

# **Price Discrimination (Chapter 12)**

**-Continued-**

# 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.**

## 11.5 BUNDLING



- **bundling** Practice of selling two or more products as a package.

To see how a film company can use customer heterogeneity to its advantage, suppose that there are two movie theaters and that their reservation prices for these two films are as follows:

	Gone with the Wind	Getting Gertie's Garter
Theater A	\$12,000	\$3000
Theater B	\$10,000	\$4000

If the films are rented separately, the maximum price that could be charged for *Wind* is \$10,000 because charging more would exclude Theater *B*. Similarly, the maximum price that could be charged for *Gertie* is \$3000.

But suppose the films are *bundled*. Theater *A* values the pair of films at \$15,000 (\$12,000 + \$3000), and Theater *B* values the pair at \$14,000 (\$10,000 + \$4000). Therefore, we can charge each theater \$14,000 for the pair of films and earn a total revenue of \$28,000.

## 11.5 BUNDLING



### Relative Valuations

Why is bundling more profitable than selling the films separately?  
Because the *relative valuations* of the two films are reversed.

The demands are *negatively correlated*—the customer willing to pay the most for *Wind* is willing to pay the least for *Gertie*.

To see why this is critical, suppose demands were *positively correlated*—that is, Theater *A* would pay more for *both* films:

	Gone with the Wind	Getting Gertie's Garter
Theater A	\$12,000	\$4000
Theater B	\$10,000	\$3000

If we bundled the films, the maximum price that could be charged for the package is \$13,000, yielding a total revenue of \$26,000, the same as by renting the films separately.

## 11.5 BUNDLING

### Relative Valuations

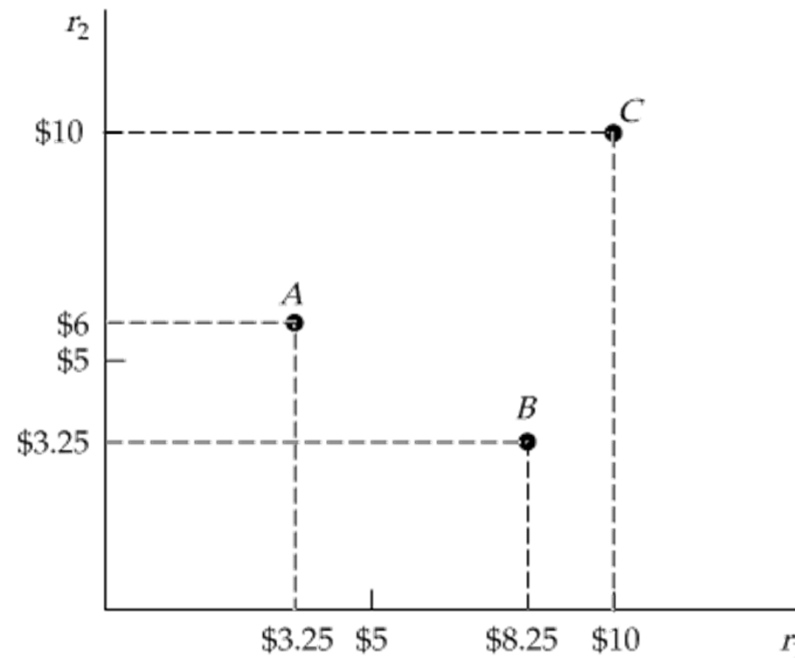


Figure 11.12

#### Reservation Prices

Reservation prices  $r_1$  and  $r_2$  for two goods are shown for three consumers, labeled  $A$ ,  $B$ , and  $C$ .

Consumer  $A$  is willing to pay up to \$3.25 for good 1 and up to \$6 for good 2.



