

ECONOMICS 105: INDUSTRIAL ORGANIZATION

FINAL EXAM FALL WINTER TERM 2005.

Instructions: You have 3 hours to do this exam. You may however take a “time out” break to read any materials such as those on reserve web pages etc, before answering any question. Officially it must be handed in by 5:00 PM, WEDNESDAY March 16, however I will grant a free extension until 1.00 PM FRIDAY March 18 if anyone needs it.

Return the completed exam to my mail box on the ground floor of Baxter or to my secretary, Patricia Hamad.

You may consult class notes or the text books before or during the time out but not while writing the exam. Spare copies of Scherer’s book ”Industry Structure, Strategy and Public Policy”” and Sutton’s book ”Sunk Cost and Market Structure ” have been placed on reserve in the Millikan library. The exam is worth 50% of your grade for the course. There are 4 questions; each question’s point value is indicated at the start. If you have any questions please e-mail me at wilkie@hss, or email your TA. Good luck!

1. [10 pts] Give brief answers to the following:
 - (a) What is the difference between fixed and sunk costs, and why is the difference important?
 - (b) What is the difference between an exogenous and an endogenous sunk cost? Give a examples of particular markets and explain how the cost structure affects the market equilibrium.
 - (c) In class the link between a performance index (the Lerner index) and a market structure index (the Herfindahl index) was explored. How would the the existence of endogenous advertising costs affect this relationship?
 - (d) Explain the role of “learning by doing” in the equilibrium in the semiconductor market. You may want to consult Scherer’s book.

2. [30 pts] Recall the Sutton model of endogenous sunk costs such as advertising that we used in class.
 - (a) What are the main empirical predictions of the theory for goods with a ”high” sensitivity to advertising? What are the key variables and how they should be related
 - (b) Describe the structure of the US beer market.
 - (c) Internationally how does the beer market highlight deficiencies and/or strengths of the Sutton model.

3. [30 pts] Consider the market for cable modem internet access. The cable company, a monopoly, has to invest in a fixed sunk cost K to enable internet access over the cable lines, it then can act an ISP (Internet Service Provider) and route internet traffic or send the traffic to another ISP such as Earthlink. Assume that the marginal cost of the service is zero.

A key feature is that the more users on a system the slower it is, and so the less valuable the service. Suppose that there is a unit mass of consumers with taste parameter θ uniformly distributed where $0 < \theta < 1$. If a fraction μ of the population uses cable modems and the price is p then a user of type θ has utility $(1 - \mu)(1 - \theta) - p$, that is I like the service best when I am the only user and $\mu = 0$.

 - (a) prove that if a user of type θ buys when there are μ users then type $\theta' < \theta$ will also sign up for the service.
 - (b) Derive the demand function for this market.
 - (c) What is the monopoly level of price and quality in this market?

- (d) Suppose that there is now open access, in that the cable company has to allow every ISP access to the cable customers at a price c per user to be paid to the cable company. Assume that all traffic is on the same channel so the level of congestion depends on the total number of users, not the number who use the same ISP. If there is price competition (Bertrand) what is the equilibrium price to the user of the service. What can be said about the quality of service?
- (e) Suppose now that there are 2 ISP companies and each can get its own channel so that if μ_1 users choose ISP 1 and μ_2 choose ISP 2 then the utility of choosing 1 is $((1 - \mu_1)(1 - \theta) - p_1)$ and ISP 2 is $(1 - \mu_2)(1 - \theta) - p_2$. What is the equilibrium in the market. [HARDER: dont lose sleep over it]
4. [30 points] Suppose we have a good where “quality” is objectively measurable. For example consumer’s reports finds that brand X lasts twice as long as brand Y, or that a PC magazine finds that one brand performs floating point operations three times as fast as another. Suppose that consumers only care about the total quality of service delivered. That is, I don’t care if I have 10 machines doing 100 operations a second or one machine that can do 1000 operations a second. If there are n firms in the industry, let x_i be the quality of good i and q_i be the quantity sold by firm i , then demand is given by $p = a - b(\sum x_i q_i)$. Thus if a firm produces q_i units of quality x_i its revenue is $p \cdot x_i \cdot q_i$. Suppose that quality is costly, so there is a strictly increasing function convex c where $c(x)$ is the cost of producing a unit of quality x , with $c'(x) > 0$ and $c''(x) > 0$. The cost of producing q units of quality x is linear in q , thus $C(x, q) = c(x)q$. Assume that all firms have the same technology and compete by simultaneously choosing quantity, (i.e. Cournot competition), and by choosing quality.
- (a) Write down the maximization problem for firm i . What are the first order conditions for a max for the variables q_i and x_i ?
- (b) Use the above equations to solve for the equilibrium level of quality. Is this level affected by n , the number of firms? What is the equilibrium price?
- (c) Suppose that an economist wanted to minimize the average cost of production, $c(x)/x$. What are the first order conditions for a minimum? How does the solution to this problem compare with the quality chosen in the Cournot equilibrium?
- (d) Often arguments are made that an increase in competition is “bad” or “good” because it either degrades or improves the quality of a product. What does this model say about the validity of these arguments, i.e, the relationship between quality of a good and the intensity of competition?