

Pricing and Price Discrimination

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Outline

- Pricing and Elasticities
- Price Discrimination
- The Coase Conjecture

Monopoly

$$\pi = R - C$$

$$FOC: MR - MC = 0$$

$$\pi = P(q)q - C(q)$$

$$FOC: P(q) + q \cdot \frac{\partial P(q)}{\partial q} = C'(q)$$

$$P(q) + q \cdot \frac{\partial P(q)}{\partial q} \cdot \frac{P(q)}{P(q)} = C'(q)$$

$$P(q) + \frac{P(q)}{\varepsilon} = C'(q)$$

$$\frac{P - C'(q)}{P} = \frac{1}{\varepsilon} \text{ (Inverse elasticity rule)}$$

$$\pi_i = q_i P(Q) - C_i(q_i), \quad Q = q_1 + q_2 + \dots + q_n$$

$$\frac{\partial \pi_i}{\partial q_i} = P(Q) + \frac{\partial P(Q)}{\partial Q} \frac{\partial Q}{\partial q_i} q_i - C'(q_i) = 0$$

$$P = - \frac{\partial P}{\partial Q} \frac{\partial Q}{\partial q_i} q_i + C'(q_i)$$

$$\text{In Cournot competition, } \frac{\partial Q}{\partial q_i} = 1.$$

$$\text{Furthermore, multiplying through by } \frac{Q}{P} \left(= \frac{1}{P} \right)$$

$$P = - \frac{\partial P}{\partial Q} \frac{Q}{P} q_i + C'(q_i)$$

$$P = \frac{1}{\varepsilon} P \frac{q_i}{Q} + C'(q_i)$$

$$\frac{P - C'(q_i)}{P} = \frac{s_i}{\varepsilon}$$

The Lerner Index

- So, the Lerner Index (the price cost mark-up) in an oligopoly is just the market share of firm i divided by the elasticity.

Estimating Elasticities

- Statistical

$$\ln P_i = \alpha_0 + \alpha_1 \ln Q_i + \alpha_2 \text{Day1} + \alpha_3 \text{Day2} + \alpha_4 \text{Day3} + \alpha_5 \text{Day4} + \varepsilon_i$$

or

$$\ln P_i = \alpha_0 + \alpha_1 \ln Q_i + \alpha_2 P_{2i} + \alpha_3 P_{3i} + \alpha_4 P_{4i} + \alpha_5 \text{Loc} + \varepsilon_i$$

Need an "instrument" to control for endogeneity

$$d \left(\frac{\ln P_i}{\ln Q_i} \right) = \frac{\frac{\partial P_i}{P_i}}{\frac{\partial Q_i}{Q_i}} = \frac{1}{\varepsilon}$$

- Surveys
- Qualitative

Qualitative Determinants of Elasticity

- Demand for a product is more elastic, the
 - more like a luxury good and less like a necessity it is
 - larger share of budget assigned to it
 - the more substitutes to it that exist
 - in long run than in short run
 - the better the consumer information

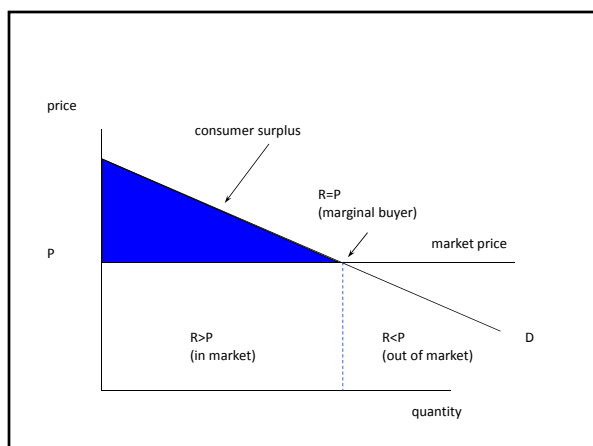
- Price Discrimination Depends on Elasticities

Price Discrimination

- Occurs when different net prices are charged for the same good
 - Suppose consumers differ in their distance from the point of sale: If differences in prices exactly reflect transport costs, prices are not discriminatory
 - Suppose consumers buy nearly identical variants of the same basic good. If the difference in price between variants exactly equals the cost of characteristics that are in one but not the other, prices are not discriminatory

How much is a product worth to a consumer?

