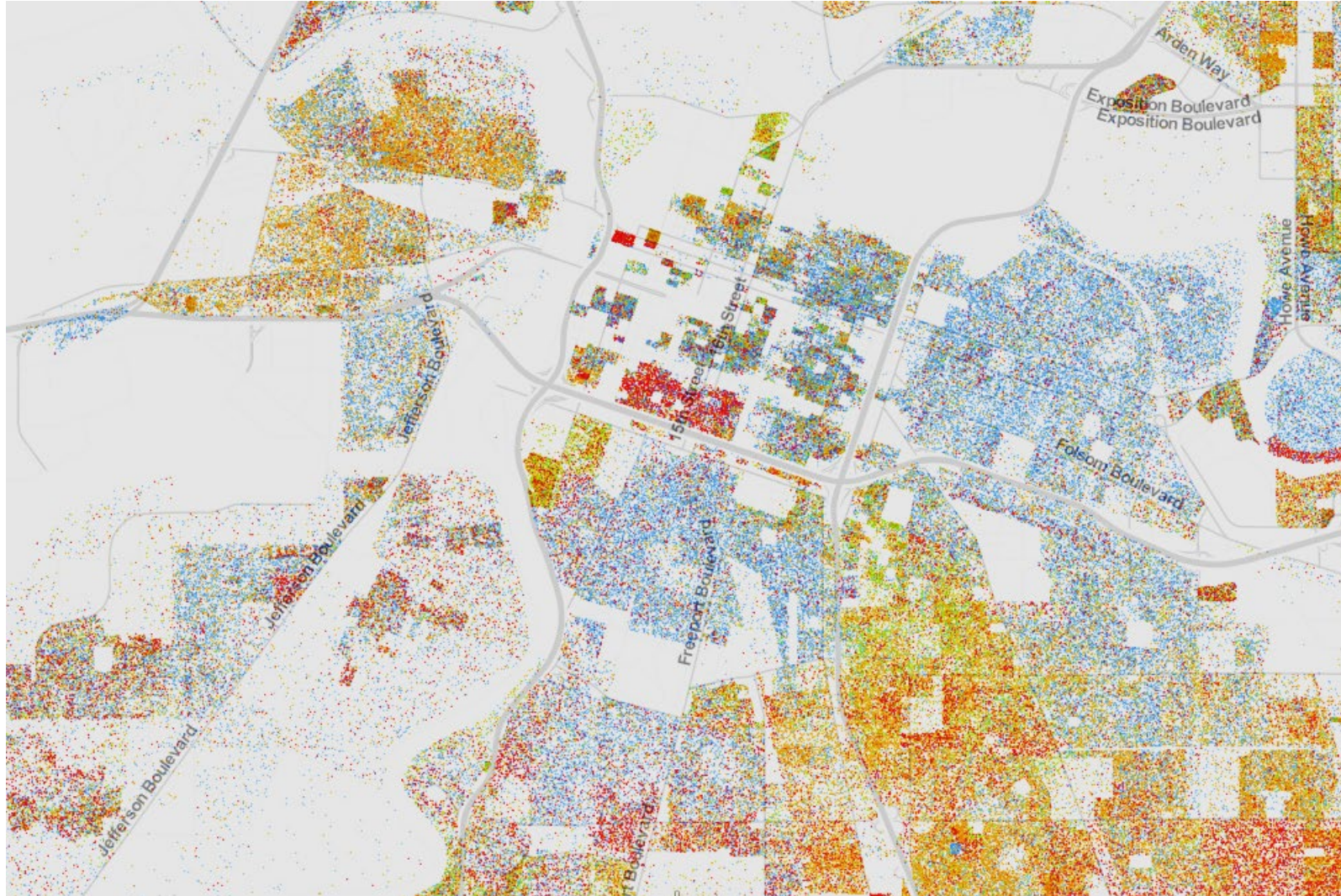
Racial Segregation in Atlanta
Whites (blue), Blacks (green), Asians (red), Hispanics (orange)

Source: Cable (2013) based on Census 2010 data

Racial Segregation in Sacramento
Whites (blue), Blacks (green), Asians (red), Hispanics (orange)

Five Strongest Correlates of Upward Mobility

1. Segregation

2. Income Inequality

   – Places with smaller middle class have much less mobility

Five Strongest Correlates of Upward Mobility

1. Segregation

2. Income Inequality

3. School Quality

   – Higher expenditure, smaller classes, higher test scores correlated with more mobility

Five Strongest Correlates of Upward Mobility

1. Segregation

2. Income Inequality

3. School Quality

4. Family Structure

   – Areas with more single parents have much lower mobility
   – Strong correlation even for kids whose *own* parents are married

Five Strongest Correlates of Upward Mobility

1. Segregation

2. Income Inequality

3. School Quality

4. Family Structure

5. Social Capital

   – "It takes a village to raise a child"
   – Putnam (1995): "Bowling Alone"