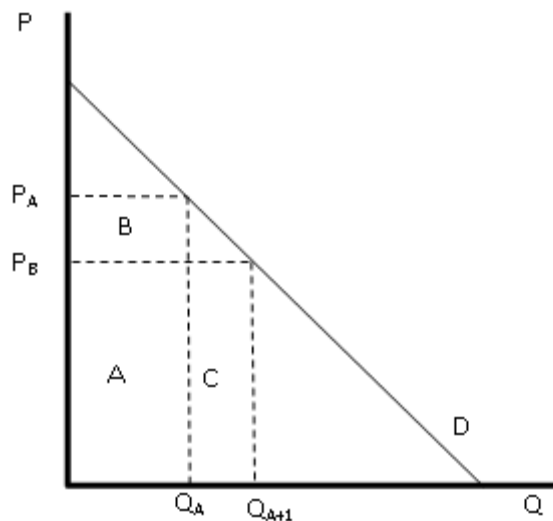


Lectures # 17 -- The Effects of Market Power: Monopolies

I. Marginal Revenue for a Monopolist

- We now begin to look at what happens if our assumptions about perfect competition are not satisfied. Our first example is monopoly.
- Monopoly -- An industry that has only one seller of the product, for which there are no close substitutes.
- Because the monopolist is the market, a monopolist has control over price.
 - Compare to a firm in perfect competition, in which each individual firm is a *price taker*.
- To increase quantity sold, a monopolist must lower its price *on each unit sold*. This has two effects:
 - The monopolist makes money on the additional quantity sold.
 - The monopolist loses money on the goods that it was already selling, as these are now sold at a lower price.

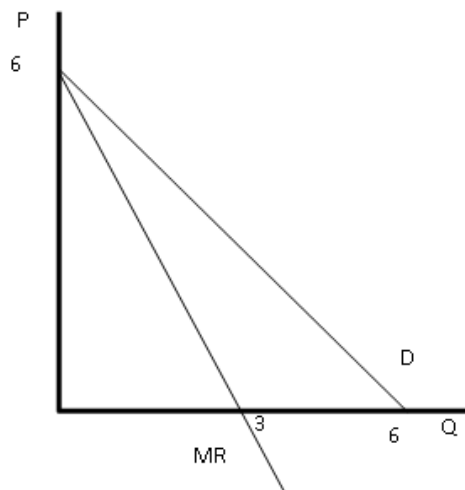


- Initially, at a price of P_A , the monopolist sells Q_A of the good.
 - Revenue equals areas $A + B$
- To sell one more unit of the good, the monopolist must lower the price to P_B .
 - Revenue equals areas $A + C$
 - The monopolist gains area C , but loses B
 - B represents the money no longer earned because the price is lower than before.
- Thus, marginal revenue = $C - B$
 - Note that area C equals P_B , since the difference between Q_A and Q_{A+1} equals 1.
 - Thus, MR at the new quantity must be less than P_B .
- Thus, for a monopolist, *marginal revenue is less than price*.

- The table below illustrates.
 - It uses the following demand curve: $P = 6 - Q$.
 - Note that, as the monopolist sells more, it must lower the price.
 - For instance, total revenue at $Q = 1$ is \$5.
 - If the monopolist wants to sell two units, it will charge a price of \$4. This price holds for each unit sold.
 - This brings in one new sale, and thus \$4 of revenue (area C on the previous graph).
 - But the monopolist loses \$1 (area B on the previous graph) on the first unit, which could have sold for \$5.
 - Thus marginal revenue is \$3 (= C - B on the previous graph)

