Graduate Public Finance
Place-based Policies: Evidence[1]

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Lecture 3b

Outline

Outline

Motivation

- 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

Detroit

Chicago

- 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 CHARACTERISICS 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.

- 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:

- $w_{jks} = \dfrac{B_k R(\rho)}{1 - \tau \delta_{jks}}$

- 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: $H_j = \sum_k \sum_s N_{jks}$

- 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

- 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

- Define indicator variables $\{D_{ijks}\} = 1$ if and only if $\max\limits_{j'k's'}\{u_{ij'k's'}\} = u_{ijks}$
  - $j' \in \mathcal{N}, k' \in \{\emptyset, \mathcal{N}\}$, 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: $V = E_\varepsilon[\max\limits_{j'k's'}\{u_{ij'k's'}\}]$

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[a]	0.020***

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 per-

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

Before EZ

Camden (inside EZ), New Jersey, *1993*

After EZ

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

- 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?

- 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)
Panel A. Total impact of the program					
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

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

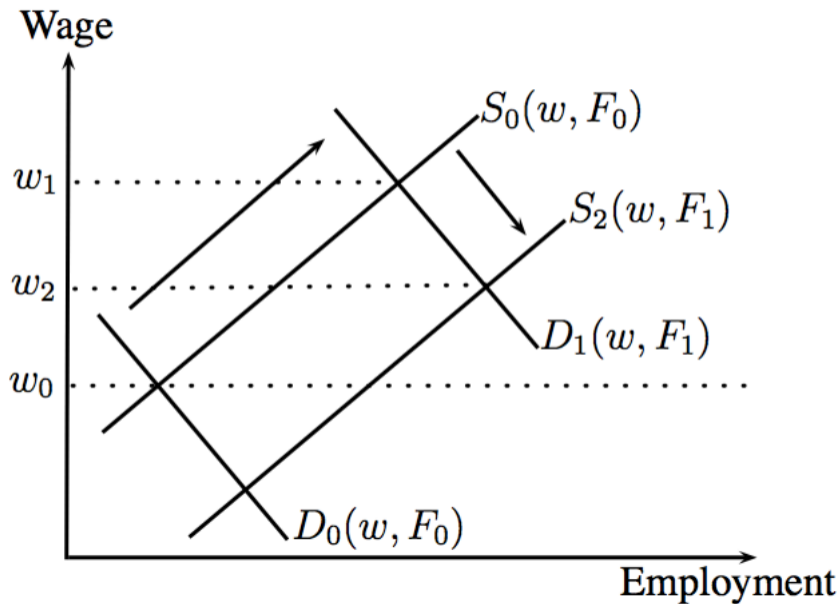- Efficiency cost roughly 13% of dollar value of subsidy

Outline

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. Opportunity across Locations: Intergenerational Mobility

3. Evidence on Moving to Opportunity

4. Movers Designs: Finkelstein, Gentzkow, Williams (QJE 2016)

5. Agglomeration

- 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

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.

- 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)

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

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

- 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:

$$\frac{\Delta N_c^i}{(1 - N_c^i)} = \frac{\Delta RealWage_c^i}{\sigma^i} + \frac{\phi^i}{\sigma^i}\Delta GS_c + \frac{\Delta A_c}{\sigma^i}$$

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

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

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

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

- 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

- 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:
$CS_{c,Census} = logPop_{c,Census}^{C} - logPop_{c,Census}^{PC}$

- 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
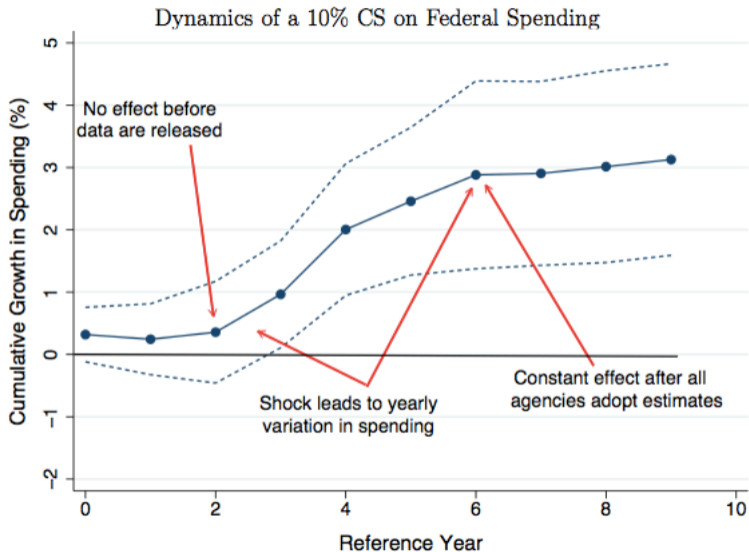
Dynamics of a 10% CS on Federal Spending

- 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.

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

- 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
All Workers				
Fed Spend	0.262***	0.018	0.007	
	(0.037)	(0.011)	(0.009)	
Skilled Workers				
Fed Spend	0.296***	0.018	0.019*	
	(0.047)	(0.012)	(0.011)	
Unskilled Workers				
Fed Spend	0.248***	0.010	0.005	-0.005
	(0.034)	(0.011)	(0.010)	(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
All Workers				
Fed Spend	1.463***	0.290***	0.251***	
	(0.314)	(0.106)	(0.091)	
Skilled Workers				
Fed Spend	1.335***	0.431***	0.313**	
	(0.397)	(0.160)	(0.130)	
Unskilled Workers				
Fed Spend	1.265***	0.132	0.163*	0.839*
	(0.294)	(0.096)	(0.087)	(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. * $p < .1$, ** $p < .05$, *** $p < .01$

