

Graduate Public Finance

Place-based Policies: Evidence ¹

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Lecture 5

- 1 Evidence on Empowerment Zones and Local Gov Spending
 - EZs: Busso Gregory and Kline (AER, 2013)
 - The Incidence of Government Spending (Suárez Serrato and Wingender 2016)
- 2 Evidence on Moving to Opportunity
 - Moving to Opportunity: Chetty Hendren Katz (AER, 2016)
 - Moved to Opportunity Chyn (AER, 2018)
 - Sorting and MTO: Galiani Murphy Pantano (AER, 2012)
- 3 Movers Designs: Finkelstein, Gentzkow, Williams (QJE 2016)
- 4 Agglomeration
 - Place Based Policies, Heterogeneity, & Agglomeration (Kline AERPP 2011)
 - Greenstone Hornbeck Moretti (JPE, 2010)
 - Kline and Moretti (QJE, 2014)

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- Place Based Policies, Heterogeneity, & Agglomeration (Kline AERPP 2011)
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- Substantial differences in incomes across locations
 - Wages in Stamford, CT is 2X same worker in Jacksonville, NC
 - In 2009, unemployment rate in Flint, MI was 6X that of Iowa city, Iowa
- These differences persist across decades and generations
- Lucas “I don’t see how one can look at figures like these without seeing them as *possibilities*”
- Many governments institute development policies aimed at increasing growth in lagging areas and reducing spatial disparities within their location

Assessing a Prominent Place Based Policy (Busso et al.)

Case Study: Empowerment Zones

Detroit



Chicago



Assessing a Prominent Place Based Policy (Busso et al.)

Question

- What is the incidence of Round I of the federal urban Empowerment Zone (EZ) program?
- Evidence helps determine whether or not place based policies are effective in accomplishing their goals
- Authors conduct the first microfounded equilibrium welfare evaluation of a large-scale place based policy

Assessing a Prominent Place Based Policy (Busso et al.)

Empowerment Zone Program

- The EZ program is a series of incentives to encourage investment in the neediest urban and rural areas
- It consists of spatially targeted investments, such as employment tax credits and block grants

TABLE 1—1990 CHARACTERISTICS OF FIRST ROUND EMPOWERMENT ZONES (EZ)

City	Total population	Population rank	Population in EZ	Poverty rate in EZ	Unemployment rate in EZ	EZ area (square miles)	Number of census tracts
Atlanta	395,337	37	43,792	58	20	8.1	20
Baltimore	736,014	13	72,725	42	16	7.1	23
Chicago	2,783,484	3	200,182	49	28	14.3	81
Detroit	1,027,974	7	106,273	47	28	19.5	42
New York	7,320,621	1	204,625	42	18	6.3	51
Philadelphia/ Camden	1,594,339	5	52,440	50	23	4.3	17

Source: 1990 Decennial Census and HUD.

Assessing a Prominent Place Based Policy (Busso et al.)

Program Benefits

- Employment tax credit
 - EZ employers were eligible for a credit of up to 20 percent of the first \$15,000 in wages paid to each employee who lived *and worked* in the EZ.
 - Roughly 20% wage subsidy!
- Social Services Block Grant Funds (SSBG)
 - Each EZ became eligible for \$100 million in SSBG funds.
 - Could be used for: infrastructure investment, improving access to credit, job training programs, childcare programs, promotion of homeownership, emergency housing assistance, etc.

Assessing a Prominent Place Based Policy (Busso et al.)

Methods: Formal Model

Workers:

- Utility of individual i living in community j and working in community k : $u_{ijks} = w_{jks} - r_j - \kappa_{jk} + A_j + \varepsilon_{ijks}$
- w is wage, r is local rent, κ is commuting cost, and A is mean value of local amenities

Firms:

- $w_{jks} = \frac{B_k R(\rho)}{1 - \tau \delta_{jks}}$
- B is a technology parameter, $R(\rho)$ is MPL and δ is an subsidy indicator

Housing:

- Landowner optimization: $G_j^{-1}(H_j) = r_j$
- H_j is the number of units rented out, so marginal landowner breaks even on house construction
- Housing market clearing: $H_j = \sum_k \sum_s N_{jks}$

Assessing a Prominent Place Based Policy (Busso et al.)

Methods: Wage Subsidy

- Tax credit τ subsidizes resident workers but does not subsidize commuters
- From firm's condition, wage subsidies raise wages and employment at EZ firms
- Employment may fall for uncovered firms and for nonresidents

Assessing a Prominent Place Based Policy (Busso et al.)

Methods: Block Grant

- Block grant affects local productivity B_k and amenities A_j
- Productivity changes proportionally boost wages of all workers, regardless of residence
- This may induce a large employment response among nonresidents and counteract negative effects at uncovered firms
- Rental rate may increase in zone neighborhoods as workers move to take advantage of higher wages and improved amenities

Assessing a Prominent Place Based Policy (Busso et al.)

Methods: Welfare Analysis

- Define indicator variables $\{D_{ijks}\} = 1$ if and only if $\max_{j'k's'} \{u_{ij'k's'}\} = u_{ijks}$
 - $j' \in \mathcal{N}, k' \in \{\emptyset, \mathcal{N}\},$ and $s' \in \{1, 2\}$
- Measure of agents in each location: $N_{jks} = P(D_{ijks} = 1 | \{v_{j'k's'}\})$
- Average utility of agents: $V = E_{\varepsilon}[\max_{j'k's'} \{u_{ij'k's'}\}]$

Assessing a Prominent Place Based Policy (Busso et al.)

Methods: Empirical Strategy

- Empirical strategy involves comparing EZ neighborhoods to rejected and future zones using a difference-in-differences estimator

- $$\Delta Y_{tzc} = \beta T_z + X'_{n(t)}\alpha^x + P'_c\alpha^p + e_{tzc}$$

- ΔY_{tzc} is change in outcome in tract t of zone z in city c
- T_z is an indicator for EZ status
- P_c is a vector of city characteristics
- $X_{n(t)}$ is a vector of proxies for trends in productivity and amenities

Assessing a Prominent Place Based Policy (Busso et al.)

Data

- Household and establishment panel data comes from the Census, the Standard Statistical Establishment List (SSEL), and the Longitudinal Business Database (LBD)
- First-round EZ applications were obtained from the US Department of Housing and Urban Development
- Housing price data is from the Office of Federal Housing Enterprise Oversight (OFHEO)

Assessing a Prominent Place Based Policy (Busso et al.)

Program Impacts

Table 2
Selected Effects of Round I Empowerment Zone Designations,
1990–2000

Outcome	Estimated Effect
Log of Jobs (data from Longitudinal Business Database)	0.179***
Log of Jobs (data from U.S. Census)	0.145*
Log of Zone Jobs Held by Zone Residents	0.150
Log of Zone Jobs Held by Nonresidents	0.097
Log of Weekly Wage Income of Zone Residents	0.053**
Log of Weekly Wage Income of Zone Workers	0.017
Log of Weekly Wage Income of Zone Residents Working in Zone	0.133**
Log of Weekly Wage Income of Nonresidents Working in Zone	0.005
Log of Rent	0.006
Log of House Value	0.281**
Log of Population	0.028
Percentage Black	-0.011
Percentage with College Degree*	0.020***

Jobs seem to go to mix of zone residents and non-residents

Wages rise most among zone residents working in zone.

No increase in rent. Small changes in demographics. But big increase in housing value

Notes: Estimated impacts derived from regression-adjusted difference-in-differences model. Statistical significance levels based on a Wild bootstrap t-test are indicated as *** 1 percent; ** 5 percent; * 10 percent. For more details, see M. Busso, J. Gregory, and P. Kline, "Assessing the Incidence and Efficiency of a Prominent Place Based Policy," *American Economic Review*, 102, No. 2 (2012), 607–647

Before EZ

Camden (inside EZ), New Jersey, 1993



After EZ

Same street in Camden (inside EZ), New Jersey, 2003



Assessing a Prominent Place Based Policy (Busso et al.)

Incidence

- Significant increase in earnings for a poor population
- Negligible cost of living increase but possible windfall gain to homeowners
- Little change in demographic composition but probably not literally the original residents
 - Only 57% of households in same house as 5 years ago
- Risk of gentrification and landlord capture over longer run..
 - How to define success?