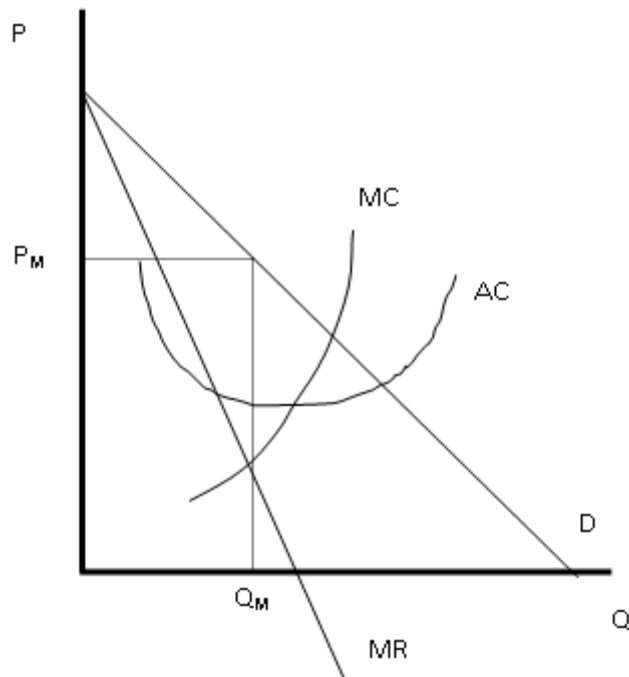
P	Q	TR	MR	AR
6	0	0	--	--
5	1	5	5	5
4	2	8	3	4
3	3	9	1	3
2	4	8	-1	2
1	5	5	-3	1
0	6	0	-5	0

- Bisection rule:
 - For a linear demand curve, the marginal revenue curve bisects the demand curve.
 - E.g.: If $P = a - bQ$, $MR = a - 2bQ$.
 - In the example below, demand is $P = 6 - Q$.
 - Thus, $MR = 6 - 2Q$.
 - Note that the marginal revenue curve goes through the x-axis at a quantity of 3, compared to a quantity of 6 for the demand curve. Thus, it cuts this distance in half. That is why this is called the bisection rule.

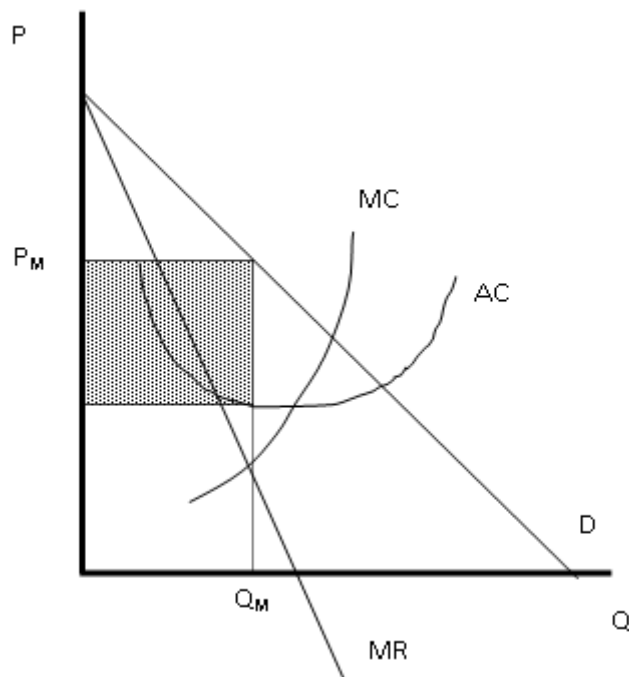


II. Profit Maximization for a Monopolist

1. As before, we find the optimal quantity by setting $MR = MC$.
 - However, note that P does *not* equal MR for a monopolist!
2. Since P does not equal MR , we get P by plugging Q^* into the demand curve.

