

Population Field Exam

Topics in Urban and Labor Economics

June 18, 2018
100 points total

1. (25 pts) Answer the following questions in a few paragraphs. Be sure to cite relevant papers where appropriate.
 - (a) Economists are often interested in estimating the value of amenities that are not explicitly traded in a marketplace, such as the value of neighborhood safety or of public education. Briefly describe how economists have attempted to do this. (5 pts)
 - (b) Set up and describe Rosen's 1974 hedonic model (you can focus just on the consumer side.) What do we learn from the equilibrium conditions of the model? What is Rosen's "two-step" method and what are some of its identification challenges? (5 pts)
 - (c) Describe Roback's 1982 model of spatial equilibrium. What is the idea behind her spatial equilibrium condition? When constructing quality of life rankings, Los Angeles often comes out near the top. Use Roback's model to explain why you think that is. (5 pts)
 - (d) What is missing from Roback's model of spatial equilibrium? Discuss some recent structural models of spatial equilibrium and relate them to Roback's model. (5 pts)
 - (e) Write down a simple user-cost model of house prices. What does the equilibrium relationship between house prices and rents depend on in your model? What is missing from your model? (5 pts)

2. (25 pts) Suppose you have a cross-section of data on housing transactions. The data allows you to see the street address of the house, the sale price, and the characteristics of the home, including neighborhood characteristics. You also have data on public schools, including each school's test score performance and attendance boundaries. You are interested in using this data to estimate the willingness to pay for school quality.
- (a) Suppose you regressed sale price on house characteristics and neighborhood characteristics, including the test scores for the school that the house is assigned to. What would you expect to find? Describe some problems with this regression. (5 pts)
- (b) Come up with an alternative strategy for estimating the average willingness-to-pay for school quality. Make sure to write down the estimating equation. If you are deriving your research strategy from another paper, cite that paper. How do you expect the new strategy to affect your estimates from part (a)? (10 pts)
- (c) Under what assumptions will your answer from part (b) correctly identify an average willingness-to-pay? How might you test these assumptions with the data that you already have? Feel free to draw hypothetical pictures/tables you would use to test these assumptions. (10 pts)
3. (25 pts) Consider a housing market with consumers $i = 1, \dots, N$ and houses $j = 1, \dots, N$. Each consumer chooses one house and each house gets chosen by one consumer. The indirect utility that consumer i gets from choosing house j is:

$$V_{ij} = \alpha_i x_j + \beta_i p_j + \xi_j + \epsilon_{ij}$$

where x_j is an observed (to the econometrician) house characteristic, p_j is the observed price of the home, ξ_j is the unobserved house quality, and ϵ_{ij} is a preference shock that is iid type 1 extreme value. α_i and β_i are preference

parameters given by:

$$\alpha_i = \alpha_0 + \sum_{k=1}^K \alpha_k z_{i,k}$$

$$\beta_i = \beta_0 + \sum_{k=1}^K \beta_k z_{i,k}$$

where $z_{i,k}$ are the observed demographic characteristics of consumer i . As the econometrician, you observe x_j , p_j , z_{ik} , and d_{ij} —an indicator for whether consumer i chooses house j .

- (a) What is the probability (over ϵ_{ij}) that person i chooses house j ? (10 pts)
 - (b) Let us write $\delta_j = \alpha_0 x_j - \beta_0 p_j + \xi_j$. Describe in words a computationally tractable strategy for estimating δ_j for each house. (5 pts)
 - (c) Suppose you correctly estimate δ_j for each house. What would happen if you regressed δ_j on x_j and p_j ? Would you get unbiased estimates of α_0 and β_0 ? Why or why not? If not, describe an identification strategy for recovering α_0 and β_0 . (10 pts)
4. (25 pts) Consider a city with $j = 1, \dots, L$ locations, and workers can choose both where to live j and where to work k . The unit price of housing in residential location j is p_j and the wage rate in work location k is w_k . Workers are homogeneous and supply one unit of labor inelastically. A worker i who lives in location j and commutes to work at location k chooses numeraire consumption C and housing consumption H to maximize:

$$U_{ijk}(C, H) = \left(\frac{C}{\theta}\right)^\theta \left(\frac{H}{1-\theta}\right)^{1-\theta} \exp(-\kappa\tau_{jk} + \sigma\epsilon_{ijk})$$

subject to budget constraint:

$$C + p_j H = w_k$$

τ_{jk} is the commute time between locations j and k and ϵ_{ijk} is a preference shock that is iid across i , j , and k . In each location k , there is a competitive firm that produces the tradeable numeraire good using labor L and capital K . The

production technology in location k is:

$$Y = L^\alpha K^{1-\alpha} \exp(x_k + \xi_k)$$

Here, x_k is an observed characteristic of location k , and ξ_k is a productivity shock. Let r be the rental rate of capital which is the same for all firms.

- (a) Derive an expression for the log indirect utility that worker i gets from living in location j and working in location k . (10 pts)
- (b) Derive an expression for the equilibrium log wage rate in location k . [Hint: In equilibrium, the unit cost of production in each location has to equal 1.] (10 pts)
- (c) Discuss how you would go about estimating the parameters of the model, θ , κ , σ , and α . What data would you try to collect? What assumptions on the error terms would you have to make? (5 pts)