## 11.5 BUNDLING

### Relative Valuations

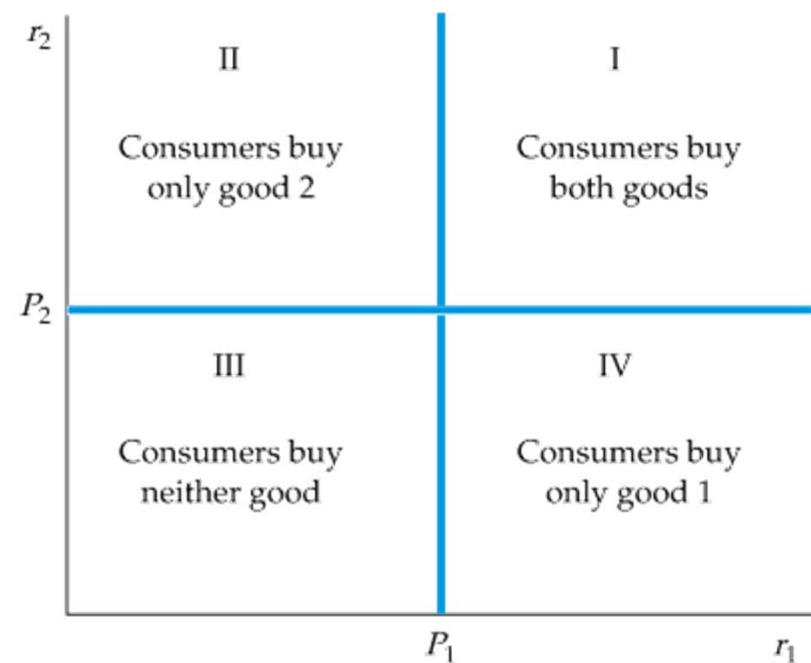


Figure 11.13

#### Consumption Decisions When Products Are Sold Separately

The reservation prices of consumers in region I exceed the prices  $P_1$  and  $P_2$  for the two goods, so these consumers buy both goods.

Consumers in regions II and IV buy only one of the goods, and consumers in region III buy neither good.



## 11.5 BUNDLING

### Relative Valuations

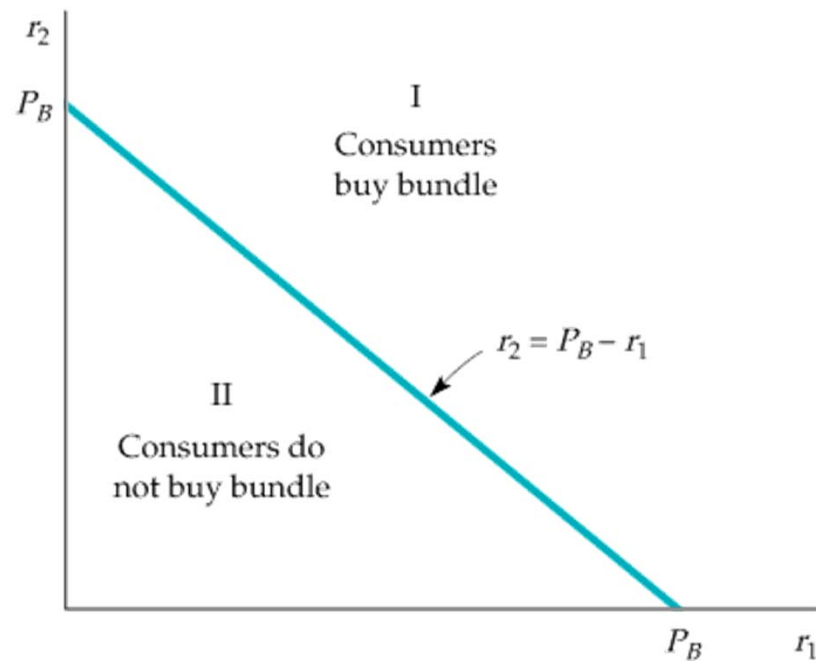


Figure 11.14

#### Consumption Decisions When Products Are Bundled

Consumers compare the sum of their reservation prices  $r_1 + r_2$ , with the price of the bundle  $P_B$ .

They buy the bundle only if  $r_1 + r_2$  is at least as large as  $P_B$ .



