

Lecture # 16 – Perfect Competition and Economic Welfare/Monopolies

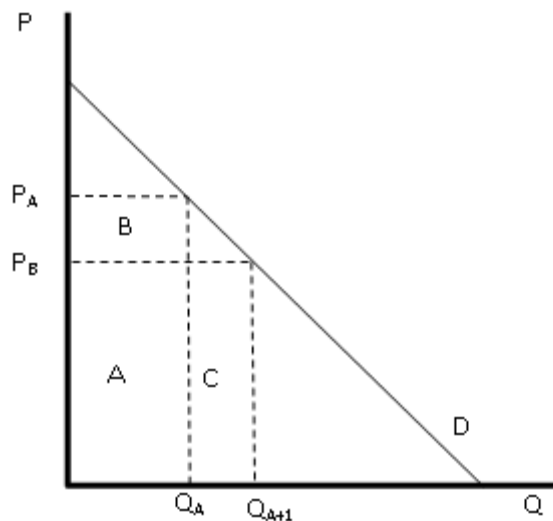
I. The Efficiency of the Competitive Market

- Recall the key questions regarding the allocation of scarce resources that we introduced on the first day of class:
 - How to utilize resources most efficiently
 - What to produce?
 - How to produce it?
 - E.g. how much capital and how much labor
 - How to allocate the goods and services that are produced?
- Now, consider how a perfectly competitive market answers these questions.
 - From marginal analysis, recall that resources are put to their highest value uses when marginal benefit = marginal cost.
 - Note that, in perfect competition, the market equates marginal benefit and marginal cost.
 - Recall that the demand curve tells us how much consumers are willing to pay for goods. This is the marginal benefit that they receive.
 - At the same time, recall that the supply curve comes from a firm's marginal cost curve.
 - Thus, equilibrium occurs where marginal benefit and marginal cost are equal. Also, note that the market price also equals marginal benefit and marginal cost.
 - Thus, both consumer tastes (represented by demand) and opportunity costs of using resources (represented by the supply curve) determine what is produced.
 - Furthermore, profit-maximizing firms will want to produce these goods as efficiently as possible. This determines how resources are allocated to production.
 - Thus, cost minimization leads to efficient use of inputs.
 - Note how this relates to our theories of consumer and producer behavior.
 - Consumers choose bundles so that $MU_X/MU_Y = P_X/P_Y$
 - Producers set $P = MC$
 - Thus, in perfect competition:
 - $MU_X/MU_Y = P_X/P_Y = MC_X/MC_Y$
 - Prices act as signals to balance the desires of consumers with the costs of using scarce resources to produce goods.
 - In perfect competition, prices act as a signal of:
 - The value of the good (relates to MU)
 - The cost of the good (relates to MC)

- The interpretation is that the simple act of individuals, each maximizing their own self-interest, leads to an efficient outcome.
 - Adam Smith referred to this as the "Invisible Hand" of the market.
 - Both firms and consumers maximize their own self-interest in response to the signals sent by market prices.
- Note that deviations from equilibrium are less efficient, because marginal cost and marginal benefit are not equal.
 - This is the deadweight loss that we discussed earlier in the semester.
 - For example, if quantity is too low, marginal benefit is greater than marginal cost. The benefits of additional quantity outweigh the additional costs.
- Market failure occurs when the equalities discussed above do not hold.
 - In these instances, government intervention may produce better results.
 - This may occur because a market does not fit the assumptions of perfect competition, or it may occur because the government intervenes in a competitive market.
 - The articles on water pricing illustrates what can happen when a government intervenes.
 - Because water is subsidized in many places, the price consumers pay does not reflect the true costs of using scarce water resources.
 - As a result, users do not have incentive to conserve water.
 - However, these subsidies are popular because they help ensure access to water for low-income families.
 - Thus, alternative policy options, such as block pricing, are often considered as alternatives.

