CHAPTER 11

Pricing with Market Power

Prepared by:

Fernando & Yvonn Quijano

CHAPTER 11 OUTLINE

11.1 CAPTURING CONSUMER SURPLUS

Figure 11.1

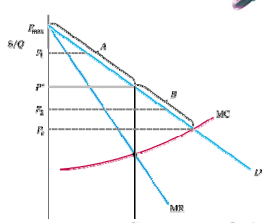
Capturing Consumer Surplus

If a firm can charge only one price for all its customers, that price will be P^* and the quantity produced will be Q^*.

Ideally, the firm would like to charge a higher price to consumers willing to pay more than P^*, thereby capturing some of the consumer surplus under region *A* of the demand curve.

The firm would also like to sell to consumers willing to pay prices lower than P^*, but only if doing so does not entail lowering the price to other consumers.

In that way, the firm could also capture some of the surplus under region *B* of the demand curve.



- **price discrimination** Practice of charging different prices to different consumers for similar goods.

11.2 PRICE DISCRIMINATION

First-Degree Price Discrimination

- **reservation price** Maximum price that a customer is willing to pay for a good.
- **first-degree price discrimination** Practice of charging each customer her reservation price.

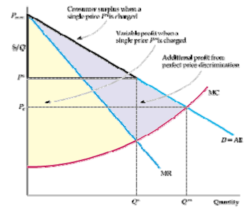
Figure 11.2

Additional Profit from Perfect First-Degree Price Discrimination

Because the firm charges each consumer her reservation price, it is profitable to expand output to Q^{**}.

When only a single price, P^*, is charged, the firm's variable profit is the area between the marginal revenue and marginal cost curves.

With perfect price discrimination, this profit expands to the area between the demand curve and the marginal cost curve.



- **variable profit** Sum of profits on each incremental unit produced by a firm; i.e., profit ignoring fixed costs.

11.2 PRICE DISCRIMINATION

First-Degree Price Discrimination

Perfect Price Discrimination

The additional profit from producing and selling an incremental unit is now the difference between demand and marginal cost.

Imperfect Price Discrimination

Figure 11.3

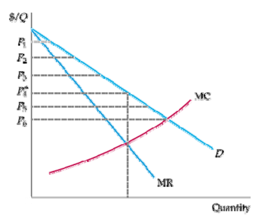
First-Degree Price Discrimination in Practice

Firms usually don't know the reservation price of every consumer, but sometimes reservation prices can be roughly identified.

Here, six different prices are charged. The firm earns higher profits, but some consumers may also benefit.

With a single price P^*_4, there are fewer consumers.

The consumers who now pay P_5 or P_6 enjoy a surplus.



11.2 PRICE DISCRIMINATION

Second-Degree Price Discrimination

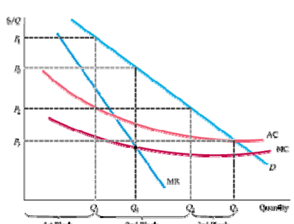
- **second-degree price discrimination** Practice of charging different prices per unit for different quantities of the same good or service.
- **block pricing** Practice of charging different prices for different quantities or "blocks" of a good.

Figure 11.4

Second-Degree Price Discrimination

Different prices are charged for different quantities, or "blocks," of the same good. Here, there are three blocks, with corresponding prices P_1, P_2, and P_3.

There are also economies of scale, and average and marginal costs are declining. Second-degree price discrimination can then make consumers better off by expanding output and lowering cost.



11.2 PRICE DISCRIMINATION

Third-Degree Price Discrimination

- **third-degree price discrimination** Practice of dividing consumers into two or more groups with separate demand curves and charging different prices to each group.

Creating Consumer Groups

If third-degree price discrimination is feasible, how should the firm decide what price to charge each group of consumers?

1. We know that however much is produced, total output should be divided between the groups of customers so that marginal revenues for each group are equal.
2. We know that *total* output must be such that the marginal revenue for each group of consumers is equal to the marginal cost of production.

