Exploiting Incentives of the Moving to Opportunity Experiment

Rodrigo Pinto

University of Chicago

Motivation

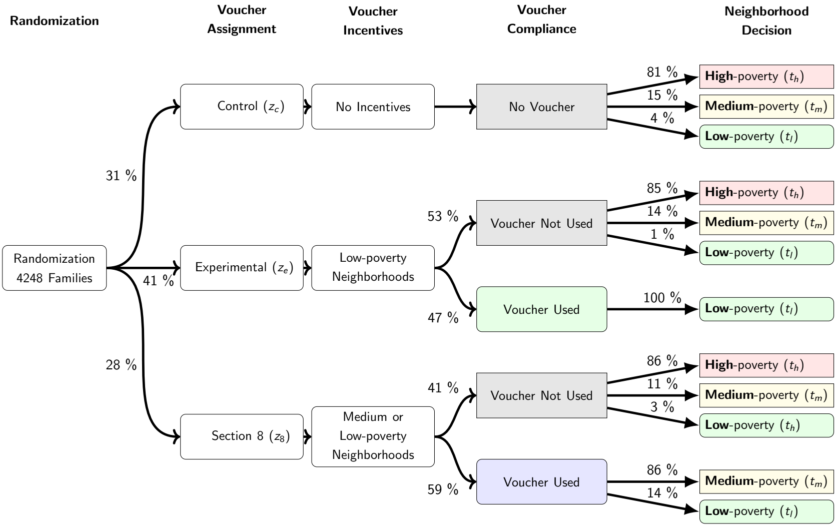
- Substantial literature has shown the importance of neighborhood effects on the economic well-being of its residents.
  Durlauf (2012); Chetty, Hendren, Kline, Saez (2014); Galiani, Murphy, Pantano (2015) Durlauf and Seshadri (2018); Chetty and Hendren (2018a,2018b);
- Moving to Opportunity (MTO) is a primary housing experiment
- MTO randomly assigned vouchers for poor families to move from high-poverty neighborhoods to lower poverty areas
- Noncompliance: about 50% of families did not use the voucher
- Influential literature evaluates MTO via ITT/TOT effects
  Kling, Liebman, and Katz (2007); Chetty, Hendren, Katz (2016); Ludwig et al. (2013)

Little or No impact on adult economic outcomes

Summary

- **Goal** Use voucher random assignment to evaluate neighborhood effects
- **Key Idea** Exploit the information on incentives of MTO design
- **How?**
  - Stylized model extends LATE framework to Multiple choices
  - Exploit MTO incentives using revealed preference analysis
- **Contributions**
  - Address the problem of noncompliance
  - Decompose TOT parameters into neighborhood effects
  - Revisit Adult Economic Outcomes
  - TOT effects are not significant, but neighborhood effects are
  - Reconcile MTO with some of recent literature of neighborhood effects

MTO: Voucher Assignments and Neighborhood Choices



Randomization

Voucher Assignment

Voucher Incentives

Voucher Compliance

Neighborhood Decision

Randomization
4248 Families

31 %

Control (z_c)

No Incentives

No Voucher

81 %

High-poverty (t_h)

15 %

Medium-poverty (t_m)

4 %

Low-poverty (t_l)

41 %

Experimental (z_e)

Low-poverty Neighborhoods

53 %

Voucher Not Used

85 %

High-poverty (t_h)

14 %

Medium-poverty (t_m)

1 %

Low-poverty (t_l)

47 %

Voucher Used

100 %

Low-poverty (t_l)

28 %

Section 8 (z_8)

Medium or Low-poverty Neighborhoods

41 %

Voucher Not Used

86 %

High-poverty (t_h)

11 %

Medium-poverty (t_m)

3 %

Low-poverty (t_h)

59 %

Voucher Used

86 %

Medium-poverty (t_m)

14 %

Low-poverty (t_l)

1.3 Stylised Model

- **Neighborhood Choices:**
    - $T = t_h$, *h*igh-poverty (Housing Projects)
    - $T = t_m$, *m*edium-poverty (Remaining Neighborhoods)
    - $T = t_l$, *l*ow-poverty (Poverty $\leq$ 10% in 1990)
- **Voucher Groups:** Three Assignment Groups
    - $Z = z_c$, *c*ontrol group (No Voucher)
    - $Z = z_8$, Section 8 Voucher (No geographical restriction)
    - $Z = z_e$, *e*xperimental Voucher (Poverty $\leq$ 10% in 1990)
- **Incentive Matrix** (**In**) describes the MTO incentives

		Incentive Matrix		
Vouchers	Z	t_h	t_m	t_l
Control	z_c	0	0	0
Section 8	z_8	0	1	1
Experimental	z_e	0	0	1

MTO Identification Problem

- **Response variable:** Unobserved vector of counterfactual choices

$$\boldsymbol{S}_i = \begin{bmatrix} T(z_c) \\ T(z_8) \\ T(z_e) \end{bmatrix} \quad \begin{matrix} t_h,\ t_m \text{ or } t_l \\ t_h,\ t_m \text{ or } t_l \\ t_h,\ t_m \text{ or } t_l \end{matrix}$$

