EKN-812 Lecture 9

Monopoly (2); Monopolistic Competition

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Welfare Economics of Monopoly

Why Are Monopolies Bad?

- as we discussed before, question should always be “relative to what?”
  - if the relevant alternative is a competitive industry with the same costs, social losses come from underprovision
  - there are marginal units that consumers value above marginal cost, but they don’t get sold
  - this, and not the fact that prices are “high”, is the source of social loss
- notice that monopolists themselves are harmed by the fact that they face downward-sloping demand
  - that is, relative to a world in which they could charge different buyers different prices
- in fact, if you can charge each buyer exactly their willingness to pay
  - the monopolist could extract the entire consumer surplus
  - and, this would be socially efficent! (although obviously “unfair”)
  - this is called “first-degree price discrimination”

Why Might Monopolies Be Good?

- defenses of monopoly you sometimes hear
  - can subsidize other activities (unprofitable routes for airlines, postal delivery, medical care)
- is it a good idea to provide services via cross-subsidization?
  - highly vulnerable to competition!
    - e.g. many medical services may not require a doctor
    - high prices on profitable routes attract entry by other firms
  - why does the subsidy (to rural customers, poor people, etc) need to be provided via the suppliers?
  - why not just give the money directly to the intended beneficiaries?
- infant industry tariffs
  - defense is that industry will eventually see productivity gains if shielded from competition "initially"
    - of course, "initially" has a way of lasting for a long time in practice
    - even if productivity gains come, are the years of higher prices worthwhile?

Price Discrimination

Price Discrimination

- any time you charge different buyers different prices for the same good
  - "price discrimination"
  - by itself, this is evidence of monopoly power (i.e. that the firm is *not* a price-taker)
  - in practice, of course, this can be hard to prove
    - how do we know cost differences don't explain price differences?
- key obstacles in practice:
  - preventing resale
  - getting consumers to reveal their WTP

Price Discrimination

- 1st degree - perfectly "personalized" pricing, so consumers pay exactly WTP for each unit
  - socially efficient
  - examples: higher education (maybe)
- 2nd degree - quantity discounts
  - examples: water, electricity, some food items
- 3rd degree - segment consumers into groups by observable characteristics
  - examples: geographically separate markets; discounts for youth or elderly
  - trade-in discounts for consumer durables (why?)
  - time of purchase (e.g. airlines, hotels)
- these terms are not completely standardized
  - nor are these pricing strategies mutually exclusive!

Durable Goods and the Coase Conjecture

Durable Goods and the Coase Conjecture

- a monopolist who sells a *durable* good faces an interesting dilemma
  - effectively have to compete with future versions of yourself
  - arises from an inability to commit to keep future production down
- if repricing can happen quickly enough, the monopolist may be forced to price at marginal cost
  - this was first suggested by Coase (1972)
  - proved formally by Stokey (1981); see also Bulow (1982)
- these considerations create incentives to
  - reduce the durability of the good ("planned obsolescence")
  - underinvest in capacity to keep marginal costs high

Durable Goods and the Coase Conjecture

- we can prove a version of these claims in a simple two-period model, as in Bulow (1982)
  - no costs of production and no depreciation
  - one-period rental price is $r_t = \alpha - \beta s_t$, where
    - r_t = WTP for one period of use
    - s_t = *stock* of good currently available
    - thus, if q_t is produced in period t, $s_2 = s_1 + q_2 = q_1 + q_2$
- we can show that the profit of a monopolist renter is

$$\pi_R^* = \frac{\alpha^2}{4\beta}(1+\delta)$$

where $\delta = (1+\rho)^{-1}$ is shorthand for the discount factor

Durable Goods and the Coase Conjecture

- the problem a seller faces is different
- the tricky part is figuring out what first-period buyers are willing to pay
  - given their expectations of second-period prices
  - we proceed by backwards induction
- in period 2, suppose $\overline{q}_1$ has already been produced
  - the seller will want to produce $q_2 = (\alpha - \beta\overline{q}_1)/2\beta$
  - this will result in a rental (and capital) price of

$$r_2 = \frac{1}{2}(\alpha - \beta\overline{q}_1)$$

- so, first-period buyers will be willing to pay

$$p_1(q_1) = (\alpha - \beta q_1) + \delta \cdot \frac{1}{2}(\alpha - \beta q_1)$$

  for q_1 units in period 1
  - imagine they plan to sell after using the good for one period

Durable Goods and the Coase Conjecture

- second-period revenues (and profits) are just $q_2 \times r_2$
  - since this is the last period, the distinction between rental and capital prices disappears
  - the price will be $r_2(q_1 + q_2) = p_2(q_1 + q_2) = \alpha - \beta(q_1 + q_2)$
- so, the profit function of the seller is

$$\pi_S(q_1, q_2) = p_1(q_1)q_1 + \delta p_2(q_1 + q_2)q_2$$

- you can show that the maximal profit of the seller will be

$$\pi_S^* = [4 + \delta]\beta^{-1}(\beta q_2^*)^2$$

  - the seller's optimal second-period production will be

$$\beta q_2^* = \frac{\alpha[1 + \delta/2]}{2[2 + \delta/2]}$$

- then, the profit of the seller relative to that of the renter is

$$\frac{\pi_S^*}{\pi_R^*} = \frac{[4 + \delta]\beta^{-1}(\beta q_2^*)^2}{[1 + \delta]\beta^{-1}(\alpha/2)^2} < 1$$

  - thus, the seller makes lower profits than the renter

Durable Goods and the Coase Conjecture

- we can push this interpretation a bit further
  - suppose you could make the good less durable
    - e.g so that it lasted for only one period, not two
  - then, you'd be in the renter's situation, not the seller's
  - "planned obsolescence"
- you might also want to deliberately reduce future production capacity
  - idea is to credibly signal low future production
  - this would raise the willingness to pay of buyers
  - an extreme example: limited editions of artworks, music, etc
    - may want to destroy the originals!