- 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

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

- Instrument $\Delta \text{Real Wage}_c^i$ with Bartik and Census Shock

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

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

- 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:

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

- $\Delta e_{c,t}^{LS,i}$ 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***	0.401***	2.552***	0.536***
	(0.261)	(0.056)	(0.631)	(0.127)
IV	0.399***	0.502***	0.350***	0.267***
	(0.108)	(0.131)	(0.082)	(0.092)
Instruments		B & CS		B & CS
Overid P-Val		0.220		0.020
Endog P-Val				

(1) and (2) LS^i : $\Delta N^i_{c,t} = \mu^{LS,i}_{s,t} + \dfrac{\Delta \text{Real Wage}^i_{c,t}}{\sigma^i} + \dfrac{\phi^i}{\sigma^i} \Delta GS_{c,t} + \Delta e^{LS,i}_{c,t}$

Decomposition of a 1% Increase in Government Spending

Figure 5: Estimated Supply and Demand Components of Government Shock

- 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

- Analyze impact of increasing spending per-adult by $1,000

- Median spending per-adult is $10,235

- Change in worker utility is given by

$$
\begin{aligned}
\frac{dV^i}{dv^i_c}\frac{1}{\lambda^i_c} &= N^i_c \frac{dv^i_c}{\lambda^i_c} \\
&= N^i_c \left(dw^i_c + dt^i_c - dr^i_c + \phi^i(w^i_c + t^i_c)\frac{dGS_c}{GS_c} \right)
\end{aligned}
$$

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

	Zero Value for Government Services	Including Value for Government Services
Welfare Effects		
Skilled Worker (25%)	$363	$1,012
Unskilled Worker (25%)	-$92	$751
Owners of Housing	$325	$325
Budget Impacts		
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

- 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

Outline

Opportunity across Locations: Intergenerational Mobility

Intergenerational Mobility and Inequality

Evidence on Intergenerational Linkages

- Typical regression is

$$\log \text{ child income} = \text{controls} + \theta \log \text{ parental income} + e$$

- Regressions of this sort were first investigated by Becker and Tomes. They found relatively small coefficients, typically in the neighborhood of 0.2.

- Estimates of 0.2 mean that if your parents are twice as rich as my parents, you will typically be about 20 percent as rich as me. Your children will be only 4 percent richer than my children

- With this degree of intergenerational dependence, differences in initial conditions will soon disappear ... and things converge to "egalitarian society"?

- However, what about **measurement error** which biases $\hat{\theta}$ downwards

- Solon and Zimmerman: dealing with measurement issues (and when kid income is measured) increases $\hat{\theta}$ to .45 to .55

- Cooper Durlauf Johnson find important heterogeneities. Using PSID get .34 with full sample and .46 for poorest third
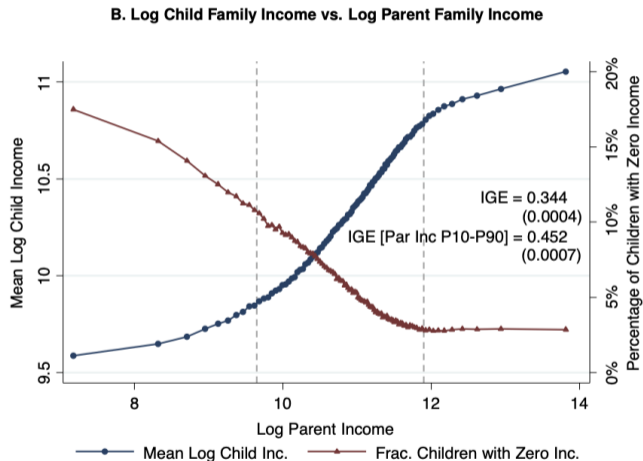
Intergenerational Mobility in the United States

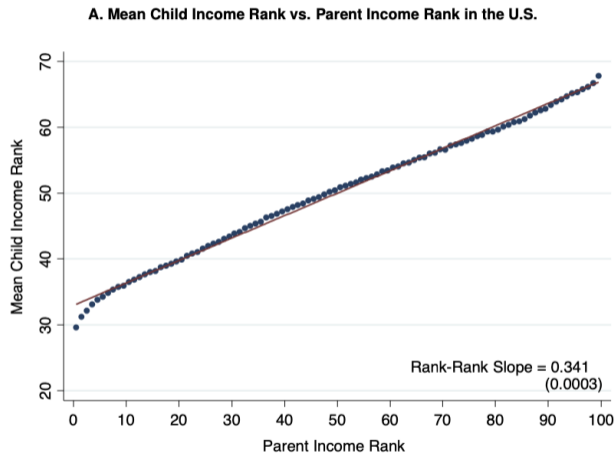**A. Level of Child Family Income vs. Parent Family Income**
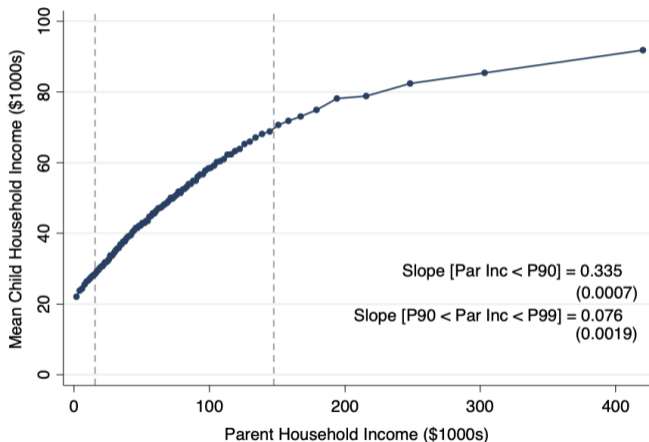
Slope [Par Inc < P90] = 0.335
(0.0007)
Slope [P90 < Par Inc < P99] = 0.076
(0.0019)

Source: Chetty Hendren Kline Saez (2014)

Intergenerational Mobility in the United States

B. Log Child Family Income vs. Log Parent Family Income

IGE = 0.344
(0.0004)
IGE [Par Inc P10-P90] = 0.452
(0.0007)

Mean Log Child Inc. ● Frac. Children with Zero Inc.

