Princeton Graduate Public Finance 524

Place-based Policies: Theory[1]

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Lecture 3a

Outline

1. Background
2. Model
   - Overview
   - Workers: marginal worker is indifferent between locations
   - Landlords: have upward sloping housing supply
   - Firm: makes traded good, zero profits
   - Gov't finances wage subsidy with lump-sum tax
3. Equilibrium
   - Comparative Statics: Graphical Results
   - Comparative Statics: Analytical Results
4. Welfare Effects
   - Welfare Comparative Statics: Graphical Results
   - Winners and Losers
5. Other considerations: market imperfections, second-best, and equity
6. Spatial Policy Design

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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

People vs Places

- Many programs target resources towards disadvantaged neighborhoods or regions
- In US, fed gov spends approx $15 B per year on spatial programs while state and local govts spend approx $80 B per year
- Glaeser and Gottleib (2008, BPEA):
  - "The rationale for spending federal dollars to try to encourage less advantaged people to stay in economically weak places is itself extremely weak"
- What is the economic case (if any) for targeting places instead of people?

Stated objectives

- California Enterprise Zone Program:
  - "To stimulate economic development by providing tax incentives to businesses enabling private sector market forces to revive the local economy"
- Empowerment Zones:
  - "To create business opportunities and jobs in the most economically distressed areas of inner cities and the rural heartland"
- Tennessee Valley Authority:
  - "Touching and giving life to all forms of human concerns"

Questions

- How large are place-based policies?
- Who benefits from place-based policies?
- Do the national benefits outweigh the costs?
- What types of interventions are most likely to be effective?

State and Local economic development spending

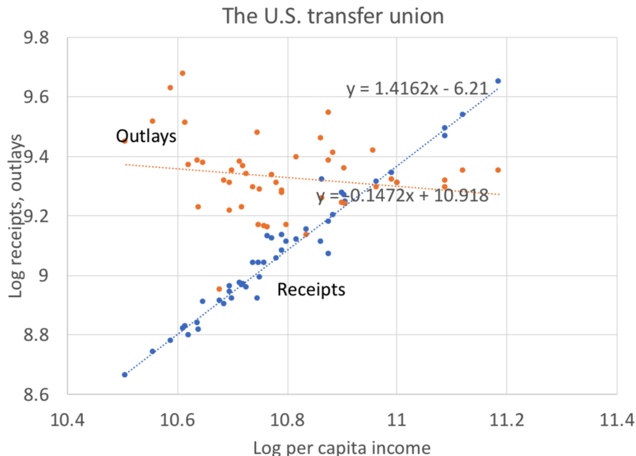
A substantial portion is for local business incentives. Source Barik (2019)

Table 3 Resources Devoted to State and Local Economic Development in the United States

CURRENT PROGRAMS		
Policy/program	Annual dollars (in billions)	
State and local business tax incentives and other cash incentives	46.3	
Customized training programs	0.6	
Other state economic development programs	2.8	
Subtotal, state/local programs		49.7
Manufacturing extension (federal/state/fees)	0.4	
Economic Development Administration (EDA)	0.3	
Economic development portion of HUD's Community Development Block Grants	1.1	
Small Business Administration	0.8	
Other economic development programs in USDA, HUD, Commerce	2.0	
Subtotal, mostly federal spending		4.6
Opportunity Zones tax credits	1.5	
New markets tax credit	1.4	
Other tax expenditures that might promote local economic development	2.3	
Subtotal, federal tax expenditures		5.3
Total of federal programs and tax expenditures		9.9
Total of all levels of government		59.6
PAST PROGRAMS		
Empowerment zones/enterprise communities (peak annual activity in early 2000s)	1.5	
Appalachian Regional Commission (peak annual spending 1966–1975)	1.6	
Tennessee Valley Authority (peak annual spending 1950–1955)	1.5	