Monopolistic Competition

Monopolistic Competition

- combine some elements of monopoly
  - firms face downward-sloping demand
- and, some elements of competition
  - take others' prices as given
  - free entry in long-run
- often used as a model for "differentiated goods"
- in the short run, looks just like monopoly
  - but, in the long run, free entry shifts in demand until profits are zero
- long-run equilibrium is defined by the two conditions
  - $MR = MC$
  - $P = AC$
  - can show that these two imply that demand is *tangent* to the AC curve

Dixit-Stiglitz Demand

- now, we study some properties of the *Dixit-Stiglitz* demand system
- suppose consumer preferences are CES:

$$c = \left(\sum_{i=0}^{N} q_i^{\rho} \right)^{1/\rho}$$

  - think of c as an aggregate of the different "brands" in the industry
    - some measure of average consumption of, e.g. "dining out" or "shoes"
    - even though there are many different types of restaurants or shoes
    - often you will want to embed this consumption aggregate in a larger demand system
- important restriction: $0 < \rho < 1$
  - this allows some of the q_i to be zero
  - that's important because it allows us to think about changing the set of goods on offer
  - it also means that the elasticity of substitution between varieties is > 1

$$\sigma = \frac{1}{1-\rho} > 1$$

Dixit-Stiglitz Demand

- the consumer's problem, given a budget I to spend on the different varieties q_i, is

$$\max_{(q_i)_i} c \text{ s.t. } I \geq \sum_{i=1}^{N} p_i q_i$$

- the first-order conditions imply that for any i, j:

$$\frac{q_i}{q_j} = \left(\frac{p_i}{p_j}\right)^{-\sigma}$$

  - thus, there is some constant K such that for all i,

$$q_i = K p_i^{-\sigma}$$

  - to figure out what this constant of proportionality K is, multiply by p_i and add over i:

$$I = \sum_{i=1}^{N} p_i q_i = K \sum_{i=1}^{N} p_i^{1-\sigma}$$

Dixit-Stiglitz Demand

- we can write demands in a more convenient format by defining

$$P = \left(\sum_{i=1}^{N} p_i^{1-\sigma} \right)^{1/(1-\sigma)}$$

  - this is a price index which has some nice properties (discussed below)
- with this definition, we have $K = I/P^{1-\sigma}$ and so the demand facing firm i is

$$q_i = \left(\frac{I}{P} \right) \left(\frac{p_i}{P} \right)^{-\sigma}$$

- we can also show that the optimal value of the consumption aggregate is $c^* = I/P$
  - this is nice, because we can interpret P exactly as the "price of an average unit"
  - in general, you can't define an "ideal price index" that doesn't depend on wealth, but with these preferences you can

Dixit-Stiglitz Demand

- then, we have

$$q_i = c^* \times \left(\frac{p_i}{P}\right)^{-\sigma}$$

  so each firm's demand depends on aggregate consumption and its *relative* price
  - again, the convenience here is that it's clear how to define "relative price"
- finally, note that in a symmetric equilibrium with all $p_i = p$, we have $P = N^{1/(1-\sigma)}p$, so

$$c^* = I/P = Ip^{-1}N^{-1/(1-\sigma)}$$

  - recall that $\sigma > 1$, so the consumption aggregate c^* is increasing in the number of types N
  - this is often called "love of variety"
    - consumers benefit from having more products available
    - comes up a lot in trade

Firms' Decision

- suppose firm i has (total) costs $c_i(q_i)$
- if N is large, the monopolistic competition assumption (take other firms' prices as given) means firm i can ignore the effects of changing its own price on the price index P
- then, firm's problem is

$$\max_q Jq^{1-1/\sigma} - c_i(q)$$

  for some constant J
  - this constant will depend on consumer's income I and the price index P
  - confirm this by computing firm i's inverse demand $p_i(q_i)$!
- now, it's easy to show that markups will be constant:

$$\frac{p_i}{c_i'(q_i)} = \frac{\sigma}{\sigma - 1}$$

- finally, in the long run, N adjusts until profits are zero

Uses of Dixit-Stiglitz

- heavily used in trade and economic geography
  - in those fields, this demand system allows increasing returns (and thus imperfect competition) to be handled in a very easy way
  - e.g. Krugman (1991) is a beautiful paper which should be quite accessible (worth reading just the introduction)
- also very popular in macro, e.g. New Keynesian models
  - a simple way to allow firms to have pricing power and get simple expressions for e.g. inflation
  - the restriction $\sigma > 1$ is less important in this context
    - there, the focus is on dynamics and not on entry of new firms

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