Assessing a Prominent Place Based Policy (Busso et al.)

Efficiency

- While population response negligible ($\eta_{pop} \approx .15$), quantity being subsidized is local jobs
- Very small target group (unbeknownst to HUD!)

TABLE 10—WELFARE ANALYSIS

	Total workers/people/households	Total annual payroll/rents/housing value (in billion \$)	OLS impact on wages/rents/housing values	Increase in annual payroll/rents/housing value (in million \$)	
				Baseline scenario (1)	Pessimistic scenario (2)
<i>Panel A. Total impact of the program</i>					
Zone residents working in zone	38,331	0.8	0.133	108.5	37.5
Zone residents working outside zone	140,708	3.3	0.036	117.5	0.0
Nonresidents working in zone	365,918	14.0	0.005	69.9	0.0
House renters in the zone	189,982	0.9	0.006	5.5	66.9
House owners in the zone	46,161	4.8	0.281	1350.4	499.8

- BGK estimate elasticity of (covered) jobs wrt $(1 - \tau)$ of

$$\eta_{jobs} \approx 1.25$$

- Efficiency cost roughly 13% of dollar value of subsidy

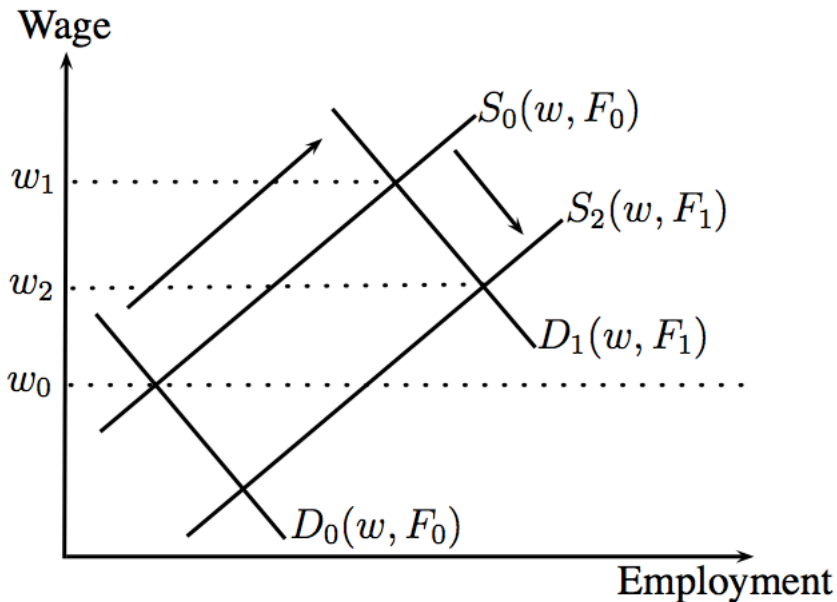
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The Incidence of Government Spending (Suárez Serrato and Wingender)

Question

- Who benefits from government spending in the long run?
- (And could place based policies improve efficiency?)
- Results are important for setting spending levels and distributing funds across localities
- Contributes to literature with by estimating long-run spending effects and workers' valuation of government services

Figure 1: Supply and Demand Components of a Government Spending Shock



The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Formal Model

Government:

- C localities, each with skilled and unskilled workers: $N_c = N_c^S + N_c^U$
- Federal spending is determined by a statutory formula

$$F_c = f(X_c, \tilde{N}_c),$$

of X_c , population characteristics, and population estimates:

$$\tilde{N}_c = N_c + CS_c,$$

where CS_c are mistakes in population measurement.

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Formal Model

- These funds have three different uses:
 - Provision of Infrastructure: $\bar{Z} = g^z F_c$
 - Hiring of local workers

$$L_c^{GD,i}(w_c^i) = \frac{g^i F_c}{w_c^i}$$

Note $g^z + g^S + g^U = 1$.

- Provision of Public Goods and Services

$$GS_c = (L_c^{GD,S})^\theta (L_c^{GD,U})^{1-\theta},$$

where $\theta = \frac{g^S}{g^S + g^U} \in (0, 1)$.

- F_c shifts demand through (1) and (2) and shifts supply through (3)

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Formal Model

Workers:

- Workers maximize utility by choosing location c :

$$\begin{aligned}u_{jc}^i &= \log(w_c^i + t_c^i) - s^{i,r} \log(r_c) + \log(A_c) + \phi^i \log(GS_c) + \sigma^i \varepsilon_{jc}^i \\ &= v_c^i + \sigma^i \varepsilon_{jc}^i,\end{aligned}$$

where $s^{i,r}$ is share of rent and ϕ^i is valuation of GS_c

- Population in area c is given by

$$N_c^i = \Pr \left(u_{jc}^i = \max_{c'} u_{jc'}^i \right)$$

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Formal Model

- Define change in real wage:

$$\Delta \text{Real Wage}_c^i = (1 - s^{i,t})\Delta w_c^i + s^{i,t}\Delta t_c^i - s^{i,r}\Delta r_c$$

- $s^{i,t}$ is the welfare transfer to total income
- Substituting and simplifying the worker location formula, we get labor supply:

$$\frac{\Delta N_c^i}{(1 - N_c^i)} = \frac{\Delta \text{Real Wage}_c^i}{\sigma^i} + \frac{\phi^i}{\sigma^i}\Delta \text{GS}_c + \frac{\Delta A_c}{\sigma^i}$$

- σ^i is the slope of the labor supply function

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Formal Model

Firms:

- Production technology: $y_c^i = B_c(L_c^i)^{\alpha_i}(\bar{Z}_c)^{1-\alpha_i}$
- Private demand for labor is given by

$$L_c^{PD,i}(w_c^i) = \frac{(\alpha_i B_c)^{1/(1-\alpha_i)} \bar{Z}_c}{(w_c^i)^{1/(1-\alpha_i)}}.$$

- Differentiating total demand for skill i in county c we get

$$\begin{aligned} \Delta L_c^{D,i} &= \Delta \bar{Z}_c - \left(\kappa^{GD,i} + \frac{\kappa^{PD,i}}{(1-\alpha_i)} \right) \Delta w_c^i \\ &\quad + \frac{\kappa^{PD,i}}{(1-\alpha_i)} \Delta B_c^i, \end{aligned}$$

where $\kappa^{GD,i}$ is the share of employment by the government.

The Incidence of Government Spending (Suárez Serrato and Wingender)

Data

- County-level panel data is obtained by aggregating public-use micro-data areas (PUMAs)
- Skill-specific individual outcomes are obtained from IPUMS samples and the American Community Survey
- Panel data on federal spending comes from the Consolidated Federal Funds Report
- Panel IRS county files are used to confirm migration measures

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Identification Strategy

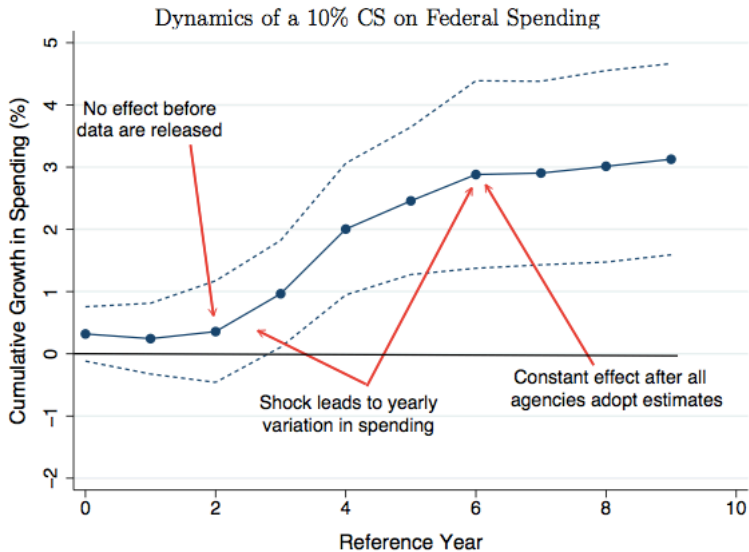
- Census shock instrument isolates geographic variation in federal formula-based spending at local level
- Postcensal (PC) population is the administrative estimate using birth, deaths and migration data : $Pop_{c,t}^{PC} = Pop_{c,t-1}^{PC} + (B_{c,t} - D_{c,t} + M_{c,t})$
- Decennial Census (C) is the physical count which replaces estimate once released
- Census shock is the mistake in population measurement:
 $CS_{c,Census} = \log Pop_{c,Census}^C - \log Pop_{c,Census}^{PC}$

- As an example consider Monterey County, CA:

Table: Population and Instrument for Monterey

Year	Population (Post-Censal) (000's)	Population (Decennial Census) (000's)	Census: Shock (% Diff)
1980	286	290	1.62
1990	362	357	-1.43
2000	374	402	6.87

Figure 2: Cumulative Impact of CS on Federal Spending



The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Labor Demand Shock

- Bartik (1991) identification strategy used to isolate shocks to labor demand
- Bartik shock constructed by interacting the national growth in employment in every industry with its predetermined share in a given area.

