Rosen-Roback Framework
Urban Economics

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Rosen-Roback

- To think about the 'optimal' provision of location specific 'amenities', from parks to crime to environmental regulation to building codes, we need to measure how these amenities are valued by households.

- Rosen uses the hedonic price method. Unfortunately, it ignores the behavior of firms.

- The Rosen-Roback model Roback (1982) is a cousin of the monocentric city model that is particularly useful for comparing one location to another.

  - For example, we expect that climate change will affect the attractiveness, and maybe the productivity of locations differently.

  - Can we infer these values from cross-location differences in rent, wages, and climate?

Spatial equilibrium

Fundamentally, spatial equilibrium is a no-arbitrage condition.

> *The high mobility of labor leads urban economists to assume a spatial equilibrium, where elevated New York incomes do not imply that New Yorkers are better off. Instead, welfare levels are equalized across space and high incomes are offset by negative urban attributes such as high prices or low amenities.*

Glaeser and Gottlieb (JEL 2009):

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Set up

- 3 Sectors:
  - Consumers of housing (homogeneous)
  - The production sector
  - The construction sector

- Assumption locations (cities) are small, and exogenous amount of land $\bar{L}$ in each city

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Housing consumption

$$maxU(C,H) = \theta C^{1-\alpha}H^{\alpha} \tag{1}$$
$$st \tag{2}$$
$$w = C + p_H H \tag{3}$$

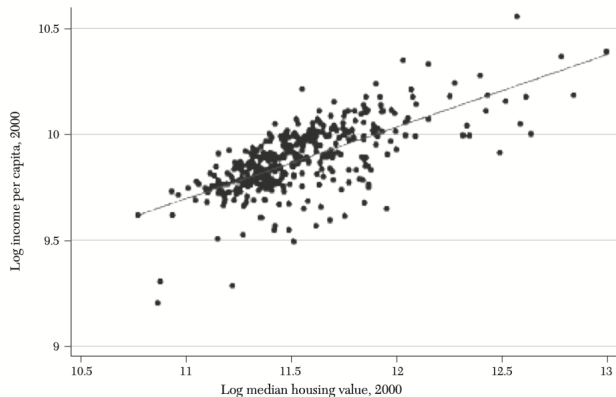# Rosen Roback

House Prices and Incomes

Figure 3. Housing Prices and Income

Notes: Units of observation are Metropolitan Statistical Areas under the 2006 definitions. Data are from the Census, as described in the Data Appendix.

The regression line is $\log income = 0.34 \, [0.02] \times \log value + 5.97 \, [0.22]$.
$R^2 = 0.46$ and $N = 363$.

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Production Sector

Cobb-Douglas production function with constant returns to scale:

$$y = AN^{\beta}K^{\gamma}\bar{Z}^{\zeta} \qquad (4)$$
$$st \qquad (5)$$
$$C = wN + p_k K + p_z Z \qquad (6)$$

$\beta + \gamma + \zeta = 1$

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Construction sector

▶ Housing supply is the product of land L, (here exogoenous) and building height h

▶ Height is built with tradable capital at a convex cost

$$\varphi p_K \left(\frac{h^\delta}{\delta} \right) \tag{7}$$

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

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Spatial Equilibrium 3 conditions

Endogenous variables

1. N

2. w

3. p_H

Exogenous parameters

1. θ

2. $\tilde{A} = A\bar{Z}^{\zeta}$

3. $\tilde{L} = \bar{L}\varphi^{\frac{-1}{(\delta-1)}}$

4. $\bar{u}$

5. p_k