CHAPTER 12 LECTURE – CAPTURING SURPLUS

Uniform Price Vs. Price Discrimination

- A monopolist charges a uniform price if it sets the same price for every unit of output sold.
- While the monopolist captures profits due to an optimal uniform pricing policy, it does not receive the consumer surplus or dead-weight loss associated with this policy.
- The monopolist can overcome this by charging more than one price for its product.
- A monopolist price discriminates if it charges more than one price for the same good or service.

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Price Discrimination

- **Price discrimination:** a practice where the monopolist charges different prices to different buyers.
- ***First-degree price discrimination:*** is the term used to describe the largest possible extent of market segmentation. The firm tries to price each unit at the consumer's reservation price (i.e., the maximum price that the consumer is willing to pay for that unit).
- **Second-degree price discrimination**: price discrimination where the same rate structure is available to every consumer and the limited number of rate categories tends to limit the amount of consumer surplus that can be captured. The firm offers consumers quantity discounts—the price per unit goes down if the consumer buys more units.
- **Third-degree price discrimination**: charging different prices to buyers in completely separate markets.

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Necessary Conditions

- A firm must have some market power to price discriminate. In other words, the demand curve the firm faces must be downward sloping.
- The firm must have some information about the different amounts people will pay for its product. The firm must know how reservation prices or elasticities of demand differ across consumers.
- A firm must be able to prevent resale, or arbitrage. If the firm cannot prevent resale, then a customer who buys at a low price can act as a middleman, buying at a low price and reselling the good to other customers who are willing to pay more for it. In that case, the middleman, not the firm that sells the good initially, captures the surplus.

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"Willingness to Pay" Curve

- **The consumer's maximum willingness to pay is called the consumer's reservation price.**
- **Think of the demand curve as a "willingness to pay" curve.**
- **If the monopolist can observe the willingness to pay of each customer (based on, for example, residence, education, "look", and so on), then the monopolist can observe demand perfectly and can "perfectly" price discriminate.**

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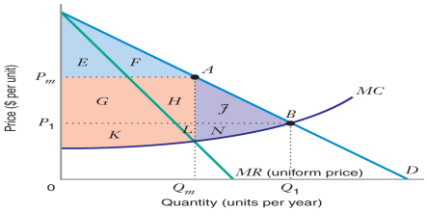
First Degree or Perfect Price Discrimination



	Uniform Pricing	First-Degree Price Discrimination
Consumer surplus	$E + F$	zero
Producer surplus	$G + H + K + L$	$E + F + G + H + J + K + L + N$
Total surplus	$E + F + G + H + K + L$	$E + F + G + H + J + K + L + N$
Deadweight loss	$J + N$	zero

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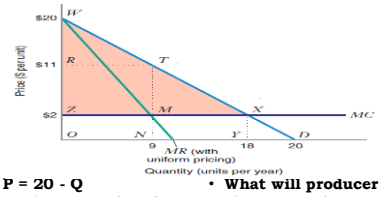
Pricing Surplus – Monopoly



- **MC = 2, P = 20 - Q**
- **What is producer surplus if uniform pricing is followed?**

MR = 20 - 2Q
MR = MC => 20 - 2Q = 2

=> Q* = 9 P* = 11

PS= Revenue - TVC
= PQ – 2Q = 11(9)-2(9) = 81

- **What will producer surplus be if the monopolist perfectly price discriminates?**

P = MC => 20 - Q = 2 =>Q* = 18

Revenue - TVC
= [18(20-2)(1/2) + 18(2)]-18(2)
= 162

This is a gain in captured surplus of 81

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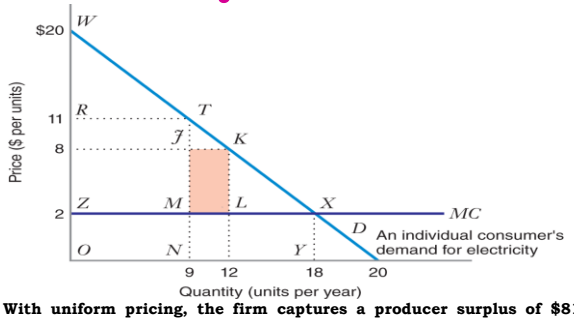
Second-Degree Price Discrimination



With uniform pricing, the firm captures a producer surplus of $81 (equal to area RTMZ). With a block tariff, the firm charges a price of $11 for the first 9 units a consumer purchases and a price of $8 for the three additional units. This example of second-degree price discrimination lets the firm capture a producer surplus of $99 (areas RTMZ + JKLM).