- $$Bartik_{c,t} = \sum_i \Delta Emp_{US,t}^{Industry_i} \times \frac{Emp_{c,t-10}^{Industry_i}}{Emp_{c,t-10}}$$

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Reduced Form Estimation

- For given outcome y we estimate

$$\Delta y_{c,t} = \alpha_{s,t} + \beta \Delta F_{c,t} + \varepsilon_{c,t},$$

where $\alpha_{s,t}$ are state group-year fixed effects and $\Delta F_{c,t}$ is the cumulative increase in federal spending over a given decade.

- Instrument for government spending using

$$\Delta F_{c,t} = \delta_{s,t} + \gamma CS_{c,t-1} + \epsilon_{c,t},$$

where $\delta_{s,t}$ are state group-year fixed effects and $CS_{c,t-1}$ is the census shock effect.

Figure: OLS Results: Effects of Federal Spending (Suárez Serrato and Wingender)

	(1) Pop	(2) Wage	(3) Adj. Wage	(4) Transfers Per-Adult
<i>All Workers</i>				
Fed Spend	0.262*** (0.037)	0.018 (0.011)	0.007 (0.009)	
<i>Skilled Workers</i>				
Fed Spend	0.296*** (0.047)	0.018 (0.012)	0.019* (0.011)	
<i>Unskilled Workers</i>				
Fed Spend	0.248*** (0.034)	0.010 (0.011)	0.005 (0.010)	-0.005 (0.040)

Notes: 1,479 county group-decade observations. State group-year fixed effects included. Standard errors clustered at the county group level in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Figure: IV Results: Effects of Federal Spending (Suárez Serrato and Wingender)

	(1) Pop	(2) Wage	(3) Adj. Wage	(4) Transfers Per-Adult
<i>All Workers</i>				
Fed Spend	1.463*** (0.314)	0.290*** (0.106)	0.251*** (0.091)	
<i>Skilled Workers</i>				
Fed Spend	1.335*** (0.397)	0.431*** (0.160)	0.313** (0.130)	
<i>Unskilled Workers</i>				
Fed Spend	1.265*** (0.294)	0.132 (0.096)	0.163* (0.087)	0.839* (0.488)

Notes: 1,479 county group-decade observations. State group-year fixed effects included. Standard errors clustered at the county group level in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Test of Valuation

- If workers value government spending, they will accept a lower wage to relocate to an area with higher services.
- Population will be more responsive to an increase in the real wage from a government shock
- Estimate IV regression

$$\Delta Pop_{c,t} = \alpha_{s,t} + \beta \Delta Real Wage_c^i + \varepsilon_{c,t}$$

- Instrument $\Delta Real Wage_c^i$ with Bartik and Census Shock

Figure: Test of Positive Valuations (Suárez Serrato and Wingender)

	(1)	(2)
	IV Pop	IV Pop
Instrument	Bartik	Census Shock
<i>All Workers</i>		
Real Wage	1.584*** (0.251)	6.698*** (2.166)
<i>Skilled Workers</i>		
Real Wage	2.463*** (0.587)	4.474** (1.987)
<i>Unskilled Workers</i>		
Real Wage	1.024*** (0.360)	6.870** (2.941)

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Structural Estimation

- Goal: know relative size of supply and demand components, evaluate welfare impacts of government spending
- Structural model allows to isolate supply component of government spending
- It estimates labor supply and demand curves, as well as the valuation of government services

Structural Estimation: Labor Supply

Problem: We don't observe changes in government services

- Model yields following relation:

$$\Delta GS_c = \Delta F_c - (\theta^S \Delta w_c^S + \theta^U \Delta w_c^U)$$

- Government Skilled Labor Demand Shares $\theta = 40\%$
- Estimate labor supply equation:

$$(LS^i) : \Delta N_{c,t}^i = \mu_{s,t}^{LS,i} + \frac{\Delta \text{Real Wage}_{c,t}^i}{\sigma^i} + \frac{\phi^i}{\sigma^i} \Delta GS_{c,t} + \Delta e_{c,t}^{LS,i}$$

- $\Delta e_{c,t}^{LS,i}$ is an amenity shock
- Instrument using Bartik and Census Shock

Figure: Structural Results: Labor Supply (Suárez Serrato and Wingender)

	(1) Labor Supply Unskilled		(2) Labor Supply Skilled	
	Mobility: σ^U	Valuation of GS: ϕ^U	Mobility: σ^S	Valuation of GS: ϕ^S
OLS	1.882*** (0.261)	0.401*** (0.056)	2.552*** (0.631)	0.536*** (0.127)
IV	0.399*** (0.108)	0.502*** (0.131)	0.350*** (0.082)	0.267*** (0.092)
Instruments		B & CS		B & CS
Overid P-Val		0.220		0.020
Endog P-Val				

$$(1) \text{ and } (2) \text{ } LS^i : \Delta N_{c,t}^i = \mu_{s,t}^{LS,i} + \frac{\Delta \text{Real Wage}_{c,t}^i}{\sigma^i} + \frac{\phi^i}{\sigma^i} \Delta GS_{c,t} + \Delta e_{c,t}^{LS,i}$$

Decomposition of a 1% Increase in Government Spending

Figure 5: Estimated Supply and Demand Components of Government Shock

Estimated Supply and Demand Components of Government Spending



- Skilled: Supply Shift explains 19% of ΔN_C^S and 32% of Δw_C^S
- Unskilled: Supply Shift explains 53% of ΔN_C^U and 46% of Δw_C^U

The Incidence of Government Spending (Suárez Serrato and Wingender)

Methods: Policy Experiment #1

- Analyze impact of increasing spending per-adult by \$1,000
- Median spending per-adult is \$10,235
- Change in worker utility is given by

$$\begin{aligned}\frac{dV^i}{dv_c^i} \frac{1}{\lambda_c^i} &= N_c^i \frac{dv_c^i}{\lambda_c^i} \\ &= N_c^i \left(dw_c^i + dt_c^i - dr_c^i + \phi^i(w_c^i + t_c^i) \frac{dGS_c}{GS_c} \right)\end{aligned}$$

Table: Policy Experiment # 1 (Suárez Serrato and Wingender)

	Zero Value for Government Services	Including Value for Government Services
<i>Welfare Effects</i>		
Skilled Worker (25%)	\$363	\$1,012
Unskilled Worker (25%)	-\$92	\$751
Owners of Housing	\$325	\$325
<i>Budget Impacts</i>		
Decrease in Transfers	\$15	\$15
Increase in Taxes	\$290	\$290
Social Welfare	\$650	\$1,445

- An additional \$1 of spending raises welfare by \$1.45
- Ballard et al. (1985) report MCPF between 1.17 and 1.33

The Incidence of Government Spending (Suárez Serrato and Wingender)

Contribution

- Estimate long-term impacts of government spending
 - Find persistent effects on wages and migration
- Estimate incidence of government spending by skill
 - Supply components of shock explains large mobility responses of the unskilled and lower wage outcomes
 - Incidence on workers may be large enough to motivate spending on utilitarian grounds
 - Heterogenous valuations of government services suggest distribution of funds should target areas with low skill-shares

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Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

