University of Toronto at Mississauga
19th April, 2005

Course: Economics 326
Instructor: Simon Board
Duration: 2 hours
Aids: books, notes, calculators, small animals.
Total marks: 100

It is an academic offence for students to possess the following items at their examination desks: cell phones, pagers, personal digital assistants or wristwatch computers. If any of these items are in your possession, put them with your belongings at the front of the room before the examination begins. No penalty will be imposed.

Please note, students are not allowed to petition to re-write a final examination. Good luck!

Question 1

[25] Consider Spence's model of educational signalling. There are two types of agent with productivity θ_H and θ_L, where $\theta_H \geq \theta_L$. If agent θ_i takes education e and is paid wage w their utility is $w - e/\theta_i$. In this question, your answers can be either pictorial or algebraic.

(a) What are the education choices in the least cost separating equilibrium? What is the wage, $w(e)$, at the chosen education levels? What restrictions must the wage function, $w(e)$, obey for other education levels? [That is, describe the set of wage functions, rather than just give one example].

(b) What are the education choices in the least cost pooling equilibrium? What is the wage, $w(e)$, at the chosen education level? What restrictions must the wage function, $w(e)$, obey for other education levels?

Question 2

[25] Consider the second degree price discrimination model. Agent θ_i has utility $\theta_i q_i - t_i$ for good of quality q_i at price t_i. There are two types, $\theta_2 \geq \theta_1$, where π is the fraction of type θ_1

agents. The cost of producing quality q is given by a continuously differentiable convex function $c(q)$. As shown in the lecture, the optimal qualities are given implicitly by

$$\begin{aligned} c'(q_1) &= \theta_1 - \frac{1-\pi}{\pi}(\theta_2 - \theta_1) \\ c'(q_2) &= \theta_2 \end{aligned}$$

(a) What happens to the qualities offered as θ_2 increases? What happens as $\theta_2 \to \theta_1$? What is the intuition behind these results?

(b) What happens to the qualities offered as θ_1 increases? What happens as $\theta_1 \to \theta_2$? What is the intuition behind these results?

Question 3

[25] Three flatmates consider whether to ban smoking in their apartment. Agent 1 is willing to pay \$1000 to ban smoking. Agent 2 is willing to pay \$700 to ban smoking. Agent 3, the smoker, is willing to pay −\$2000 to ban smoking (i.e. they have to be paid \$2000 to be compensated for the ban). The flatmates decide to ban smoking if the sum of their valuations is positive.

(a) Suppose the agents valuations are observable. Should they ban smoking?

For the rest of the question suppose the agents' valuations are private knowledge.

(b) Suppose the agents hold a majority vote. What will be the outcome?

(c) Suppose we randomly assign one agent to be the dictator. What will be the outcome?

(d) Suppose we just asked the agents to reveal their valuations. We then sum up these reports and ban smoking if the total exceeds 0. Will agents report truthfully?

(e) Suppose we use the Clarke tax (i.e. the pivitol mechanism). If smoking is banned and the agent is pivitol, they must pay the externality on the other two agents. In order to get truthtelling, what should the pivitol payments be? What will the outcome be? In the truthtelling equilibrium, what will payment actually be?

Question 4

[25] Consider the market for computers. A consumer who buys a working computer gets utility 1. If the computer works with probability q they thus receive utility q. There are two computer firms. The good quality firm produces a computer that works with probability q_H and costs c_H to make, where $q_H > c_H$. The bad quality firm produces a computer that works with probability q_L and costs c_L to make, where $q_L > c_L$, $q_H > q_L$ and $c_H > c_L$. The two firms have equal capacity, if they choose to produce, while there are an infinite number of consumers. There are no fixed cost of production.

(a) Suppose q is observable. What price will the good and bad computers trade at?

For the rest of the question suppose consumers cannot observe q.

(b) Given the price for computers, p, when would the good quality firm wish to make computers? If $(q_L + q_H)/2 \geq c_H$ what will be the equilibrium market price? What types of computers will be supplied? If $(q_L + q_H)/2 < c_H$ what will be the equilibrium market price? What types of computers will be supplied?

(c) Suppose computer firms can offer warranties on their computers, so the consumer gets their money back if the computer breaks. What price is a consumer willing to pay for a computer of quality q? What is the market price for computers with warranties? What is the profit on a good quality computer with a warranty? Comparing this to the profit in part (b), will the good quality firm wish to issue warranties?

(d) Suppose both firms simultaneously choose whether to issue warranties or not. Consumers observe this choice and make inferences about quality. Consumers then choose from a firm with or without warranties to buy. Describe equilibrium of this signalling game.