CHAPTER 10

Market Power: Monopoly and Monopsony

CHAPTER OUTLINE

10.1 Monopoly
10.2 Monopoly Power
10.3 Sources of Monopoly Power
10.4 The Social Costs of Monopoly Power
10.5 Monopsony
10.6 Monopsony Power
10.7 Limiting Market Power: The Antitrust Laws

Prepared by: Fernando Quijano, Illustrator
- **monopoly**  Market with only one seller.

- **monopsony**  Market with only one buyer.

- **market power**  Ability of a seller or buyer to affect the price of a good.
10.1 Monopoly

Average Revenue and Marginal Revenue

- **marginal revenue** Change in revenue resulting from a one-unit increase in output.

Consider a firm facing the following demand curve: $P = 6 - Q$

<table>
<thead>
<tr>
<th>PRICE (P)</th>
<th>QUANTITY (Q)</th>
<th>TOTAL REVENUE (R)</th>
<th>MARGINAL REVENUE (MR)</th>
<th>AVERAGE REVENUE (AR)</th>
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</thead>
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<tr>
<td>$5$</td>
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<td>$1$</td>
<td>$5$</td>
<td>$5$</td>
<td>$-3$</td>
<td>$1$</td>
</tr>
</tbody>
</table>
**Figure 10.1**

**AVERAGE AND MARGINAL REVENUE**

Average and marginal revenue are shown for the demand curve $P = 6 - Q$. 

![Graph showing average and marginal revenue](image)
The Monopolist’s Output Decision

**Figure 10.2**

**Profit is maximized when marginal revenue equals marginal cost**

$Q^*$ is the output level at which $MR = MC$.

If the firm produces a smaller output—say, $Q_1$—it sacrifices some profit because the extra revenue that could be earned from producing and selling the units between $Q_1$ and $Q^*$ exceeds the cost of producing them.

Similarly, expanding output from $Q^*$ to $Q_2$ would reduce profit because the additional cost would exceed the additional revenue.
We can also see algebraically that $Q^*$ maximizes profit. Profit $\pi$ is the difference between revenue and cost, both of which depend on $Q$:

$$\pi(Q) = R(Q) - C(Q)$$

As $Q$ is increased from zero, profit will increase until it reaches a maximum and then begin to decrease. Thus the profit-maximizing $Q$ is such that the incremental profit resulting from a small increase in $Q$ is just zero (i.e., $\Delta\pi / \Delta Q = 0$). Then

$$\Delta\pi / \Delta Q = \Delta R / \Delta Q - \Delta C / \Delta Q = 0$$

But $\Delta R / \Delta Q$ is marginal revenue and $\Delta C / \Delta Q$ is marginal cost. Thus the profit-maximizing condition is that

$$MR - MC = 0, \text{ or } MR = MC$$
An Example

**FIGURE 10.3**

**EXAMPLE OF PROFIT MAXIMIZATION**

Part (a) shows total revenue $R$, total cost $C$, and profit, the difference between the two.

Part (b) shows average and marginal revenue and average and marginal cost.

Marginal revenue is the slope of the total revenue curve, and marginal cost is the slope of the total cost curve.

The profit-maximizing output is $Q^* = 10$, the point where marginal revenue equals marginal cost.

At this output level, the slope of the profit curve is zero, and the slopes of the total revenue and total cost curves are equal.

The profit per unit is $15$, the difference between average revenue and average cost. Because 10 units are produced, total profit is $150.$
A Rule of Thumb for Pricing

With limited knowledge of average and marginal revenue, we can derive a rule of thumb that can be more easily applied in practice. First, write the expression for marginal revenue:

\[
MR = \frac{\Delta R}{\Delta Q} = \frac{\Delta(PQ)}{\Delta Q}
\]

Note that the extra revenue from an incremental unit of quantity, \(\Delta(PQ)/\Delta Q\), has two components:

1. Producing one extra unit and selling it at price \(P\) brings in revenue \((1)(P) = P\).

2. But because the firm faces a downward-sloping demand curve, producing and selling this extra unit also results in a small drop in price \(\Delta P/\Delta Q\), which reduces the revenue from all units sold (i.e., a change in revenue \(Q[\Delta P/\Delta Q]\)).