Source: Chetty Hendren Kline Saez (2014)

Intergenerational Mobility in the United States

A. Mean Child Income Rank vs. Parent Income Rank in the U.S.

Rank-Rank Slope = 0.341
(0.0003)

Source: Chetty Hendren Kline Saez (2014)

Intergenerational Mobility in the United States

B. Cross-Country Comparisons

Rank-Rank Slope (Denmark) = 0.180
(0.006)
Rank-Rank Slope (Canada) = 0.174
(0.005)

United States   Denmark   Canada
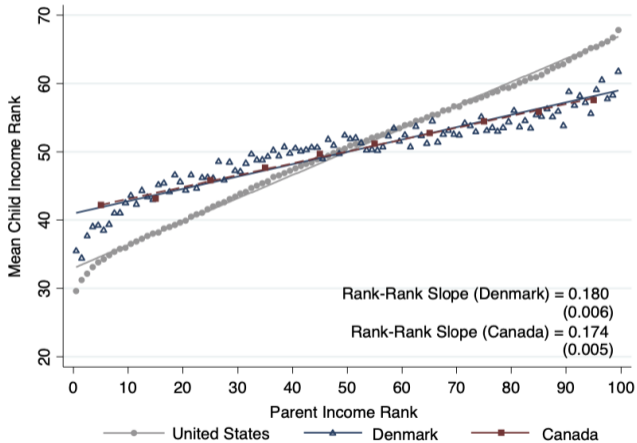
Source: Chetty Hendren Kline Saez (2014)

Intergenerational Mobility in the United States

A. Salt Lake City vs. Charlotte

Salt Lake City: $\bar{r}_{100} - \bar{r}_0 = 0.264$, $\bar{r}_{25} = 46.2$
Charlotte: $\bar{r}_{100} - \bar{r}_0 = 0.397$, $\bar{r}_{25} = 35.8$

Mean Child Rank in National Income Distribution (y-axis)
Parent Rank in National Income Distribution (x-axis)

Salt Lake City ●———● Charlotte ▲———▲
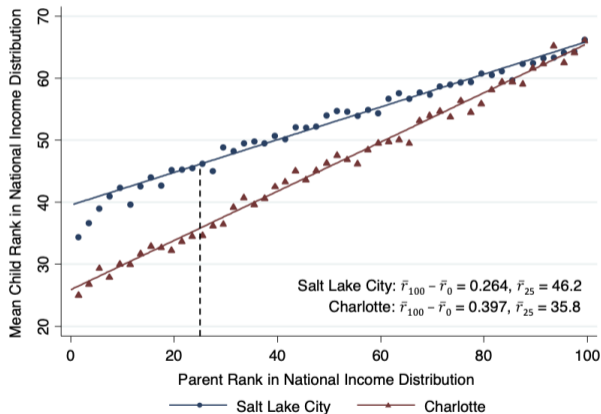
Source: Chetty Hendren Kline Saez (2014)

A Theory of Intergenerational Mobility
Sketch of Becker Kominers Murphy Spenkuch JPE 2018

Cobb Douglas production function of children's human capital:

$$H_c = F(y, G, A_c, H_p, \nu_c) = A_c y^\alpha H_p^\beta \qquad (1)$$

Where:

- H_c, H_p is human capital of child and of the parent
- $y =$ parental investment in children
- $G =$ gov't spending on education (shut down with $G = 1$)
- $A_c = 1$ (shut down an ability/ IQ inheritability channel)
- $\alpha > 0, \beta > 0$
- Gives rise to complementarity between parent human capital and investments in kids, which lead to more investment all else equal

Assume earnings depend on human capital $E = rH^\sigma \epsilon$

- $r > 0 =$ price level of human capital
- $\sigma > 0 =$ elasticity between human capital and earnings
- $\epsilon \perp H$ with mean 1

Parents invest in their children's human capital until the marginal return on these investments equals the exogenous return on capital:

$$R_y = \frac{d\bar{I}_c}{dy} = r\alpha\sigma y^{\alpha\sigma-1} H_p^{\beta\sigma} = R_k \tag{2}$$

This implies optimal investment y^*:

$$y^* = \left(\frac{r\alpha\sigma}{R_k}\right)^{\frac{1}{1-\alpha\sigma}} H_p^{\frac{\beta\sigma}{1-\alpha\sigma}} \tag{3}$$

- Parental investments decrease with return on physical capital R_k
- increase with returns to human capital (r and σ) as well as parents own human capital H_p

Plugging in y^* into the production function for H_c:

$$H_c = (\frac{r\alpha\sigma}{R_k})^{\frac{\alpha}{1-\alpha\sigma}} H_p^{\frac{\beta}{1-\alpha\sigma}} \tag{4}$$

- Even if $\alpha + \beta < 1$ (production of human capital exhibits decreasing returns to scale, the equilibrium relationship between parents' and childrens human capital will be convex whenever $\alpha\sigma + \beta > 1$.
- Thus $\sigma > 1$ is a necessary condition for convexity.

