The Long-Run Effects of Low-Income Housing on Neighborhood Composition

Morris A. Davis[A], Jesse Gregory[B], Daniel A. Hartley[C]

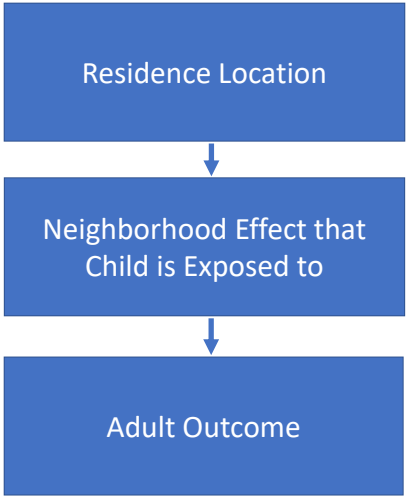
[A] Rutgers University
[B] University of Wisconsin
[C] Federal Reserve Bank of Chicago

July 25, 2019

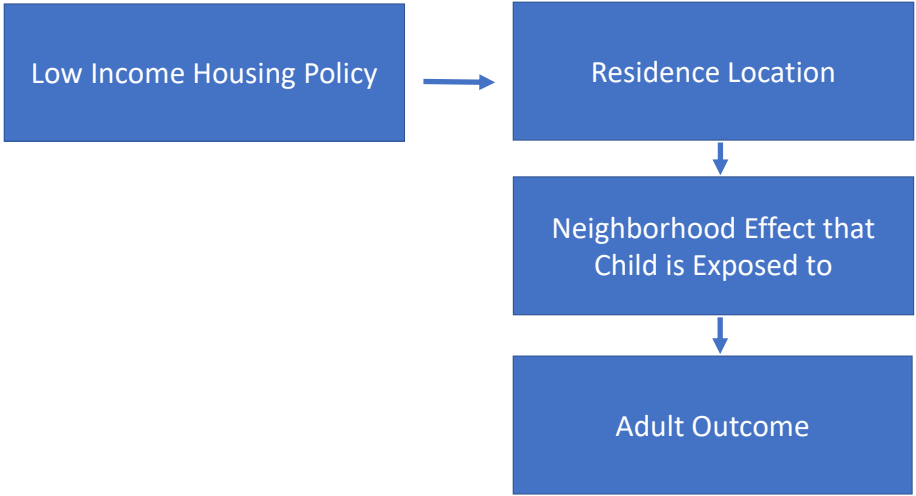
Disclaimer

The opinions expressed are those of the authors and do not necessarily represent the views of the Federal Reserve Bank of Chicago or the Board of Governors of the Federal Reserve System.

