EC1410-Spring 2023
Problem Set 2

(Updated 17 January 2023)

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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 that do not achieve these goals will not be awarded full credit.

Problems

1. COVID, Rent and Asset Price Gradients.

   This problem will examine the change in the rent and purchase price gradients from Gupta et al. (2021).

   (a) Before the pandemic, the rental price gradient was described by:

   $$\ln R_0(x) = 7.6 - 0.04 \ln(x+1)$$

   where x is distance from the city center. This is shown in panel A of Figure 3 from Gupta et al. (2021). During the pandemic, the rental gradient changed to:

   $$\ln R_1(x) = 7.5 - 0.004 \ln(x+1)$$

   What are the monthly rental prices at $x = 0$, before and during the pandemic? What is the percent change in rent at $x = 0$?

   (b) As shown in Panel B, the asset price gradient before the pandemic was described by:

   $$\ln P_0(x) = 13.2 - 0.127 \ln(x+1)$$

   During the pandemic, this gradient changed to:

   $$\ln P_1(x) = 13.15 - 0.115 \ln(x+1)$$

   What are the asset prices at $x = 0$, before and during the pandemic? What is the percent change in asset price at $x = 0$?

   (c) Suppose that the pandemic-related changes in rental prices are permanent. Use 1a to find the implied asset price of rental properties at $x = 0$ before and after the pandemic, using $\rho = 0.03$. What is the percent change in these implied asset prices?

   (d) Compare this implied change in asset prices, which assumed that the change in rental prices due to COVID would be permanent, to the actual change in asset prices from 1b. Which is larger? What does this suggest about how long people expect the pandemic to last?

   (e) Throughout the pandemic, people have speculated that COVID would be "the death of cities". What does your work above suggest about this sort of speculation?