A Theory of Intergenerational Mobility
Sketch of Becker Kominers Murphy Spenkuch JPE 2018

Converting to earnings gives the inter-generational transmission of earnings:

$$log(E_c) = \mu + \frac{\beta}{1 - \alpha\sigma_c} \frac{\sigma_c}{\sigma_p} log(E_p) + \tilde{\epsilon} \tag{5}$$

Where:

- $\mu = \frac{1}{1-\alpha\sigma_c} log(r_c) - \frac{\beta}{1-\alpha\sigma_c} \frac{\sigma_c}{\sigma_p} log(r_p) + \frac{\alpha\sigma_c}{1-\alpha\sigma_c} log(\frac{\alpha\sigma_c}{R_k})$
- $\tilde{\epsilon} = log(\epsilon_c) - \frac{\beta}{1-\alpha\sigma_c} \frac{\sigma_c}{\sigma_p} log(\epsilon_p)$

When $\sigma_c = \sigma_p$, the inter-generational earnings elasticity is equal to the inter-generational human capital elasticity:

$$\frac{dlogE_c}{dlogE_p} = \frac{dlogH_c}{dlogH_p} = \frac{\beta}{1 - \alpha\sigma} \tag{6}$$

Whether families regress to the population mean depends critically on the shape of the human capital transmission function

FIG. 3.—Intergenerational dynamics in linear models
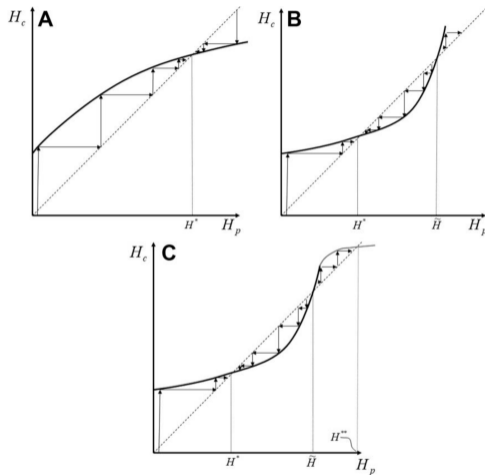
Fig. 4.—Intergenerational dynamics in our model: A, concave transmission function; B, convex transmission function; C, two stable steady states.

Outline

- **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, Oreopoulous 2003, Sanbonmatsu et al. 2011]

Source: Chetty Hendren Katz (AER, 2016)

- 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)

- 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)

Most Common MTO Residential Locations in New York

- 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]

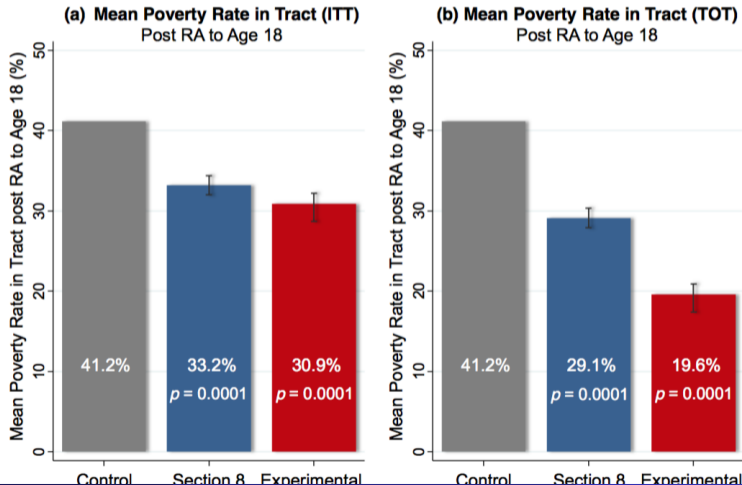$$y_i = \alpha + \beta_E^{ITT} Exp_i + \beta_S^{ITT} S8_i + s_i \delta_s + \epsilon_i$$

Treatment Indicators

Site Indicators

- 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 takeup 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

(a) Mean Poverty Rate in Tract (ITT)
Post RA to Age 18

(b) Mean Poverty Rate in Tract (TOT)
Post RA to Age 18

Chetty Hendren Katz (AER, 2016) on MTO
Effect of Exposure to Better Neighborhoods

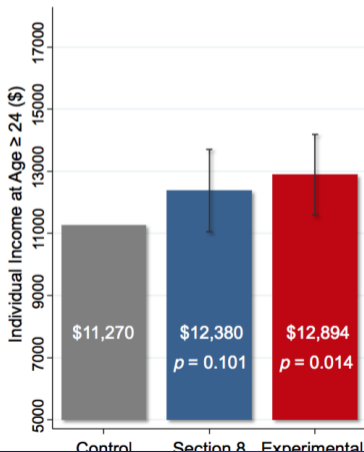Impacts of MTO on Children <u>Age 13-18</u> at Random Assignment
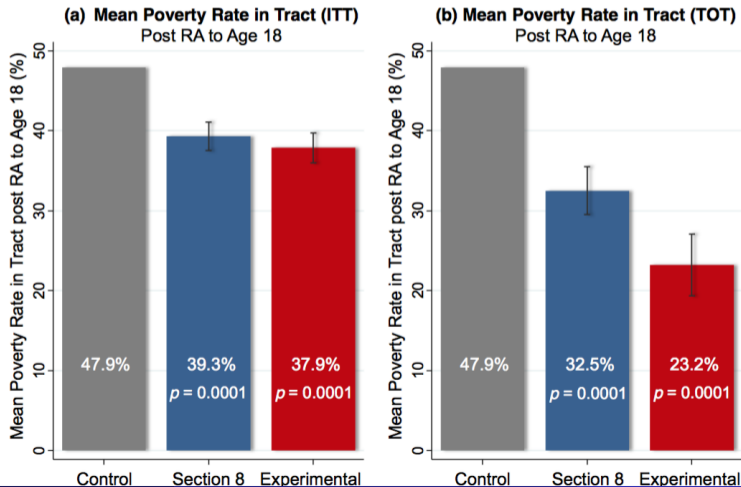
(a) **Mean Poverty Rate in Tract (ITT)**
Post RA to Age 18

