

## **Topic 9 Part 2**

# **Price Discrimination (Chapter 12)**

# Price Discrimination Summary

## 1<sup>st</sup> Degree

The monopolist charges each consumer the maximum price he/she is willing to pay.

## 2<sup>nd</sup> Degree

Price varies according to quantity demanded, i.e. quantity discount.

## 3<sup>rd</sup> Degree

The monopolist charges different prices for different consumer groups.

# 3<sup>rd</sup> Degree Price Discrimination

For the monopolist to implement the **3<sup>rd</sup> Degree PD**, it has to be able to “**screen**” consumers.

**Screening** is a process for sorting consumers based on their **characteristics**.

These characteristics can be

- Observable, e.g. sex and age.
- Unobservable but inferable, e.g. PED and willingness to pay.

# 3<sup>rd</sup> Degree Price Discrimination

## Two Interesting Screening Mechanisms

### **Time**

- Some consumers want to be the first who own the product.
- Sellers price goods higher when they are first introduced.

### **Coupons and Rebates** (a partial refund)

- For example, you buy a printer ink cartridge for \$20, when it is empty, you can send it to the seller and get a rebate of \$2.
- Consumer who take time to process rebates shows that they are price-sensitive.
- Sellers will offer lower prices for these consumers.

# 3<sup>rd</sup> Degree Price Discrimination

## 3<sup>rd</sup> Degree Price Discrimination with Capacity Constraints

**Capacity Constraints:** Production or supply of goods is limited, e.g. seats of airlines, cars of car rentals, etc.

Suppose that the monopolist can produce up to  $Q'$  units.

It is to supply  $Q'$  units of output in two market segments.

How should it allocate  $Q'$  between these two segments?

# 3<sup>rd</sup> Degree Price Discrimination

## 3<sup>rd</sup> Degree Price Discrimination with Capacity Constraints

Let  $Q_1$  be quantity supplied to Segment 1  
 $Q_2$  be quantity supplied to Segment 2

**It should allocate  $Q' = Q_1 + Q_2$   
such that  $MR(Q_1) = MR(Q_2)$ .**

If  $MR(Q_1) > MR(Q_2)$ , it can increase revenue and hence profit by supplying more quantity in Segment 1.

# 3<sup>rd</sup> Degree Price Discrimination



## LEARNING-BY-DOING EXERCISE 12.6

### Price Discrimination Subject to Capacity Constraints

This exercise shows you how to determine the profit-maximizing prices and quantities for a firm that wants to engage in third-degree price discrimination but operates with a capacity constraint.

Suppose that the demand curve in market segment 1 is  $Q_1 = 200 - 2P_1$  and the demand curve in market segment 2 is  $Q_2 = 250 - P_2$ . The marginal cost of selling in each market segment is \$10 per unit. The firm's overall capacity is 150 units.

**Problem** What are the profit-maximizing quantities and prices in each market segment?

# Third Degree Price Discrimination

## Implementing the 3<sup>rd</sup> Degree Price Discrimination

Suppose the monopolist cannot “screen” consumers.

How can it ensure that the consumers targeted to pay the high price ACTUALLY pay the high price?

**Versioning** refers to a strategy of selling two or more versions of a product with different quality levels at different prices.

Versioning takes advantage of the trait that the least price-sensitive buyers tend to be the most quality-sensitive.

# Third Degree Price Discrimination

## Implementing the 3<sup>rd</sup> Degree Price Discrimination

**Damaged Goods Strategy** refers to a versioning strategy in which the firm creates a low-end version of its full-price good by deliberately damaging the product.

For example, one version of a 1990 IBM laser printer was “added” chips to slow down printing speed.

Other examples include goods in shopping outlets.

# Tie-in Sales

**Apart from Price Discrimination, ANY FIRMS with market power have another technique that can be used to “capture” surplus from consumers.**

**Definition:** A **tie-in sale** occurs if customer can buy one product **ONLY IF** they agree to purchase another product as well. Examples include printers and ink cartridges, photocopiers and papers, computers and monitors, etc.