- **27 Possible Response-types (Strata)**

		Neighborhood	**Response-types**						
Vouchers	Z	Counterfact.	s_1	s_2	s_3	s_4	s_5	$\cdots$	s_{27}
Control	z_c	$T_i(z_c)$	t_h	t_h	t_h	t_h	t_m	$\cdots$	t_l
Section 8	z_8	$T_i(z_8)$	t_h	t_h	t_m	t_m	t_l	$\cdots$	t_l
Experimental	z_e	$T_i(z_e)$	t_h	t_m	t_m	t_l	t_l	$\cdots$	t_l

- **Identification:** Need to *eliminate* some of the 27 response-types

Connection with the LATE Model

- **Binary Model:** $Z \in \{z_0, z_1\},\ T \in \{t_0, t_1\}$
- **Response variable:** 2×1 unobserved vector

	4 Response-types			
	Never-takers	Compliers	Always-takers	Defiers
$\boldsymbol{S} = \begin{bmatrix} T(z_0) \\ T(z_1) \end{bmatrix}$	t_0	t_0	t_1	t_1
	t_0	t_1	t_1	t_0

- **Identification:**
  1. Monotonicity $\mathbf{1}[T_i(z_0) = t_1] \leq \mathbf{1}[T_i(z_1) = t_1]$
  2. Eliminates Defiers
  3. Identifies $LATE = E(Y(t_1) - Y(t_0)|Compliers)$

Typical Monotonicity Assumptions are Not Sufficient

		Incentive Matrix		
Vouchers	Z	t_h	t_m	t_l
Control	z_c	0	0	0
Section 8	z_8	0	1	1
Experimental	z_e	0	0	1

1. If voucher changes from **control** z_c to **experimental** z_e, then family is induced to relocate to **low**-poverty neighborhoods t_l:

$$\mathbf{1}[T_i(z_c) = t_l] \leq \mathbf{1}[T_i(z_e) = t_l]$$

2. If voucher changes from **control** z_c to **Section 8** z_8, then family is induced to relocate to *either* **low** t_l or **medium** t_m :
3. If voucher changes from **experimental** z_e to **Section 8** z_8, then family is induced to relocate to **medium** t_m poverty:

Three rules eliminate 13 Response-types out of 27, but **No** identification.

Exploiting Incentives Using Revealed Preferences

- Identification Strategy:
  1. Incentives + Behavior Assumptions = Choice Restrictions
  2. Choice Restrictions ⇒ Eliminate Response-types
  3. Elimination of Response-types ⇒ Identification
- Assuming **WARP** and that treat choice as a normal good:
  1. If family i chooses t (instead of t') under z
  2. And the change $z \rightarrow z'$ incentivizes t more (as much as) t'
  3. Then family i does not choose t' under z'
- Example: $T_i(z_c) = t_l \Rightarrow T_i(z_8) \neq t_h$

$$T_i(z) = t, \;\; \boldsymbol{In}(z', t') - \boldsymbol{In}(z, t') \leq \boldsymbol{In}(z', t) - \boldsymbol{In}(z, t) \Rightarrow T_i(z') \neq t'$$

Incentives + Revealed Preferences ⇒ 7 Choice Restrictions

$$\underbrace{\boldsymbol{In} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}}_{\text{Incentives}} + \underbrace{\left(\begin{array}{c} \text{WARP} \\[1em] \text{and} \\[1em] \text{Normal Choice} \end{array} \right)}_{\text{Choice Axioms}} \Rightarrow \underbrace{\left\{ \begin{array}{l} T_i(z_c) = t_l \Rightarrow T_i(z_8) \neq t_h \text{ and } T_i(z_e) = t_l \\ T_i(z_c) = t_m \Rightarrow T_i(z_e) \neq t_h \text{ and } T_i(z_8) \neq t_h \\ T_i(z_e) = t_m \Rightarrow T_i(z_c) = t_m \text{ and } T_i(z_8) = t_m \\ T_i(z_e) = t_h \Rightarrow T_i(z_c) = t_h \text{ and } T_i(z_8) \neq t_l \\ T_i(z_8) = t_h \Rightarrow T_i(z_c) = t_h \text{ and } T_i(z_e) = t_h \\ T_i(z_8) = t_l \Rightarrow T_i(z_e) = t_l \\ T_i(z_c) \neq t_h \Rightarrow T_i(z_8) = T_i(z_c) \end{array} \right.}_{\text{Generate 7 Choice Restrictions}}$$

- Subsume the previous monotonicity relations
- Eliminate 20 out of the 27 response-types
- Enable the identification of a range of causal parameters

The Response Matrix

- 7 Choice Restrictions eliminate 20 of the 27 Response-types

$$
\mathbf{R} = \begin{array}{cc}
\begin{array}{ccccccc} s_1 & s_2 & s_3 & s_4 & s_5 & s_6 & s_7 \end{array} & \\
\begin{bmatrix}
t_h & t_m & t_l & t_h & t_h & t_m & t_h \\
t_h & t_m & t_l & t_m & t_l & t_m & t_m \\
t_h & t_m & t_l & t_l & t_l & t_l & t_h
\end{bmatrix} & \begin{array}{c} T_i(z_c) \\ T_i(z_8) \\ T_i(z_e) \end{array}
\end{array}
$$