(b) **Mean Poverty Rate in Tract (TOT)**
Post RA to Age 18

Chetty Hendren Katz (AER, 2016) on MTO

Effect of Exposure to Better Neighborhoods

Impacts of MTO on Children <u>Below Age 13</u> at Random Assignment
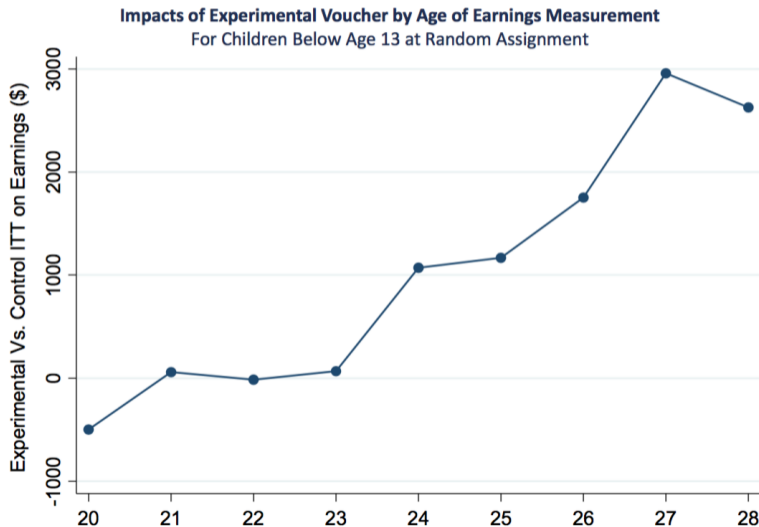
(a) Individual Earnings (ITT)

(b) Individual Earnings (TOT)
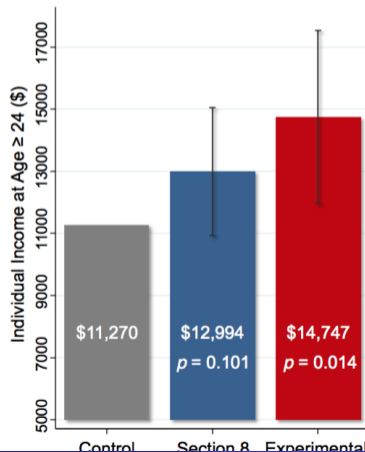
Chetty Hendren Katz (AER, 2016) on MTO
Effect of Exposure to Better Neighborhoods

Impacts of Experimental Voucher by Age of Earnings Measurement
For Children Below Age 13 at Random Assignment

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*	-723.7**	-564.9*	-171.0**	-0.582*	0.261*	-65.81**
	(199.5)	(255.5)	(282.8)	(55.16)	(0.290)	(0.139)	(23.88)
Section 8 × Age at RA	-229.5	-338.0	157.2	-117.1*	-0.433	0.0109	-42.48*
	(208.9)	(266.4)	(302.0)	(63.95)	(0.316)	(0.156)	(24.85)
Experimental	4823.3*	9441.1**	8057.1*	1951.3**	8.309*	-4.371*	831.2**
	(2404.3)	(3035.8)	(3760.9)	(575.1)	(3.445)	(1.770)	(279.4)
Section 8	2759.9	4447.7	-1194.0	1461.1*	7.193*	-1.237	521.7*
	(2506.1)	(3111.3)	(3868.2)	(673.6)	(3.779)	(2.021)	(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)

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)

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)

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
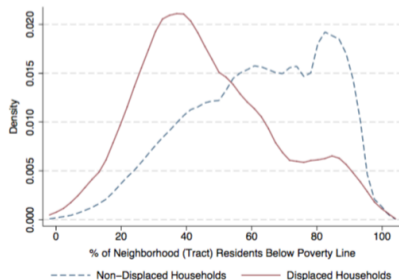
  4. Nearly all residents are African-American

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
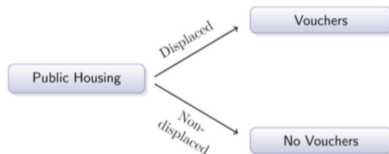
  - Limited funding for demolition

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)

- ▶ Provided housing vouchers and compensated for moving costs
  - ▶ Note: Vouchers and project-based assistance have the same rules ⇒ No effect on budget set

- ▶ Households moved to lower poverty areas:

Densities of Neighborhood Poverty Rates

- - - Non–Displaced Households   —— Displaced Households

Source: Chyn (AER, 2018)

- 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)

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

Lottery Design
The 1997 Chicago Housing Voucher Lottery
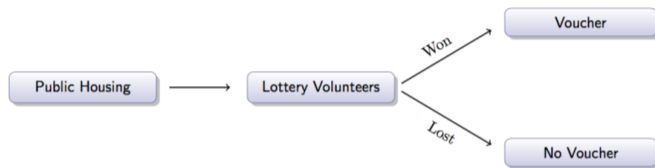
- Main finding: Small and not statistically significant effects on lottery children outcomes

Source: Chyn (AER, 2018)

Notable contrast between demolition and lottery results
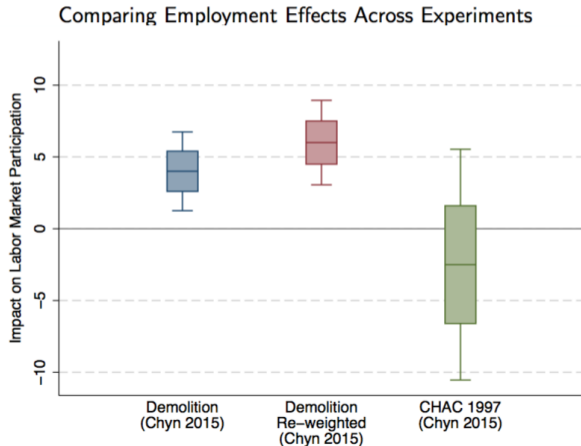
Comparing Employment Effects Across Experiments

