The Distributional Effects of Uneven Regional Growth

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Spatial Reading Group – UChicago

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Introduction – Motivation

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  - Develop a dynamic quantitative spatial model with rich heterogeneity

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  - ⇒ Distributional consequences
- Main results :
  - 1% increase in local TFP raises residents' welfare by 0.43%
  - Passthrough vary a lot with age, wealth and homeownership
- Policy counterfactual
  - Relaxing land-use regulation / Eliminate mortgage interest deduction
  - Both mitigate spatial redistribution, but effects quantitatively small

Household, migration and labor reallocation

- Household in location i and age j has preferences over amenities, consumption and housing

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$$\ln l_t = \bar{l}(j) + \ell_t \qquad \ell_t = \theta\ell_{t-\Delta} + \zeta_t \qquad \zeta_j \sim f_\zeta$$

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- Demographics : probability of surviving $\phi(j)$ and no bequest.

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- Wealth dynamics :

$$\dot{x} = (1-\tau)\Big[ra + \underbrace{w_{it}\exp(\bar{l}(j) + \ell_j)}_{=\text{earnings}}\Big] - c - p^r_{it} h^r - \Big[\delta p_{it} - \underbrace{(1+\phi)\dot{p}_{it}\Big]h}_{=\text{user cost of } h}$$

  - Change in housing due to migration

$$x'(h', i') = x + (1 - f_s - \phi) p_{it} h - (1 + f_b - \phi) p_{i't} h'$$

Dynamic HH decision :

- Joint optimal control problem on c, h and i'
  - HJB-VI equation :

$$\rho V_t(x,h,i,\ell,j,\varepsilon,\kappa) = \max_{c,h^r} u\left(A_i,c,\mathbf{h}\right) + \varepsilon - \kappa + \partial_x V_t(x,h,i,\ell,j,\varepsilon,\kappa)\dot{x} + \dot{V}_t(x,h,i,\ell,j,\varepsilon,\kappa)$$

$$\text{subject to } h^r = 0 \text{ if } h > 0 \qquad \dot{x} \geq 0 \text{ if } x = 0$$

$$V_t(x,h,i,\ell,j,\varepsilon,\kappa) \geq \max_{h':x'(h',i)\geq 0} V_t\left(x'\left(h',i\right),h',i,\ell,j,\varepsilon,\kappa\right)$$

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  - Result, optimal decisions after migration to i' give
    - Housing choice $h'(i')$ changes $x'(i') = x'(h'(i'),i')$ and get value

$$V_t^m(x,h,i,\ell,j,i') = \max_{h'(i')} V_t(x'(h'(i'),i'),h'(i'),\ell,j,0,0)$$

    - Migration affects location choice, which affects homeownership, affecting wealth (and consumption and welfare)

$$m(i,i') = \frac{\exp(V_t^m(x,h,i,\ell,j,i') - \tilde{\kappa}_{ii'})^{1/\tilde{\upsilon}}}{\sum_{ii''} \exp(V_t^m(x,h,i,\ell,j,i'') - \tilde{\kappa}_{ii''})^{1/\tilde{\upsilon}}}$$

Rest of the model :

- Law of motion of the distribution (KFE) and labor N_{it}

$$g(x,h,i,\ell,j) \qquad N_{it} = \int g(x,h,i,\ell,j)d(x,h,\ell,j)$$

- Cobb Douglas production : $Y_{it} = \bar{Z}_{it} L_{it}^{\alpha} K_{it}^{1-\alpha}$

$$w_{it} = Z_{it} = \bar{Z}_{it}^{1/\alpha} R_t^{1-\frac{1}{\alpha}} \tilde{\alpha}$$

  - Shock of interest : rise of Z_{it} and hence w_{it}
- Housing price and supply housing elasticity ξ_i and no-arbitrage (renting/owning)

$$p_{it}^r = \bar{p}_{it}^r N_{it}^{\xi_i} \qquad p_{it} = \int e^{-(r+\delta)(s-t)} p_{is}^r ds$$

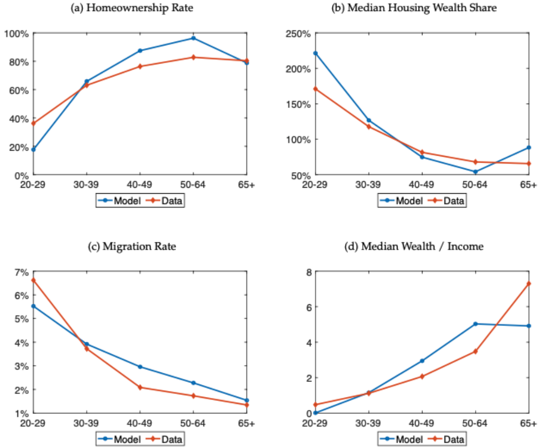
- Small open econ : r_t and R_t exogenous