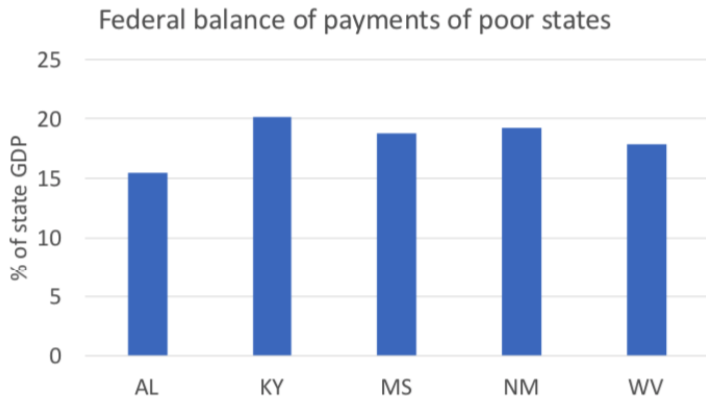
Poor states receive a lot of federal aid

Per capita spending and revenues vs per capita income



Source: Paul Krugman (2019)

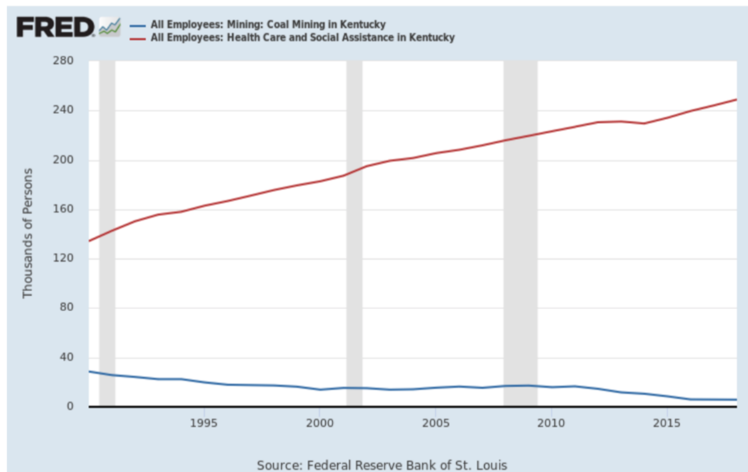
Poor states receive a lot of federal aid



Source: Paul Krugman (2019)

Poor states receive a lot of federal aid

In Kentucky, for example, gov financed hcare much bigger than coal employment



Source: Paul Krugman (2019)

Rationales for place-based policies

- **Equity**
  1. Economists have generally been skeptical of equity-based arguments, as location is being used to serve a person-based motive: subsidizing poor households (see Glaser and Gottlieb, 2008)
  2. Could do so more directly through tax progressive or transfer programs
  3. Mobility can undermine spatial targeting. Rosen-roback model (with mobile workers and inelastic housing supply) predicts that entire benefit of location-based subsidies will be capitalized into land rents
  4. However, if workers (or firms) are less mobile, redistributive policies can benefit inframarginal workers (firms)
- **Efficiency:** Can remedy market failures
  1. Public Goods (amenities like public safety or productive public goods like roads)
  2. Agglomeration
  3. Labor market frictions
  4. Missing insurance/ credit markets
  5. Pre-existing distortions

A recent case for place-based policy

Larry Summers at Boston Fed, Oct 2019

1. There's widely uneven incidence of distress in US in terms of employment, opportunity, health, etc
2. National economic forces are doing little to cause this problem to solve itself
3. The propensity for migration to take place has diminished quite substantially and outmigrants are likely to be most able, skilled, catalytic
4. Disaffection of non-cosmopolitans who live away from major prosperous cities is a key source of protectionism, nationalism, anti-globalization, etc

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Overview

1. Goals
   - Characterize effect of place-based wage subsidy on prices (wages and rents), city size, and welfare
   - Determine aggregate benefits (costs) and how they are distributed across agents and locations
2. Two Locations $c \in \{a, b\}$
3. Markets
   - Local labor and housing: price w_c, quantity N_c. Price r_c, N_c
   - Global capital and goods: price ρ, quantity K_c. Price $p = 1$, Y_c
4. Agents
   - Workers (continuum, have heterogeneous taste draws)
   - Landlord (representative, housing has upward sloping supply)
   - Firm (perfectly competitive, CRS, traded good)
   - Government provides ad valorem wage credit τ_c to firms
5. Key Indifference Condition
   - *Marginal worker* has same indirect utility in both locations

Workers: Indirect Utility

- Indirect utility of individual i in location c is given

$$U_{ic} = \underbrace{w_c - r_c + A_c - t}_{\equiv v_c} + e_{ic}$$

- where
  - nominal wages w_c
  - cost of housing r_c
  - lump sum taxes t
  - local amenities A_c
  - common indirect utility component v_c
  - e_{ic} represents worker i's idiosyncratic preferences for location c