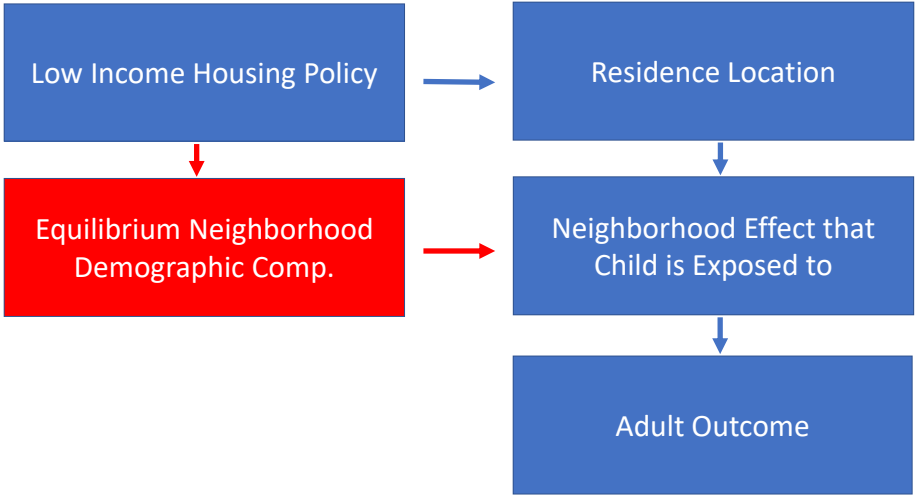
Neighborhood Effects and Policy



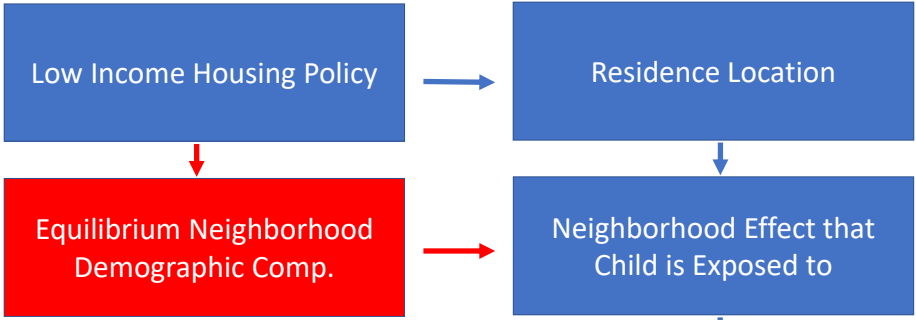
Neighborhood Effects and Policy



Neighborhood Effects and Policy



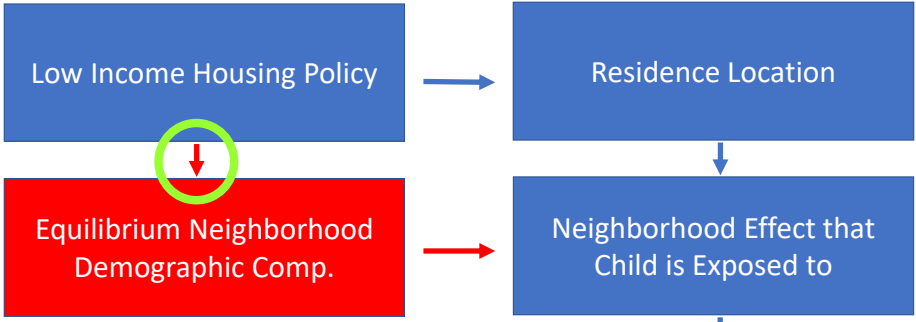
Neighborhood Effects and Policy



What we do:

1) Quasi-experimental evidence (LIHTC)
2) Structural eqm. model (counterfactuals)
3) Bounding exercise re: adult-inc. impacts

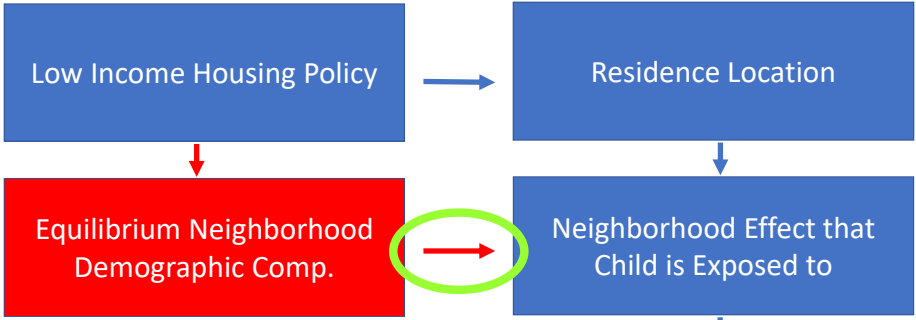
Neighborhood Effects and Policy



What we do:

1) Quasi-experimental evidence (LIHTC)
2) Structural eqm. model (counterfactuals)
3) Bounding exercise re: adult-inc. impacts