- Reservation price: How much a consumer is willing to pay rather than do without the good
- Consumer surplus: Difference between what a consumer is willing to pay for a good and what he actually pays
 - The consumer surplus is measured by the area under the demand curve above the market price

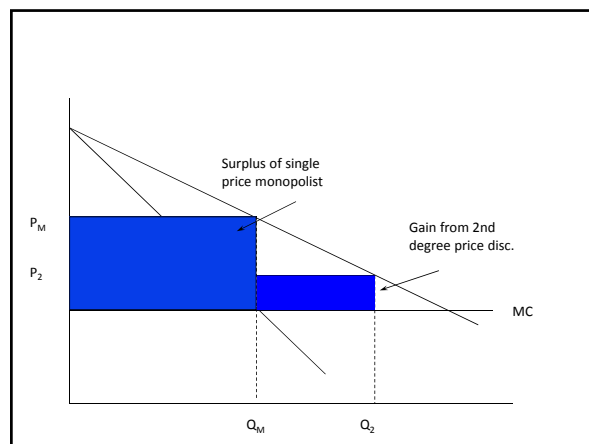


First Degree Price Discrimination

- Every consumer pays his own reservation price
- Marginal Revenue = Average Revenue
 - Most profitable type of pricing
 - Same quantity is sold as in competition
- Possible examples: small town doctor, shoe repair shop, piano teacher

Second Degree Price Discrimination

- Consumers distinguished by the quantity of the good they consume
 - Quantity discounts
 - Two-part tariffs
- Examples: software site licenses, toothpaste



Third Degree Price Discrimination

- Consumers are divided into groups or market segments according to some observable characteristic, and each is charged a different price
 - Higher price is given to buyers with less elastic demand
- Examples: airlines, student and senior discounts

Formally, for each market set

$$MC = MR_1 = MR_2$$

Since for market i:

$$MR_i = p_i \left(1 - \frac{1}{\varepsilon_i}\right)$$

Coase model of a durable monopoly good (CP, p. 522)

- Assume a seller cannot sign contracts limiting his future production.
 - Upon sale of a unit, optimal strategy is to try to sell another unit at as high a price as he can get
 - This would go on until price equals marginal cost
- Suppose very little time is needed to transact
 - Intelligent consumers, assuming the price will soon fall to the competitive level, will be unwilling to pay more than the competitive price for the early units.
 - This could go on until price equals marginal cost; monopolist can lose all control of situation.

Assumptions of Model

- Lifetime of good exceeds the basic “period”
 - Period is the length of time between price revisions
 - Goods offered by monopolist at two different dates are substitutes
 - Customers have “rational” expectations

Example

- 7 customers
- Valuations $v=1,2,\dots,7$
- Each consumer derives utility from 1 unit of the good
- Time is discrete $t=1,2,\dots$ and discount factor δ between periods
- No cost to produce the good and the good is infinitely durable

- First
 - Assume monopolist makes once and for all offer in the first period of the monopoly price, which is 4. He sells to consumers with valuations 4 to 7
 - Monopoly profit is $4 \cdot 4 = 16$
- At beginning of period 2, have residual demand of consumers with valuations 1 through 3. Monopolist is then tempted to charge a lower price.
 - Some consumers with high valuations may still accept paying 4 because they are eager to get the good
 - However, likely that consumer with valuation 4 does not buy, because his surplus is zero
 - Necessary condition to purchase: $v - 4 \geq \delta(v - 2)$

- Equilibrium:
 - A sequence of prices and consumers' expectations such that the expectations are rational given the firm's behaviour and such that the firm's behaviour is optimal given the consumers' expectations
 - Monopolist price discriminates over time
 - Books
 - Computers
- Flexibility hurts the monopolist

Responses

- An artist may make a lithograph and destroy the plate
- A seller rents rather than sells
 - IBM
 - Xerox
 - Crucial difference between seller and renter is that if a renter "overproduces" he suffers capital loss on old units, the costs are internalised; rational for him to limit production
 - For a seller, buyer suffers cost; sellers end up overproducing
 - Firms that rent can resemble monopolists producing nondurable goods

- Find ways of capacity commitment (spend too little on fixed costs and too much on marginal cost)
- Give price guarantees (a money-back guarantee exercisable at any time)– makes it very expensive for firms to lower price to new consumers
- Transfer monopoly power to service contracts or in another area
 - Car servicing
 - Polaroid in film
 - Gillette in blades
- Implicit contracts not to lower price – DeBeers never reduced nominal price of diamonds.

Conclusion

- Why firms are interested in elasticities
- Price discrimination
 - Pervasive
 - Can be extremely "unfair"
- A durable goods monopolist