Workers: Idiosyncratic Component of Indirect Utility

- e_{ic} are i.i.d. according to a Type I Extreme Value distribution with scale parameter s and mean 0

$$\implies \frac{e_{ia} - e_{ib}}{s} \sim logistic(0, 1)$$

- s governs the **strength** of idiosyncratic preferences for location, i.e., the degree of labor mobility
- if s is:
  - *large*, then many workers will need large real-wage or amenity differences to move
  - *small*, then most workers will move in response to small real-wage or amenity differences
  - *0*, then workers will arbitrage any differences in the systematic component of utility (Rosen-Roback baseline)

Worker location decision determines local labor supply

- Workers choose the location that maximizes their utility
- A worker chooses city a if and only if

$$e_{ib} - e_{ia} < v_{ia} - v_{ib}$$

- The fraction of workers locating in city a can be expressed as:

$$N_a = \Lambda\left(\frac{v_a - v_b}{s}\right)$$

where $\Lambda(\cdot) = \frac{exp(\cdot)}{1+exp(\cdot)}$ is the standard logistic cumulative density function

- The number of workers residing in community a is increasing in:
  - the *real-wage gap* between city a and city b, $(w_a - r_a) - (w_b - r_b)$
  - the *difference in amenities* between the cities, $A_a - A_b$

Workers: Comments

- **Big picture**: s and the $\Lambda(\cdot)$ distribution are a way of getting upward sloping labor supply and having inframarginal workers who can benefit from local policies
- Logistic distribution is not essential. Many trade folks like Frechet
- Indirect utility is linear in r_c, which implies each person uses a house but has no intensive margin response when wages increase
- If preferences are Cobb-Douglas over housing and non-housing as in Suarez-Serrato and Zidar (AER 2016), you'll get an expression for indirect utility that is log linear and implies that expenditure shares will be fixed (so higher income means you spend more on housing)
- Diamond (AER 2016) models endogenous amenities $A_c(N_c)$ that are increasing with population

Elasticity of Local Labor Supply depends on s

- The elasticity of *city size* with respect to city-specific components of utility:

$$\frac{d \ln N_a}{d \ln(v_a - v_b)} = \frac{N_b}{s}(v_a - v_b)$$

- This elasticity varies based on the intensity of preferences for location:
  - if s is *small*, then workers are very sensitive to differences in mean utility between cities
  - if s is *0*, the any real-wage difference not offset by a corresponding difference in amenities results in the entire population of workers choosing the location with the higher mean utility

Landlords: Housing supply is stylized, upward sloping

- Housing is supplied competitively (note: it requires no workers)
- Land is fixed, so the marginal cost of housing is increasing in the number of units produced
- Constant elasticity[2] inverse supply function:

$$r_c = z_c N_c^{k_c}$$

  where N_c (number of workers in location c) is assumed to be equal to the number of housing units in location c
- z_c governs housing productivity (lower z_c increases supply of housing)
- k_c governs the elasticity of housing supply
- k_c is determined by geography and land regulations, and it is:
  - *small* in cities where geography and regulations make it easy to build new housing
  - *0* in locations where there are no constraints to building new houses

Representative firm makes traded good, zero profits

- Firms produce a single good Y using labor and a local amenity
- Y is a traded good sold on international markets at price 1
- Cobb-Douglas production function with constant returns to scale:

$$Y_c = X_c N_c^{\alpha} K_c^{1-\alpha}$$

  where:
  - X_c is a city-specific productivity shifter
  - N_c is the fraction of workers in community c
  - K_c is the local capital stock
- Firms can rent as much capital as desired at fixed price ρ