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

Source: Chyn (AER, 2018)

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

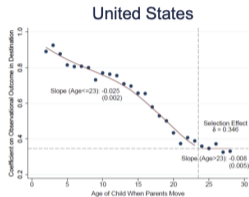**Motivation: Four Facts on Neighborhoods and Economic Opportunity**

1. Children's prospects for upward income mobility vary substantially across neighborhoods

2. Moving to better neighborhoods earlier in childhood improves children's outcomes in adulthood significantly

3. Low-income families who receive housing vouchers currently live predominantly in low-opportunity neighborhoods

4. Differences in rent do not explain why low-income families live in low-opportunity areas
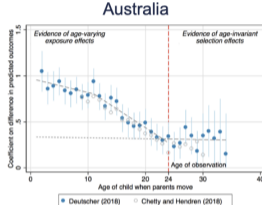
Creating Moves to Opportunity
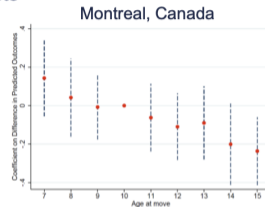Bergman Chetty DeLuca Hendren Katz Palmer (2019)
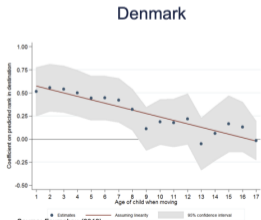

Estimates of Childhood Exposure Effects

Source: BCDHKP (2019)

Bergman Chetty DeLuca Hendren Katz Palmer (2019)

Question: Why Don't Low-Income Families Move to Opportunity?

- Two classes of explanations:

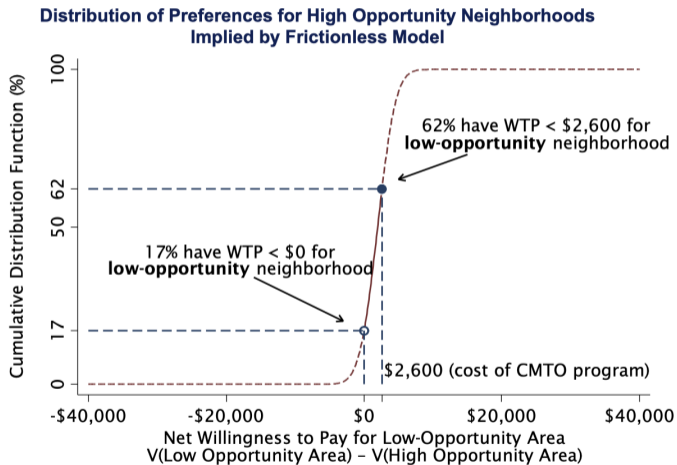 1. **Preferences**: families may prefer to stay in current neighborhoods because of other amenities (e.g., commute time, proximity to family)

  2. **Barriers**: families may be unable to find housing in high-opportunity areas because of lack of information, search frictions, or landlords' tastes

- If barriers are what is driving segregation, can we reduce them through changes in affordable housing policy?

Source: BCDHKP (2019)

Distribution of Preferences for High Opportunity Neighborhoods Implied by Frictionless Model

Source: BCDHKP (2019)

Implications for Models of Neighborhood Choice

- Experimental results suggest that barriers play a central role in neighborhood choice

  - Frictionless model would require that 45% of people happen to have (net) willingness to pay for low-opportunity areas between $0 and $2,600 (cost of treatment)

- These barriers could potentially be captured in a standard model of housing search with sufficiently large search costs [e.g., Wheaton 1990; Kennan and Walker 2011]

  - Important to unpack what these costs are to understand how to reduce them

Source: BCDHKP (2019)

Qualitative Evidence on Mechanisms

- What are the barriers families face in moving to higher-opportunity areas?

- Qualitative study of 110 families interviewed for two hours each during search process and post-move

- Key lessons from these interviews:

  1. [Scarcity] Most families have extremely limited time and resources to search
     [Mullainathan and Shafir 2013]

  2. [Customization] Case workers' ability to respond to each family's **specific** needs is crucial above and beyond standardized resources

Source: BCDHKP (2019)

Impacts of Financial Incentives: Conclusions

- Results suggest that simply providing adequate rental payments to move to higher-opportunity areas is insufficient to induce moves to opportunity

- Need to provide additional customized support in search process to overcome barriers
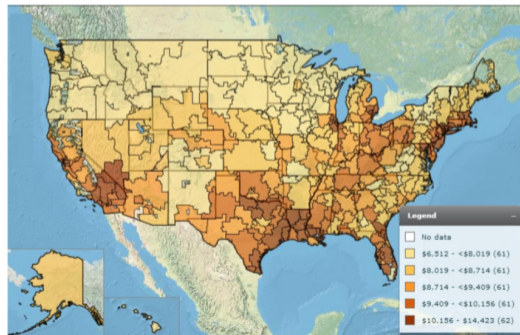
Source: BCDHKP (2019)

Outline

- 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

- 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%)