Estimation of parameters

- External calibration
  - for matching demographics J and $\psi(j)$, earning with θ, f_ζ and $\bar{l}(j)$,
  - Fixed cost of house markets f_s, f_b and δ and ϕ, and house price elasticities ξ from the literature
- Internal calibration :
  - χ for homeownership rate (72%), ρ for median wealth/income (2.35), housing preference η for housing wealth (78%) from SCF
  - Migration cost $\kappa_{ii'}(j)$ linear in j to match migration rate from ACS
  - Migration elasticity υ from the IV-regression, $\Delta \ln L_i = c + \pi \ln Z_i + \alpha_r + \epsilon_i$
    - Long run labor supply effect ≈ 4.03
  - Local productivity Z_{it} to match w_{it}, amenities A_{it} for local population and p^r_{it} for house prices p_{it}

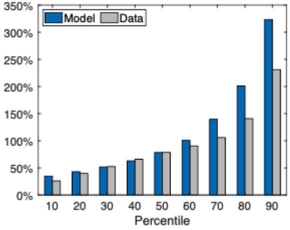
Untargeted model – distribution of migration/homeownership

Figure 1: Statistics over the Lifecycle

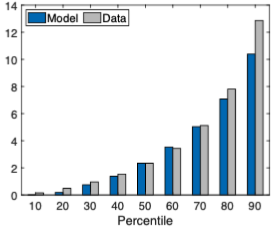


Wealth distribution

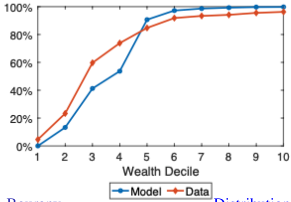
(a) House Wealth Share



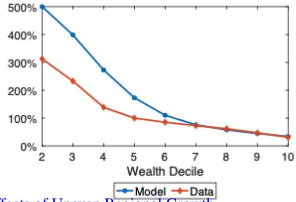
(b) Wealth / Income



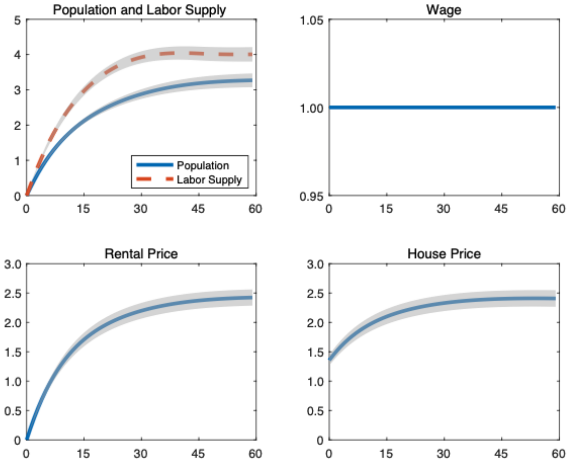
(a) Homeownership Rate



(b) Housing Wealth Share (Owners)



Results –Dynamic effect of a productivity shock Z_{it}



Effect of local TFP shock

- Welfare effect : $\omega = c + \beta \Delta \ln Z_{it} + \epsilon$ such that

$$\mathbb{E}[\int_t e^{-\rho s} \ln([1+\omega] A_s c_s^{1-\eta} h_s^{\eta}) + \varepsilon_s - \kappa_s ds] = V'(x, h, i, \ell, j, \varepsilon, \kappa)\Big|_{\Delta \ln Z_{it} = 1\%}$$

Tenure / Age	All Ages	20-29	30-39	40-49	50-64	65+
All Tenures	0.43	0.39	0.52	0.55	0.44	0.32
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Renters	0.27	0.34	0.39	0.40	0.26	-0.09
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Owners	0.50	0.61	0.59	0.57	0.45	0.43
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Results – welfare impact of different channels

- Channels of transmission :
  - Full model $\beta \approx 0.4$ with heterogeneity $[0.25 - 0.55]$
  - Model without wealth/homeownership/earning risk / migration : $\beta = 1$
  - Model without wealth/homeownership/earning risk, but free mobility : $\beta = 0$.
  - Model with wealth/homeownership/earning risk, but one location : $\beta \approx 0.8$ for young $20 - 40y.o.$ and $\beta \approx 0 - 0.4$ for $50 - 80y.o$ and renters 0.1 higher than owners.
  - Model without homeownership (absentee landlord) or lump $\beta \approx 0.16$, with $\beta \approx 0.3$ for young $20 - 40y.o.$ and $\beta \approx 0$ for $50 - 80y.o$

Policy counterfactuals

- Comparative statics

1. Land use regulation
   - Change the housing supply elasticity ξ by the most flexible city (New Orleans), reestimate housing price shifters p^r_{it} to match house prices
   - New welfare coefficient $\beta = 0.42$ (instead of $\beta = 0.43$)
   - With $\xi = 0$ we get $\beta = 0.3$
2. Eliminating the Mortgage Interest Deduction
   - Eliminating subsidy to owner-occupied housing (likely mitigate redistribution)
   - Reduce housing investment (homeownership/housing wealth share)
   - New welfare coefficient $\beta = 0.38$ (instead of $\beta = 0.43$)

Conclusion

- Develop a quantitative model with homeownership and migration frictions
- Analysis of redistributive effects through labor market, house prices
  - Methodological contribution : bring HACT into quantitative spatial models
- All channels needed to measure accurately the distributional effects
- Analysis of two policies
  - Link between local growth and welfare remains strong