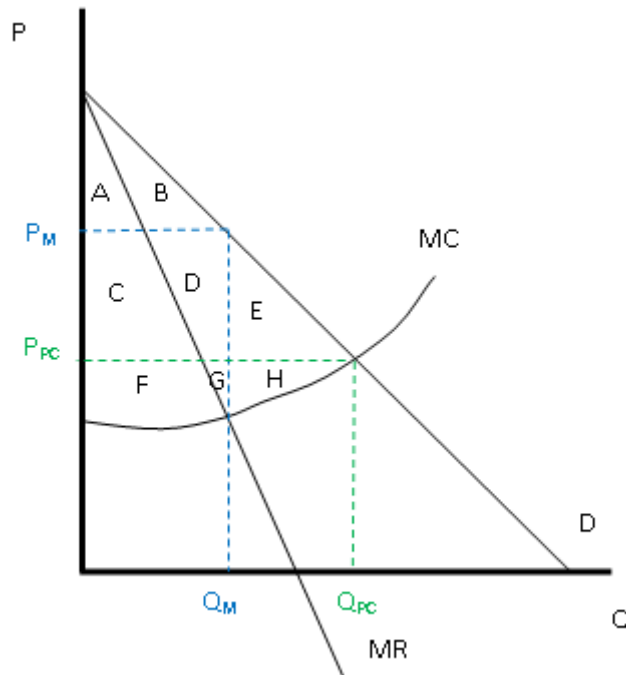


3. Profits can be calculated in the same way as in perfect competition.



III. Monopoly vs. Perfect Competition

- In perfect competition, $P = MR = MC$, whereas in monopoly, $P > MR = MC$.
 - Thus, price is greater than marginal cost in a monopoly, so it no longer reflects the scarcity of the good.
- Quantity is lower with a monopoly, and price is higher.
- Also, there is deadweight loss with a monopoly, since some potentially beneficial trades do not take place.



- In the illustration above, the monopolist finds where $MR = MC$. It chooses Q_M and P_M (shown in blue).
- If, instead, the industry consisted of several small firms, so that we had perfect competition, the MC curve would be the supply curve. The market would operate where $MC = D$, ending up with Q_{PC} and P_{PC} (shown in green).
- Note how consumer and producer surplus changes between perfect competition and monopoly.
 - Perfect competition:
 - Consumer surplus: $A + B + C + D + E$
 - Producer surplus: $F + G + H$
 - Monopoly:
 - Consumer surplus: $A + B$
 - Producer surplus: $C + D + F + G$
 - Deadweight loss: $E + H$

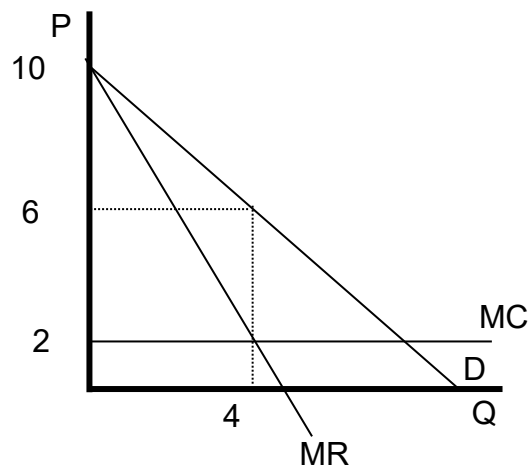
- Note how this relates to the equations for efficiency in perfect competition. In a monopoly, $P > MR$. Thus:
 - $MU_X/MU_Y = P_X/P_Y > MR_X/MR_Y = MC_X/MC_Y$
 - In this case, the marginal utility from the last unit of good X, for example, is greater than the marginal cost. There will be a deadweight loss.
- Unlike perfect competition, there is no entry when monopolies make profits (due to barriers to entry). Therefore, profits persist in the long run.
- Numerical example
 - Assumptions:
 - Demand: $P = 10 - Q$
 - $MC = 2$
 - $FC = 0$
 - Maximizing profits for a monopolist
 - Profits are maximized where $MR = MC$. We use the bisection rule to find the MR curve, which is $MR = 10 - 2Q$.

$$\begin{aligned}
 MR = 10 - 2Q &= 2 = MC \\
 8 &= 2Q \\
 Q &= 8/2 = 4
 \end{aligned}$$

- To get the price, we need to look at the demand curve, to see how much consumers are willing to pay for 4 units. We get:

$$P = 10 - Q = 10 - 4 = \mathbf{\$6}$$

- The graph for this market is shown below.