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Model of Third- Degree Price Discriminating Monopolist

1. Firm produces for two different markets: 1, 2
2. Firm charges two different prices in each market: P_1, P_2
3. Goal of firm is to maximize profit.

- Suppose that marginal costs for the two markets are the same. How does a monopolist maximise profit with this type of price discrimination?
- Set the marginal revenue in each market equal to marginal cost. (i.e., the monopolist maximises total profits by maximising profits from each group individually.)
- This implies that MR_1 = MC = MR_2 at the optimum. Otherwise, the monopolist could raise revenues by switching sales from the low MR group to the high MR group.

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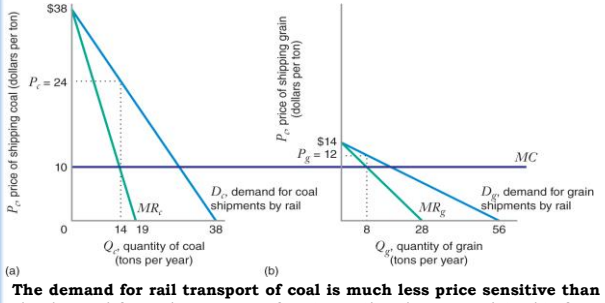
Third – Degree Price Discrimination: Different Prices for Different Market Segments



The demand for rail transport of coal is much less price sensitive than the demand for rail transport of grain. Railroads can exploit this fact, using third-degree price discrimination to set a much higher profit-maximizing price for coal than for grain, even though the marginal costs of transporting the two goods are the same.

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Example

We have one firm selling in two separate markets 1 and 2

$TR = TR_1 + TR_2 \qquad TR_1 = P_1Q_1 \qquad TR_2 = P_2Q_2$

$$\pi = P_1Q_1 + P_2Q_2 - TC(Q_1 + Q_2)$$

We want to find the level of Q_1 and Q_2 that maximizes profit.

$$\frac{d\pi}{dQ_1} = MR_1 - MC = 0$$

$$\frac{d\pi}{dQ_2} = MR_2 - MC = 0$$

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Example

We will assume that MC = AC = 20

Demand Curve in Market 1 is $P_1 = 100 - Q_1$
Demand Curve in Market 2 is $P_2 = 80 - 2Q_2$

What is the optimal price for each group?

You can show that $MR_1 = 100 - 2Q_1$ and $MR_2 = 80 - 4Q_2$

We know MC = 20 and we set $MR_1 = MR_2 = MC$

Setting $MR_1 = 100 - 2Q_1 = 20$ and $MR_2 = 80 - 4Q_2 = 20$

$Q_1^* = 40 \qquad Q_2^* = 15 \qquad P_1^* = 60 \qquad P_2^* = 50$

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Looking at Elasticities in Each Market

Firm maximizes profit by producing where $MR_1 = MC$, $MR_2 = MC$ or $MR_1 = MR_2$

Solving:

$$MR_1 = P_1(1+\frac{1}{E_1})$$

$$MR_2 = P_2(1+\frac{1}{E_2})$$

Or

$$\frac{P_1}{P_2} = \frac{\left(1+\frac{1}{E_2}\right)}{\left(1+\frac{1}{E_1}\right)}$$

Let's assume $E_1 = -2$ and $E_2 = -4$

$$\frac{P_1}{P_2} = \frac{\left(1+\frac{1}{E_2}\right)}{\left(1+\frac{1}{E_1}\right)} = \frac{\left(1+\frac{1}{-4}\right)}{\left(1+\frac{1}{-2}\right)} = \frac{.75}{.5} = 1.5 \qquad P_1 = 1.5P_2$$

Firm will charge higher price in market which has the lower price elasticity of demand. (E must be greater than 1)

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Inverse Elasticity Pricing Rule

In the last chapter we showed that the IEPR is

$$\frac{P-MC}{P} = -\frac{1}{E_{Q,P}}$$

We can solve this for P and we have

$$P = \frac{MC}{\left(1+\frac{1}{E_{Q,P}}\right)}$$

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Simple Problem

- **A monopolist faces two market segments. In each market segment, the demand curve is of the constant elasticity form.**
- **In market segment 1, the price elasticity of demand is -3, while in market segment 2, the price elasticity of demand is -1.5.**
- **The monopolist has a constant marginal cost of $5 per unit, which is the same in each market segment. What is the monopolist's profit maximizing price in each segment?**

We use the inverse elasticity rule to determine the profit-maximizing prices:

$P_1 = MC[1/(1 + 1/\varepsilon_1)] = 5[1/(1+1/(-3))] = 5(3/2) = 7.5$

$P_2 = MC[1/(1 + 1/\varepsilon_2)] = 5[1/(1+1/(-1.5))] = 5(3) = 15$

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More Difficult Problem

- **Suppose that Acme Pharmaceutical Company discovers a drug that cures the common cold. Acme has plants in both the United States and Europe and can manufacture the drug on either continent at a marginal cost of 10.**
- **In Europe, the demand for the drug is $Q_E = 70 - P_E$, where Q_E is the quantity demanded when the price in Europe is P_E.**
- **In the US, the demand for the drug is $Q_U = 110 - P_U$, where Q_U is the quantity demanded when the price in the US is P_U.**
- **If the firm can engage in third-degree price discrimination, what price should it set on each continent to maximize its profit?**

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Solution

With third-degree price discrimination the firm should set MR=MC in each market to determine price and quantity. Thus, in Europe setting MR=MC

$$70 - 2Q_E = 10$$
$$Q_E = 30$$

At this quantity, price will be $P_E = 40$. Profit in Europe is then $\pi_E = (P_E - 10)Q_E = (40 - 10)30 = 900$.

Setting MR = MC in the US implies

$$110 - 2Q_U = 10$$
$$Q_U = 50$$

At this quantity price will be $P_U = 60$. Profit in the US is then $\pi_U = (P_U - 10)Q_U = (60 - 10)50 = 2500$.

Total Profit = 900+2500 = 3400

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Problem Continued

Assume now that it is illegal for the firm to price discriminate, so that it can charge only a single price P on both continents. What price will it charge, and what profits will it earn?

Remember that in Europe, the demand for the drug is $Q_E = 70 - P_E$
In the US, the demand for the drug is $Q_U = 110 - P_U$

The total demand is $Q = Q_E + Q_U = 70 - P + 110 - P = 180 - 2P$

Looking at the inverse demand function we get $P = 90 - 0.5Q$

Since MC = 10, setting MR = MC implies $90 - Q = 10$ *or* $Q = 80$

At this quantity price will be $P = 50$. If the firm sets price at 50, the firm will sell $Q_E = 20$ and $Q_U = 60$.

Profit will be $\pi = 50(80) - 10(80) = 3200$. **Better off by discriminating. 3400 > 3200**

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Two Part Tariff

- **A monopolist charges a two part tariff if it charges a per unit fee, r, plus a lump sum fee (paid whether or not a positive number of units is consumed), F.**
- **This, effectively, charges demanders of a low quantity a different average price than demanders of a high quantity.**

Block Tariff

If a consumer pays one price for one block of output and another price for another block of output, the consumer faces a block tariff.

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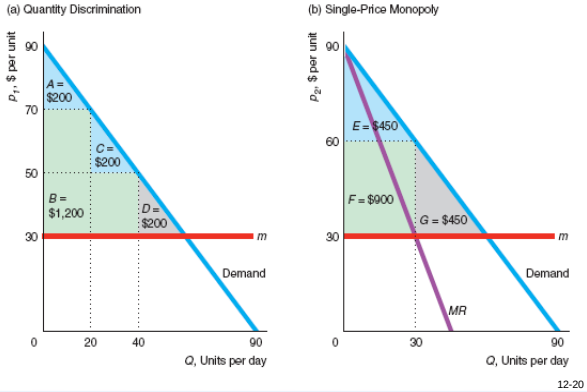
Block Pricing



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Tie-in Sales – Requirements

- A tie-in sale occurs if customer can buy one product only if they agree to purchase another product as well.
- Requirements tie-in sales occur when a firm requires customers who buy one product from the firm to buy another product from the firm.
- A requirements tie-in sale may be used in place of price discrimination when the firm cannot observe the relative willingness to pay of different customers.

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Tie-in Sales – Bundling

- Package tie-in sales (or bundling) occur when goods are combined so that customers cannot buy either good separately.
- Bundling may be used in place of price discrimination to increase producer surplus when consumers have different willingness to pay for the goods sold in the bundle

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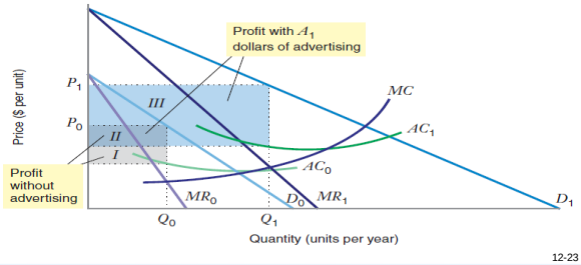
Effects of Advertising

- The firm can capture surplus using nonprice strategies such as advertising
- When the firm does not advertise, its maximum profit is areas I + II
- When the firms spends A_1 dollars on advertising, its maximum profit is areas II + III



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"It says the cost of the flight went up because we acknowledged its existence."

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