II. 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.
- This can be seen on the graph below

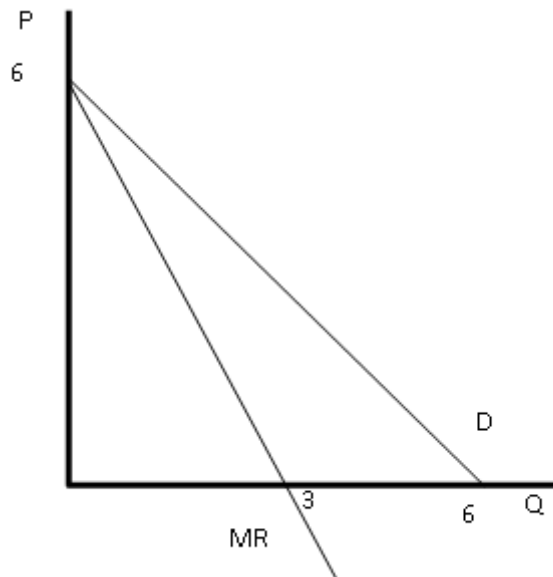


- Initially, at a price of P_A , the monopolist sells Q_A of the good.
 - Revenue equals areas $A + B$
- To sell one more unit of the good, the monopolist must lower the price to P_B .
 - Revenue equals areas $A + C$
 - The monopolist gains area C , but loses B
 - B represents the money no longer earned 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 .*
 - Area B is the change in price \times initial quantity
- 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)

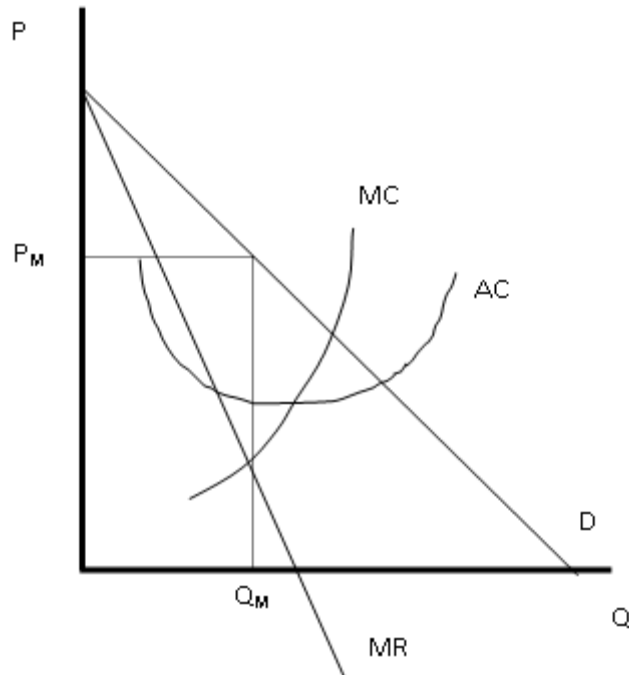
P	Q	TR	MR	AR
6	0	0	--	--
5	1	5	5	5
4	2	8	3	4
3	3	9	1	3
2	4	8	-1	2
1	5	5	-3	1
0	6	0	-5	0

- 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.

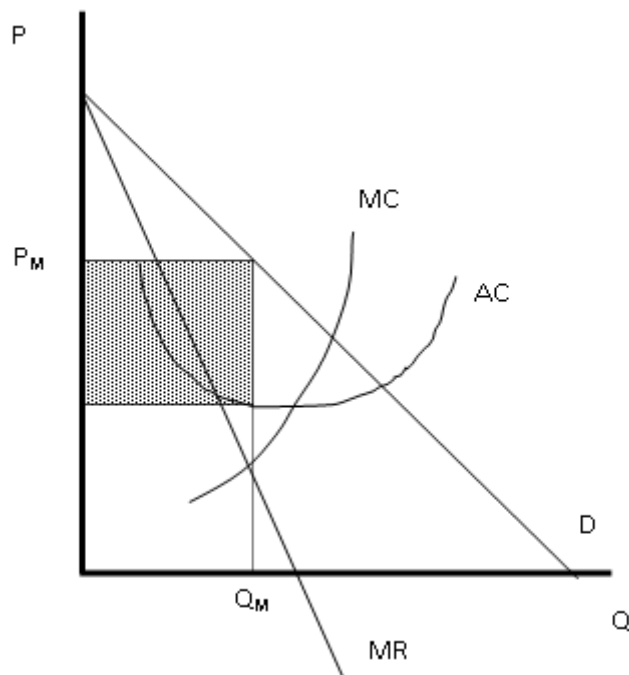


III. Profit Maximization for a Monopolist

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.