- Calculate profits:

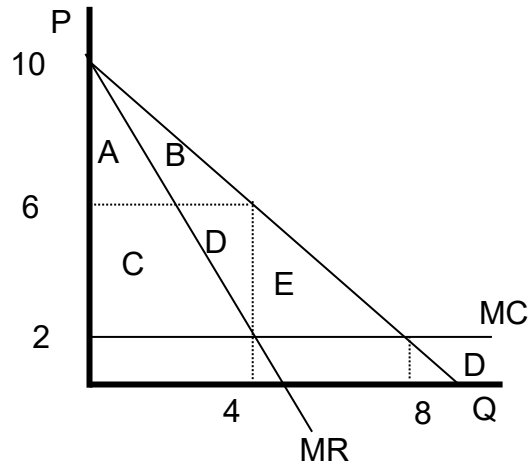
$$\begin{aligned}
 \text{profit} &= TR - TC \\
 \text{profit} &= P \times Q - TC \\
 \text{profit} &= (6)(4) - 2(4) \\
 \text{profit} &= 24 - 8 = \mathbf{\$16}
 \end{aligned}$$

- Compare to perfect competition
 - MC becomes the supply curve in perfect competition, so we set MC = Demand

$$P = 10 - Q = 2 = MC$$

$$Q = 8$$

- The price will equal the MC, which is \$2
 - Profits = TR – TC = (2)(8) – (2)(8) = 0.
- Compare welfare under perfect competition and monopoly



- Perfect competition
 - Consumer surplus = ABCDE = $0.5(8)(8) = \$32$
 - Producer surplus = \$0
- Monopoly:
 - Consumer surplus = A + B = $0.5(4)(4) = \$8$
 - Producer surplus = CD = $(4)(4) = \$16$
- Compare
 - CS has fallen by \$24.
 - PS increases by only \$16.
 - Thus, \$8 of welfare has disappeared. This is the deadweight loss.
 - Graphically, this is area E = $0.5(4)(4) = \$8$.

IV. What Causes Monopolies?

- Monopolies arise from barriers to entry.
 - Technical barriers to entry
 1. Economies of scale
 - Occurs when it is cheaper to produce large quantities because of falling average costs.
 - Natural monopoly -- an industry in which advantages of large scale production make it possible for a single firm to produce at a lower average cost than a number of small firms.
 2. Large sunk costs (fixed costs)
 - Often the cause of natural monopolies.
 3. Technical superiority
 - Note: this is not permanent.
 - Legal barriers to entry
 1. Patents
 2. Franchises awarded by contract
 3. Control of a scarce resource
 4. Barriers erected by firms to discourage entry

V. Regulating Monopolies

- Because monopolies lead to inefficiencies (measured by deadweight loss), they are regulated. There are two main types of regulation.