## 11.5 BUNDLING

### Relative Valuations

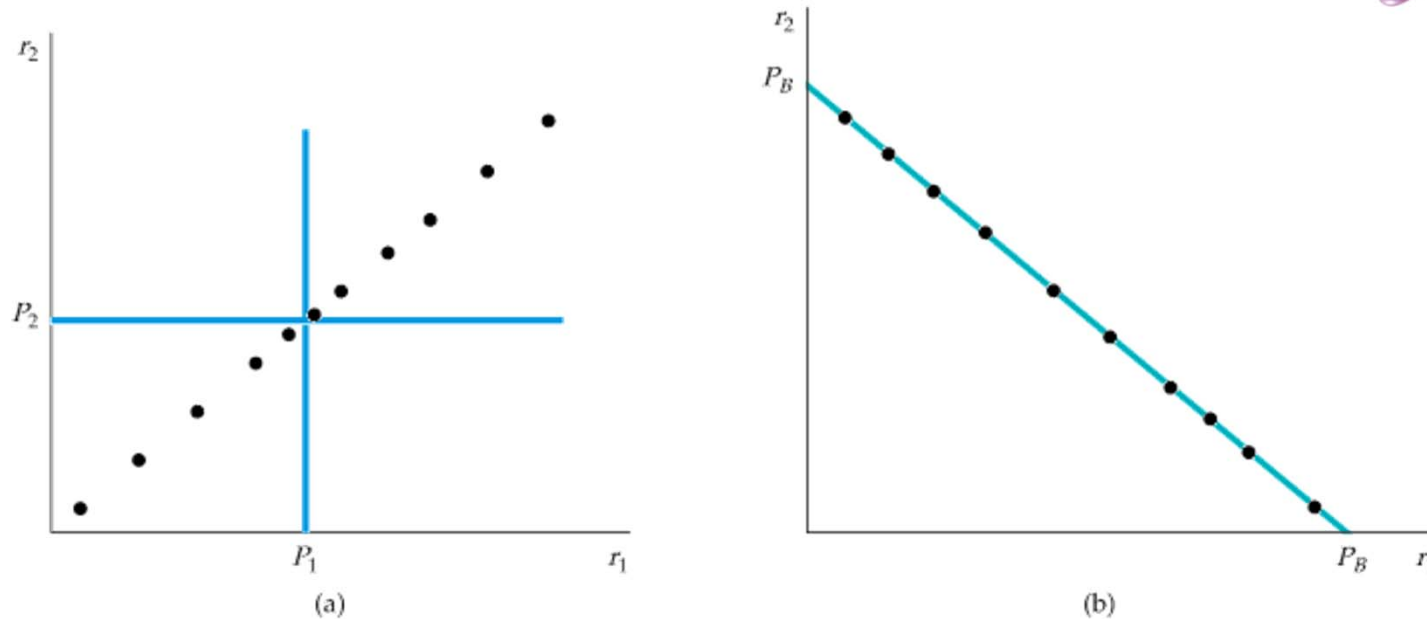


Figure 11.15

#### Reservation Prices

In **(a)**, because demands are perfectly positively correlated, the firm does not gain by bundling: It would earn the same profit by selling the goods separately.

In **(b)**, demands are perfectly negatively correlated. Bundling is the ideal strategy—all the consumer surplus can be extracted.

## 11.5 BUNDLING

### Relative Valuations

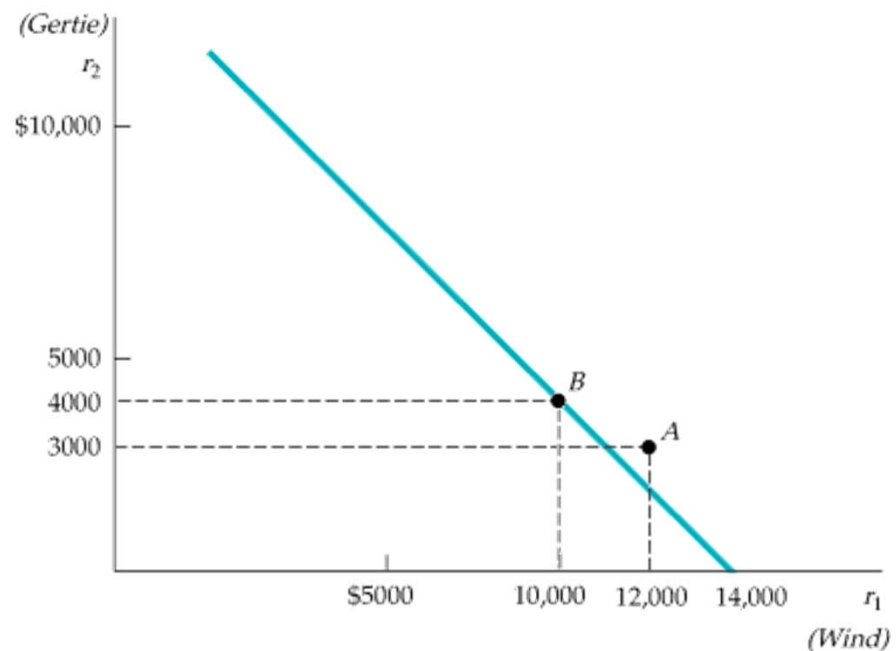


Figure 11.16

#### Movie Example

Consumers *A* and *B* are two movie theaters. The diagram shows their reservation prices for the films *Gone with the Wind* and *Getting Gertie's Garter*.

Because the demands are negatively correlated, bundling pays.



## 11.5 BUNDLING



### Mixed Bundling

- **mixed bundling** Selling two or more goods both as a package and individually.
- **pure bundling** Selling products only as a package.