11.2 PRICE DISCRIMINATION

Third-Degree Price Discrimination

Creating Consumer Groups

$$\pi = P_1Q_1 + P_2Q_2 - C(Q_T)$$

$$\frac{\Delta\pi}{\Delta Q_1} = \frac{\Delta(P_1Q_1)}{\Delta Q_1} - \frac{\Delta C}{\Delta Q_1} = 0$$

$$\mathrm{MR}_1 = \mathrm{MC}$$

$$\mathrm{MR}_2 = \mathrm{MC}$$

$$\boxed{\mathrm{MR}_1 = \mathrm{MR}_2 = \mathrm{MC}} \quad \textbf{(11.1)}$$

Determining Relative Prices

$$\mathrm{MR} = P(1 + 1/E_d)$$

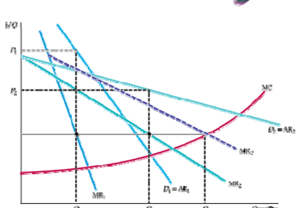
$$\boxed{\frac{P_1}{P_2} = \frac{(1 + 1/E_2)}{(1 + 1/E_1)}} \quad \textbf{(11.2)}$$

11.2 PRICE DISCRIMINATION

Third-Degree Price Discrimination

Figure 11.5

Third-Degree Price Discrimination



Consumers are divided into two groups, with separate demand curves for each group. The optimal prices and quantities are such that the marginal revenue from each group is the same and equal to marginal cost.

Here group 1, with demand curve D_1, is charged P_1, and group 2, with the more elastic demand curve D_2, is charged the lower price P_2.

Marginal cost depends on the total quantity produced Q_T.

Note that Q_1 and Q_2 are chosen so that $MR_1 = MR_2 = MC$.

11.2 PRICE DISCRIMINATION

Third-Degree Price Discrimination

Determining Relative Prices

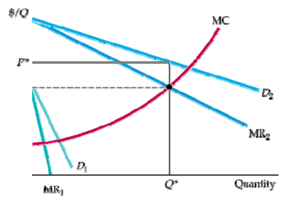
Figure 11.6

No Sales to Smaller Market

Even if third-degree price discrimination is feasible, it may not pay to sell to both groups of consumers if marginal cost is rising.

Here the first group of consumers, with demand D_1, are not willing to pay much for the product.

It is unprofitable to sell to them because the price would have to be too low to compensate for the resulting increase in marginal cost.



11.2 PRICE DISCRIMINATION

EXAMPLE 11.1 The Economics of Coupons and Rebates

Coupons provide a means of price discrimination.

Studies show that only about 20 to 30 percent of all consumers regularly bother to clip, save, and use coupons.

Rebate programs work the same way.

Only those consumers with relatively price-sensitive demands bother to send in the materials and request rebates.

Again, the program is a means of price discrimination.

11.2 PRICE DISCRIMINATION

EXAMPLE 11.1 The Economics of Coupons and Rebates (continued)

TABLE 11.1 Price Elasticities of Demand for Users versus Nonusers of Coupons

	PRICE ELASTICITY	
Product	**Nonusers**	**Users**
Toilet tissue	−0.60	−0.66
Stuffing/dressing	−0.71	−0.96
Shampoo	−0.84	−1.04
Cooking/salad oil	−1.22	−1.32
Dry mix dinners	−0.88	−1.09
Cake mix	−0.21	−0.43
Cat food	−0.49	−1.13
Frozen entrees	−0.60	−0.95
Gelatin	−0.97	−1.25
Spaghetti sauce	−1.65	−1.81
Creme rinse/conditioner	−0.82	−1.12
Soups	−1.05	−1.22
Hot dogs	−0.59	−0.77

11.2 PRICE DISCRIMINATION

EXAMPLE 11.2 Airline Fares

Travelers are often amazed at the variety of fares available for round-trip flights from New York to Los Angeles.

Recently, for example, the first-class fare was above $2000; the regular (unrestricted) economy fare was about $1700, and special discount fares (often requiring the purchase of a ticket two weeks in advance and/or a Saturday night stayover) could be bought for as little as $400.