Gov't finances wage subsidy with lump-sum tax

- The government provides an ad valorem wage credit τ_c to employers in community c
- Lump sum taxes are levied on all workers in both locations to finance the wage credit
- Balanced budget constraint:

$$w_a \tau_a N_a + w_b \tau_b N_b = t$$

- Firms equate the marginal revenue product of labor to wages net of taxes:

$$w_c(1 - \tau_c) = \alpha \frac{y_c}{N_c}$$

- First-order condition for capital:

$$\rho = (1 - \alpha) \frac{y_c}{K_c}$$

Local Labor Demand

- Inverse labor demand schedule in location c:

$$\ln w_c = C + \frac{\ln X_c}{\alpha} - \frac{1-\alpha}{\alpha} \ln \rho - \ln(1-\tau_c)$$

  where $C \equiv \ln \alpha + \frac{1-\alpha}{\alpha} \ln(1-\alpha)$
- inverse labor demand is *horizontal* in the wage-employment space due to:
  - production function with constant returns to scale
  - elastic supply of capital at price ρ
- wage variation across cities stems from variation in productivity levels
- firms make zero profits (so can't bear incidence. See SS-Z AER, 2016)

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Local Labor Market Equilibrium

- Equilibrium: the marginal worker's relative preference for city b over city a equals the difference in real wages net of amenities:

$$s\Lambda^{-1}(N_a) = (w_a - w_b) - (r_a - r_b) + (A_a - A_b)$$

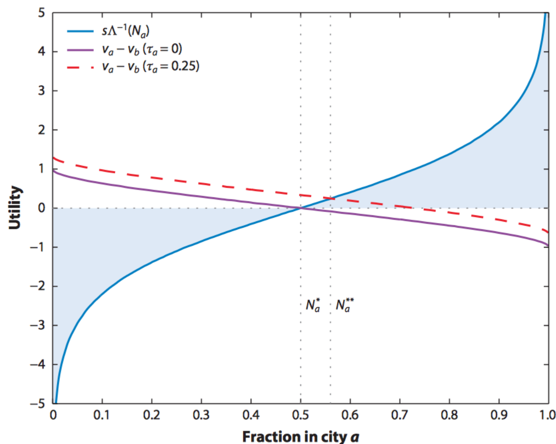
- Workers whose relative preference for city b is *greater* (*smaller*) than the real-wage gap net of amenities locate in city b (a)
- City size is ultimately determined by fundamentals:

$$\underbrace{s\Lambda^{-1}(N_a)}_{\text{Taste Differences}} = \underbrace{\frac{e^C}{\rho^{\frac{1-\alpha}{\alpha}}}\left(\frac{X_a^{\frac{1}{\alpha}}}{1-\tau_a} - \frac{X_b^{\frac{1}{\alpha}}}{1-\tau_b}\right)}_{\text{Wage difference}} + \\ - \underbrace{\left(z_a N_a^{k_a} - z_b(1-N_a)^{k_b}\right)}_{\text{Rent difference}} + \underbrace{A_a - A_b}_{\text{Amenity difference}}$$

Local Labor Market Equilibrium

- LHS: quantiles of workers' relative preferences $(e_{ib} - e_{ia})$ for city b as a function of $N_a \Rightarrow$ supply curve to city a
- RHS: difference in mean utilities between the two communities $\Rightarrow$ relative demand curve for residence in city a vs. city b
- Equilibrium at the intersection of the two curves:
  - A *single marginal worker* is indifferent between city a and city b
  - All other workers are *inframarginal* and enjoy a strictly positive consumer surplus associated with residing in the city they strictly prefer

A Two-City Model: Equilibrium Comparative Statics



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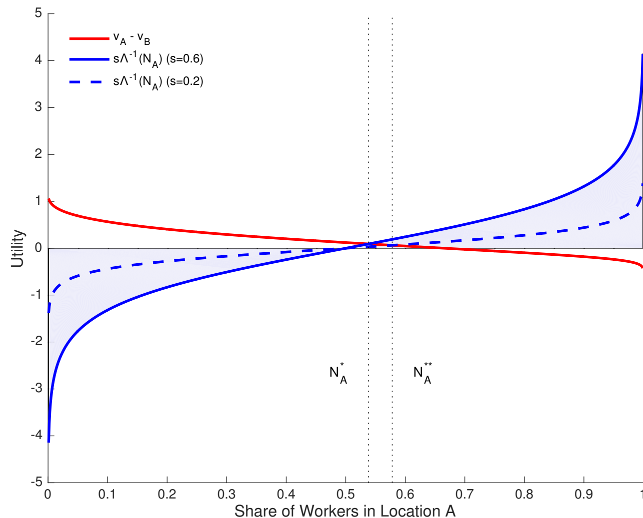
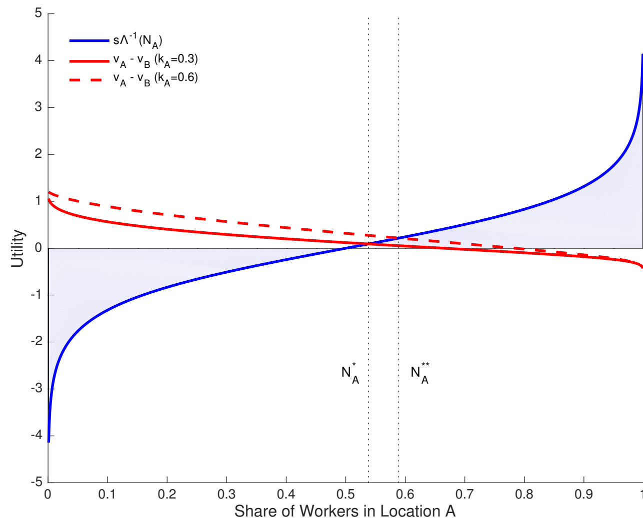