Model

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

- 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 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
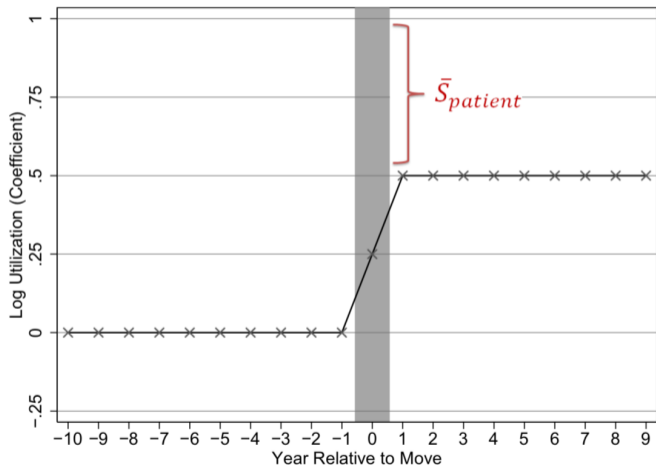- For each mover i, scale utilization relative to destination-origin gap:

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

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

Event study: Example
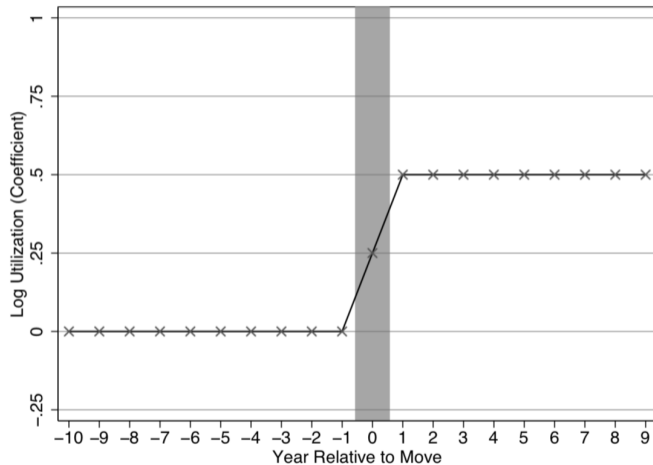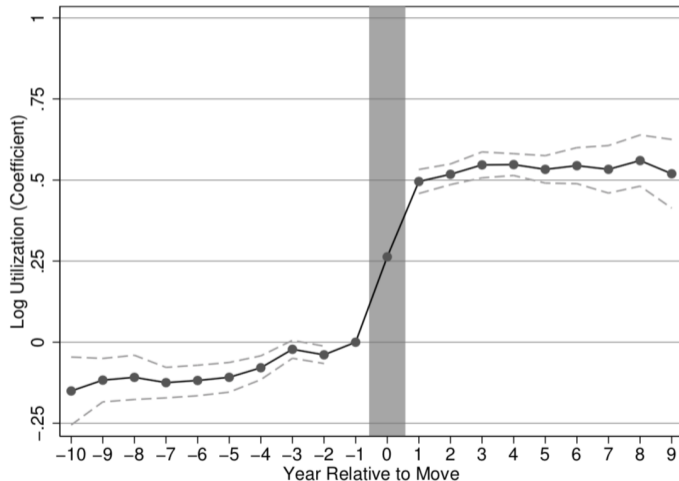
Figure 1: Geographic Variation in Financial Distress

(A) Debt in Collections (%)

(B) Credit Card Not Current (%)

(C) Chapter 7 Filings in Past 3 Years (Per 1,000)

(D) Chapter 13 Filings in Past 3 Years (Per 1,000)
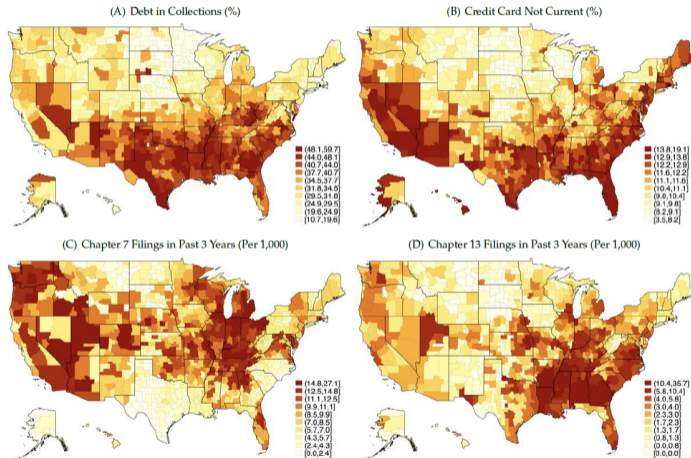
Note: Figure shows CZ-level maps of financial distress. CZ means are constructed using a 10% random sample of TransUnion credit records from June 2015. Debt in collections is an indicator for 1+ debt in collections. Credit card not current is an indictor for 1+ credit card that is 30+ DPD, charged off, or in collections. Bankruptcy filings are the number of individuals out of 1,000 who file for chapter 7 and 13, respectively, in the last 3 years. See Section 2 for more details on variable construction.

- Uses a "movers" design to assess the relative importance of place- and person-based factors in determining financial distress
- Financial distress measured three ways: debt in collections, credit card non-payment, and personal bankruptcy
- Estimate event-study regressions of a given outcome on the "size" of the move
- Data: Monthly panel of TransUnion credit reports over 2000-2016. Movers defined as those who move exactly once between CZs between 2004 and 2007

Keys, Mahoney, and Yang: Setup

- Define y_{it} as outcome y for individual i in time period t, where t is measured in quarters
- Define event time r as -1 for the last quarter in the origin, 0 for first quarter in destination
- Size of move $\widehat{\delta_i}$ defined as average difference in outcome between non-movers in the destination and origin zipcodes
- Baseline specification:

$$y_{it} = \alpha_i + \alpha_y + \alpha_q + \alpha_r + \left[\sum_{r \neq -1} \theta_r \cdot \widehat{\delta_i} \right] + x_{it}\beta + \epsilon_{it}$$