These fares provide a profitable form of price discrimination. The gains from discriminating are large because different types of customers, with very different elasticities of demand, purchase these different types of tickets.

TABLE 11.2 Elasticities of Demand for Air Travel

	FARE CATEGORY		
Elasticity	**First Class**	**Unrestricted Coach**	**Discounted**
Price	−0.3	−0.4	−0.9
Income	1.2	1.2	1.8

11.3 INTERTEMPORAL PRICE DISCRIMINATION AND PEAK-LOAD PRICING

- **intertemporal price discrimination** Practice of separating consumers with different demand functions into different groups by charging different prices at different points in time.
- **peak-load pricing** Practice of charging higher prices during peak periods when capacity constraints cause marginal costs to be high.

11.3 INTERTEMPORAL PRICE DISCRIMINATION AND PEAK-LOAD PRICING

Intertemporal Price Discrimination

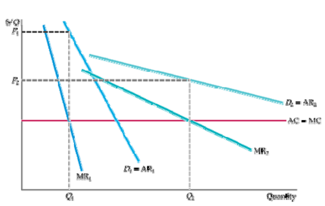
Figure 11.7

Intertemporal Price Discrimination

Consumers are divided into groups by changing the price over time.

Initially, the price is high. The firm captures surplus from consumers who have a high demand for the good and who are unwilling to wait to buy it.

Later the price is reduced to appeal to the mass market.



11.3 INTERTEMPORAL PRICE DISCRIMINATION AND PEAK-LOAD PRICING

Peak-Load Pricing

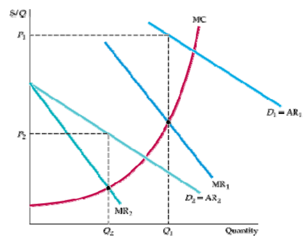
Figure 11.8

Peak-Load Pricing

Demands for some goods and services increase sharply during particular times of the day or year.

Charging a higher price P_1 during the peak periods is more profitable for the firm than charging a single price at all times.

It is also more efficient because marginal cost is higher during peak periods.



11.3 INTERTEMPORAL PRICE DISCRIMINATION AND PEAK-LOAD PRICING

EXAMPLE 11.3 How to Price a Best-Selling Novel

Publishing both hardbound and paperback editions of a book allows publishers to price discriminate.

Some consumers want to buy a new bestseller as soon as it is released, even if the price is \$25. Other consumers, however, will wait a year until the book is available in paperback for \$10.

The key is to divide consumers into two groups, so that those who are willing to pay a high price do so and *only* those unwilling to pay a high price wait and buy the paperback.

It is clear, however, that those consumers willing to wait for the paperback edition have demands that are far more elastic than those of bibliophiles.

It is not surprising, then, that paperback editions sell for so much less than hardbacks.

11.4 THE TWO-PART TARIFF

- **two-part tariff** Form of pricing in which consumers are charged both an entry and a usage fee.

Single Consumer

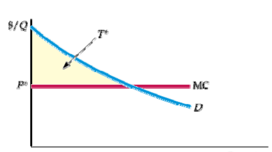
Figure 11.9

Two-Part Tariff with a Single Consumer

The consumer has demand curve *D*.

The firm maximizes profit by setting usage fee *P* equal to marginal cost

and entry fee T^* equal to the entire surplus of the consumer.



11.4 THE TWO-PART TARIFF

Two Consumers

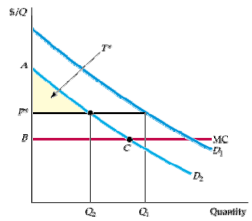
Figure 11.10

Two-Part Tariff with Two Consumers

The profit-maximizing usage fee P^* will exceed marginal cost.

The entry fee T^* is equal to the surplus of the consumer with the smaller demand.

The resulting profit is $2T^* + (P^* - \text{MC})(Q_1 + Q_2)$. Note that this profit is larger than twice the area of triangle *ABC*.