Ceteribus paribus, the degree of labor mobility increases ($s \downarrow$)

A Two-City Model: Equilibrium Comparative Statics



Ceteribus paribus, the housing price elasticity in location A increases ($k_A \uparrow$)

A Two-City Model: Labor Effects

- An increase in the wage subsidy in city a yields an increase in the nominal wage in a:

$$\frac{dw_a}{d\tau_a} = \frac{w_a}{1-\tau_a}$$

- Workers in city b are unaffected by an increase in the wage subsidy to workers in city a
- N_a increases because some workers move from a to b:

$$\frac{dN_a}{d\tau_a} = \frac{N_a N_b}{s + k_b r_b N_a + k_a r_a N_b} \frac{w_a}{1-\tau_a}$$

- The number of movers is *larger*:
    - the *smaller* is s, which implies that labor is more mobile in response to real-wage differentials
    - the *larger* is the elasticity of housing supply in city a (i.e., the *smaller* is k_a), which implies that it is easier for city a to add new housing units to accommodate the increased demand

A Two-City Model: Housing Market Effects

- An increase in the wage subsidy in city a yields an increase in the cost of housing in a:

$$\frac{dr_a}{d\tau_a} = \frac{k_a r_a N_b}{s + k_b r_b N_a + k_a r_a N_b} \frac{w_a}{1 - \tau_a}$$

- Conversely, the cost of housing decreases in city b:

$$\frac{dr_b}{d\tau_a} = \frac{k_b r_b N_a}{s + k_b r_b N_a + k_a r_a N_b} \frac{w_a}{1 - \tau_a}$$

- The increase in r_a is increasing in k_a
- The decrease in r_b is increasing in k_b

A Two-City Model: Real Wage Effects

- An increase in the wage subsidy in city a yields an economywide increase in real wages
- In community a:

$$\frac{d(w_a - r_a)}{d\tau_a} = \frac{s + k_b r_b N_a}{s + k_b r_b N_a + k_a r_a N_b} \frac{w_a}{1 - \tau_a} > 0$$

- In community b:
  - nominal wages are unaffected
  - the cost of housing falls

  thus leading to higher real wages
- The reason why real wages increase in both cities differs:
  - city a: the subsidy raises nominal wages more than housing costs
  - city b: workers out-migrate
- The real-wage increase in city a is larger than the increase in city b, unless labor is perfectly mobile ($s = 0$), in which case the increase is the same

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A Two-City Model: Welfare Effects

- Worker welfare is defined as the average utility level given optimal location choices:

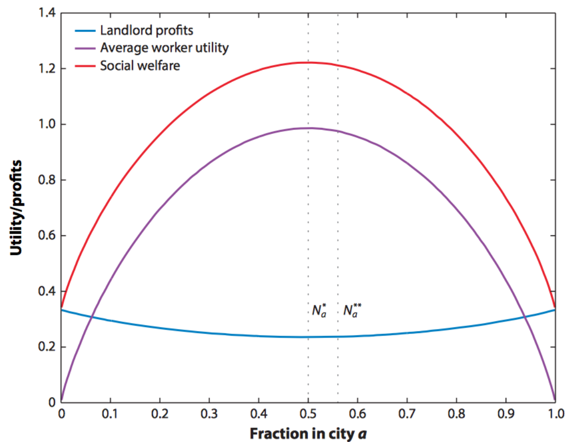
$$V = E\, max\{U_{ia}, U_{ib}\} = s \log \left(exp\left(\frac{v_a}{s}\right) + exp\left(\frac{v_b}{s}\right) \right)$$