- $\boldsymbol{s}_1$ - Always-takers, high-poverty neighborhoods t_h
- $\boldsymbol{s}_2$ - Always-takers, medium-poverty neighborhoods t_m
- $\boldsymbol{s}_3$ - Always-takers, low-poverty neighborhoods t_m
- $\boldsymbol{s}_4$ - Full compliers
- $\boldsymbol{s}_5$ - Partial compliers (t_h, t_l)
- $\boldsymbol{s}_6$ - Partial compliers (t_m, t_l)
- $\boldsymbol{s}_7$ - Partial compliers (t_h, t_m)

Unordered Monotonicity

- Identification depends only on properties of the response matrix $\boldsymbol{R}$
- Unordered Monotonicity (Heckman and Pinto, 2018) holds

Unordered Monotonicity: $\forall\, z, z' \ \in\ \text{supp}(Z)$ and $\forall\, t \in \text{supp}(T)$:

$$\mathbf{1}[T_i(z) = t] \leq \mathbf{1}[T_i(z') = t] \ \forall\ i$$
$$\text{or } \mathbf{1}[T_i(z) = t] \geq \mathbf{1}[T_i(z') = t] \ \forall\ i,$$

- Which means that **choices are nested**

Unordered Monotonicity $\Rightarrow$ Choices are Nested

Consider choice t_l Low-poverty neighborhood:

$$\begin{array}{cc} & \overbrace{\begin{array}{ccccccc} s_1 & s_2 & s_3 & s_4 & s_5 & s_6 & s_7 \end{array}}^{\text{Support of Response Variable } S} \\ \mathbf{R} = & \left[\begin{array}{ccccccc} t_h & t_m & t_l & t_h & t_h & t_m & t_h \\ t_h & t_m & t_l & t_m & t_l & t_m & t_m \\ t_h & t_m & t_l & t_l & t_l & t_l & t_h \end{array}\right] \begin{array}{c} z_c \\ z_8 \\ z_e \end{array} \end{array}$$

$$\begin{aligned} \text{for } t_l,\ z_c &\rightarrow \boldsymbol{s}_3 \\ z_8 &\rightarrow \boldsymbol{s}_3, \boldsymbol{s}_5 \\ z_e &\rightarrow \boldsymbol{s}_3, \boldsymbol{s}_5, \boldsymbol{s}_4, \boldsymbol{s}_6 \end{aligned}$$

Nested Choices $\Rightarrow$ Identification and Estimation

- D_z, D_t are binary indicators
- Comparison $z_8 - z_c$ for t_l gives $\boldsymbol{s}_5$:

$$P(\boldsymbol{S} = \boldsymbol{s}_5) = P(T = t_l | Z = z_8) - P(T = t_l | Z = z_c)$$
$$E(Y(t_l)|\boldsymbol{S} = \boldsymbol{s}_5) = \frac{E(YD_{t_l}|Z = z_8) - E(YD_{t_l}|Z = z_c)}{E(D_{t_l}|Z = z_8) - E(D_{t_l}|Z = z_c)}$$

- **2SLS** estimation of $E(Y(t_l)|\boldsymbol{S} = \boldsymbol{s}_5)$.

$$\text{First Stage } D_{t_l} = \gamma_1 D_{z_8} + \gamma_2 D_{z_c} + \epsilon$$
$$\text{Second Stage } Y \cdot D_{t_l} = \beta_0 + \beta_{IV} D_{t_l} + \epsilon$$

- Accounting for X : extend Abadie (2003) κ for multiple choices

Median-Poverty Neighborhood Choice t_m is also Nested

$$\mathbf{R} = \begin{array}{cc} \overbrace{\begin{array}{ccccccc} s_1 & s_2 & s_3 & s_4 & s_5 & s_6 & s_7 \end{array}}^{\text{Support of Response Variable } S} & \\ \begin{bmatrix} t_h & t_m & t_l & t_h & t_h & t_m & t_h \\ t_h & t_m & t_l & t_m & t_l & t_m & t_m \\ t_h & t_m & t_l & t_l & t_l & t_l & t_h \end{bmatrix} & \left.\begin{array}{c} z_c \\ z_8 \\ z_e \end{array}\right\} \end{array}$$

$$\begin{aligned} \text{for } t_m,\ z_e &\rightarrow \boldsymbol{s}_2 \\ z_c &\rightarrow \boldsymbol{s}_2, \boldsymbol{s}_6 \\ z_8 &\rightarrow \boldsymbol{s}_2, \boldsymbol{s}_6, \boldsymbol{s}_4, \boldsymbol{s}_7 \end{aligned}$$

High-Poverty Neighborhood Choice t_h is also Nested

$$\begin{array}{ccc} & \overbrace{\begin{array}{ccccccc} s_1 & s_2 & s_3 & s_4 & s_5 & s_6 & s_7 \end{array}}^{\text{Support of Response Variable } S} & \\ \mathbf{R} = & \left[\begin{array}{ccccccc} \boxed{t_h} & t_m & t_l & \boxed{t_h} & \boxed{t_h} & t_m & \boxed{t_h} \\ \boxed{t_h} & t_m & t_l & t_m & t_l & t_m & t_m \\ \boxed{t_h} & t_m & t_l & t_l & t_l & t_l & \boxed{t_h} \end{array}\right] & \left.\begin{array}{c} z_c \\ z_8 \\ z_e \end{array}\right\} \end{array}$$

$$\begin{aligned} \text{for } t_h,\ z_8 &\rightarrow \boldsymbol{s}_1 \\ z_e &\rightarrow \boldsymbol{s}_1, \boldsymbol{s}_7 \\ z_c &\rightarrow \boldsymbol{s}_1, \boldsymbol{s}_7, \boldsymbol{s}_4, \boldsymbol{s}_5 \end{aligned}$$