11.4 THE TWO-PART TARIFF

Many Consumers

Figure 11.11

Two-Part Tariff with Many Different Consumers

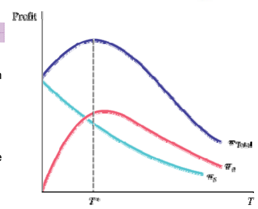
Total profit π is the sum of the profit from the entry fee π_a and the profit from sales π_s. Both π_a and π_s depend on T, the entry fee. Therefore

$$\pi = \pi_a + \pi_s = n(T)T + (P - \text{MC})Q(n)$$

where n is the number of entrants, which depends on the entry fee T, and Q is the rate of sales, which is greater the larger is n.

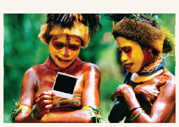
Here T^* is the profit-maximizing entry fee, given P. To calculate optimum values for P and T, we can start with a number for P, find the optimum T, and then estimate the resulting profit.

P is then changed and the corresponding T recalculated, along with the new profit level.



11.4 THE TWO-PART TARIFF

EXAMPLE 11.4 Polaroid Cameras



In 1971, Polaroid introduced its SX-70 camera. This camera was sold, not leased, to consumers. Nevertheless, because film was sold separately, Polaroid could apply a two-part tariff to the pricing of the SX-70.

Why did the pricing of Polaroid's cameras and film involve a two-part tariff?

Because Polaroid had a monopoly on both its camera and the film, only Polaroid film could be used in the camera.

How should Polaroid have selected its prices for the camera and film? It could have begun with some analytical spadework. Its profit is given by

$$\pi = PQ + nT - C1(Q) - C2(n)$$

where P is the price of the film, T the price of the camera, Q the quantity of film sold, n the number of cameras sold, and $C1(Q)$ and $C2(n)$ the costs of producing film and cameras, respectively.

11.4 THE TWO-PART TARIFF

EXAMPLE 11.5 Pricing Cellular Phone Service

Most telephone service is priced using a two-part tariff: a monthly access fee, which may include some free minutes, plus a per-minute charge for additional minutes.

This is also true for cellular phone service, which has grown explosively, both in the United States and around the world.

Because providers have market power, they must think carefully about profit-maximizing pricing strategies.

The two-part tariff provides an ideal means by which cellular providers can capture consumer surplus and turn it into profit.

11.4 THE TWO-PART TARIFF

EXAMPLE 11.5 Pricing Cellular Phone Service (continued)

TABLE 11.3 Cellular Rate Plans (2007)

Anytime Minutes	Monthly Access Fee	Unlimited Nights/ Weekends	Per-Minute Rate After Allowance
A. Verizon: America's Choice Basic			
450	$39.99	Included	$0.45
900	$59.99	Included	$0.40
1350	$79.99	Included	$0.35
2000	$99.99	Included	$0.25
4000	$149.99	Included	$0.25
6000	$199.99	Included	$0.20
B. T-Mobile Individual Plans			
300	$29.99	Unlimited weekends, not weeknights	$0.40
1000	$39.99	Included	$0.40
1500	$59.99	Included	$0.40
2500	$99.99	Included	$0.30
5000	$129.99	Included	$0.30
C. AT&T Individual Plans			
450	$39.99	Includes 5000 minutes	$0.45
900	$59.99	Included	$0.40
1350	$79.99	Included	$0.35
2000	$99.99	Included	$0.25
4000	$149.99	Included	$0.25
6000	$199.99	Included	$0.20

Note: T-Mobile plans do not include any mobile-to-mobile minutes; for T-Mobile these calls are charged from the Anytime Minutes. All other plans include unlimited mobile to mobile minutes.

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

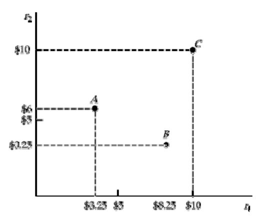
Relative Valuations

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.



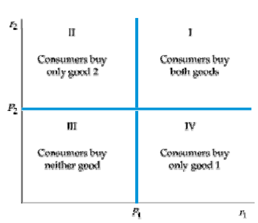
11.5 BUNDLING

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.