- An increase in the subsidy to community a yields:

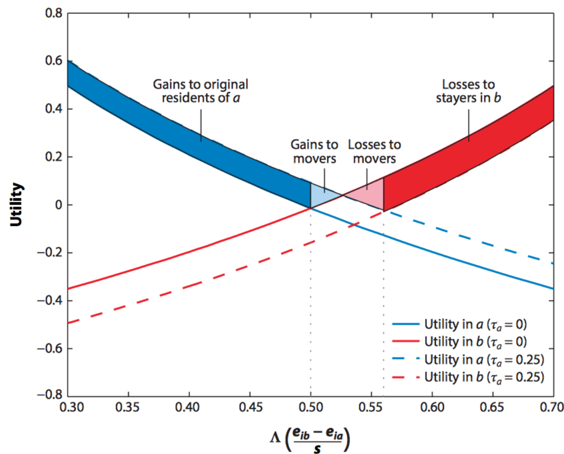
$$\frac{dV}{d\tau_a} = N_a \frac{d(w_a - r_a)}{d\tau_a} + N_b \frac{d(w_b - r_b)}{d\tau_a} - \frac{dt}{d\tau_a}$$

- The impact of a subsidy to city a equals:
  - the impact on real wages in a times the share of workers in a, plus
  - the impact on real wages in b times the share of workers in b, minus
  - the cost of raising funds
- Movers do not show up in this expression because they were indifferent about the communities to begin with

A Two-City Model: Welfare Comparative Statics



A Two-City Model: Gains and Losses



Efficiency Costs

- Average worker utility

$$V = E\,max\{U_{ia}, U_{ib}\} = s\log\left(exp\left(\frac{v_a}{s}\right) + exp\left(\frac{v_b}{s}\right)\right)$$

- For small subsidy, impact on welfare is impact on after-tax disposable income

$$\frac{dV}{d\tau_a} = N_a\frac{d(w_a - r_a)}{d\tau_a} + N_b\frac{d(w_b - r_b)}{d\tau_a} - \frac{dt}{d\tau_a}$$

- Net impact on worker utility + landlord profits

$$\frac{d\left(V + \Pi_a + \Pi_b\right)}{d\tau_a} = -\eta N_a \tau_a$$

where $\eta = -\frac{dN_a}{d(1-\tau_a)}\frac{1-\tau_a}{N_a} \geq 0$ gives mobility elasticity

- Harberger (1964) "triangle" approximation: $DWL \approx \frac{1}{2}\eta\tau_a^2 N_a$

Summary

- Subsidizing a place yields a transfer to targeted households (and landlords) but distorts location decisions
- Efficient transfer: no quantity response / job creation!
- Ramsey (1927)-style targeting principle: subsidize locations that are least elastic
- Empirical question: when are elasticities big?

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Market imperfections and additional considerations

See Kline and Moretti, Annual Review 2014 for discussion

- Local public goods
  - (Suárez Serrato and Wingender, 2014)
- Agglomeration Economies $\ln X_c = g(density_c, HC_c)$
  - Big push (Kline, 2013) and (Kline Moretti 2014 on TVA)
- Unemployment, Labor and Product Market Frictions
  - Hiring costs (Kline and Moretti, 2013), (Bilal 2019)
  - Keynesian frictions in spatial models (Rodrguez-Clare, 2020)
- Credit Constraints and Missing Insurance
  - Location as an asset (Bilal Rossi-Hansberg, 2019)
- Many other second best considerations ...

Other considerations: Second best arguments

Correct prior distortions that can interact with place

- Deductibility of state and local taxes (Albouy, 2009)
- State sales & biz taxes (Fajgelbaum, Morales, Serrato, Zidar, 2019)
- Housing Regulations (Hsieh and Moretti, 2019)
- Intergovernmental transfers (Albouy, 2012)
- Payroll taxes?
- Subsidy war as prisoner's dilemma (Ossa, 2019)
- Transportation Infrastructure (Donaldson, 2020)
- Allocation of talent (Gaubert Fajgelbaum, 2019) vs (Moretti, 2019), (Rossi-Hansberg, Sarte, Schwartzman, 2019)

Equity considerations

- Place conveys useful information about preferences and endowments
- Odd to ignore when setting policy
- In "Place-Based Redistribution," Gaubert, Kline, & Yagan (2019) study whether place-based transfers to individuals can still improve welfare in a world with an optimal income tax
- Answer turns out to be yes when there is either strong skill taste correlation or strong income effects in location.