$\alpha_i =$ Individual fixed effects $\qquad\qquad$ $\widehat{\delta_i} =$ size of move
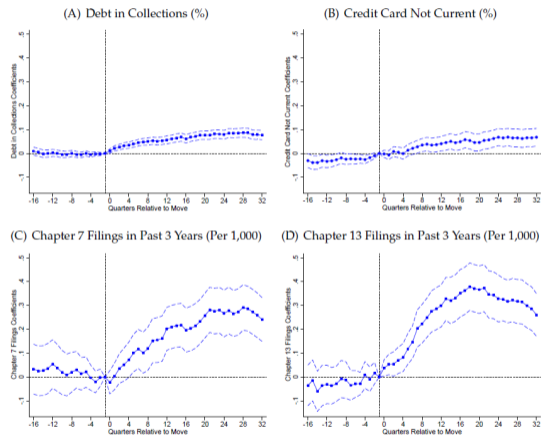
$\alpha_y =$ Calendar-year fixed effects $\qquad\qquad$ $x_{it} =$ controls for 10-

$\alpha_q =$ Calendar-quarter fixed effects $\qquad\qquad\qquad$ year age bins

$\alpha_r =$ Event time fixed effects

Figure 4: Event-Study Plots

(A) Debt in Collections (%)

(B) Credit Card Not Current (%)

(C) Chapter 7 Filings in Past 3 Years (Per 1,000)

(D) Chapter 13 Filings in Past 3 Years (Per 1,000)

Note: Figure shows place-based effects θ_r from event study regressions of financial distress on the size of the move δ_i, individual and time fixed effects, and other controls. The dash lines show 95% confidence intervals, based on standard errors clustered by origin $\times$ destination CZ.

- Small place-based effects on debt in collections and credit card not current:
  - Supply-side factors such as state laws, local lending practices less important than persistent individual characteristics (financial literacy, human capital, household wealth, etc.)
- Larger place-based effects for bankruptcy, esp. Ch. 13:
  - Supports importance of local lawyer networks and legal traditions in driving filing decisions

Outline

Outline

- Equilibrium without agglomeration forces:

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

- Equilibrium without agglomeration forces:

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

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

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

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

Figure: Agglomeration Effects (Kline)
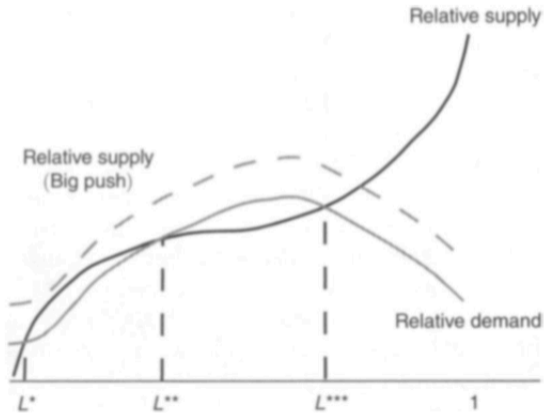
An un-natural experiment
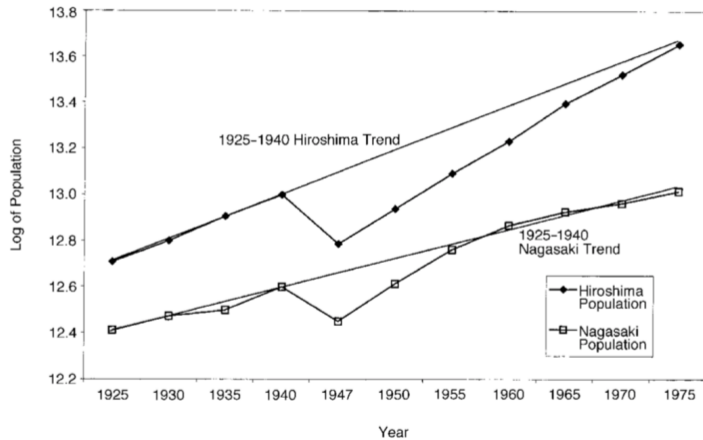
Source: Davis and Weinstein (2002)

Outline

- 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.

- 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) (1)	Clustered S.E. (2)	Point Estimate (Controls) (3)	Clustered S.E. (4)	Spatial HAC (5)	N (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)

	Outcome	Point Estimate (Unadjusted)	Clustered S.E.	Point Estimate (Controls)	Clustered S.E.	Spatial HAC	N
		(1)	(2)	(3)	(4)	(5)	(6)
(1)	Population	0.004	(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: $\ln w_{it} + M_{it} = \overline{u_t}$

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

  - D_i is a dummy for TVA exposure

- 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: $\ln A_i = g(\frac{L_i}{R_i}) + \eta_i + \delta D_i$

Structural Estimation:

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

- $\frac{\delta_t - \delta_{t-1}}{\beta}$ 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) OLS	(2) OLS	(3) OLS	(4) 2SLS	(5) 2SLS	(6) 2SLS
Change in Log Manufacturing Density Spline Components:						
Low	0.078	0.053	0.052	0.349	0.323	0.325
	(0.030)	(0.031)	(0.030)	(0.109)	(0.122)	(0.123)
				[182.83]	[149.61]	[148.34]
Medium	0.072	0.075	0.069	0.339	0.327	0.319
	(0.049)	(0.050)	(0.050)	(0.097)	(0.101)	(0.103)
				[92.69]	[96.61]	[97.01]
High	0.084	0.090	0.086	0.306	0.304	0.307
	(0.059)	(0.059)	(0.059)	(0.134)	(0.135)	(0.136)
				[206.26]	[204.81]	[202.69]
Log Manufacturing Wages	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**
TVA	0.024	0.027	0.029	0.008	0.011	0.012
	(0.013)	(0.013)	(0.014)	(0.011)	(0.011)	(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?