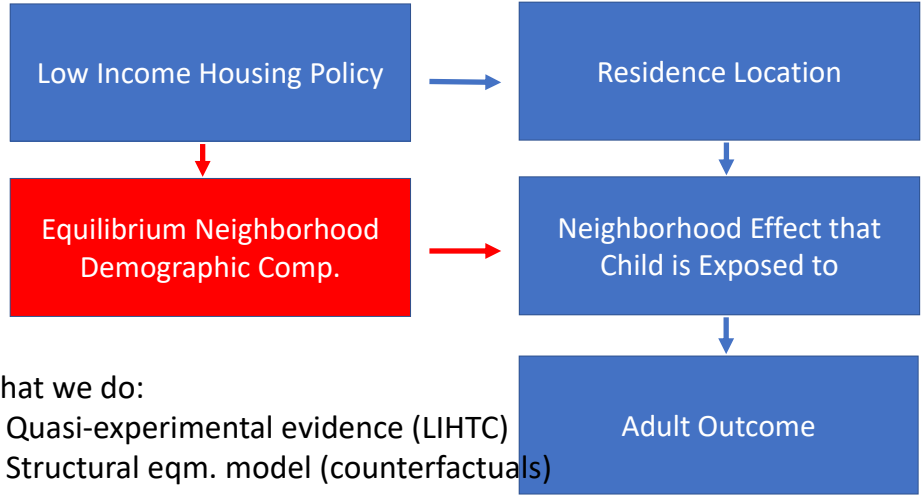
Neighborhood Effects and Policy



What we do:

1) Quasi-experimental evidence (LIHTC)
2) Structural eqm. model (counterfactuals)
3) Bounding exercise re: adult-inc. impacts

Neighborhood Effects and Policy

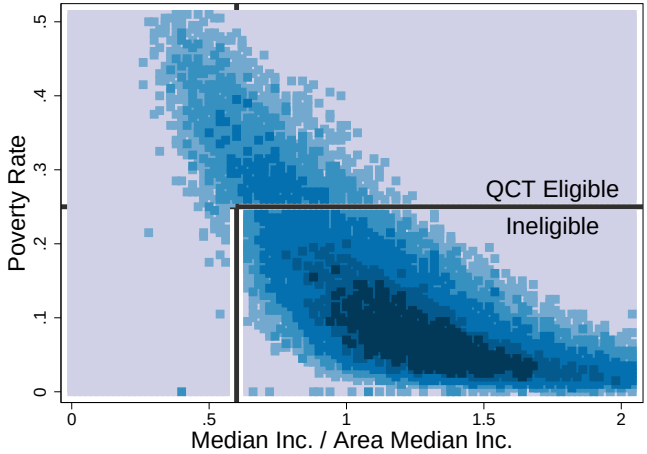


What we do:

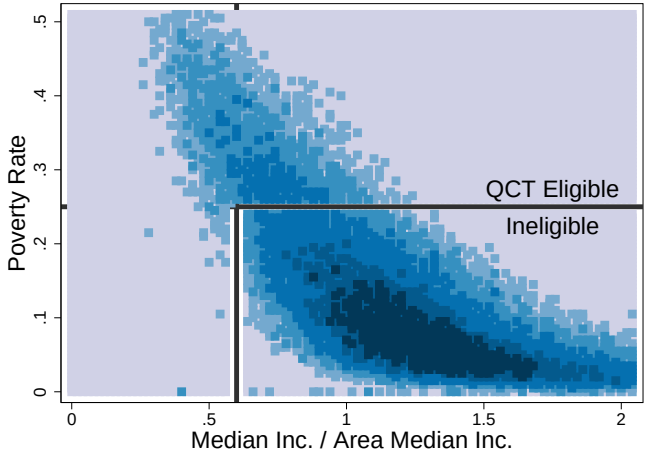
1) Quasi-experimental evidence (LIHTC)
2) Structural eqm. model (counterfactuals)
3) Bounding exercise re: adult-inc. impacts

Which Tracts are Eligible for Low Income Housing Tax Credits?

