EC2410-Spring 2018
Problem Set 1

(Updated 23 January 2018)

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When you write up your answers, your goals should be to (1) be correct, and (2) convince your reader that your answer is correct. It is always helpful if your work is legible and if all steps are presented, possibly with a line of explanation.

Answers which do not achieve these goals will not be awarded full credit.

Problems

1. Consider the monocentric city model with housing developed in Breuckner(2004) and discussed in class. Find the sign of $\frac{\partial r}{\partial t}$ and $\frac{\partial D}{\partial t}$. That is, the rate of change of the land rent gradient and the population density gradient as transportation costs change.

2. Consider the linear city model developed in class. Recall the following notation:

$$\begin{aligned} l = 1 &\sim \text{unit land consumption for all residents} \\ c &\sim \text{composite consumption} \\ x &\sim \text{distance to center} \\ R(x) &\sim \text{unit land rent} \\ t &\sim \text{unit cost of transportation} \\ w &\sim \text{fixed wage paid to all workers at city center} \\ \overline{u} &\sim \text{reservation utility level} \\ \overline{R} &\sim \text{agricultural land rent} \end{aligned}$$

   Consumers solve

$$\begin{aligned} &\max_x u(c) \\ &\text{s.t.} w = c + R(x) + 2tx. \end{aligned}$$

   In equilibrium all consumers are indifferent between all locations in the city and their outside option. Land rent is collected by absentee landlords and leaves the model.

   (a) Find the equilibrium extent of the city, $\overline{x}$.

   (b) Consider an increase in the wage from w to w'.

      i. Calculate the resulting change in aggregate land rent.

      ii. Calculate the resulting change in aggregate wage income. Assume that migrants' wages are also w before they move.

      iii. Draw a graph to illustrate both quantities.

      iv. Is an infinitesimal wage increase 'completely capitalized' into land rent? Explain briefly.