Not obvious that PBR would be desirable!

"Place-Based Redistribution" by Gaubert, Kline, & Yagan

- Urban intuition appears to rule this out
  - Key assumption: perfect mobility/location indifference
  - PBR causes people to move to less productive places
  - Why would we want to increase activity in less productive areas?
- Public Finance intuition also seems to rule this out
  - Key assumption: preferences are weakly separable and homogeneous
  - Notorious Atkinson-Stiglitz result: an optimal income tax can take care of all forms of redistribution

Why do they find PBR is desirable?

"Place-Based Redistribution" by Gaubert, Kline, & Yagan

- Urban Side: Assume people have location-specific preferences/imperfect mobility
- PF Side: Show weak separability does not apply in this case
  - True when tastes for amenities vary by income and when there is income sorting
  - When high earners sort elsewhere, equity motive for spatial targeting to distressed areas
- With two main roadblock out of the way ... off to the races of optimal taxation!

What the Paper Does

"Place-Based Redistribution" by Gaubert, Kline, & Yagan

- Shows when the introduction of small PBR is desirable in special cases
    - Skill-taste correlation
    - Sorting through income effects
    - Productivity differences
- General results:
    - Introducing small PBR is desirable if value of redistribution outweighs fiscal cost of productivity differences from migration
    - Optimal PBR depends on further migration effects that also have fiscal costs
- Quantitative exercise finds a small PBR to bottom CZs can improve welfare

Main Result Intuition

"Place-Based Redistribution" by Gaubert, Kline, & Yagan

- General model shows PBR is desirable when:

$$\underbrace{\bar{\lambda}_1 - \bar{\lambda}_0}_{\text{(1) Gain from redistribution}} > \mathbb{E}_\theta \left\{ \underbrace{\frac{dS^\theta(0)}{d\Delta}}_{\text{(2) Induced Migration}} \underbrace{[T(z_0^\theta) - T(z_1^\theta)]}_{\text{(3) Tax cost of migration}} \right\} \quad (1)$$

- Paper shows:
  1. can be assumed to be positive
  2. migration only matters due to the fiscal externality
  3. cost of tax loss depends on productivity differences

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Optimal Labor Allocations

- We now explore how can the welfare be improved by reallocating labor across locations
  - The idea is that we have a planner that can freely chose who lives where, and he is constrained by welfare equalization
- The policy instrument that can be used to implement these allocations are transfers (through subsidies and transfers)
- Intuition (for 2 locations):
  - If location 1 has better fundamentals $(\bar{u}_1, \bar{A}_1, \tau_{21})$, population L_1 will be ''too high'' in a free-market equilibrium (agents don't internalize the congestion they cause when moving to location 1).
  - As a solution, government can tax inhabitants of 1 a bit and redistribute to inhabitants of 2.
  - Now $W_1 < W_2$, so people will move out of 1 into 2 until welfare equalizes again.
  - New, equalized level of welfare will be higher than initial welfare under the free-market economy.

Source: Costas Arkolakis

Optimal Labor Allocations: Planner

- Here is the program that the planner solves

$$\max_{L_1} W$$

subject to welfare equalization

$$W = c_1 \bar{u}_1 L_1^{-\beta} = c_2 \bar{u}_2 L_2^{-\beta}$$

production must be enough for total consumption

$$(\bar{A}_1 L_1^{\alpha}) L_1 + (\bar{A}_2 L_2^{\alpha}) L_2 = L_1 c_1 + L_2 c_2$$

labor feasibility

$$L_1 + L_2 = 1$$

Source: Costas Arkolakis

Optimal Labor Allocations: Planner

- Three equations
  - Welfare equalization: $W = c_1\bar{u}_1 L_1^{-\beta} = c_2\bar{u}_2 L_2^{-\beta}$
  - Labor market clearing: $A_1 L_1 + A_2 L_2 = L_1 c_1 + L_2 c_2$
  - Labor feasibility $L_1 + L_2 = 1$
- We can substitute the first equation

$$\bar{A}_1 L_1^{\alpha} L_1 + \bar{A}_2 L_2^{\alpha} L_2 = L_1 c_1 + (1 - L_1)\,\frac{c_1\bar{u}_1}{\bar{u}_2}\left(\frac{1 - L_1}{L_1}\right)^{\beta}$$