Which Tracts are Eligible for Low Income Housing Tax Credits?

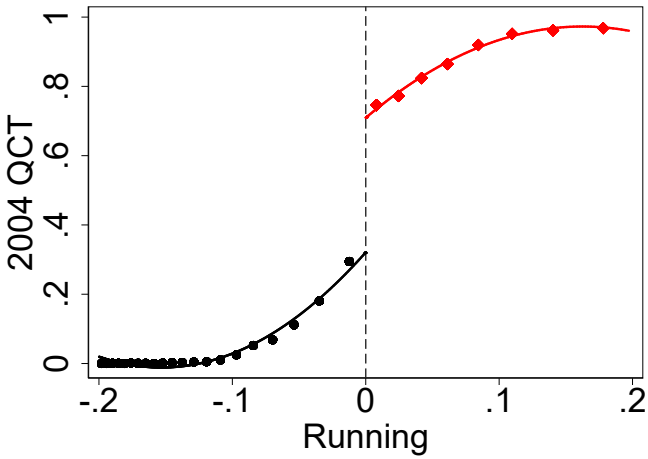


Which Tracts are Eligible for Low Income Housing Tax Credits?



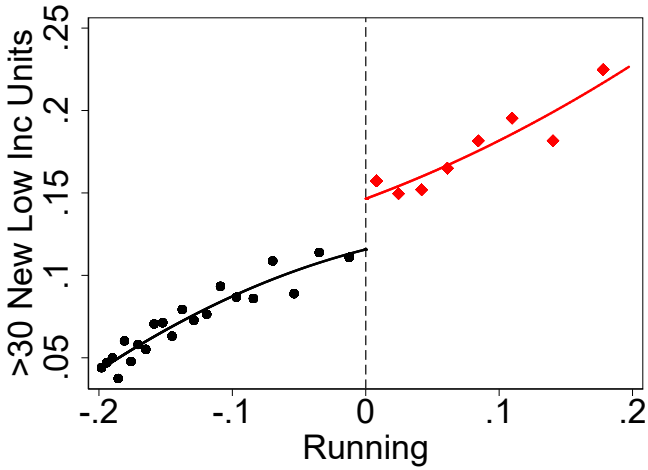
$$Running_j = max(pov_j - 0.25, 0.6 - MedIncIndex_j)$$

Poverty and Income Threshold is "Relevant"



Source: HUD LIHTC Database

QCT Impacts Low Income Development (Cumulative 2004-2013)



Source: HUD LIHTC Database

QCT Impacts People's Choices and Neighborhoods Differently

Demographic Subgroup			Neighborhoods Included in Estimation Sample			
				Neighborhood's Predominant Race in 2000		
Race	"Type" Income	Age	All Neighborhoods	Black	Hispanic	White/Other

Note: Outcome = (tract choice prob.) $\times$ (# MSA tracts)
Bold indicates p<.05. Source: NYFRB / Equifax to be described later.

QCT Impacts People's Choices and Neighborhoods Differently

Demographic Subgroup			Neighborhoods Included in Estimation Sample			
				Neighborhood's Predominant Race in 2000		
Race	"Type" Income	Age	All Neighborhoods	Black	Hispanic	White/Other
Black			**0.151**			
Hispanic			**0.104**			
White			0.022			
Other			0			
	Low Income		**0.063**			
	Non-low income		0.035			
		< 35	**0.067**			
		35-44	0.047			
		45-54	0.043			
		55-64	0.006			
		65+	-0.04			

Note: Outcome = (tract choice prob.) $\times$ (# MSA tracts)
Bold indicates p<.05. Source: NYFRB / Equifax to be described later.