Main Identification Results

1. All Response-type Probabilities are identified

$$\mathbf{P}(S = s_1), ..., \mathbf{P}(S = s_7)$$

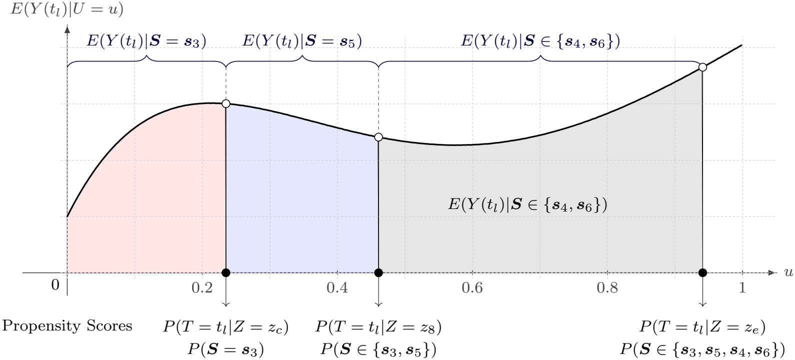
2. Baseline Variables $\mathbf{E}(X|\boldsymbol{S} = s)$ are identified for all $s \in \mathrm{supp}(S)$

$$E(X|S = s_1), ..., E(X|S = s_7)$$

3. The following Counterfactual Outcomes are identified:

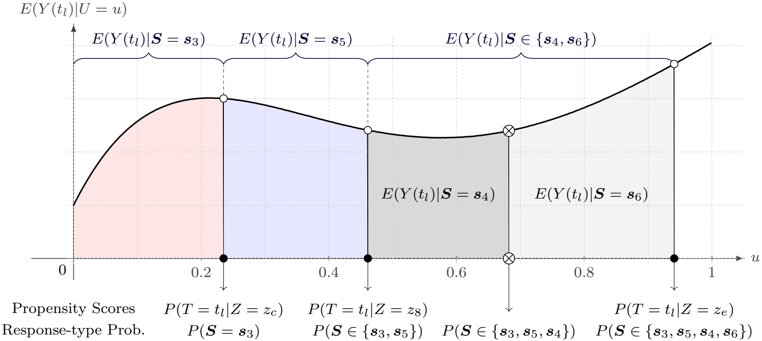
High Pov. $Y(t_h)$	Med. Pov. $Y(t_m)$	Low Pov. $Y(t_l)$
$\mathbf{E}(Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_1)$	$\mathbf{E}(Y(t_m)\|\boldsymbol{S} = \boldsymbol{s}_2)$	$\mathbf{E}(Y(t_l)\|\boldsymbol{S} = \boldsymbol{s}_3)$
$\mathbf{E}(Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_7)$	$\mathbf{E}(Y(t_m)\|\boldsymbol{S} = \boldsymbol{s}_6)$	$\mathbf{E}(Y(t_l)\|\boldsymbol{S} = \boldsymbol{s}_5)$
$\mathbf{E}(Y(t_h)\|S \in \{\boldsymbol{s}_4, \boldsymbol{s}_5\})$	$\mathbf{E}(Y(t_m)\|S \in \{\boldsymbol{s}_4, \boldsymbol{s}_7\})$	$\mathbf{E}(Y(t_l)\|S \in \{\boldsymbol{s}_4, \boldsymbol{s}_6\})$

Disentangling $E(Y(t_l)|S = s_4)$ and $E(Y(t_l)|S = s_6)$



Marginal Treatment Response $E(Y(t_l)|U_{t_l} = u)$

Disentangling $E(Y(t_l)|S = s_4)$ and $E(Y(t_l)|S = s_6)$



Marginal Treatment Response $E(Y(t_l)|U_{t_l} = u)$

Where do the Properties of the MTO Response Matrix come from?

MTO Group Assignment	Z-values	Incentive Matrix t_h	t_m	t_l
Control	z_c	0	0	0
Section 8	z_8	0	1	1
Experimental	z_e	0	0	1

MTO has **Monotonic Incentives:**
Incentives increase across $z_c \rightarrow z_e \rightarrow z_8$ for all t

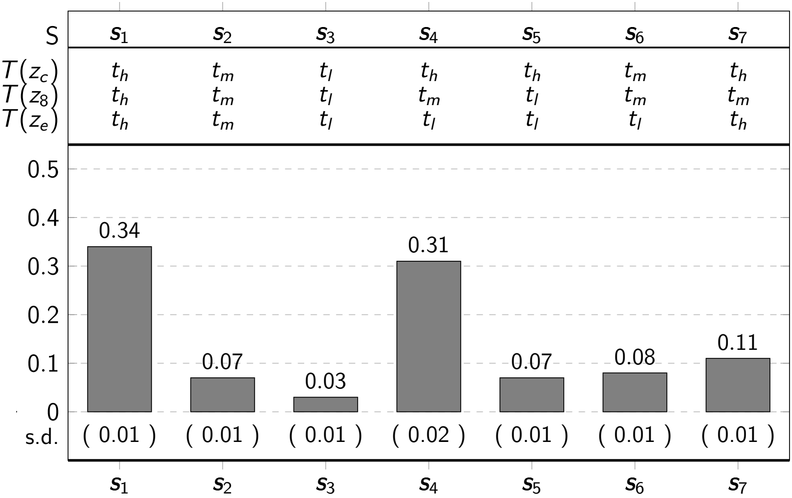
What does the TOT estimate?