Thus,

\[
MR = P + Q \frac{\Delta P}{\Delta Q} = P + P \left(\frac{Q}{P}\right) \left(\frac{\Delta P}{\Delta Q}\right)
\]
\((Q/P)(\Delta P/\Delta Q)\) is the reciprocal of the elasticity of demand, \(1/E_d\), measured at the profit-maximizing output, and

\[
MR = P + P\left(1/E_d\right)
\]

Now, because the firm’s objective is to maximize profit, we can set marginal revenue equal to marginal cost:

\[
P + P\left(1/E_d\right) = MC
\]

which can be rearranged to give us

\[
\frac{P - MC}{P} = -\frac{1}{E_d} \quad (10.1)
\]

Equivalently, we can rearrange this equation to express price directly as a markup over marginal cost:

\[
P = \frac{MC}{1 + (1/E_d)} \quad (10.2)
\]
Shifts in Demand

A monopolistic market has no supply curve. In other words, there is no one-to-one relationship between price and the quantity produced.

The reason is that the monopolist’s output decision depends not only on marginal cost but also on the shape of the demand curve.

As a result, shifts in demand do not trace out the series of prices and quantities that correspond to a competitive supply curve. Instead, shifts in demand can lead to changes in price with no change in output, changes in output with no change in price, or changes in both price and output.

Shifts in demand usually cause changes in both price and quantity. A competitive industry supplies a specific quantity at every price. No such relationship exists for a monopolist, which, depending on how demand shifts, might supply several different quantities at the same price, or the same quantity at different prices.
**Figure 10.4**

**SHIFTS IN DEMAND**

Shifting the demand curve shows that a monopolistic market has no supply curve—i.e., there is no one-to-one relationship between price and quantity produced.

In (a), the demand curve $D_1$ shifts to new demand curve $D_2$.

But the new marginal revenue curve $\text{MR}_2$ intersects marginal cost at the same point as the old marginal revenue curve $\text{MR}_1$.

The profit-maximizing output therefore remains the same, although price falls from $P_1$ to $P_2$.

In (b), the new marginal revenue curve $\text{MR}_2$ intersects marginal cost at a higher output level $Q_2$.

But because demand is now more elastic, price remains the same.
The Multiplant Firm

Suppose a firm has two plants. What should its total output be, and how much of that output should each plant produce? We can find the answer intuitively in two steps.

- **Step 1.** Whatever the total output, it should be divided between the two plants so that *marginal cost is the same in each plant*. Otherwise, the firm could reduce its costs and increase its profit by reallocating production.

- **Step 2.** We know that total output must be such that *marginal revenue equals marginal cost*. Otherwise, the firm could increase its profit by raising or lowering total output.
We can also derive this result algebraically. Let $Q_1$ and $C_1$ be the output and cost of production for Plant 1, $Q_2$ and $C_2$ be the output and cost of production for Plant 2, and $Q_T = Q_1 + Q_2$ be total output. Then profit is

$$\pi = PQ_T - C_1(Q_1) - C_2(Q_2)$$

The firm should increase output from each plant until the incremental profit from the last unit produced is zero. Start by setting incremental profit from output at Plant 1 to zero:

$$\frac{\Delta \pi}{\Delta Q_1} = \frac{\Delta(PQ_T)}{\Delta Q_1} - \frac{\Delta C_1}{\Delta Q_1} = 0$$

Here $\Delta(PQ_T)/\Delta Q_1$ is the revenue from producing and selling one more unit—i.e., marginal revenue, MR, for all of the firm’s output.
The next term, $\Delta C_1/\Delta Q_1$, is marginal cost at Plant 1, $MC_1$. We thus have $MR - MC_1 = 0$, or

$$MR = MC_1$$

Similarly, we can set incremental profit from output at Plant 2 to zero,

$$MR = MC_2$$

Putting these relations together, we see that the firm should produce so that

$$MR = MC_1 = MC_2 \quad (10.3)$$
A firm with two plants maximizes profits by choosing output levels $Q_1$ and $Q_2$ so that marginal revenue MR (which depends on total output) equals marginal costs for each plant, $MC_1$ and $MC_2$. 
Production, Price, and Monopoly Power

In figure 10.7, although Firm A is not a pure monopolist, it does have monopoly power—it can profitably charge a price greater than marginal cost. Of course, its monopoly power is less than it would be if it had driven away the competition and monopolized the market, but it might still be substantial.

This raises two questions.

1. How can we measure monopoly power in order to compare one firm with another? (So far we have been talking about monopoly power only in qualitative terms.)

