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* 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**

**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* 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

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

Determining Relative Prices

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

No Sales to Smaller Market

Figure 11.6

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.

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

<table>
<thead>
<tr>
<th>Product</th>
<th>Nonusers</th>
<th>Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet tissue</td>
<td>−0.66</td>
<td>−0.66</td>
</tr>
<tr>
<td>Stuffing/dressing</td>
<td>−0.71</td>
<td>−0.71</td>
</tr>
<tr>
<td>Shampoo</td>
<td>−0.6</td>
<td>−0.6</td>
</tr>
<tr>
<td>Cooking/dressing</td>
<td>−1.22</td>
<td>−1.22</td>
</tr>
<tr>
<td>Shampoo</td>
<td>−0.08</td>
<td>−0.08</td>
</tr>
<tr>
<td>Gels</td>
<td>−0.21</td>
<td>−0.43</td>
</tr>
<tr>
<td>Salt</td>
<td>0.06</td>
<td>−1.13</td>
</tr>
<tr>
<td>Frozen entrees</td>
<td>0.06</td>
<td>−0.06</td>
</tr>
<tr>
<td>Gelatin</td>
<td>0.07</td>
<td>−1.25</td>
</tr>
<tr>
<td>Spaghetti sauce</td>
<td>1.48</td>
<td>−1.61</td>
</tr>
<tr>
<td>Creme de la creme</td>
<td>0.02</td>
<td>1.12</td>
</tr>
<tr>
<td>Snaps</td>
<td>1.05</td>
<td>−2.18</td>
</tr>
<tr>
<td>Hot dogs</td>
<td>0.56</td>
<td>−0.37</td>
</tr>
</tbody>
</table>

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 11.2  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**

<table>
<thead>
<tr>
<th>FARE CATEGORY</th>
<th>Price Elasticity</th>
<th>Income Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class</td>
<td>-0.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Unrestricted Coach</td>
<td>-0.4</td>
<td>1.2</td>
</tr>
<tr>
<td>Discounted</td>
<td>-0.9</td>
<td>1.8</td>
</tr>
</tbody>
</table>

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

**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

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
\[
2T^* + (P^* - MC)(Q_1 + Q_2)
\]
Note that this profit is larger than twice the area of triangle ABC.

Many Consumers

Two-Part Tariff with Many Different Consumers

Total profit \( \pi \) is the sum of the profit from the entry fee \( \pi_a \) and the profit from sales \( \pi_s \). Both \( \pi_a \) and \( \pi_s \) depend on \( T \), the entry fee.

\[
\pi = \pi_a + \pi_s = n(T)T + (P - MCQ)(\overline{n})
\]
where \( n \) is the number of entrants, which depends on the entry fee \( T \), and \( \overline{n} \) 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.

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

\[
x = PQ + nT - C_1(Q) - C_2(n)
\]
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 \( C_1(Q) \) and \( C_2(n) \) 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.

11.5 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:

<table>
<thead>
<tr>
<th></th>
<th>Wind</th>
<th>Gertie's Carpet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theater A</td>
<td>$12,000</td>
<td>$3,000</td>
</tr>
<tr>
<td>Theater B</td>
<td>$10,000</td>
<td>$4,000</td>
</tr>
</tbody>
</table>

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 $3,000.

But suppose the films are bundled. Theater A values the pair of films at $15,000 ($12,000 + $3,000), and Theater B values the pair at $14,000 ($10,000 + $4,000). Therefore, we can charge each theater $14,000 for the pair of films and earn a total revenue of $28,000.
Chapter 11: Pricing with Market Power

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:

<table>
<thead>
<tr>
<th>Go with the Wind</th>
<th>Getting Gertie’s Garter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theater A</td>
<td>$12,000</td>
</tr>
<tr>
<td>Theater B</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

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.

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, as these consumers buy both goods.

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

Relative Valuations

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 \( P_B \).