- Substantial disparities in economic outcomes across low vs. high poverty neighborhoods [e.g., Wilson 1987, Jencks and Mayer 1990, Cutler and Glaeser 1997]
- These disparities motivated the HUD Moving to Opportunity (MTO) experiment in the mid 1990's
 - Offered a randomly selected subset of families living in high-poverty housing projects housing vouchers to move to lower-poverty areas
- Large literature on MTO has found significant effects on adult health and subjective well-being
- But these studies have consistently found that the MTO treatments had no impact on earnings or employment rates of adults and older youth [e.g. Katz, Kling, and Liebman 2001, Oreopoulos 2003, Sanbonmatsu et al. 2011]

Source: Chetty Hendren Katz (AER, 2016)

Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

- We revisit the MTO experiment and focus on its impacts on children who were young when their families moved to better neighborhoods
- Re-analysis motivated by a companion paper that presents quasi-experimental evidence on neighborhood effects [Chetty and Hendren 2015]
 - Key finding: **childhood exposure effects**
 - Every year in a better area during childhood → better outcomes in adulthood
 - Implies that gains from moving to a better area are larger for children who move when young

Source: Chetty Hendren Katz (AER, 2016)

Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

- In light of this evidence on childhood exposure effects, we returned to MTO data to examine treatment effects on young children
- Link MTO data to tax data to analyze effects of MTO treatments on children's outcomes in adulthood
- Children we study were not old enough to observe outcomes in adulthood at the time of the MTO Final Impacts Evaluation (which used data up to 2008)

Source: Chetty Hendren Katz (AER, 2016)

Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

- HUD Moving to Opportunity Experiment implemented from 1994-1998
- 4,600 families at 5 sites: Baltimore, Boston, Chicago, LA, New York
- Families randomly assigned to one of three groups:
 1. Experimental: housing vouchers restricted to low-poverty (<10%) Census tracts
 2. Section 8: conventional housing vouchers, no restrictions
 3. Control: public housing in high-poverty (50% at baseline) areas

Source: Chetty Hendren Katz (AER, 2016)

Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

Most Common MTO Residential Locations in New York



Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

- MTO data obtained from HUD
 - 4,604 households and 15,892 individuals
 - Primary focus: 8,603 children born in or before 1991
- Link MTO data to federal income tax returns from 1996-2012
 - Approximately 85% of children matched
 - Match rates do not differ significantly across treatment groups
 - Baseline covariates balanced across treatment groups in matched data

Source: Chetty Hendren Katz (AER, 2016)

Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

- We replicate standard regression specifications used in prior work [Kling, Katz, Liebman 2007]

$$y_i = \alpha + \beta_E^{ITT} Exp_i + \beta_S^{ITT} S8_i + s_i \delta_s + \epsilon_i$$

The diagram shows two labels, "Treatment Indicators" and "Site Indicators", positioned below the regression equation. Two blue arrows originate from "Treatment Indicators": one points to the variable Exp_i and the other points to the variable $S8_i$. A single blue arrow originates from "Site Indicators" and points to the variable $S8_i$.

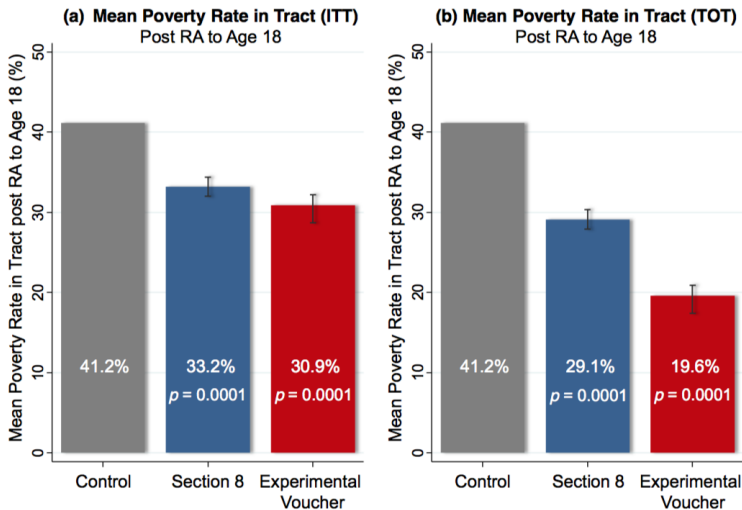
- These intent-to-treat (ITT) estimates identify effect of being *offered* a voucher to move through MTO
- Estimate treatment-on-treated (TOT) effects using 2SLS, instrumenting for voucher take-up with treatment indicators
 - Experimental take-up: 48% for young children, 40% for older children
 - Section 8 take-up: 65.8% for young children, 55% for older children

Source: Chetty Hendren Katz (AER, 2016)

Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

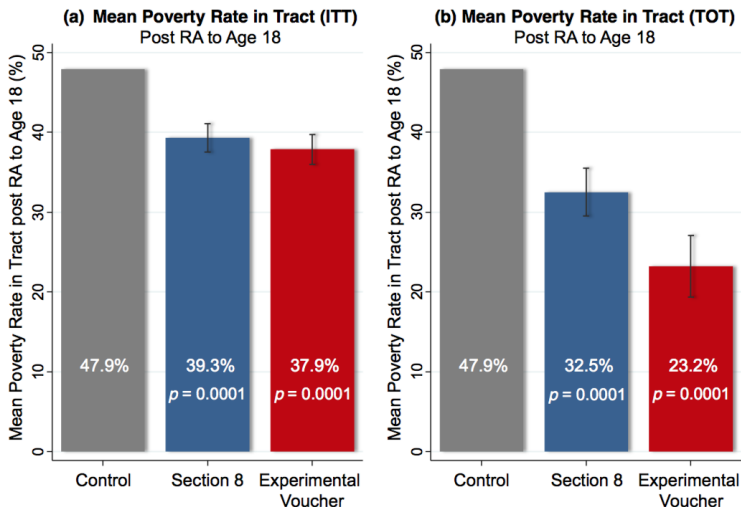
Impacts of MTO on Children Below Age 13 at Random Assignment



Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

Impacts of MTO on Children Age 13-18 at Random Assignment

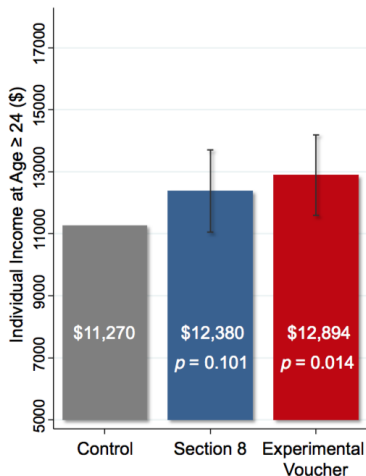


Chetty Hendren Katz (AER, 2016) on MTO

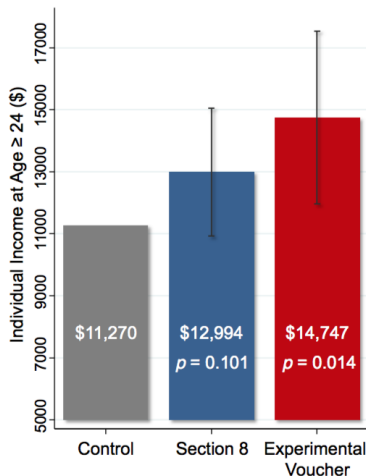
Effect of Exposure to Better Neighborhoods

Impacts of MTO on Children Below Age 13 at Random Assignment

(a) Individual Earnings (ITT)

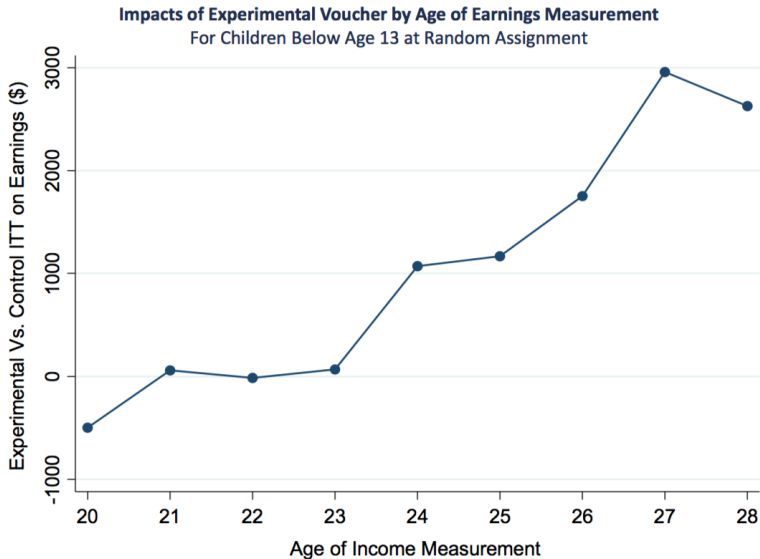


(b) Individual Earnings (TOT)



Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods



Could improving places eventually save money?