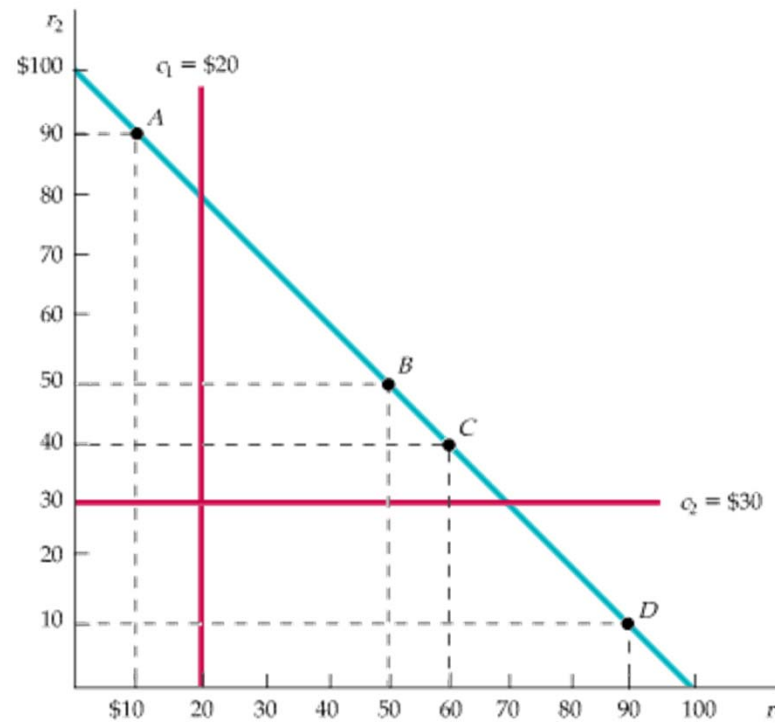
Figure 11.17

#### Mixed versus Pure Bundling

With positive marginal costs, mixed bundling may be more profitable than pure bundling.

Consumer *A* has a reservation price for good 1 that is below marginal cost  $c_1$ , and consumer *D* has a reservation price for good 2 that is below marginal cost  $c_2$ .

With mixed bundling, consumer *A* is induced to buy only good 2, and consumer *D* is induced to buy only good 1, thus reducing the firm's cost.



## 11.5 BUNDLING



### Mixed Bundling

Let's compare three strategies:

1. Selling the goods separately at prices  $P_1 = \$50$  and  $P_2 = \$90$ .
2. Selling the goods only as a bundle at a price of \$100.
3. Mixed bundling, whereby the goods are offered separately at prices  $P_1 = P_2 = \$89.95$ , or as a bundle at a price of \$100.

**TABLE 11.4 Bundling Example**

	$P_1$	$P_2$	$P_B$	Profit
Sold separately	\$50	\$90	—	\$150
Pure bundling	—	—	\$100	\$200
Mixed bundling	\$89.95	\$89.95	\$100	\$229.90

# 11.5 BUNDLING



## Mixed Bundling

Figure 11.18

### Mixed Bundling with Zero Marginal Costs

If marginal costs are zero, and if consumers' demands are not perfectly negatively correlated, mixed bundling is still more profitable than pure bundling.

In this example, consumers *B* and *C* are willing to pay \$20 more for the bundle than are consumers *A* and *D*.

With pure bundling, the price of the bundle is \$100. With mixed bundling, the price of the bundle can be increased to \$120 and consumers *A* and *D* can still be charged \$90 for a single good.

