Rosen-Roback Framework

Urban Economics

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Agenda

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.
- The Rosen-Roback model Roback (1982) is a cousin of the monocentric city model that is particularly useful for comparing one city to another.
  - For example, we expect that climate change will affect the attractiveness, and maybe the productivity of cities differently.
  - Can we infer these values from cross-city differences in rent, wages, and climate?

Rosen-Roback

Set up

- 3 Sectors:
  - Consumers of Housing (homogeneous)
  - The production sector
  - The construction sector
- Assumption cities are small, and exogenous amount of land $\bar{L}$ in each city

Recap: Rosen Roback Framework

Housing consumption

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

$$st \tag{2}$$

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

Sol

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

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

Recap: Rosen Roback Framework

Housing consumption

Indirect Utility

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

For spatial equilibrium to hold, this quantity must equal a reservation utility level $\bar{u}$

$$\bar{u} = \theta \alpha^{\alpha} (1-\alpha)^{(1-\alpha)} \frac{W}{p_H^{\alpha}} \tag{7}$$

Example Spatial Equilibrium

House Prices and Incomes

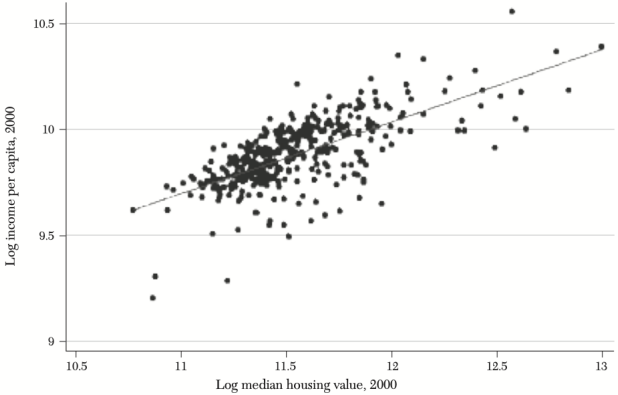

Figure 3. Housing Prices and Income

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 $N = 363$.

Recap: Rosen Roback Framework

An Example: Does the Rise of Sunbelt Cities Represent Amenities or Production?

In the US, fastest growing areas have warm climates, something similar in Europe (what about Latam?) These areas, in the south and west of US, are known as the "sunbelt"
If we look across metropolitan areas, the relationship between January temperature and size is:

$$log(Population2000) = \underset{(0.2)}{12.2} + \underset{(0.005)}{0.017} JanuaryTemp$$

more if we look at changes

$$log(\frac{Population2000}{Population1990}) = \underset{(0.14)}{0.016} + \underset{(0.0004)}{0.003} JanuaryTemp$$

Recap: Rosen Roback Framework

An Example: Does the Rise of Sunbelt Cities Represent Amenities or Production?

Why has population growth shifted to sunbelt?

1. Has productivity increased in South?
2. Have political institutions become more efficient (and less corrupt)?
3. Has advent of air conditioning made South more comfortable (amenities)?
4. Are people attracted to cheap housing, made possible by pro-building policies?

Recap: Rosen Roback Framework

An Example: Does the Rise of Sunbelt Cities Represent Amenities or Production?

- To differentiate between these hypothesis, we can use the spatial equilibrium model
- Glaeser and Gottileb run regressions of population, wages, and house values on temperature with controls
- Combine coefficients using model to look at effect of temperature on amenities, productivity, housing construction productivity

Example Spatial Equilibrium

An Example: Does the Rise of Sunbelt Cities Represent Amenities or Production?

TABLE 3
SPATIAL EQUILIBRIUM

Dependent variable	(1) Log wage	(2) Log house value	(3) Log real wage	(4) Log wage	(5) Log house value	(6) Log real wage
Year:	2000	2000	2000	1990, 2000	1990, 2000	1990, 2000
Mean January temperature	−0.19	0.60	−0.33			
	[0.06]	[0.31]	[0.10]			
Mean January temperature × year 2000				−0.001	−0.43	0.19
				[0.05]	[0.11]	[0.03]
Year 2000 dummy				0.25	0.62	0.06
				[0.02]	[0.06]	[0.02]
Individual controls	Yes	—	Yes	Yes	—	Yes
Housing controls	—	Yes	—	—	Yes	—
MSA fixed effects	—	—	—	Yes	Yes	Yes
N	1,590,467	2,341,976	1,590,467	2,950,850	4,245,315	2,950,850
R^2	0.29	0.36	0.21	0.27	0.60	0.26

Notes: Individual-level data are from the Census Public Use Microdata Sample, as described in the Data Appendix. Metropolitan-area population is from the Census, as also described in the Data Appendix. Mean January temperature is from the City and County Data Book, 1994, and is measured in hundreds of degrees Fahrenheit. Real wage is controlled for with median house value, also from the Census as described in the Data Appendix. Individual controls include age and education. Location characteristics follow Metropolitan Statistical Areas under the 1999 definitions, using Primary Metropolitan Statistical Areas rather than Consolidated Metropolitan Statistical Areas where applicable and New England County Metropolitan Areas where applicable. Standard errors are clustered by