Exposure specification: extra year of good neighborhood → extra \$566 of age 26 earnings!

TABLE 8
Linear Exposure Effect Estimates

Dep. Var.:	Indiv. Earn. (\$)	Household Income (\$)		Coll. Qual. 18-	Married	ZIP Poverty	Taxes Paid
	2008-2012 ITT	2008-2012 ITT	Age 26 ITT	20 ITT (\$)	ITT (%)	Share ITT (%)	ITT (\$)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Experimental × Age at RA	-364.1* (199.5)	-723.7** (255.5)	-564.9* (282.8)	-171.0** (55.16)	-0.582* (0.290)	0.261* (0.139)	-65.81** (23.88)
Section 8 × Age at RA	-229.5 (208.9)	-338.0 (266.4)	157.2 (302.0)	-117.1* (63.95)	-0.433 (0.316)	0.0109 (0.156)	-42.48* (24.85)
Experimental	4823.3* (2404.3)	9441.1** (3035.8)	8057.1* (3760.9)	1951.3** (575.1)	8.309* (3.445)	-4.371* (1.770)	831.2** (279.4)
Section 8	2759.9 (2506.1)	4447.7 (3111.3)	-1194.0 (3868.2)	1461.1* (673.6)	7.193* (3.779)	-1.237 (2.021)	521.7* (287.5)
Number of Observations	20043	20043	3956	20127	20043	15798	20043
Control Group Mean	13807.1	16259.9	14692.6	21085.1	6.6	23.7	627.8

Source: Chetty, Hendren, Katz (2015)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

How does growing up in a disadvantaged neighborhood affect long-run child outcomes?

- ▶ Large observational literature shows children from disadvantaged areas have notably worse outcomes
 - ▶ Ellen and Turner (1997); Cutler and Glaeser (1997); Altonji and Mansfield (2014); Chetty et al., (2014)
- ▶ Yet, some experimental evidence finds few significant effects of moving to better neighborhoods
 - ▶ Katz et al. (2001); Oreopolous (2003); Sanbonmatsu et al., (2011)
- ▶ Existence and size of neighborhood effects is uncertain
 - ▶ This view has started to change due to recent work: Chetty, Hendren and Katz (2015); Chetty and Hendren (2015)

Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

What is public housing?

- ▶ Goal: Provide “decent” housing for low-income families
- ▶ Large residential buildings (high-rises) built in close proximity
 - ▶ A **collection** of buildings is called a housing project

Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

Figure 1: Robert Taylor Homes



Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

- ▶ Federally supported program, but owned and operated by local (city) authority
- ▶ Assistance is *not* an entitlement – long waiting lists
- ▶ Value of subsidy is large: \approx \$8,000 per year (HUD, 2015)

Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

► Descriptive statistics:

1. Third largest public housing system during the 1990s
2. Average household income: \$7,000
3. 20% of units have more than 5 people
4. Nearly all residents are African-American

Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

- ▶ Reaction to serious management and infrastructure problems
 - ▶ Buildings built during the 50s and 60s cheaply
 - ▶ Few believed the Chicago Housing Authority (CHA) could deal with maintenance issues
 - ▶ Scandals revealed officials had mismanaged public funds
- ▶ Local politicians proposed demolition and expanding voucher assistance
 - ▶ Limited funding for demolition

Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

- ▶ Limited funding \Rightarrow selection of buildings based on specific maintenance issues (Jacob, 2004)
 - ▶ Initial demolitions motivated by specific crises
 - ▶ Ex. Pipes burst in Robert Taylor high-rise buildings

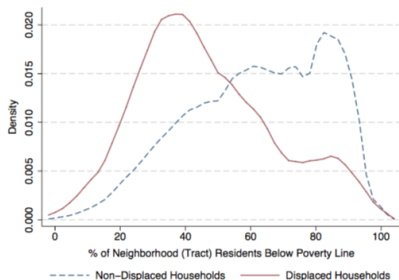
Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

- ▶ Provided housing vouchers and compensated for moving costs
 - ▶ Note: Vouchers and project-based assistance have the same rules \Rightarrow No effect on budget set
- ▶ Households moved to lower poverty areas:

Densities of Neighborhood Poverty Rates



Moved to Opportunity Chyn (AER, 2018)

Contribution

- ▶ Provide new evidence on neighborhood effects for children from two different housing policy interventions
 1. Natural experiment created by public housing demolition
 2. Housing voucher lottery
- ▶ Compare these two contexts to answer two questions:
 1. What are the benefits of relocating youth in a general population?
 2. Do children of volunteers benefit more or less than average?

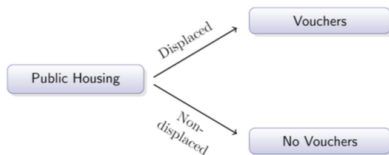
Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

Natural Experiment Research Design

Public Housing Demolition in Chicago



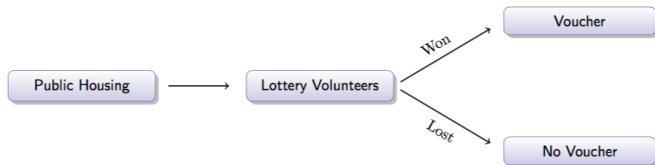
- ▶ Identification: Displacement unrelated to resident characteristics (Jacob, 2004)
- ▶ Results: Displaced children are (1) more likely to work, (2) have higher annual earnings and (3) have fewer arrests for violent crime

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

Lottery Design

The 1997 Chicago Housing Voucher Lottery



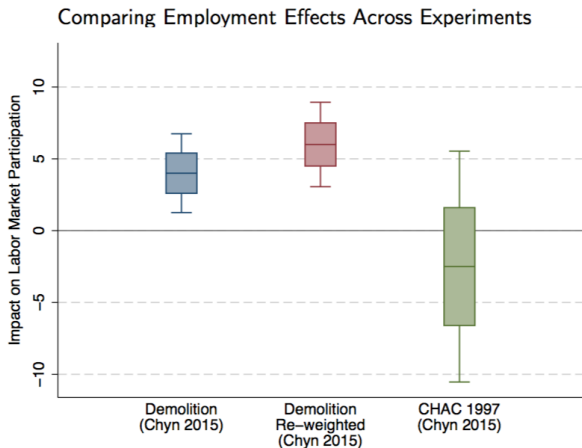
- ▶ Main finding: Small and not statistically significant effects on lottery children outcomes

Source: Chyn (AER, 2018)

Moved to Opportunity Chyn (AER, 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

Notable contrast between demolition and lottery results



Moved to Opportunity (Chyn, AER 2018)

The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children

Interpreting the Evidence and Implications

- ▶ Pattern consistent with larger benefits for children from households where parents have low demand for moving
 - ▶ Demolition \Rightarrow General set of households
 - ▶ Lottery \Rightarrow Subset with **high willingness** to move
- ▶ “Reverse Roy” and parental behavior in education studies:
 - ▶ Boston charter schools (Walters, 2015)
 - ▶ North Carolina school choice (Hastings et al., 2008)
- ▶ Benefits to moving children from public housing may be larger than estimates based on experiments such as MTO

Sorting and MTO: Galiani Murphy Pantano (AER, 2012)