		Response Matrix R						
Voucher	Z	s_1	s_2	s_3	s_4	s_5	s_6	s_7
Control	$Z = z_c$	t_h	t_l	t_m	t_h	t_h	t_m	t_h
Section 8	$Z = z_8$	t_h	t_l	t_m	t_m	t_l	t_m	t_m
Experimental	$Z = z_e$	t_h	t_l	t_m	t_l	t_l	t_l	t_h

$$TOT(z_e, z_c) = \big(E(Y|Z = z_e) - E(Y|Z = z_c)\big) \cdot \frac{1}{\mathbf{P}(Compliers|Z = z_e)},$$

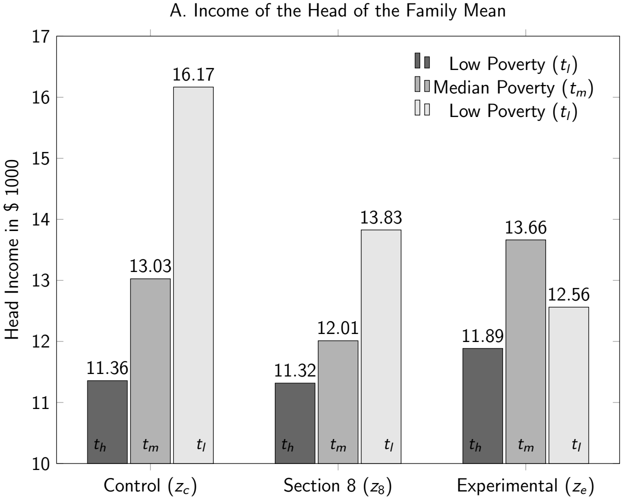
$$TOT(z_e, z_c) =$$
$$\left(\frac{\mathbf{E}(Y(t_l) - Y(t_h)|S \in \{s_4, s_5\})\,\mathbf{P}_{\{s_4,s_5\}} + \mathbf{E}(Y(t_l) - Y(t_m)|S = s_6)\,\mathbf{P}_{s_6}}{\mathbf{P}_{\{s_4,s_5\}} + \mathbf{P}_{s_6}}\right)$$
$$\cdot \big(1 - \mathbf{P}(S = s_2|S \in \{s2, s_4, s_5, s_6\})\big),$$

Figure 1 1: Response-type Probabilities



Pre-intervention Averag. by Response-types

Response-types	s_1	s_2	s_3	s_4	s_5	s_6	s_7
Control (z_c)	t_h	t_m	t_l	t_h	t_h	t_m	t_h
Section 8 (z_8)	t_h	t_m	t_l	t_m	t_l	t_m	t_m
Experimental (z_e)	t_h	t_m	t_l	t_l	t_l	t_l	t_h
Family							
Disable Household Member	**0.21**	0.13	0.14	0.13	0.14	0.16	0.12
Household size is 2 or smaller	0.19	0.14	**0.44**	0.22	0.24	0.32	0.16
No teens (ages 13-17)	0.55	0.70	0.63	**0.72**	0.54	0.55	0.54
Neighborhood							
Victim last 6 months (baseline)	0.39	0.38	**0.56**	0.43	0.47	0.45	0.42
Chat with neighbor	0.51	0.51	**0.36**	0.46	**0.70**	0.56	0.66
Welfare/economics							
Car Owner	**0.13**	0.20	**0.28**	0.21	0.25	0.05	0.14
Completed high school	0.35	0.38	**0.58**	0.35	0.35	0.46	0.38

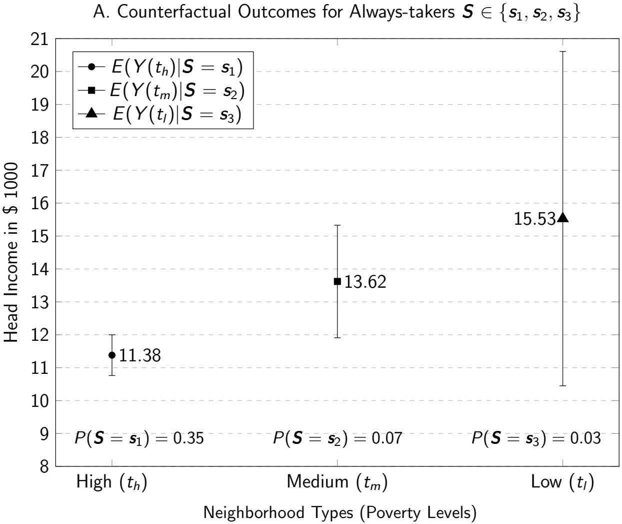


① **Control group:** Low-poverty × High-poverty = US $ 4.81k

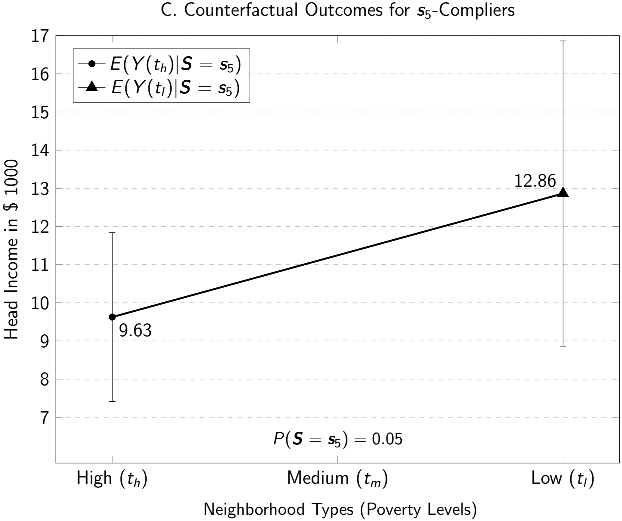
② **Experimental group:** Low-poverty × High-poverty = US $ 2.51k

