Rosen-Roback Framework

Urban Economics

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Recap: Rosen Roback Framework

Three Simultaneous Equilibria

- Individuals are optimally choosing which city to live in
  - There is a group of homogeneous individuals
  - Some of them are living in different cities
  - Their utility level is the same in all those cities
- Firms earn zero expected profits
  - Free entry of firms
  - Firm profits are equalized across cities
- The construction sector operates optimally
  - If a city is growing, house prices equal construction costs
  - If a city is declining, house prices $<$ construction costs
  - Free entry, zero profit for builders
  - Construction profits are equalized across cities

Recap: Rosen Roback Framework

Housing consumption

$$max U(C,H) = \theta C^{1-\alpha} H^{\alpha} \tag{1}$$

$$st \tag{2}$$

$$W = C + r_H H \tag{3}$$

FOC

$$H^* = \alpha \frac{W}{r_H} \tag{4}$$

$$C^* = (1-\alpha) W \tag{5}$$

Indirect Utility

$$V = U^* = \theta \alpha^{\alpha} (1-\alpha)^{(1-\alpha)} \frac{W}{r_H^{\alpha}} \tag{6}$$

Recap: Rosen Roback Framework

Production Sector

Cobb-Douglas production function with constant returns to scale:

$$y = AN^{\beta}K^{\gamma}\bar{Z}^{\zeta} \tag{7}$$

$$st \tag{8}$$

$$C = WN + p_k K + p_z Z \tag{9}$$

$\beta + \gamma + \zeta = 1$
The competitive wage in each city is

$$W = \beta \left(\left(\frac{\gamma}{p_k} \right)^{\gamma} A \left(\frac{\bar{Z}}{N} \right)^{\zeta} \right)^{\frac{1}{1-\gamma}} \tag{10}$$

small open economy $p_k = 1$

Recap: Rosen Roback Framework

Construction sector

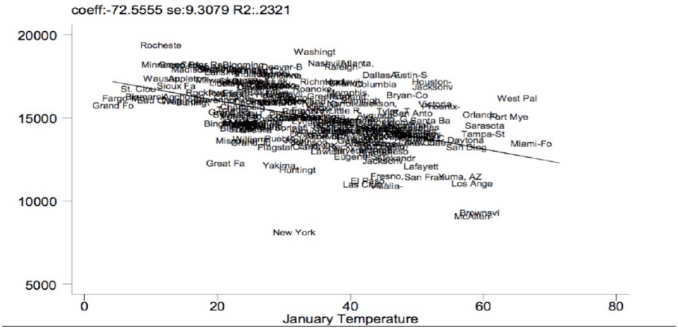
- Exogenous amount of land $\bar{L}$ in each city
  - Natural and regulatory constraints
- Housing supply is the product of land L and building height h
- Height is built with tradable capital at a convex cost

$$\varphi p_K \left(\frac{h^{\delta}}{\delta} \right) \tag{11}$$

for $\phi > 0$ and $\delta > 1$

Example Spatial Equilibrium

Income and Climate



Further Readings

- Glaeser, E. L., & Gottlieb, J. D. (2009). The wealth of cities: Agglomeration economies and spatial equilibrium in the United States. Journal of economic literature, 47(4), 983-1028.
- Glaeser, E. (2008). Cities, agglomeration, and spatial equilibrium. OUP Oxford.
- Ponzetto, G. (2012) Spatial Equilibrium Across Cities. Mimeo