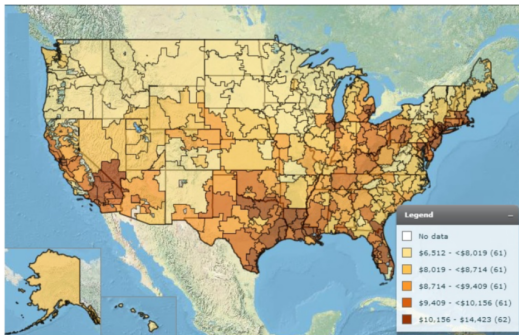
- A big question related to MTO/ Opportunity Atlas is what happens if we move people at scale
- We will talk about models of sorting next lecture, but for those who are interested Galiani Murphy Pantano (AER, 2012) use data from MTO to estimate a sorting model of neighborhood choice
- They simulate the effects changing the subsidy-use constraints implemented in the actual MTO experiment
- Find that restricting subsidies to even lower poverty neighborhoods would substantially reduce take-up and actually increase average exposure to poverty
- Also find that adding restrictions based on neighborhood racial composition would not change average exposure to either race or poverty

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Finkelstein, Gentzkow, Williams (QJE 2016)

Sources of Geographic Variation in Health Care: Evidence from Patient Migration

- Substantial geographic variation in health care utilization
 - Age/race/sex-adjusted 2010 per-enrollee average Medicare spending: \$14,423 in Miami vs. \$7,819 in Minneapolis
- Higher area utilization not generally correlated with better patient outcomes



Source: *Dartmouth Atlas*; Medicare spending per enrollee (2010; adjusted for age, sex, and race)

Two broad classes of explanations: People vs Places

- Patients are different (shorthand: “demand” factors)
 - Health status
 - Preferences

- Places are different (shorthand: “supply” factors)
 - Doctors’ incentives and beliefs
 - Endowments of physical capital
 - Characteristics of hospital markets

Summary of Finkelstein, Gentzkow, Williams (QJE 2016)

- Exploit patient migration to separate variation due to patient vs place
 - Thought experiment: Miami vs Minneapolis
- An important advantage of FGW approach
 - Captures the effect of both observed and unobserved patient characteristics
- Results
 - 40-50% of geographic variation is due to patients, 50-60% to place
 - What underlying economic primitives drive differences in patient demand?
 - Small role for demographics, persistence of past treatments, habit formation
 - Patient health can explain a substantial portion (47-80%)

$$y_{ijt} = \alpha_i + \gamma_j + \tau_t + \rho_{r(i,t)} + x_{it}\beta + \varepsilon_{ijt}$$

- y_{ijt} : log utilization of patient i in geographic area j in year t
- $\rho_{r(i,t)}$: fixed effects for “relative years” for movers (zero for non-movers)
- x_{it} : fixed effects for five-year age bins
- Allows movers to differ arbitrarily from non-movers in:
 - Levels of log utilization (α_i)
 - Trends in log utilization around their moves, e.g., due to health shocks ($\rho_{r(i,t)}$)
- Embeds several key assumptions, which we empirically investigate:
 - No shocks to utilization that coincide exactly with the timing of the move and that are correlated with utilization in the origin and destination
 - α_i and γ_j are additively separable in equation for log utilization

Summary Measures

- \bar{y}_j : Average across years of $E(y_{it}|i \in j)$
 - \bar{c}_j : Analogous average of $\alpha_i + \rho_{r(i,t)} + x_{it}\beta$
- Place share of difference between areas j and j' :

$$S_{place}(j, j') = \frac{\gamma_j - \gamma_{j'}}{\bar{y}_j - \bar{y}_{j'}}$$

- Patient share of difference between areas j and j' :

$$S_{pat}(j, j') = \frac{\bar{c}_j - \bar{c}_{j'}}{\bar{y}_j - \bar{y}_{j'}}$$

Movers and their moves

- Movers are different from non-movers (fixed differences captured by α_i)
 - Slightly more likely to be female, white
 - HRS: Somewhat more educated, similar initial retirement rates [▶ Table](#)
- Time varying correlates of moving (correlates of moving captured by ρ_r)
 - HRS: Top reason for moving to be near/with children [▶ Figure](#)
 - HRS: Becoming widowed/retired associated with higher move probability; changes in self-reported health are not [▶ Details](#)
- Geography of moves
 - Median move = 357 miles; IQ range = 120-913 miles [▶ Histogram](#)
 - 68% of moves are cross state
 - 12% have Florida as destination [▶ Table](#)

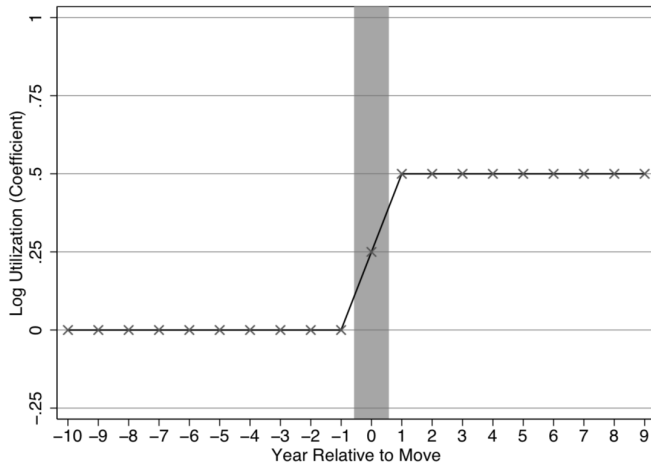
Event study

- Consider a simple model with only patient and place fixed effects
- For each mover i , scale utilization relative to destination-origin gap:

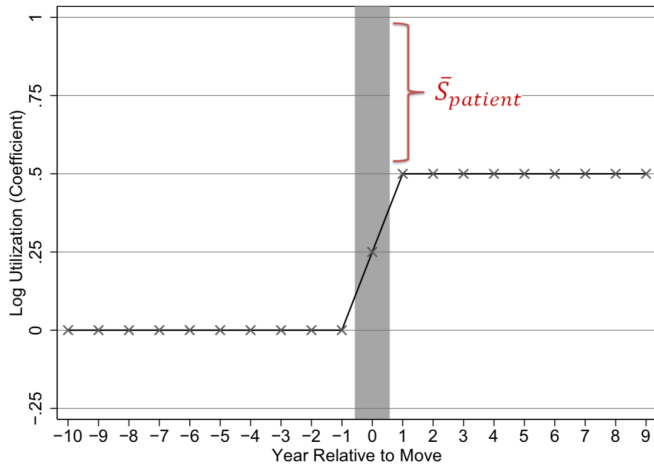
$$y_{it}^{scaled} = \frac{y_{it} - \bar{y}_{o(i)}}{\bar{y}_{d(i)} - \bar{y}_{o(i)}}$$

- Plot averages of y_{it}^{scaled} by relative year: jump on move is \bar{S}_{place}
- Regression implementation to partial covariates and handle weighting

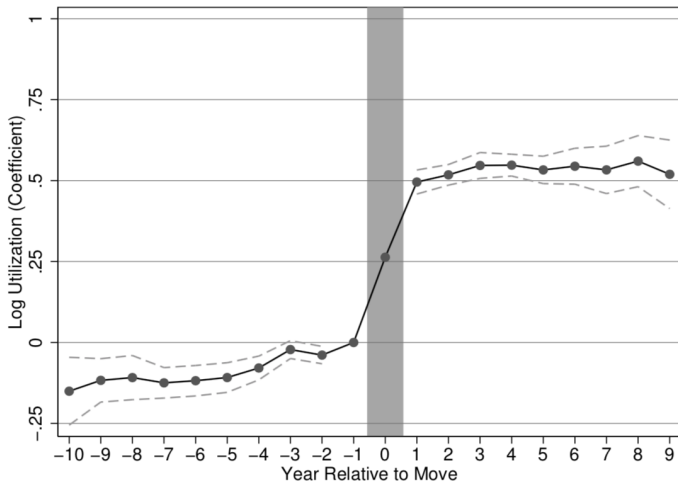
Event study: Example



Event study: Example



Event study: Data



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Recap: Place Based Policies, Heterogeneity, and Agglomeration (Kline)

Methods: Agglomeration Effects

- Equilibrium without agglomeration forces:

$$g_{\Delta}(L_1) = B_1^{\frac{1}{\alpha}} c_1^{-\frac{1-\alpha}{\alpha}} - B_2^{\frac{1}{\alpha}} c_2^{-\frac{1-\alpha}{\alpha}} \\ + A_1 - A_2 - F^{-1}(L_1)$$