③ **Section 8 group:** Low-poverty × High-poverty = US $ 0.67k

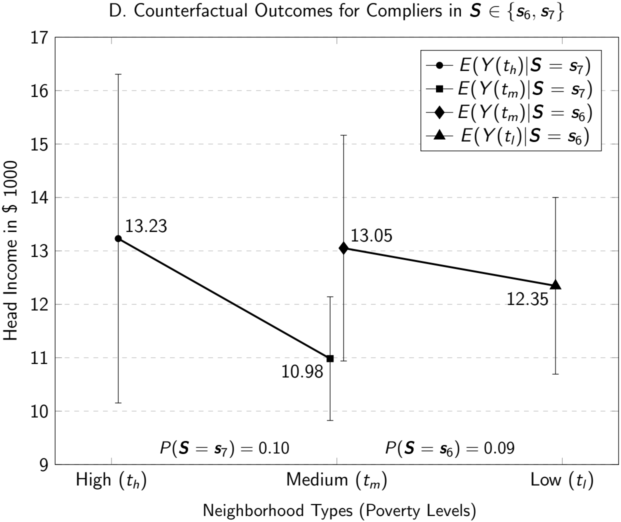
Income Head of Household - Always Takers s_1, s_2, s_3



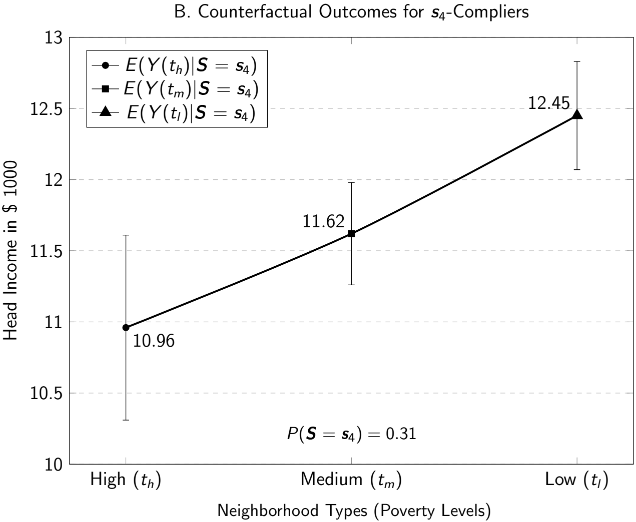
Income Head of HH : s_5-compliers $(t_h \leftrightarrow t_l)$



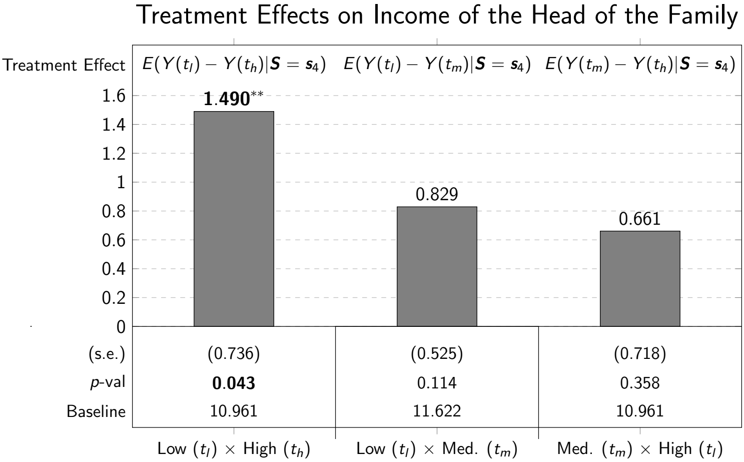
Income Head of HH : s_7 $(t_h \leftrightarrow t_m)$ and s_6 $(t_m \leftrightarrow t_l)$



Income Head of Household - Full Compliers s_4



Income Head of HH - Neigh. Effects Full Compliers s_4



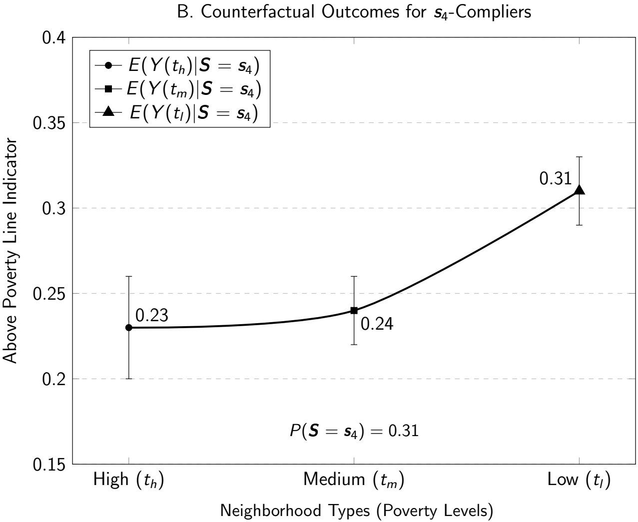
	Low (t_l) × High (t_h)	Low (t_l) × Med. (t_m)	Med. (t_m) × High (t_l)
(s.e.)	(0.736)	(0.525)	(0.718)
p-val	**0.043**	0.114	0.358
Baseline	10.961	11.622	10.961

