Outline

• Monopolies
• The monopolist’s problem
• The discriminating monopolist
• Natural monopolies and regulation
• Monopolies and innovation
• Welfare costs and the competitive fringe
So what is a monopoly?

• Firm that has no competitors
• Why may that happen?
  – Property rights
    • Sale of salt, gasoline, vodka, oranges
  – Economies of scale (natural monopolies)
    • Costs decline with scale
  – Technology
    • One firm just has much lower cost than anyone and keeps ahead by innovation
  – Patents
    • Firm keeps ahead by preventing imitation
Back to competition

• Recall firm takes price as given.
• Two decisions.
  – (1) if it produces how much
    – \( \Pi(q) = pq - C(q) \Rightarrow p - C'(q) = 0 \)
  – (2) should it produce at all
    – \( \Pi(q^*) > 0 \) produce, if \( \Pi(q^*) < 0 \) shut down
• Notice that \( p \) does not depend on \( q \)
if only one firm

• Price must depend on $q$
  - Because we know $p(q)$ falls with $q$

• So profit function
  - $\Pi(q) = p(q)q - C(q)$
  - Almost same as before

• So marginal condition

$$\frac{\partial \Pi}{\partial q} = p + \frac{\partial P}{\partial q} q - \frac{\partial C}{\partial q} = 0$$

Notice this has extra term relative to competition
Optimal decision by monopolist

- Competition
  \[ p = \frac{\partial c}{\partial q} \]

- MR=MC

- Here MR is simple its just price

- Monopoly

\[ p + \frac{\partial P}{\partial q} q = \frac{\partial c}{\partial q} \]

- MR=MC

- And the second term is precisely how output affects price

Note 1: the whole difference with monopoly involve the revenue side and setting price. What does this say about the cost minimization problem under monopoly?

Note 2: could ask what happens if the monopolist does not take input prices as given?
Competition Max Π

Marginal Cost

Average Costs

Short Run Average Cost
Or
Average Variable Cost

Profits

Costs

p

q
Competitive equilibrium

- Marginal Cost
- Average Costs
- Profits
- Costs
Interpretation

- Monopoly
  - $MR = MC$
- Suppose $MC = 0$.
  - Optimum is $MR = 0$. => Revenue is maximum
- $\Rightarrow \frac{\partial R(q)}{\partial q} = 0$ but $R(q) = pq$
- $\frac{\partial R}{\partial q} = p + q\frac{\partial p}{\partial q} = 0$
  $\Rightarrow p = -q\frac{\partial p}{\partial q}$
  $\Rightarrow 1 = -\left(\frac{q}{p}\right)\left(\frac{\partial p}{\partial q}\right)$
  (but that is elasticity)

Second order conditions $\Rightarrow$ that optimum (with $MC > 0$) always involves elasticity $> 1$
Monopoly Compared to Competition

- Marginal Cost
- Average Costs
- Marginal Revenue

$p_m$ and $p_c$ represent the prices, $q_m$ and $q_c$ represent the quantities.
Market failure

- Recall that the socially efficient allocation is the competitive allocation.
  - marginal cost = marginal willingness to pay
  - Maximize consumer surplus

- With monopoly
  - prices are higher and quantities lower

- Market failure
  - Equilibrium allocation is inefficient.
Can the monopolist do better?

• Well we assumed she had to charge everyone the same price.
  – But what if she could offer some people (students, the elderly, ) discounts?
  – Suppose she could offer quantity discounts?
• Extreme: monopolist knows each person’s valuation for each unit.
  – Then monopolist can make it take it or leave it offers to each individual.
Monopoly

Marginal Cost

Average Costs

Marginal Revenue

Profits

Costs

p

q
The discriminating monopolist

• Produces the competitive quantity
  – Extract alls the consumer surplus

• Efficient?
  – Yes because it maximizes consumer surplus (its just that the monopolist gets it rather than consumers)

• Fair?
Well informed discriminating monopolists are efficient and very profitable.

Uninformed monopolies are inefficient but profitable.

Argument that price setting should be avoided. Policy should seek to eliminate Monopoly.

Anti-trust legislation.

Source: Herman Viola, *Why We Remember: United States History*, Scott Foresman–Addison Wesley Publishing Co. (adapted)
Natural monopolies and regulation

• When Fixed costs are high enough and demand low enough, there may not be a competitive equilibrium.

• Such a situation arises marginal cost be below average cost where marginal cost crosses the demand curve

• Note there may be a possibility to have more than one firm if firms do not behave competitively
  — Oligopoly.
Cases where this arises often

- Communication Infrastructure
  - Roads, railroads..
  - pipelines
  - Net
- Energy
  - Electricity
  - Hydropower
  - Natural gas
- Solution regulation (regulated public utility)
  - Limit owners’ discretion on pricing
Regulated Monopolies

• Could just impose a price where the average cost curve crosses the demand curve and require the firm to sell to all customers who want the service.
  – Notice firm decides neither p nor q
• At that price firm just breaks even given quantity demanded
• But this requires a lot of data
Monopoly tamed
Rate of return regulation

• Alternative is to use accounting data so that the firm can only make a return of say \( \alpha \% \) on capital (or sales) and it must serve all customers

• Then its profit function becomes

\[ \Pi(q) = \alpha C(q) \] (rev is \((1+ \alpha) C(q)\), cost \(c(q)\))

• \( \text{Max} \ \Pi(q) \) is simple \( \text{max} \ C(q) \) which is \( \text{max} \ q \)
  – Sbj to constraint \((1+ \alpha) C(q)/q=p(q)\)
Regulated Monopoly

- Marginal Cost
- Average Costs
- Marginal Revenue

\[ p \]
\[ \alpha C(q) \]

Graph showing the relationship between price, marginal cost, and average costs in a regulated monopoly scenario.
Welfare Costs and the competitive fringe

• Are welfare costs likely to be large in reality (two barriers)
• Substitutes to goods produced by Monopoly?
• Entry
  – Except for natural monopolies, single firm businesses have to worry about entry.
  – If they take that into consideration, they will not chose quantities such that MR=MC
  – rather chose a quantity such that any other firm that might think of coming would not make any money.
    • Let plant level technology be such that $q^*$ is minimum efficient scale (MC=AC) for the industry.
    • If the monopolist chooses a $q_m$ such that $q_m \geq Q_c + q^*$
    • But that is likely to be quite a low price; in particular if economies of scale are limited.