Recap: Place Based Policies, Heterogeneity, and Agglomeration (Kline)

Methods: Agglomeration Effects

- Equilibrium without agglomeration forces:

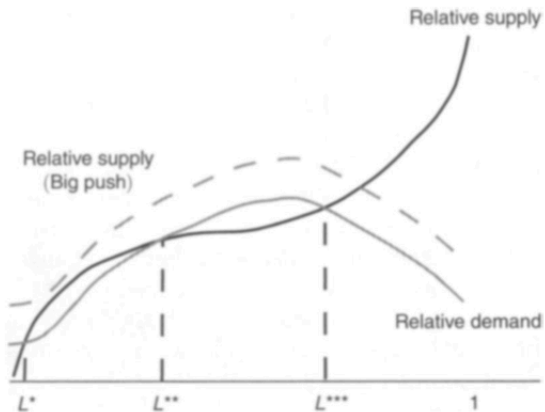
$$g_{\Delta}(L_1) = B_1^{\frac{1}{\alpha}} c_1^{-\frac{1-\alpha}{\alpha}} - B_2^{\frac{1}{\alpha}} c_2^{-\frac{1-\alpha}{\alpha}} + A_1 - A_2 - F^{-1}(L_1)$$

- With agglomeration, productivity is a function of the number of workers, so $B_j = h_j(L_j)$. Equilibrium with agglomeration forces is now':

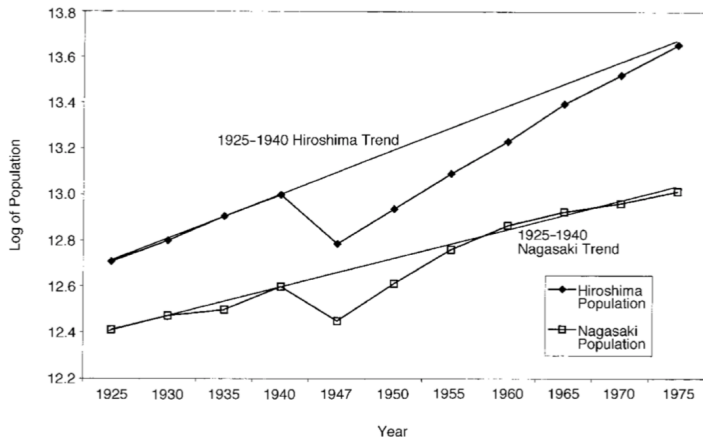
$$g_{\Delta}(L_1) = h_1(L_1)^{\frac{1}{\alpha}} c_1^{-\frac{1-\alpha}{\alpha}} - h_2(1 - L_1)^{\frac{1}{\alpha}} c_2^{-\frac{1-\alpha}{\alpha}} + A_1 - A_2 - F^{-1}(L_1)$$

- Equilibrium results depend on the relative strength of agglomeration forces vs the costs of housing a larger population.

Figure: Agglomeration Effects (Kline)



An un-natural experiment



Source: Davis and Weinstein (2002)

Million Dollar Plants (Greenstone et al.)

Question

- What is the impact of the opening of a large manufacturing plant on the total factor productivity (TFP) of incumbent plants in the same county?
- This work contributes to the policy debate on the importance of location-based incentives
- The authors add to the literature by providing evidence for the existence of agglomeration spillovers in a specific industry

Million Dollar Plants (Greenstone et al.)

Methods: Formal Model

Formal Model:

- Incumbent firms choose labor L , capital K and land T to maximize:
$$\text{Max}_{L,K,T} f(A, L, K, T) - wL - rK - qT$$
- $A = A(N)$ depends on the density of economic activity in the area, and includes all facts that affect the productivity of labor, capital and land equally
- In equilibrium, the marginal products of L^* , K^* and T^* are equal to their prices

Million Dollar Plants (Greenstone et al.)

Methods: Formal Model

- Assume $q(N)$ is the inverse of the land supply function

$$\begin{aligned}\Pi^* &= f[A(N), L^*(w, r, q), K^*(w, r, q), T^*(w, r, q)] \\ &\quad - w(N)L^* - rK^* - q(N)T^*\end{aligned}$$

- If firms are price takers and factors are paid their marginal product:

$$\frac{d\Pi^*}{dN} = (\partial f / \partial A \times \partial A / \partial N) - [\partial w / \partial N L^* + \partial q / \partial N T^*]$$

- The first term represents the increase in factor productivity from positive spillovers
- The second term represents the negative effect from increases in the cost of production

Million Dollar Plants (Greenstone et al.)

Methods: Formal Model

Predictions in case of positive spillovers:

- The opening of a new plant will increase TFP of incumbents
- The increase in TFP may be larger for firms that are economically “closer” to new plant
- The density of economic activity in the county will increase as firms move in
- The price of locally supplied factors of production will increase

Million Dollar Plants (Greenstone et al.)

Methods: Empirical Estimation

Empirical strategy:

- Comparing the “winning” counties (where the new plant is located) to the “losing” ones (runner-ups) allows to isolate the effects that result solely from agglomeration
- Identification: use location rankings of firms to identify a valid counterfactual for what would have happened to incumbent plants in “winning” counties in the absence of the plant opening
- The research design is convincing at testing for agglomeration - it is realistic that “winning” counties would benefit from the concentration of economic activity

Million Dollar Plants (Greenstone et al.)

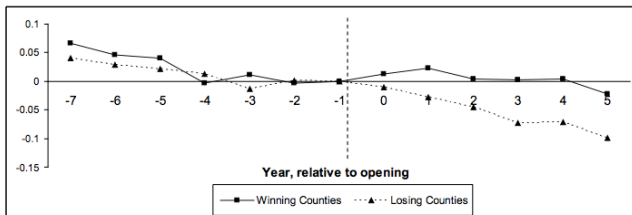
Data

- “Million Dollar Plant” articles from the Site Selection list the “winning” and “losing” counties.
- Information about the plants comes from the Census Bureau’s Standard Statistical Establishment List (SSEL), the Annual Survey of Manufactures (ASM) and the Census of Manufactures (CM).
- The data on plant variables such as employment and value of shipments is panel for the opening year + 8 years before.

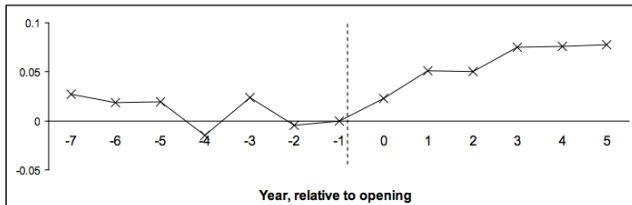
Figure: Incumbents' Productivity in Winning vs Losing Counties (Greenstone et al.)

Figure 1. All Incumbent Plants' Productivity in Winning vs. Losing Counties, Relative to the Year of a MDP Opening

All Industries: Winners vs. Losers



Difference: Winners – Losers



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Agglomeration Economies and the Tennessee Valley Authority (Kline and Moretti)

Question

- What are the effects of the Tennessee Valley Authority policy on local economies?
- Paper informs the debate on spatially targeted policies
- Kline and Moretti are the first to empirically quantify the long run social costs and benefits of a place based policy

Agglomeration Economies and the Tennessee Valley Authority (Kline and Moretti)

Methods: Empirical Strategy

- The empirical strategy is to compare long run changes in TVA counties with long run changes in non-TVA counties with similar characteristics
- This allows to isolate the effects of the TVA policy on economic growth, controlling for other influences
- Regression model: $y_{it} - y_{it-1} = \alpha + \beta X_i + (\epsilon_{it} - \epsilon_{it-1})$
 - $y_{it} - y_{it-1}$ is the change in the dependent variable between years $t - 1$ and t for county i .
 - X_i is the vector of preprogram characteristics.

