Quantitative Spatial Economics (cont.)

Urban Economics

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Introduction to a basic quantitative spatial model

- We begin with a twist to Rosen-Roback
  - We'll work through n = 2 case to develop intuition, but it can be easily extended to n locations
  - Can be used for other applications (trade, commuting, etc.)

Introduction to a basic quantitative spatial model

- Why aren't wages equalized across space?
  - People maximize utility, not wages
  - Places may have different levels of amenities
  - Places may have different costs of living
  - Places may have differently skilled workers (selection)
  - People also usually differ over their individual preferences for locations
  - Additionally, may have frictions
    - Migration costs
    - Trade costs
    - Housing

Simple Rosen-Roback

- Simple example: 2 locations

$$V_A^i = w_A - r_A + A_A + \epsilon_A^i = V_A + \epsilon_A^i \tag{1}$$

$$V_B^i = w_B - r_B + A_B + \epsilon_B^i = V_B + \epsilon_B^i \tag{2}$$

- Choose location j that maximizes utility

$$max_j V_j + \epsilon_j \tag{3}$$

$$\epsilon_j \sim F(x) \tag{4}$$

Simple Rosen-Roback

- Gumbel:

$$F(x) = exp(-exp(-x + \alpha)) \tag{5}$$

- Frechet

$$F(x) = exp(-Tx^{-\theta})) \tag{6}$$

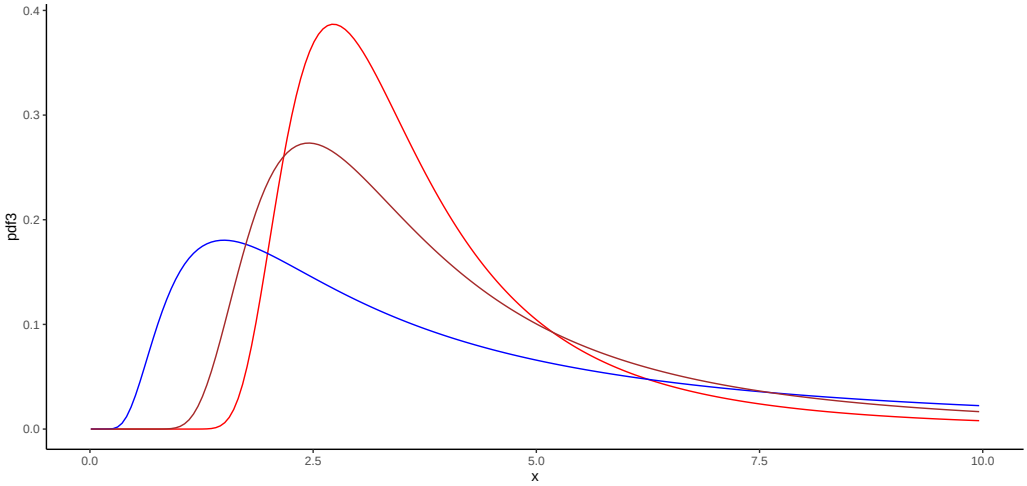
Simple Rosen-Roback

- Gumbel

$$P(choose j) = \frac{e^{v_j}}{\sum_j e^{v_j}} \tag{7}$$

- Frechet

$$P(choose j) = \frac{v_j^{\theta}}{\sum_j v_j^{\theta}} \tag{8}$$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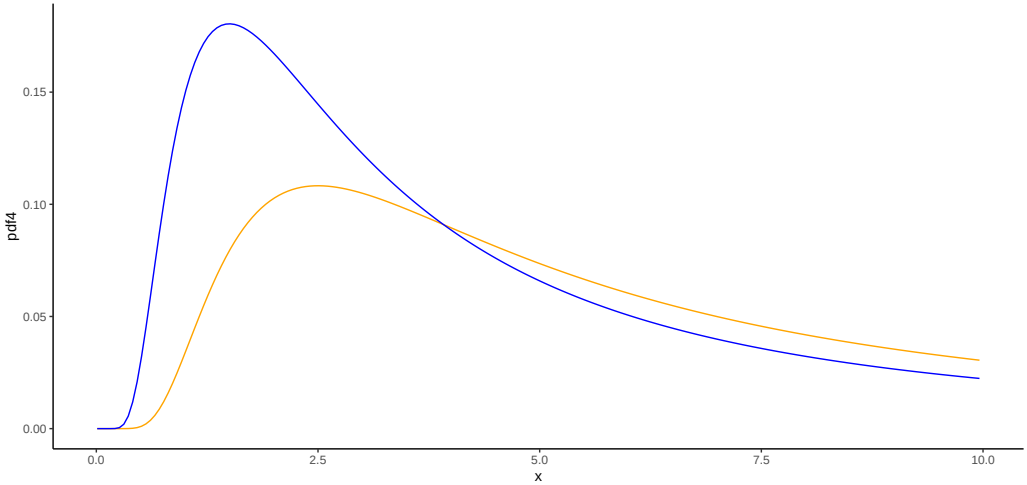

$$E(x) = \Gamma\left(\frac{\theta - 1}{\theta}\right) T^{\frac{1}{\theta}} \tag{9}$$

Further Readings

- Ahlfeldt, G. M., Redding, S. J., Sturm, D. M., & Wolf, N. (2015). The economics of density: Evidence from the Berlin Wall. Econometrica, 83(6), 2127-2189.
- Glaeser, E. (2008). Cities, agglomeration, and spatial equilibrium. OUP Oxford.
- Morten, M. (2021) Introduction to the spatial equilibrium model. Mimeo