QCT Impacts People's Choices and Neighborhoods Differently

Demographic Subgroup			Neighborhoods Included in Estimation Sample			
				Neighborhood's Predominant Race in 2000		
Race	"Type" Income	Age	All Neighborhoods	Black	Hispanic	White/Other
Black			**0.151**	0.173	-0.07	0.106
Hispanic			**0.104**	-0.17	**0.21**	0
White			0.022	-0.01	**0.121**	-0.05
Other			0	-0.08	0.097	-0.04
	Low Income		**0.063**	-0.04	**0.135**	0
	Non-low income		0.035	0.015	**0.113**	-0.03
		< 35	**0.067**	-0.01	**0.133**	0.013
		35-44	0.047	0.011	**0.114**	-0.01
		45-54	0.043	-0.02	**0.14**	0
		55-64	0.006	-0.01	0.051	-0.05
		65+	-0.04	0.0	**0.103**	**-0.25**

Note: Outcome = (tract choice prob.) $\times$ (# MSA tracts)
Bold indicates p<.05. Source: NYFRB / Equifax to be described later.

Neighborhood Demand Model

Neighborhood Demand Model

- Dynamic discrete choice model, within-MSA choice of Census tracts
- Household's belong to discrete "types," indexed τ
- State variable is HH's initial location j
- Must choose location for the current period: $\ell \in 1, \ldots J$

$$u(\ell \mid j, \epsilon_\ell) = \underbrace{\delta_\ell^{(\tau)}}_{\text{maximized indirect flow utility}} - \overbrace{\kappa^{(\tau)}}^{\text{moving cost}} \cdot 1_{\ell \neq j} + \underbrace{\epsilon_\ell}_{\text{Type I EV}}$$

$$V(j \mid \epsilon_1, \epsilon_2, ..., \epsilon_J) = \max_{\ell \in 1, \ldots J} V(\ell \mid j, \epsilon_\ell)$$

$$V(\ell \mid j, \epsilon_\ell) = u(\ell \mid j, \epsilon_\ell) + \beta EV(\ell)$$

Neighborhood Demand Model

- Types' indirect utility from neighborhoods is a function of endogenous neighborhood characteristics:

$$\delta_{j\tau} = \bar{\delta}_{j\tau} + \underbrace{\alpha_{R\tau} R_j}_{\text{log-rent}} + \underbrace{\alpha_{B\tau} B_j}_{\text{black share}} + \underbrace{\alpha_{L\tau} L_j}_{\text{low-income share}} + \underbrace{\xi_{j,\tau}}_{\text{unobserved}}$$

Baseline Model's Steady State Equilibrium

Baseline Model's Steady State Equilibrium

- Equilibrium concept, tract-by-tract:
  - Housing supply equals housing demand
  - Expectations about neighborhood composition are consistent with outcomes

Data

Data

- NYFRB Consumer Credit Panel / Equifax
  - 5% of U.S. population
  - Panel 1999-present
    - Census block of residence
    - Equifax Risk Score^{TM} and many debt categories
  - By merging with Census data, we infer race and income
- Sample:
  - 145,421,128 person-year observations
  - **315 types**

Estimation

Estimation (1)

- For each type, we use location choices to estimate the indirect utility of each tract and the moving cost $\theta_\tau = [\kappa_\tau, \delta_{1\tau}, ..., \delta_{\tau J}]$ by maximum likelihood

Estimation (2)

Estimation (2)

- Estimate $\alpha_{R\tau}$, $\alpha_{B\tau}$, $\alpha_{L\tau}$ by IV in a second stage.

$$\delta_{j\tau} = \bar{\delta}_{j\tau} + \underbrace{\alpha_{R\tau} R_j}_{\text{prices}} + \underbrace{\alpha_{B\tau} B_j}_{\text{black share}} + \underbrace{\alpha_{L\tau} L_j}_{\text{low-income share}} + \underbrace{\xi_{j,\tau}}_{\text{unobserved}}$$

- Need instruments for R_j, B_j, and L_j
  - IV for demographics based on RDD in Low Income Housing Tax Credits
  - Bayer, Ferreira and McMillan (2007) instruments for rent