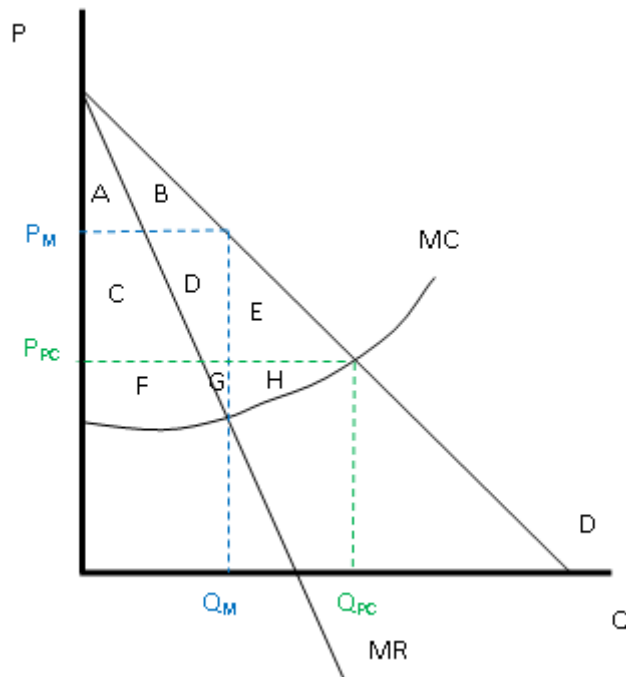


3. Profits can be calculated in the same way as in perfect competition.



IV. 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 also how this inefficiency 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

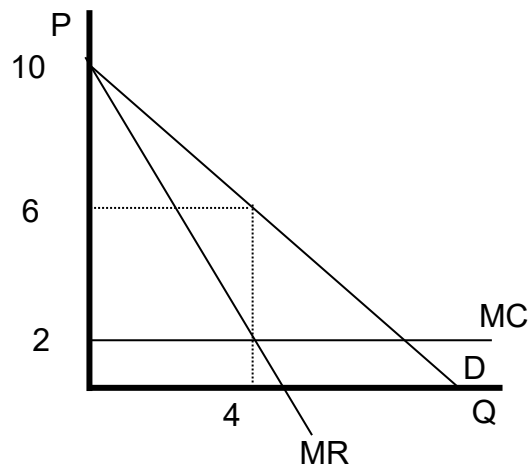
- Assumptions:
 - Demand: $P = 10 - Q$
 - $MC = 2$
 - $FC = 0$
- Maximizing profits for a monopolist
 - Profits are maximized where $MR = MC$. We use the bisection rule to find the MR curve, which is $MR = 10 - 2Q$.

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

- 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:

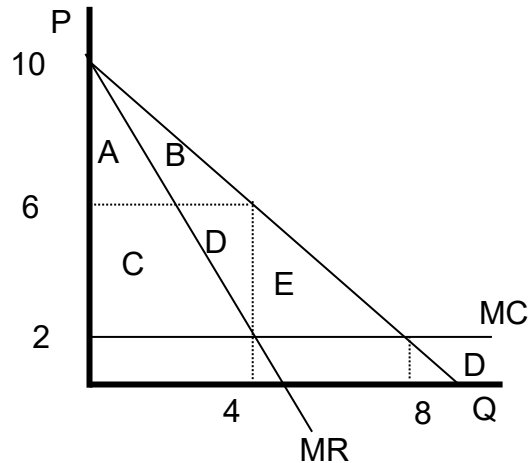
$$\begin{aligned} \text{profit} &= TR - TC \\ \text{profit} &= P \times Q - TC \\ \text{profit} &= (6)(4) - 2(4) \\ \text{profit} &= 24 - 8 = \mathbf{\$16} \end{aligned}$$

- 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 = $0.5(4)(4) = \$8$.