Lecture # 16 – Perfect Competition and Economic Welfare/Monopolies

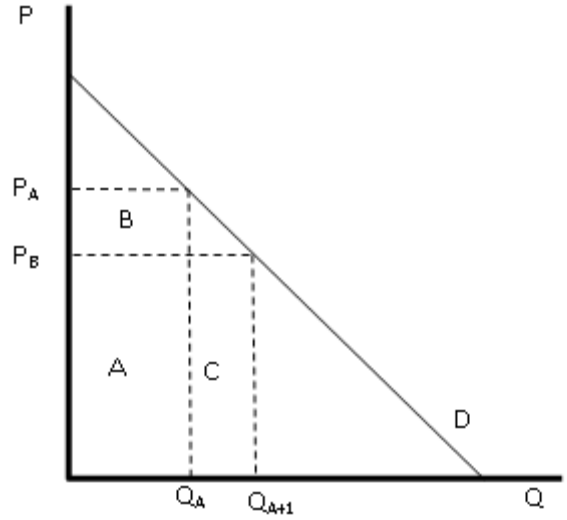
I. The Efficiency of the Competitive Market

- 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

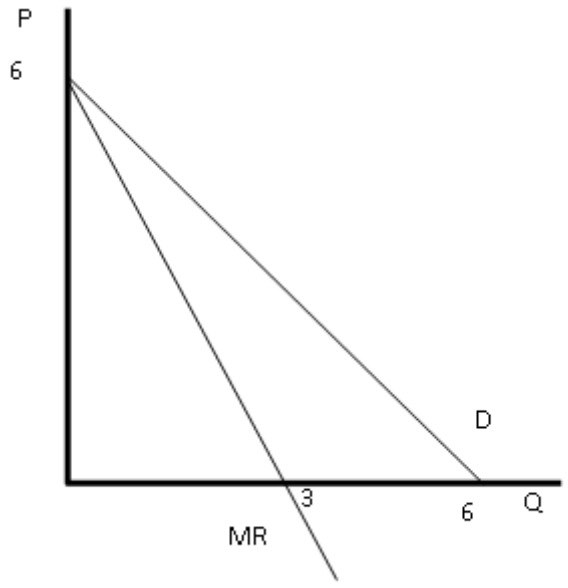


- Initially, at a price of P_A, the monopolist sells Q_A of the good.
    - Revenue equals areas A + B
- To sell one more unit of the good, the monopolist must lower the price to P_B.
    - Revenue equals areas A + C
        - The monopolist gains area C, but loses B
        - B represents the money 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 X 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)

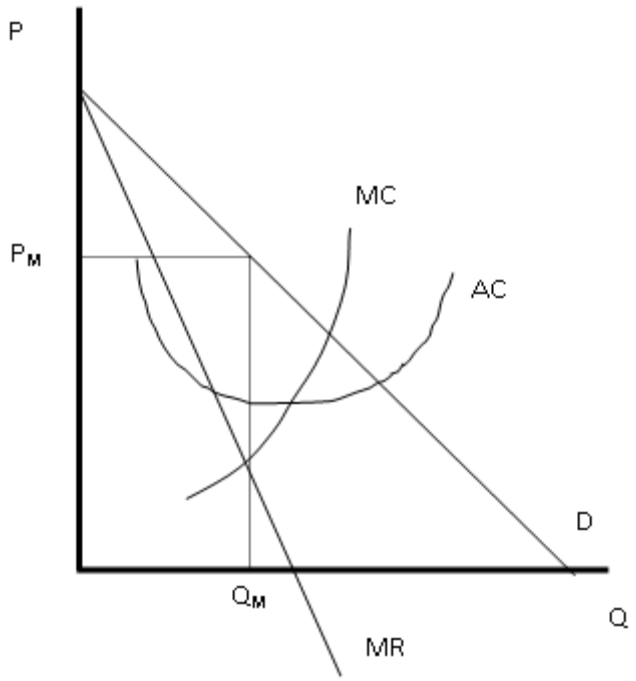
P	Q	TR	MR	AR
6	0	0	--	--
5	1	5	5	5
4	2	8	3	4
3	3	9	1	3
2	4	8	-1	2
1	5	5	-3	1
0	6	0	-5	0

- 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.

