Economics 301

Problem Set due October 6, 2023 Upload your answers to canvas

1) Consider a market with many identical consumers, with quasiconcave utility function $u(q,x)$ and many identical producers producing at cost $c(q)$ that is increasing and weakly convex. q is the quantity per consumer and x is their consumption of other goods. Consumers pay p per each unit of good to the producers. Following Marshall, we use the $[q,p]$ plane to examine this market. We also rule out Giffen goods.

a. Draw the producers' isoprofit curves in the $[q,p]$ plane. How are they related to the cost function? What can you say about their slopes and convexity/concavity?

b. Draw the consumers' indifference curves in the $[q,p]$ plane, assuming no income effects on the demand for q. Note that you are not drawing them in the $[q,x]$ plane. What can you say about their slopes and convexity/concavity? How do they relate to the Hicksian demand curve? The Marshallian demand curve?

c. Repeat part (b) allowing q to be a normal good.

d. How is the competitive equilibrium related to the indifference curves of consumers and producers? Are there other $\{q,p\}$ combinations that result in the same joint consumer-producer surplus?

e. Suppose that (i) producers could jointly determine their quantities and prices and (ii) consumers are free to purchase as much or little as they want at the price selected by the producers. How is this equilibrium related to the indifference curves of consumers and producers?

f. Now suppose that a third party – neither a producer nor a consumer – is harmed by the activity in this industry. Their harm, measured in units of revenue, is tq, where $t > 0$ is a constant. Draw their indifference curves in the $[q,p]$ plane.

g. Draw the iso-surplus curves for the combined surplus of the producers and the third parties. What can you say about their slopes and convexity/concavity?

h. Taking into account the third parties and assuming they can cooperate with the producers, what $\{q,p\}$ allocations are Pareto improvements on the competitive equilibrium? How does your finding compare to the recommendation that negative externalities should be taxed?

2) Princeton professors Case and Deaton write in their latest book "If people are withdrawing their labor, wages should rise; but in the late part of the twentieth century and into the twenty-first, wages fell along with employment, a clear indication that the problem [reduced quantity of labor] lies with falling demand, not falling supply." Here we accept for the sake of argument that wages did fall with employment ("the data").

a. Using comparative statics of the supply-demand model of the labor market $d[w,a] = q = s[w,b]$, express the data as an algebraic expression [Hint: it is not complicated!]. w denotes the wage and q the quantity of labor. a summarizes shifters of the labor demand curve. b represents shifters of the labor supply curve.

b. How can Case and Deaton's conclusion about the quantity of labor be expressed algebraically? [Hint: you may want to contrast actual quantity (the data) with a counterfactual quantity – where something was different]

c. What is the algebraic representation of the opposite of their conclusion – that the quantity of labor fell primarily due to shifts in supply?

d. Is, together with the data, downward-sloping labor demand and upward sloping supply sufficient to reach their conclusion? If not, what else must be assumed?

e. In the labor supply-demand diagram, what is the economic interpretation of the area under the labor demand curve?

f. Can labor's share of national income be calculated just from a labor supply-demand diagram?