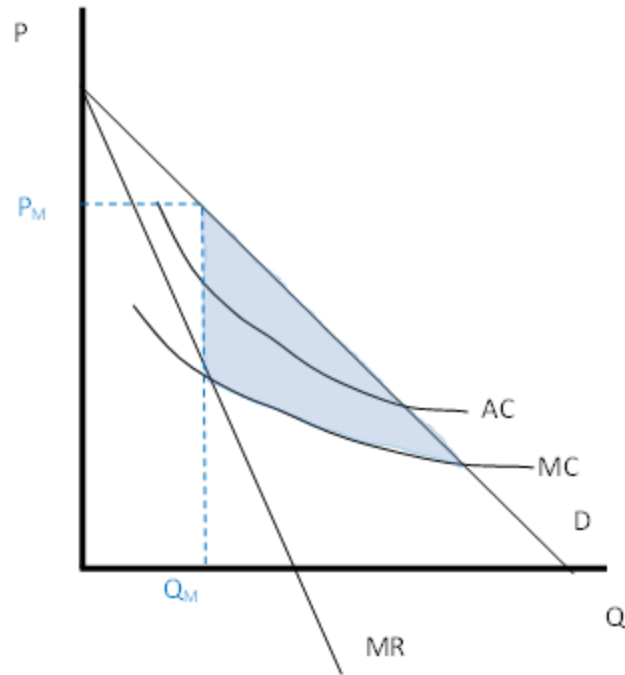
A. Anti-Trust Laws

- Regulating price is used for natural monopolies. In other cases, monopolies are prohibited by anti-trust laws.
- Sherman Act (1890)
 - Section one prohibits contracts, combinations, or conspiracies in restraint of trade.
 - Section two makes it illegal to monopolize or attempt to monopolize a market.
- Clayton Act (1914)
 - Helped to clarify the Sherman Act.
 - Prohibits actions that restrain competition.
- Enforcement:
 - Federal Trade Commission (created 1914)
 - Department of Justice's Anti-Trust Division
 - Private legal proceedings

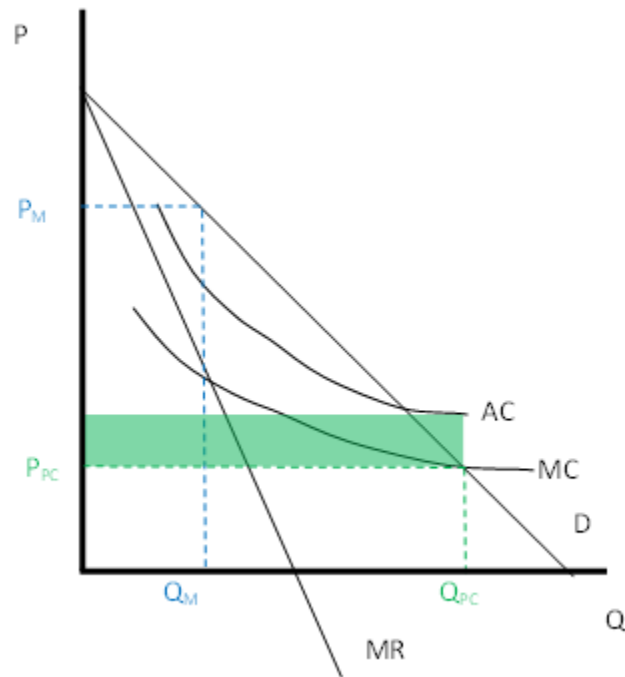
B. Regulating Price

- Whether the government is acting as a regulator of a monopoly firm or is providing the service as a monopoly themselves, determining the price at which to sell the good is an important question.
- The role of prices in the public sector
 - In the public sector, prices can still signal scarcity and value to consumers.
 - Consider, for example, providing water for free. That does not give consumers a signal to conserve.
 - But, prices can also play other roles.
 - Prices generate revenue to pay for goods and services
 - Particularly important to cover the fixed costs of infrastructure.
 - The marginal cost of crossing a bridge may be near 0, but recovering funds to pay for construction is still necessary.
 - Prices can be set lower than in the private sector:
 - To encourage consumption of desirable goods (e.g. public vs. private university tuitions)
 - For reasons of equity
 - Administrative costs are a concern
 - Erecting a toll bridge on a highway is easier than collecting entrance fees at every public park
- Price regulation is used for natural monopolies. Due to economies of scale, it is better to have one firm producing output than to have several small firms. Thus, we allow the monopoly, but regulate the price at which it sells output.

- Without regulation, the monopolist would determine price and quantity by operating where $MC = MR$. This results in a positive profit (although not shown below, we know there is profit because $P > AC$ at Q_M).
 - There is a deadweight loss here, because the price is greater than marginal cost. The deadweight loss is shaded in blue below.