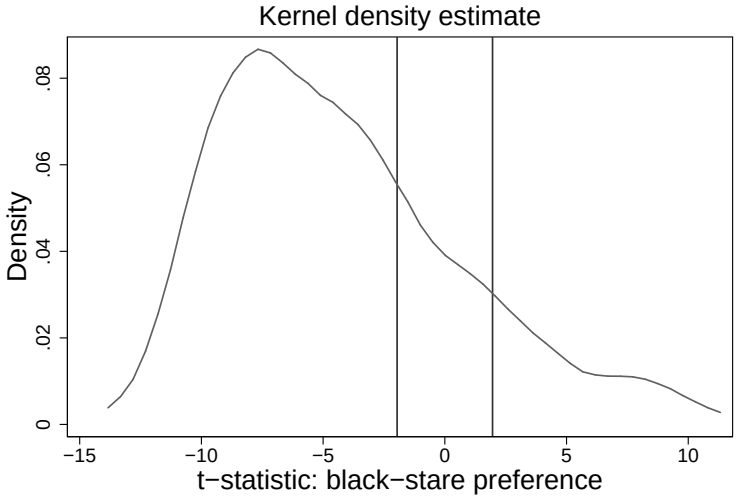
LIHTC-based Instruments: Basic Logic

LIHTC-based Instruments: Basic Logic

- Discontinuous QCT rule "randomly assigns" low income units
- Different "types" value this treatment differently
  $\longrightarrow$ random variation in predicted demographic mix
- Model combined with RDD $\longrightarrow$ independent variation

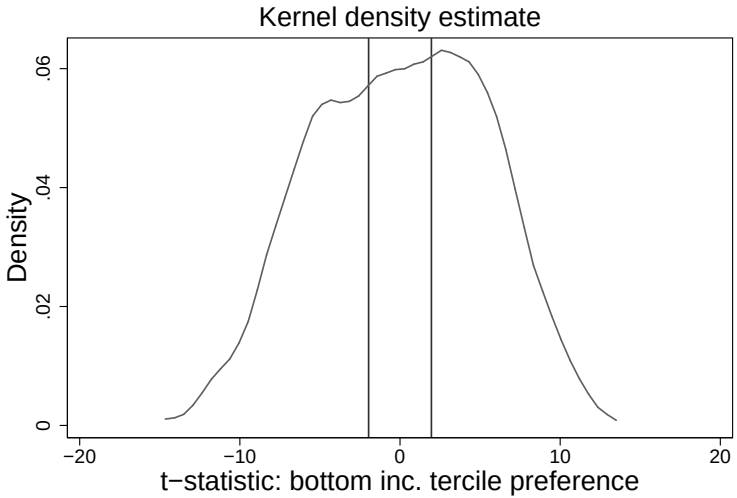
Distribution of Preferences: Black Share ($\alpha_{B\tau}$)

Distribution of Preferences: Black Share (α_{BT})



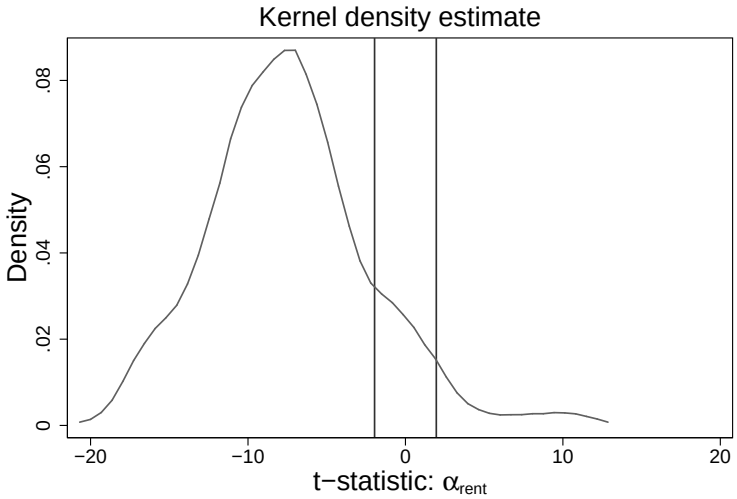
Distribution of Preferences: Low-income Share ($\alpha_{L\tau}$)