- After manipulations, we get:

$$c_1 = \frac{\bar{A}_1 L_1^{1+\alpha} + \bar{A}_2 (1 - L_1)^{1+\alpha}}{L_1 + (1 - L_1)\frac{\bar{u}_1}{\bar{u}_2}\left(\frac{1}{L_1} - 1\right)^{\beta}}$$

- The optimal labor for the planner, L_1^*, is the one that $\max_{L_1} c_1(L_1) \times \bar{u}_1 L_1^{-\beta}$

Source: Costas Arkolakis

Equilibrium Transfers in the Market

- Can we initiate people to move optimally and replicate the planner allocation L_1^*?
- We can offer compensation (or tax) to the workers in each location, T_1, T_2
- This compensation has to satisfy a budget constraint

$$T_1 L_1 + T_2 L_2 = 0.$$

- Remember that model $p = \frac{w_i}{A_i}$. If we normalize price to $p = 1 \implies w_i = A_i$.
  - Welfare in location i

$$W_i = u_i(w_i + T_i) = u_i(A_i + T_i).$$

  - It can be verified that welfare maximizing transfer is

$$T_1^* = \frac{u_2\left(1 - L_1^*\right) \times A_2\left(1 - L_1^*\right) - u_1\left(L_1^*\right) \times A_1\left(L_1^*\right)}{u_1\left(L_1^*\right) + u_2\left(1 - L_1^*\right) \times \frac{L_1^*}{1 - L_1^*}},$$

    $u_i\left(.\right)$, $A_i\left(.\right)$ are amenity/productivity functions, L_1^* planner's labor allocation
  - The tranfer to location 2 is: $T_2^* = -T_1^* L_1 / L_2$

Source: Costas Arkolakis

Equilibrium Transfers in the Market

- Welfare in location i is

$$W_i = u_i^*(w_i^* + T_i^*) = u_i^*(A_i^* + T_i^*).$$

- You can verify that the welfare maximizing transfer is

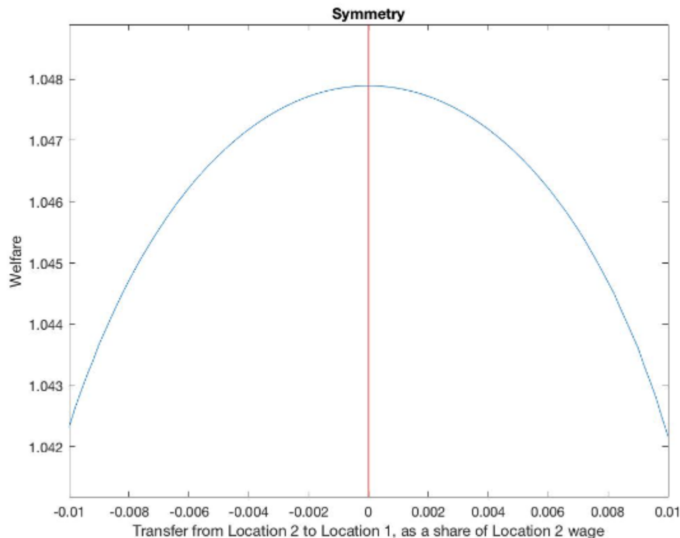
$$T_1^* = \frac{u_2^* A_2^* - u_1^* A_1^*}{u_1^* + u_2^* \frac{L_1^*}{1-L_1^*}}$$

  and a transfer to location 2 is: $T_2^* = -T_1^* L_1 / L_2$
  - In other words if location 2 is poorer it is getting a transfer versus to 1

- A more elaborate analysis of optimal transfers in spatial context is done by Fagjelbaum and Gaubert
  - Their analysis applies to our baseline model
  - We next show numerical examples of optimal transfers in the baseline model

Source: Costas Arkolakis

Optimal Transfers under symmetry $\beta > \alpha$



Optimal Transfers under Productivity Asymmetry