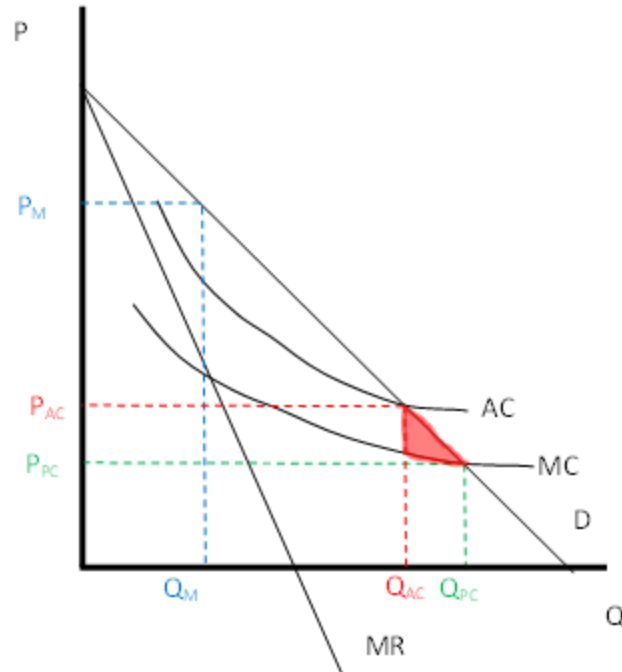


- Marginal cost pricing
 - Setting price equal to marginal cost provides the most efficient outcome
 - However, with a natural monopoly, AC is falling. Thus, setting the price equal to MC will lead to losses, since MC is less than AC when AC is falling.
 - The green rectangle below is the loss that occurs using marginal cost pricing.



- For a public sector organization, general revenues raise from taxes can be used to cover the fixed costs. Or, we could consider other pricing options discussed below.
- When regulating the private sector, we consider the alternatives below, since private sector firms won't be willing to operate at a loss.

- Average cost pricing -- set the price where $AC = AR = \text{demand}$. This yields zero economic profits.
 - In the graph below, determining price where $AC = \text{demand}$ results in some deadweight loss (shaded in red).



- Average cost pricing is thus less efficient than marginal cost pricing, but it allows the firm to continue to operate. Without it, this good wouldn't be provided, since the firm would lose money.
 - It is, however, more efficient than monopoly pricing, as the deadweight loss here is smaller than the deadweight loss shown in blue on the earlier graph.
- Average cost pricing can be implemented using rate of return regulation.
 - The regulatory agency decides on a "competitive" or "fair" rate of return for the utilities investments, based on what the rate of return is in other competitive industries.
 - Since economic profits include opportunity costs, such as the cost of not investing your money elsewhere, this also yields zero economic profits.

- Two-part tariff
 - Includes a flat fee, such as a membership fee, to use a service, plus a per-unit charge based on consumption.
 - The flat fee helps cover fixed costs
 - The per-unit charge can be based on marginal costs.
 - Charging consumers per unit gives them proper incentives to conserve.
 - But, the flat membership fee might discourage some low income users.
 - Using subsidies for the flat fee can address this concern.
 - For example, low income families could be exempt from the flat rate fee.
 - The flat fee will then need to be higher for other families to cover the fixed costs.
- Price discrimination
 - Charging different prices to different buyers of the same product.
 - Price discrimination allows the monopolist to capture more consumer surplus.
 - Examples:
 - Perfect Price Discrimination – Charging a different price to each consumer.
 - Each consumer is charged her reservation price -- the maximum she is willing to pay for each unit bought.
 - Allows the producer to capture all consumer surplus
 - However, difficult to implement in practice, as requires negotiating a price with each buyer.
 - Perfect price discrimination applies when prices are negotiated between buyers and sellers, such as buying a car.
 - Segmenting the market into two or more groups with different demands for a product in order to charge different prices to each group (e.g. student discounts, senior citizen discounts).
 - The article on pricing of popular community college courses in California is an example.