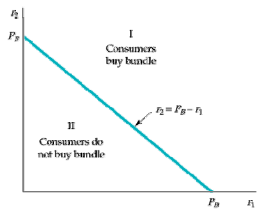
Relative Valuations

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.



Relative Valuations

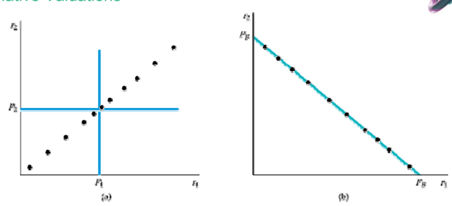


Figure 11.15

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.

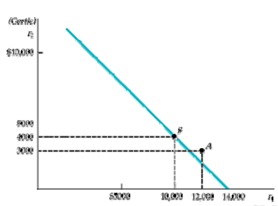
Relative Valuations

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.

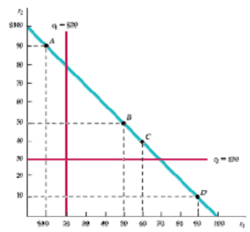
Figure 11.17

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.

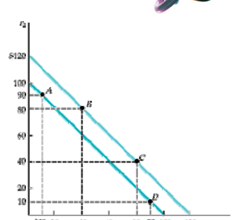


TABLE 11.5 Mixed Bundling with Zero Marginal Costs

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

Bundling in Practice

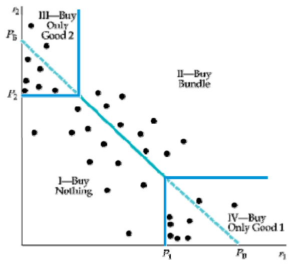
Figure 11.19

Mixed Bundling in Practice

The dots in this figure are estimates of reservation prices for a representative sample of consumers.

A company could first choose a price for the bundle, P_B, such that a diagonal line connecting these prices passes roughly midway through the dots. The company could then try individual prices P_1 and P_2.

Given P_1, P_2, and P_B, profits can be calculated for this sample of consumers. Managers can then raise or lower P_1, P_2, and P_B and see whether the new pricing leads to higher profits. This procedure is repeated until total profit is roughly maximized.



EXAMPLE 11.6 The Complete Dinner versus à la Carte: A Restaurant's Pricing Problem

For a restaurant, mixed bundling means offering both complete dinners (the appetizer, main course, and dessert come as a package) and an à la carte menu (the customer buys the appetizer, main course, and dessert separately).

This strategy allows the à la carte menu to be priced to capture consumer surplus from customers who value some dishes much more highly than others.

At the same time, the complete dinner retains those customers who have lower variations in their reservation prices for different dishes (e.g., customers who attach moderate values to both appetizers and desserts).

EXAMPLE 11.6 The Complete Dinner versus à la Carte: A Restaurant's Pricing Problem (continued)

TABLE 11.6 Mixed Bundling at McDonald's (2007)

Individual Item	Price	Meal (Includes Soda and Fries)	Unbundled Price	Price of Bundle	Savings
Chicken Sandwich	$3.49	Chicken Sandwich	$7.77	$5.89	$1.88
Filet-O-Fish	$2.59	Filet-O-Fish	$6.87	$4.89	$1.98
Big Mac	$2.99	Big Mac	$7.27	$5.29	$1.98
Quarter Pounder	$3.09	Quarter Pounder	$7.37	$5.39	$1.98
Double Quarter Pounder	$3.69	Double Quarter Pounder	$7.97	$5.99	$1.98
10-piece Chicken McNuggets	$3.89	10-piece Chicken McNuggets	$8.17	$6.19	$1.98
Large French Fries	$2.29				
Large Soda	$1.99				

11.5 BUNDLING

Tying

- **tying** Practice of requiring a customer to purchase one good in order to purchase another.

Why might firms use this kind of pricing practice?

One of the main benefits of tying is that it often allows a firm to *meter demand* and thereby practice price discrimination more effectively.

Tying can also be used to extend a firm's market power.