**The firm can extend its market power from one product to the other.**

# Tie-in Sales – Bundling

**Package tie-in sales** (or *bundling*) occur when goods are combined so that customers cannot buy either good separately.

For example, one Disney Land ticket includes “admission fee” and “roller coaster fee”.

**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.

**Bundling MAY NOT increase profit.**

# Tie-in Sales – Bundling

**TABLE 12.2** Bundling Can Increase Profit When Customer Preferences Are Negatively Correlated

	Reservation Price (maximum willingness to pay)	
	Computer	Monitor
Customer 1	\$1,200	\$600
Customer 2	\$1,500	\$400
Marginal cost	\$1,000	\$300

## WITHOUT Bundling

Max. profit from computer = 500, i.e. sold to Customer 2.

Max. profit from monitor = 300, i.e. sold to Customer 1.

Max. total profit = 500 + 300 = 800.

# Tie-in Sales – Bundling

**TABLE 12.2** Bundling Can Increase Profit When Customer Preferences Are Negatively Correlated

	Reservation Price (maximum willingness to pay)	
	Computer	Monitor
Customer 1	\$1,200	\$600
Customer 2	\$1,500	\$400
Marginal cost	\$1,000	\$300

## WITH Bundling (MC = 1300)

**At  $P^* = 1800$** , BOTH customers buy the bundle.

Total Profit =  $500 \times 2 = 1000$ .

**At  $P = 1900$** , ONLY Customer 2 buys the bundle.

Total Profit = 600.

# Tie-in Sales – Bundling

**TABLE 12.3** Bundling Does Not Increase Profit When Customer Preferences Are Positively Correlated

	Reservation Price (maximum willingness to pay)	
	Computer	Monitor
Customer 1	\$1,200	\$400
Customer 2	\$1,500	\$600
Marginal cost	\$1,000	\$300

## WITHOUT Bundling

Max. profit from computer = 500, i.e. sold to Customer 2.

Max. profit from monitor = 300, i.e. sold to Customer 2.

Max. total profit = 500 + 300 = 800.

# Tie-in Sales – Bundling

**TABLE 12.3** Bundling Does Not Increase Profit When Customer Preferences Are Positively Correlated

	Reservation Price (maximum willingness to pay)	
	Computer	Monitor
Customer 1	\$1,200	\$400
Customer 2	\$1,500	\$600
Marginal cost	\$1,000	\$300

## WITH Bundling (MC = 1300)

At  $P = 1600$ , BOTH customers buy the bundle.

Total Profit =  $300 \times 2 = 600$ .