$TOT(z_e, z_c)$ Analysis of Income Head of HH

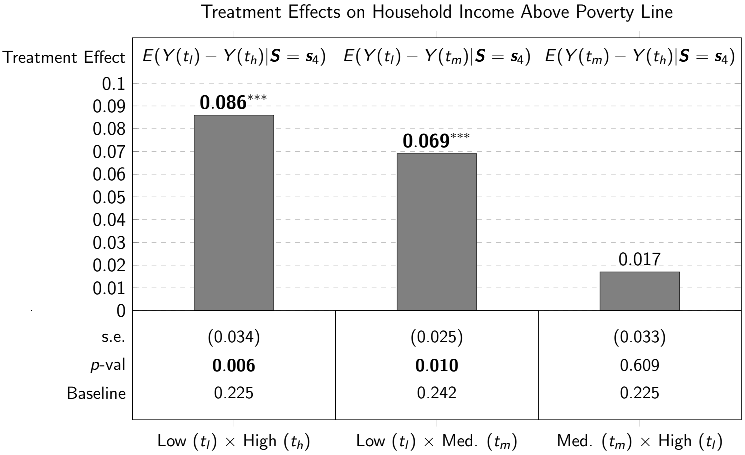
	TOT (2SLS)	Treat. Eff.	Estimate	$P(\boldsymbol{S})$
est.	**1.219**	$E(Y(t_l) - Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_4)$	**1.490****	0.310
s.e.	(0.791)	$E(Y(t_l) - Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_5)$	3.237	0.052
		$E(Y(t_l) - Y(t_m)\|\boldsymbol{S} = \boldsymbol{s}_6)$	-0.705	0.087
		TOT (via T.Effs)	**1.191**	

$TOT(z_e, z_c)$ via 2SLS, $Y = \beta_0 + \beta C + \gamma_X X + \epsilon$ for all the participants assigned to either experimental z_e or control group z_c. Compliance C instrumented by site × voucher assignment z_e. All estimates use MTO weighting and controlled for baseline variables X. Robust standard errors.

Income Above Poverty Line - Full Compliers s_4



Income Above Poverty Line - Effects Full Compliers s_4



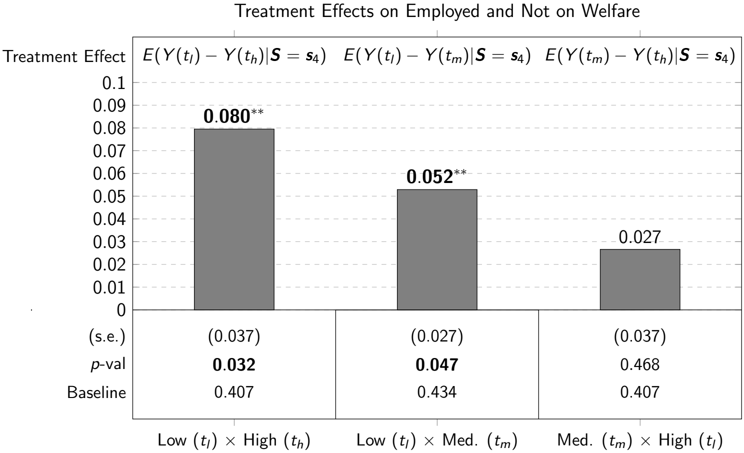
	Low (t_l) × High (t_h)	Low (t_l) × Med. (t_m)	Med. (t_m) × High (t_l)
s.e.	(0.034)	(0.025)	(0.033)
p-val	**0.006**	**0.010**	0.609
Baseline	0.225	0.242	0.225

$TOT(z_e, z_c)$ Analysis of Household Income Above Poverty Line

	TOT (2SLS)	Treat. Eff.	Estimate	$P(\boldsymbol{S})$
est.	**0.033**	$E(Y(t_l) - Y(t_h) \vert \boldsymbol{S} = \boldsymbol{s}_4)$	**0.086*** **	0.310
s.e.	(0.037)	$E(Y(t_l) - Y(t_h) \vert \boldsymbol{S} = \boldsymbol{s}_5)$	0.015	0.052
p-val	0.376	$E(Y(t_l) - Y(t_m) \vert \boldsymbol{S} = \boldsymbol{s}_6)$	-0.128	0.087
		TOT (via T.Effs)	**0.035**	

$TOT(z_e, z_c)$ via 2SLS, $Y = \beta_0 + \beta C + \gamma_X X + \epsilon$ for all the participants assigned to either experimental z_e or control group z_c. Compliance C instrumented by site × voucher assignment z_e. All estimates use MTO weighting and controlled for baseline variables X. Robust standard errors.