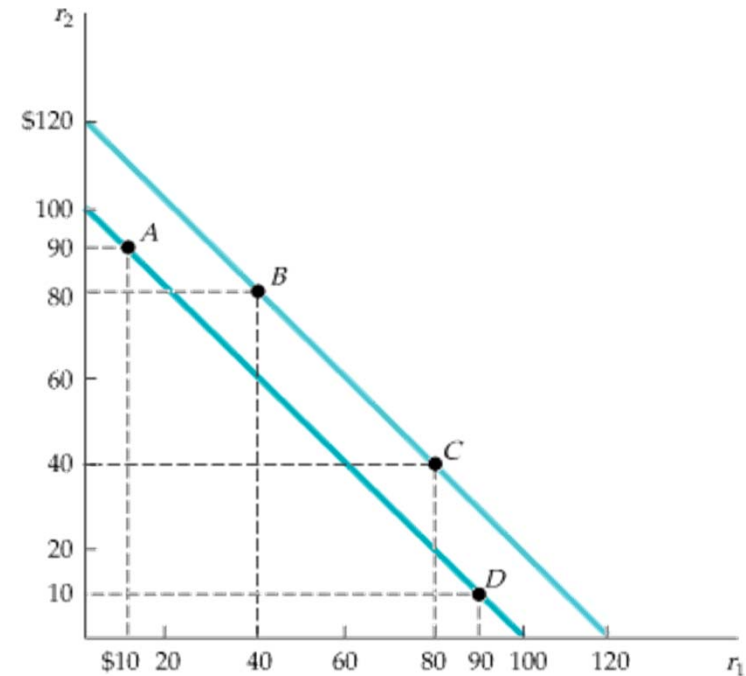
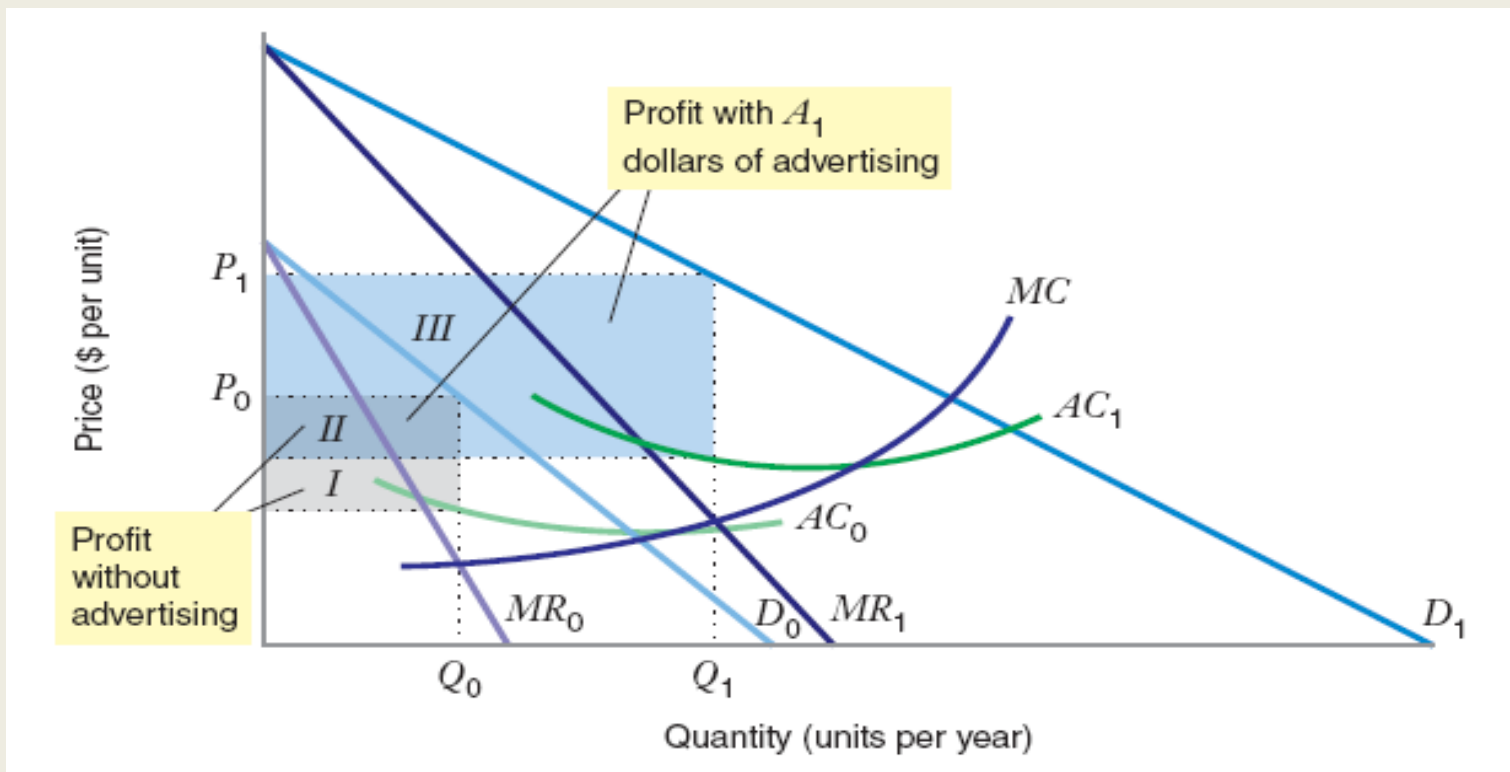


TABLE 11.5 Mixed Bundling with Zero Marginal Costs

	$P_1$	$P_2$	$P_B$	Profit
Sell separately	\$80	\$80	—	\$320
Pure bundling	—	—	\$100	\$400
Mixed bundling	\$90	\$90	\$120	\$420

# 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?