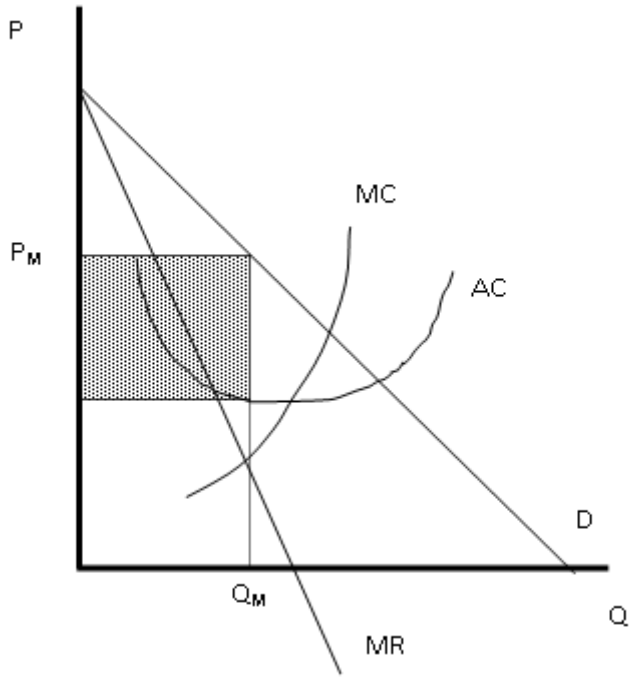


III. Profit Maximization for a Monopolist

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.

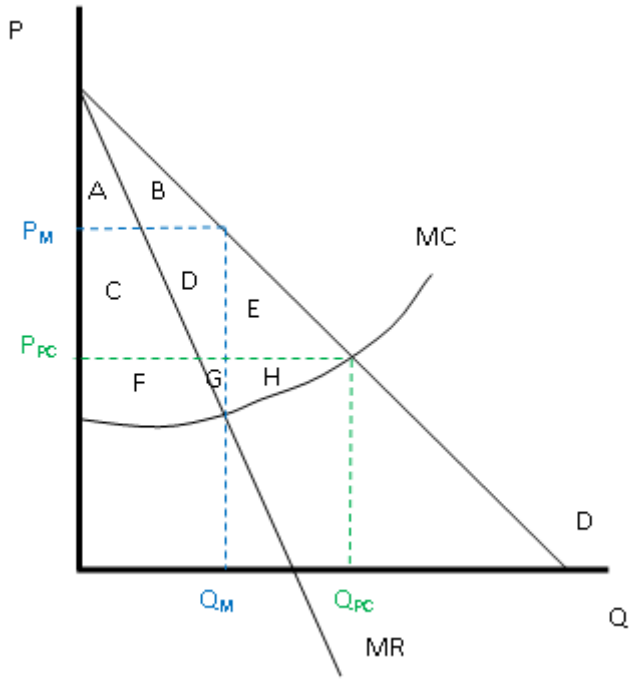


3. Profits can be calculated in the same way as in perfect competition.



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.

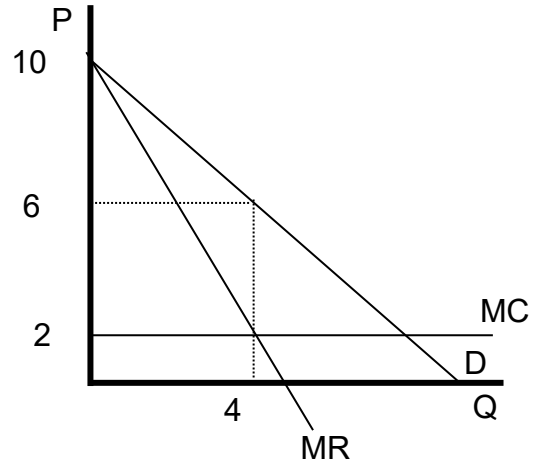
- Numerical example
  - Assumptions:
    - Demand: P = 10-Q
    - MC = 2
    - FC = 0
  - Maximizing profits for a monopolist
    - Profits are maximized where MR=MC. We use the bisection rule to find the MR curve, which is MR = 10-2Q.

$$MR = 10-2Q = 2 = MC$$
$$8 = 2Q$$
$$Q = 8/2 = \mathbf{4}$$

    - 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:

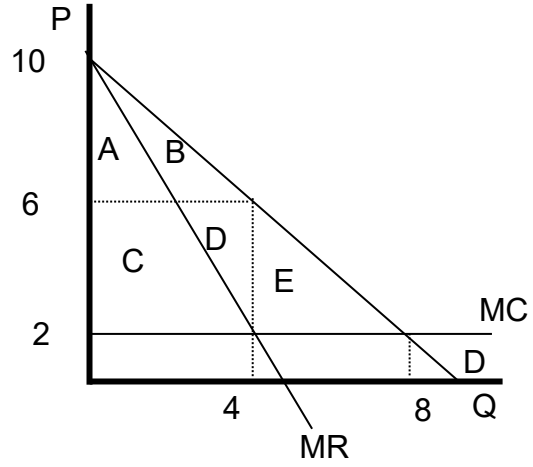
$$profit = TR - TC$$
$$profit = PxQ - TC$$
$$profit = (6)(4) - 2(4)$$
$$profit = 24 - 8 = \mathbf{\$16}$$

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

$$P = 10 - Q = 2 = MC$$
$$\mathbf{Q = 8}$$

  - 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.