Distribution of Preferences: Low-income Share ($\alpha_{L\tau}$)



Distribution of Preferences: (Log) Rents ($\alpha_{R\tau}$)

Distribution of Preferences: (Log) Rents ($\alpha_{R\tau}$)



Policy Impacts on Children's Human Capital Accumulation

Policy Impacts on Children's Human Capital Accumulation

- Opportunity Atlas (Chetty et al. 2018): Neighborhood can significantly impact a child's earnings (tract "value added")
- We use the Opportunity Atlas data to ask how MSA-wide child earnings change with 100 new low-income units placed in a tract
- The change has three possible sources
  a. New residents: Receive value added of tract with new development
  b. Existing, stayers: New mix of residents may affect value added
  c. Existing, movers: New tract may have different value added

Policy 1 Impacts on Children's Human Capital Accumulation

- Does changing demographics affect tract value added?

$$VA_j \quad = \quad g\left(B_j, L_j\right) \; + \; \xi_j$$

- Case 1: $g = 0$ (no impact of demographics on value added)
- Case 2: $g =$ OLS (cubic spline in B and L)
- The two cases should provide bounds for estimates

Policy Impacts on Children's Human Capital Accumulation

	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed Neighborhood Effects			Endogenous Neighborhood Effects		
	All tracts	Total Impact < 0	Total Impact > 0	All tracts	Total Impact < 0	Total Impact > 0
Aggregate impacts on annual adult income ($):						
Total impact						
Occupents of new low-income units						
Relocation of other households						
Neighborhood change						
Total impact > 0						

*Table reports averages across experiments.

Policy Impacts on Children's Human Capital Accumulation

	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed Neighborhood Effects			Endogenous Neighborhood Effects		
	All tracts	Total Impact < 0	Total Impact > 0	All tracts	Total Impact < 0	Total Impact > 0
Aggregate impacts on annual adult income ($):						
Total impact						
Occupents of new low-income units						
Relocation of other households						
Neighborhood change						
Total impact > 0	**0.50**					

*Table reports averages across experiments.

Policy Impacts on Children's Human Capital Accumulation

	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed Neighborhood Effects			Endogenous Neighborhood Effects		
	All tracts	Total Impact < 0	Total Impact > 0	All tracts	Total Impact < 0	Total Impact > 0
Aggregate impacts on annual adult income ($):						
Total impact						
Occupents of new low-income units						
Relocation of other households						
Neighborhood change						
Total impact > 0	**0.50**			**0.37**		

*Table reports averages across experiments.

Policy Impacts on Children's Human Capital Accumulation

	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed Neighborhood Effects			Endogenous Neighborhood Effects		
	All tracts	Total Impact < 0	Total Impact > 0	All tracts	Total Impact < 0	Total Impact > 0
Aggregate impacts on annual adult income ($):						
Total impact	**11,888**			**-69,052**		
Occupents of new low-income units						
Relocation of other households						
Neighborhood change						
Total impact > 0	**0.50**			**0.37**		

*Table reports averages across experiments.

Policy Impacts on Children's Human Capital Accumulation

	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed Neighborhood Effects			Endogenous Neighborhood Effects		
	All tracts	Total Impact < 0	Total Impact > 0	All tracts	Total Impact < 0	Total Impact > 0
Aggregate impacts on annual adult income ($):						
Total impact	**11,888**		**190,657**	**-69,052**		**186,375**
Occupents of new low-income units			202,140			215,673
Relocation of other households			-11,483			-10,480
Neighborhood change			0			-18,818
Total impact > 0	**0.50**			**0.37**		

*Table reports averages across experiments.

Thank you.