Tying can have other uses. An important one is to protect customer goodwill connected with a brand name.

This is why franchises are often required to purchase inputs from the franchiser.

*11.6 ADVERTISING

Figure 11.20

Effects of Advertising

AR and MR are average and marginal revenue when the firm doesn't advertise, and AC and MC are average and marginal cost.

The firm produces Q_0 and receives a price P_0.

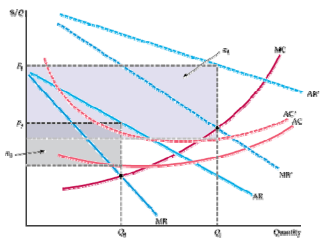
Its total profit π_0 is given by the gray-shaded rectangle.

If the firm advertises, its average and marginal revenue curves shift to the right.

Average cost rises (to AC') but marginal cost remains the same.

The firm now produces Q_1 (where MR' = MC), and receives a price P_1.

Its total profit, π_1, is now larger.



$$\pi = PQ(P, A) - C(Q) - A$$

*11.6 ADVERTISING

The price P and advertising expenditure A to maximize profit, is given by:

$$\pi = PQ(P, A) - CQ - A$$

Advertising leads to increased output.

But increased output in turn means increased production costs, and this must be taken into account when comparing the costs and benefits of an extra dollar of advertising.

The firm should advertise up to the point that

$$\mathrm{MR}_{\mathrm{Ads}} = P\frac{\Delta Q}{\Delta A} = 1 + \mathrm{MC}\frac{\Delta Q}{\Delta A} \quad \textbf{(11.3)}$$

= *full* marginal cost of advertising

*11.6 ADVERTISING

A Rule of Thumb for Advertising

First, rewrite equation (11.3) as follows:

$$(P - \mathrm{MC})\frac{\Delta Q}{\Delta A} = 1$$

Now multiply both sides of this equation by A/PQ, the advertising-to-sales ratio.

- **advertising-to-sales ratio** Ratio of a firm's advertising expenditures to its sales.

$$\frac{P - \mathrm{MC}}{P}\left[\frac{A}{Q}\frac{\Delta Q}{\Delta A}\right] = \frac{A}{PQ}$$

- **advertising elasticity of demand** Percentage change in quantity demanded resulting from a 1-percent increase in advertising expenditures.

$$A/PQ = -(E_A/E_P) \qquad \textbf{(11.4)}$$

Chapter 11: Pricing with Market Power

*11.6 ADVERTISING

EXAMPLE 11.7 Advertising in Practice

Convenience stores have lower price elasticities of demand (around −5), but their advertising-to-sales ratios are usually less than those for supermarkets (and are often zero). Why?

Because convenience stores mostly serve customers who live nearby; they may need a few items late at night or may simply not want to drive to the supermarket.

Advertising is quite important for makers of designer jeans, who will have advertising-to-sales ratios as high as 10 or 20 percent.

Laundry detergents have among the highest advertising-to-sales ratios of all products, sometimes exceeding 30 percent, even though demand for any one brand is at least as price elastic as it is for designer jeans. What justifies all the advertising? A very large advertising elasticity.

Chapter 11: Pricing with Market Power

*11.6 ADVERTISING

EXAMPLE 11.7 Advertising in Practice (continued)

TABLE 11.7 Sales and Advertising Expenditures for Leading Brands of Over-the-Counter Drugs (in millions of dollars)

	Sales	Advertising	Ratio (%)
Pain Medications			
Tylenol	855	143.8	17
Advil	360	91.7	26
Bayer	170	43.8	26
Excedrin	130	26.7	21
Antacids			
Alka-Seltzer	160	52.2	33
Mylanta	135	32.8	24
Tums	135	27.6	20
Cold Remedies (decongestants)			
Benadryl	130	30.9	24
Sudafed	115	28.6	25
Cough Medicine			
Vicks	350	26.6	8
Robitussin	205	37.7	19
Halls	130	17.4	13

Source: New York Times, September 27, 1994.

Chapter 11: Pricing with Market Power