**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.

**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.

#### 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.

---

#### 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 11.4 Bundling Example

<table>
<thead>
<tr>
<th></th>
<th>$P_1$</th>
<th>$P_2$</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold separately</td>
<td>$50</td>
<td>$90</td>
<td>$150</td>
</tr>
<tr>
<td>Pure bundling</td>
<td>—</td>
<td>—</td>
<td>$100</td>
</tr>
<tr>
<td>Mixed bundling</td>
<td>$89.95</td>
<td>$89.95</td>
<td>$100</td>
</tr>
</tbody>
</table>

---

#### Table 11.5 Mixed Bundling with Zero Marginal Costs

<table>
<thead>
<tr>
<th></th>
<th>$P_1$</th>
<th>$P_2$</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold separately</td>
<td>$50</td>
<td>$90</td>
<td>$150</td>
</tr>
<tr>
<td>Pure bundling</td>
<td>—</td>
<td>—</td>
<td>$100</td>
</tr>
<tr>
<td>Mixed bundling</td>
<td>$89</td>
<td>$90</td>
<td>$100</td>
</tr>
</tbody>
</table>

---
### 11.5 Bundling

#### 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 through the sample means. 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).

#### Table 11.8: Mixed Bundling at McDonald’s (2007)

<table>
<thead>
<tr>
<th>Individual Item</th>
<th>Price</th>
<th>Meal Excluding Soda and Fries</th>
<th>Unbundled Price</th>
<th>Price of Bundle</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken Sandwich</td>
<td>$3.99</td>
<td>Chicken Sandwich</td>
<td>$7.77</td>
<td>$5.00</td>
<td>$2.77</td>
</tr>
<tr>
<td>File O Fish</td>
<td>$2.09</td>
<td>File O Fish</td>
<td>$6.00</td>
<td>$4.00</td>
<td>$2.00</td>
</tr>
<tr>
<td>Big Mac</td>
<td>$2.99</td>
<td>Big Mac</td>
<td>$7.27</td>
<td>$5.25</td>
<td>$2.02</td>
</tr>
<tr>
<td>Quarter Pounder</td>
<td>$3.09</td>
<td>Quarter Pounder</td>
<td>$7.30</td>
<td>$5.30</td>
<td>$2.00</td>
</tr>
<tr>
<td>Double Quarter Pounder</td>
<td>$3.99</td>
<td>Double Quarter Pounder</td>
<td>$7.99</td>
<td>$5.99</td>
<td>$2.00</td>
</tr>
<tr>
<td>McNuggets</td>
<td>$3.99</td>
<td>McNuggets</td>
<td>$8.19</td>
<td>$6.19</td>
<td>$2.00</td>
</tr>
<tr>
<td>Large French Fries</td>
<td>$2.39</td>
<td>Large French Fries</td>
<td>$4.19</td>
<td>$2.19</td>
<td>$2.00</td>
</tr>
<tr>
<td>Large Salad</td>
<td>$5.99</td>
<td>Large Salad</td>
<td>$9.99</td>
<td>$3.99</td>
<td>$6.00</td>
</tr>
</tbody>
</table>
11.5 BUNDLING

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

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 Q₀ and receives a price P₀.

Its total profit, π₀, 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 Q₁ (where MR’ = MC), and receives a price P₁.

Its total profit, π₁, is now larger.

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

\[ \pi = P(Q, A) - C(Q) - A \]

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

\[ MR' = P + \frac{MC}{Q} \]

is the full marginal cost of advertising.
First, rewrite equation (11.3) as follows:

\[(P-MC)Q^* = A\]

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.
  \[
  \frac{P-MC}{P} \left[ \frac{4A}{4A} \right] \frac{A}{PQ}
  \]

- **advertising elasticity of demand**: Percentage change in quantity demanded resulting from a 1-percent increase in advertising expenditures.
  \[
  \frac{A}{PQ} = \left( \frac{E_D}{E_P} \right)
  \]

### 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.

### Table 11.7: Sales and Advertising Expenditures for Selected Brands (Unit: Thousands of Dollars)

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Sales</th>
<th>Advertising</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hair Care</td>
<td>120</td>
<td>20</td>
</tr>
<tr>
<td>Personal Care</td>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>Pets</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>Cough Medicine</td>
<td>50</td>
<td>5</td>
</tr>
</tbody>
</table>