Employed and No Welfare - Effects Full Compliers s_4



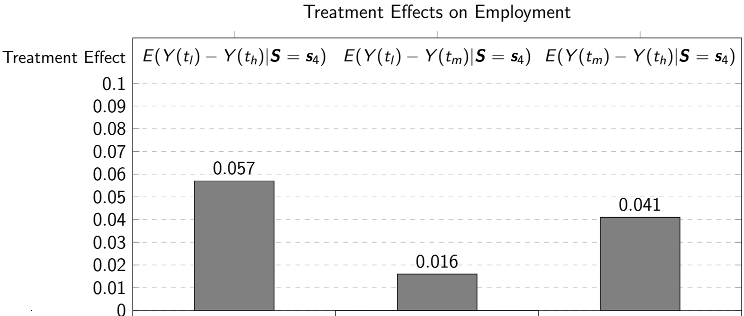
	Low (t_l) × High (t_h)	Low (t_l) × Med. (t_m)	Med. (t_m) × High (t_l)
(s.e.)	(0.037)	(0.027)	(0.037)
p-val	**0.032**	**0.047**	0.468
Baseline	0.407	0.434	0.407

$\boldsymbol{TOT}(z_e, z_c)$ Analysis of Employed and Not on Welfare

	TOT (2SLS)	Treat. Eff.	Estimate	$P(\boldsymbol{S})$
est.	**0.065**	$E(Y(t_l) - Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_4)$	**0.080****	0.320
s.e.	0.040	$E(Y(t_l) - Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_5)$	0.196	0.048
		$E(Y(t_l) - Y(t_m)\|\boldsymbol{S} = \boldsymbol{s}_6)$	-0.060	0.083
		TOT (via T.Effs)	**0.062**	

$TOT(z_e, z_c)$ via 2SLS, $Y = \beta_0 + \beta C + \gamma_X X + \epsilon$ for all the participants assigned to either experimental z_e or control group z_c. Compliance C instrumented by site × voucher assignment z_e. All estimates use MTO weighting and controlled for baseline variables X. Robust standard errors.

Employed - Effects Full Compliers s_4



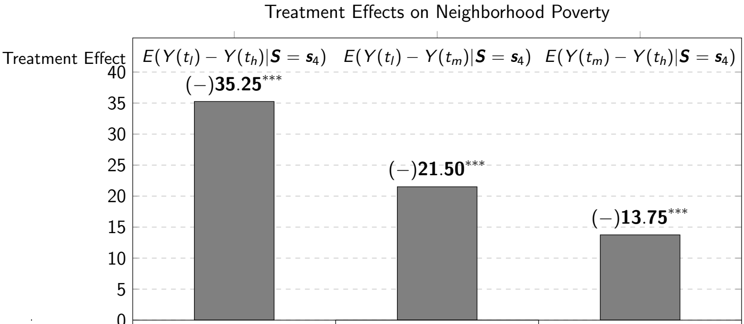
	Low (t_l) × High (t_h)	Low (t_l) × Med. (t_m)	Med. (t_m) × High (t_l)
s.e.	(0.037)	(0.027)	(0.036)
p-val	0.116	0.544	0.255
Baseline	0.514	0.555	0.514

$TOT(z_e, z_c)$ Analysis of Employed

	TOT (2SLS)	Treat. Eff.	Estimate	$P(\boldsymbol{S})$
est.	**0.058**	$E(Y(t_l) - Y(t_h) \vert \boldsymbol{S} = \boldsymbol{s}_4)$	**0.057**	0.314
s.e.	(0.040)	$E(Y(t_l) - Y(t_h) \vert \boldsymbol{S} = \boldsymbol{s}_5)$	0.109	0.051
		$E(Y(t_l) - Y(t_m) \vert \boldsymbol{S} = \boldsymbol{s}_6)$	0.040	0.084
		TOT (via T.Effs)	**0.057**	

$TOT(z_e, z_c)$ via 2SLS, $Y = \beta_0 + \beta C + \gamma_X X + \epsilon$ for all the participants assigned to either experimental z_e or control group z_c. Compliance C instrumented by site × voucher assignment z_e. All estimates use MTO weighting and controlled for baseline variables X. Robust standard errors.

Neighborhood Poverty - Effects Full Compliers s_4



	Low (t_l) × High (t_h)	Low (t_l) × Med. (t_m)	Med. (t_m) × High (t_l)
(s.e.)	(1.059)	(0.570)	(1.185)
p-val	**0.000**	**0.000**	**0.000**
Baseline	42.840	42.840	29.090

$TOT(z_e, z_c)$ Analysis of Neighborhood Poverty

	TOT (2SLS)	Treat. Eff.	Estimate	$P(\boldsymbol{S})$
est.	**-30.60*** **	$E(Y(t_l) - Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_4)$	**-35.25*** **	0.311
s.e.	(1.240)	$E(Y(t_l) - Y(t_h)\|\boldsymbol{S} = \boldsymbol{s}_5)$	-28.917	0.066
		$E(Y(t_l) - Y(t_m)\|\boldsymbol{S} = \boldsymbol{s}_6)$	-22.798	0.078
		TOT (via T.Effs)	**-30.11**	

$TOT(z_e, z_c)$ via 2SLS, $Y = \beta_0 + \beta C + \gamma_X X + \epsilon$ for all the participants assigned to either experimental z_e or control group z_c. Compliance C instrumented by site × voucher assignment z_e. All estimates use MTO weighting and controlled for baseline variables X. Robust standard errors.