**At  $P^* = 2100$ , ONLY Customer 2 buys the bundle.**

Total Profit w/ Bundling = 800 = Total Profit w/o Bundling

# Tie-in Sales – MIXED Bundling

**Mixed Bundling** is when firms allow customers to purchase components individually as well as in bundles.

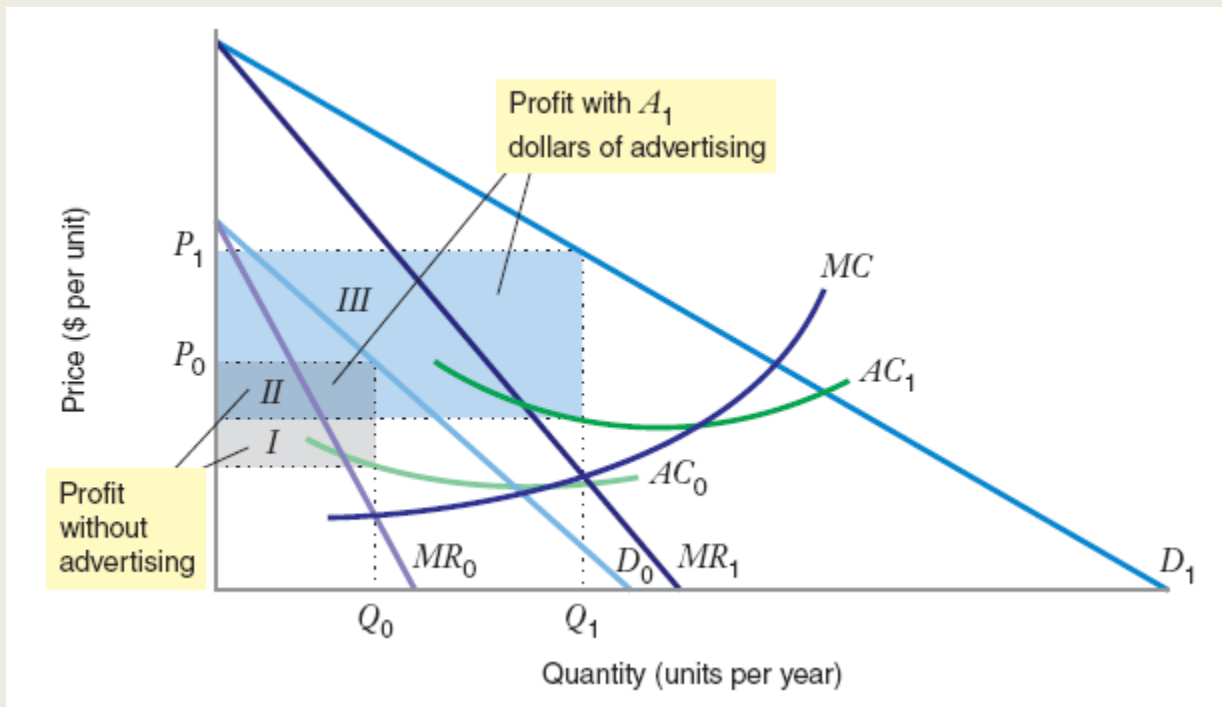
- The firm should sell only computer to Customer 4.
- It should sell only monitor to Customer 1.
- For Customers 2 and 3, it can offer bundles.

**TABLE 12.4** Mixed Bundling Can Increase Profit

	Reservation Price (maximum willingness to pay)	
	Computer	Monitor
Customer 1	\$ 900	\$800
Customer 2	\$ 1,100	\$600
Customer 3	\$1,300	\$400
Customer 4	\$1,500	\$200
Marginal cost	\$1,000	\$300

# Advertising

The firm can capture surplus using **non-price strategies** such as advertising.



# Advertising

**Advertising comes with costs;** therefore, for a firm to maximize profit, two conditions must hold:

1) Quantity is optimally chosen:

$$MR(Q) = MC(Q)$$

2) Expenditure on Advertising is optimally chosen:

$$MR(A) = MC(A)$$

# Advertising

Recall the Inverse Elasticity Pricing Rule (IEPR):

$$\frac{P - MC}{P} = -\frac{1}{\varepsilon}$$

**The IEPR tells us the profit-maximizing price.**

**We can derive a similar expression for a profit-maximizing firm to choose the optimal level of advertising:**

$$\frac{A}{PQ} = -\frac{\theta}{\varepsilon}$$

where  $\theta$  is the advertising elasticity of demand.

LHS = ratio of advertising expenditure to TR

RDH = ratio of the two elasticities

# Advertising



## LEARNING-BY-DOING EXERCISE 12.7

### Markup and Advertising-to-Sales Ratio

Suppose you own a restaurant specializing in fine steak dinners, and you want to maximize your profits. Your marketing studies have revealed that your own price elasticity of demand is  $-1.5$  and that your advertising elasticity of demand is  $0.1$ . Assume that these elasticities are constant, even if you change your price and your level of advertising.

#### Problem

- (a) Interpret the advertising elasticity of demand.
- (b) How much should you mark up your price over marginal cost of your dinners? What should your advertising-to-sales ratio be?