

14.20 Problem Set #4

Due: Monday April 30, 2001

Problem 1: Durable Goods Monopolist

Assume that demand for services per period is:

$$P_t = 1000 - Q_t \quad \text{where } Q_t \text{ is the stock of the durable consumed.}$$

Let the discount factor for both consumers and the firm be one. Suppose that the monopolist producer of this good has a choice: he can either produce a product that is durable at zero MC or he can produce a nondurable product (ie: it provides consumption services for one period only) at a MC of c . Assume that there are only two periods.

- Suppose the monopolist sells its output and cannot commit to prices. For what values of c would he choose the durable product?
- Suppose the monopolist leases its output. For what values of c would he introduce the nondurable product?
- What is the efficient solution? How is this related to planned obsolescence?

Problem 2: R&D

Consider DIGICAM, a producer of digital cameras. DIGICAM currently produces digital cameras at a constant MC of 400. DIGICAM is considering an investment in R&D that would lower its MC of producing a digital camera to 280.

The demand for digital cameras is:

$$P = 1600 - 10Q$$

- Suppose that DIGICAM is a monopolist in the market for digital cameras. What are DIGICAM's profits with its existing MC? What would be DIGICAM's profits after the R&D expenditure? What is the most DIGICAM would be willing to spend on this R&D investment?
- Now suppose that the market for digital cameras is a duopoly, with DIGICAM and BESTPIX. Suppose that both firms initially have a constant MC of 400. Demand is still $P = 1600 - 10Q$ and the firms compete in quantities. Suppose that DIGICAM is again considering an investment in R&D that would lower its MC to 280. Assume that DIGICAM would receive a patent for this innovation preventing BESTPIX from copying it. What are each firm's profits before the R&D investment? What would be each firm's profits if DIGICAM made the R&D investment? What is the most DIGICAM would be willing to spend on this investment? How have DIGICAM's incentives for innovation changed relative to (a)?
- Now suppose that DIGICAM is again a monopolist and BESTPIX is a potential entrant. Both firms have initial MC equal to 400. Suppose that the technology that would allow either firm to lower its cost to 280 is owned by a third party who will sell it to whichever firm pays more. Suppose that if it sells it to BESTPIX, BESTPIX enters the market with MC equal to 280 and competes in quantities with DIGICAM, whose MC remains at 400. If it sells the technology to DIGICAM, BESTPIX stays out of the market and DIGICAM remains a monopolist with MC equal to 280. How much would each firm be willing to pay for the technology? Which firm gets it? Intuitively, why does this firm end up offering more?

Problem 3: Price Discrimination

Healthworks is an all-women's gym in Porter Square. The gym has two types of potential consumers: wealthy Cambridge business professionals and cash-constrained students.

The demands for Healthworks memberships by students and professionals are respectively:

$$Q^S = 120 - 2P$$
$$Q^P = 50 - P/2$$

The cost to Healthworks of a membership is:

$$C = 100 + 7Q^2/25 \quad \text{where } Q = Q^S + Q^P.$$

- (a) If Healthworks is forced to charge a single price to all consumers, what will be its profit-maximizing price and quantity? What will be its profits?
- (b) Now suppose that Healthworks can charge a student price for customers who present them with a valid student ID. What prices will it set now? What are its profits under this pricing scheme?
- (c) Now suppose that it is illegal for Healthworks to check for a student ID when selling a membership. How else might Healthworks be able to separate its different types of consumers?

Problem 4: Pricing Practices

Provide brief economics explanations for each of the following pricing observations:

- (a) A cell phone that costs \$150 comes with various mail-in rebates that, combined, provide the buyer with almost \$120 in cash and coupons.
- (b) The best airfare deals on the Internet are usually found on websites that are difficult to navigate and slow to load.
- (c) If an item goes on sale at the GAP and you bought it for full price within the last 2 weeks, the GAP will refund you the difference between what you paid and the sale price.
- (d) Two gas stations on opposite corners of Memorial Drive often have up to a 15 cents per gallon price difference.
- (e) The price of an Inkjet printer is about \$100 while the price of each ink cartridge is \$30.

Problem 5: Internet Pricing

Look at the attached printout from www.mysimon.com showing the results from a price search for the new Dave Matthews Band CD. Answer each of the following questions on internet pricing.

- (a) Many have claimed that the internet provides a "frictionless market" – one in which search is costless, pricing is transparent and competition is fierce. Looking at the printout from mysimon.com and referring to models you've learned so far in the course, what do you think of this claim?

- (b) Some researchers claim that differentiation accounts for the observed price dispersion in online markets for books and CDs. How do you reconcile this claim with the fact that books and CDs are homogeneous products?
- (c) Some researchers claim that switching costs account for the observed price dispersion in online markets for books and CDs. This would seem strange given that every retailer is just “a click away”. What types of switching costs could they be referring to? How important do you think these are?
- (d) Looking at the mysimon.com printout, you’ll see that mysimon.com provides retailer ratings with each price quote. These ratings are a relatively new addition to mysimon.com. What effect do you think including these ratings will have on click-through market shares from mysimon.com? (a click-through market share is the share of visitors to mysimon.com that clicks through to a retailer’s website).

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