Agglomeration Economies and the Tennessee Valley Authority (Kline and Moretti)

Data

- The data comes from the Population Census, the Manufacturing Census, the Agricultural Census, and from Fishback, Haines, and Kantor (2011)
- It is used to create a county-level panel from 1900 to 2000
- Some of the variables are imprecise, and substantial measurement error is likely to be present at the beginning of the sample period

Figure: Impact of TVA on Growth Rate (Kline and Moretti)

Table 2a: Decadalized Growth Rates in TVA Region vs. Rest of U.S. 1900-1940

	Outcome	Point Estimate (Unadjusted)	Clustered S.E.	Point Estimate (Controls)	Clustered S.E.	Spatial HAC	N
		(1)	(2)	(3)	(4)	(5)	(6)
(1)	Population	0.007	(0.016)	0.010	(0.012)	(0.012)	1776
(2)	Total Employment	-0.009	(0.016)	0.005	(0.013)	(0.013)	1776
(3)	Housing Units	-0.006	(0.015)	0.007	(0.011)	(0.011)	1776
(4)	Average Manufacturing Wage	0.009	(0.018)	0.010	(0.021)	(0.021)	1428
(5)	Manufacturing Share	0.007*	(0.004)	0.005	(0.004)	(0.004)	1776
(6)	Agricultural Share	-0.007*	(0.004)	-0.001	(0.005)	(0.005)	1776
(7)	Average Agricultural Land Value	0.078***	(0.021)	0.025	(0.018)	(0.018)	1746

Figure: Impact of TVA on Growth Rate (Kline and Moretti)

Table 3a: Decadalized Impact of TVA on Growth Rate of Outcomes (1940-2000)

		Point Estimate (Unadjusted)	Clustered S.E.	Point Estimate (Controls)	Clustered S.E.	Spatial HAC	N
	Outcome	(1)	(2)	(3)	(4)	(5)	(6)
(1)	Population	0.004	(0.021)	0.007	(0.020)	(0.018)	1907
(2)	Average Manufacturing Wage	0.027***	(0.006)	0.005	(0.004)	(0.005)	1172
(3)	Agricultural Employment	-0.130***	(0.026)	-0.056**	(0.024)	(0.027)	1907
(4)	Manufacturing Employment	0.076***	(0.013)	0.059***	(0.015)	(0.023)	1907
(5)	Value of Farm Production	-0.028	(0.028)	0.002	(0.032)	(0.026)	1903
(6)	Median Family Income (1950-2000 only)	0.072***	(0.014)	0.021	(0.013)	(0.011)	1905
(7)	Average Agricultural Land Value	0.066***	(0.013)	-0.002	(0.012)	(0.016)	1906
(8)	Median Housing Value	0.040**	(0.017)	0.005	(0.015)	(0.015)	1906

Agglomeration Economies and the Tennessee Valley Authority (Kline and Moretti)

Methods: Formal Model

Formal Model:

- Utility is equalized across counties in each year: $\ln w_{it} + M_{it} = \bar{u}_t$
- It is used to create a county-level panel from 1900 to 2000
- Production function: $Y_{it} = A_{it} K_{it}^{\alpha} F_i^{\beta} L_{it}^{1-\alpha-\beta}$
- A_{it} is a local productivity level, L_{it} is the number of manufacturing workers, K_{it} is the capital stock, F_i is a fixed nonreproducible factor (i.e. natural features)

Agglomeration Economies and the Tennessee Valley Authority (Kline and Moretti)

Methods: Formal Model

- Labor demand:

$$\ln w_{it} = C - \frac{\beta}{1-\alpha} \ln L_{it} + \frac{\beta}{1-\alpha} \ln F_i - \frac{\alpha}{1-\alpha} \ln r_t + \frac{1}{1-\alpha} \ln A_{it}$$

- $C \equiv \ln(1 - \alpha - \beta) + \frac{\alpha}{1-\alpha} \ln \alpha$

- $\ln A_{it}$ can be decomposed into a locational advantage component, a component due to agglomeration effects, an effect of TVA, and an idiosyncratic component:

$$\ln A_{it} = g\left(\frac{L_{it-1}}{R_i}\right) + \delta_t D_i + \eta_i + \gamma_t + \varepsilon_{it}$$

- D_i is a dummy for TVA exposure

Agglomeration Economies and the Tennessee Valley Authority (Kline and Moretti)

Methods: Formal Model

- Direct TVA effect: impact on public infrastructure, as captured by δ_t coefficients
- Indirect TVA effect: increases in employment may cause further increases in productivity (agglomeration)
- The impact of a marginal increase in the productivity of TVA's investments on output: $\frac{dY_i}{d\delta} = \frac{1}{1-\alpha} Y_i (D_i + \frac{1-\alpha-\beta+\sigma_i}{L_i} \frac{dL_i}{d\delta})$
 - σ_i is the local agglomeration elasticity
- Steady state productivity: $\ln A_i = g\left(\frac{L_i}{R_i}\right) + \eta_i + \delta D_i$

Agglomeration Economies and the Tennessee Valley Authority (Kline and Moretti)

Methods: Structural Estimation

Structural Estimation:

$$\begin{aligned}\ln(L_{it}) - \ln(L_{it-1}) &= -\frac{1-\alpha}{\beta}(\ln w_{it} - \ln w_{it-1}) + \frac{\delta_t - \delta_{t-1}}{\beta} D_i \\ &+ \frac{\theta_1}{\beta} \left[g_1\left(\frac{L_{it-1}}{R_i}\right) - g_1\left(\frac{L_{it-2}}{R_i}\right) \right] + \frac{\theta_2}{\beta} \left[g_2\left(\frac{L_{it-1}}{R_i}\right) \right. \\ &- \left. g_2\left(\frac{L_{it-2}}{R_i}\right) \right] + \frac{\theta_3}{\beta} \left[g_3\left(\frac{L_{it-1}}{R_i}\right) - g_3\left(\frac{L_{it-2}}{R_i}\right) \right] \\ &+ X_i' \tilde{\lambda} + \tilde{\gamma}_t + \gamma_{t-1} + \tilde{v}_{it}\end{aligned}$$

- $\frac{\delta_t - \delta_{t-1}}{\beta}$ gives the change in direct effects of TVA between decades
- Spline coefficients $\frac{\theta_i}{\beta}$ determine the indirect effects, since they give the labor demand effects of within the relevant density range

Figure: Structural Estimates of Agglomeration Function (Kline and Moretti)

Table 6: Structural Estimates of Agglomeration Function (log basis)

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	2SLS	2SLS	2SLS
<i>Change in Log Manufacturing Density Spline Components:</i>						
Low	0.078 (0.030)	0.053 (0.031)	0.052 (0.030)	0.349 (0.109) [182.83]	0.323 (0.122) [149.61]	0.325 (0.123) [148.34]
Medium	0.072 (0.049)	0.075 (0.050)	0.069 (0.050)	0.339 (0.097) [92.69]	0.327 (0.101) [96.61]	0.319 (0.103) [97.01]
High	0.084 (0.059)	0.090 (0.059)	0.086 (0.059)	0.306 (0.134) [206.26]	0.304 (0.135) [204.81]	0.307 (0.136) [202.69]
Log Manufacturing Wages	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
TVA	0.024 (0.013)	0.027 (0.013)	0.029 (0.014)	0.008 (0.011)	0.011 (0.011)	0.012 (0.012)
Regional Trends	no	no	yes	no	no	yes
1940 Manufacturing Density	no	yes	yes	no	yes	yes
Decade Effects	yes	yes	yes	yes	yes	yes
Controls for 1920 and 1930 characteristics	yes	yes	yes	yes	yes	yes
P-value equal slopes	0.981	0.799	0.837	0.891	0.980	0.982
P-value slopes equal zero	0.039	0.141	0.173	0.002	0.007	0.012
N	5462	5462	5462	5318	5318	5318

Other considerations: Second best arguments

Correct prior distortions that can interact w/ place:

- Deductibility of state and local taxes (Albouy, 2008)
- Hiring costs (Kline and Moretti, 2013)
- State sales / business taxes (Fajgelbaum, Morales, Suarez Serrato, Zidar, 2016)
- Housing regulations (Hsieh and Moretti, 2016)
- Payroll taxes?

Closing thoughts

- Place conveys useful information about preferences and endowments
- Odd to ignore when setting policy
- Equity - efficiency tradeoff looms large but “triangle” view may miss forest for trees
- Some under-explored questions:
 - 1 Picking winners: what do economists have to offer?
 - 2 Paternalism and place: nudge households to move?
 - 3 Coordinating expectations: is economic development like faith healing?