2. What are the sources of monopoly power, and why do some firms have more monopoly power than others?

We address both these questions below, although a more complete answer to the second question will be provided in Chapters 12 and 13.
Measuring Monopoly Power

Remember the important distinction between a perfectly competitive firm and a firm with monopoly power: *For the competitive firm, price equals marginal cost; for the firm with monopoly power, price exceeds marginal cost.*

- **Lerner Index of Monopoly Power**  
  Measure of monopoly power calculated as excess of price over marginal cost as a fraction of price.

Mathematically:

\[ L = \frac{P - MC}{P} \]

This index of monopoly power can also be expressed in terms of the elasticity of demand facing the firm.

\[ L = \frac{P - MC}{P} = -\frac{1}{E_d} \]  \hspace{1cm} (10.4)
The Rule of Thumb for Pricing

The markup \((P - MC)/P\) is equal to minus the inverse of the elasticity of demand.

If the firm’s demand is elastic, as in (a), the markup is small and the firm has little monopoly power.

The opposite is true if demand is relatively inelastic, as in (b).

\[
P = \frac{MC}{1 + (1/E_d)}
\]
10.3 Sources of Monopoly Power

As equation (10.4) shows, the less elastic its demand curve, the more monopoly power a firm has. The ultimate determinant of monopoly power is therefore the firm’s elasticity of demand.

Three factors determine a firm’s elasticity of demand.

1. The elasticity of market demand. Because the firm’s own demand will be at least as elastic as market demand, the elasticity of market demand limits the potential for monopoly power.

2. The number of firms in the market. If there are many firms, it is unlikely that any one firm will be able to affect price significantly.

3. The interaction among firms. Even if only two or three firms are in the market, each firm will be unable to profitably raise price very much if the rivalry among them is aggressive, with each firm trying to capture as much of the market as it can.
The Elasticity of Market Demand

If there is only one firm—a pure monopolist—its demand curve is the market demand curve. In this case, the firm’s degree of monopoly power depends completely on the elasticity of market demand.

When several firms compete with one another, the elasticity of market demand sets a lower limit on the magnitude of the elasticity of demand for each firm.

A particular firm’s elasticity depends on how the firms compete with one another, and the elasticity of market demand limits the potential monopoly power of individual producers.

Because the demand for oil is fairly inelastic (at least in the short run), OPEC could raise oil prices far above marginal production cost during the 1970s and early 1980s. Because the demands for such commodities as coffee, cocoa, tin, and copper are much more elastic, attempts by producers to cartelize these markets and raise prices have largely failed. In each case, the elasticity of market demand limits the potential monopoly power of individual producers.
The Number of Firms

Other things being equal, the monopoly power of each firm will fall as the number of firms increases.

When only a few firms account for most of the sales in a market, we say that the market is highly *concentrated*.

- **barrier to entry**  
  Condition that impedes entry by new competitors.

Sometimes there are natural barriers to entry:

- Patents, copyrights, and licenses
- *Economies of scale* may make it too costly for more than a few firms to supply the entire market. In some cases, economies of scale may be so large that it is most efficient for a single firm—a *natural monopoly*—to supply the entire market.
The Interaction Among Firms

Firms might compete aggressively, undercutting one another’s prices to capture more market share, or they might not compete much. They might even collude (in violation of the antitrust laws), agreeing to limit output and raise prices.

Other things being equal, monopoly power is smaller when firms compete aggressively and is larger when they cooperate. Because raising prices in concert rather than individually is more likely to be profitable, collusion can generate substantial monopoly power.

Remember that a firm’s monopoly power often changes over time, as its operating conditions (market demand and cost), its behavior, and the behavior of its competitors change. Monopoly power must therefore be thought of in a dynamic context.

Furthermore, real or potential monopoly power in the short run can make an industry more competitive in the long run: Large short-run profits can induce new firms to enter an industry, thereby reducing monopoly power over the longer term.
10.4 The Social Costs of Monopoly Power

**Figure 10.10**

DEADWEIGHT LOSS FROM MONOPOLY POWER

The shaded rectangle and triangles show changes in consumer and producer surplus when moving from competitive price and quantity, \( P_c \) and \( Q_c \), to a monopolist’s price and quantity, \( P_m \) and \( Q_m \).

Because of the higher price, consumers lose \( A + B \) and producer gains \( A - C \). The deadweight loss is \( B + C \).

Rent Seeking

- **rent seeking** Spending money in socially unproductive efforts to acquire, maintain, or exercise monopoly.

We would expect the economic incentive to incur rent-seeking costs to bear a direct relation to the gains from monopoly power (i.e., rectangle \( A \) minus triangle \( C \)).
If left alone, a monopolist produces $Q_m$ and charges $P_m$.

When the government imposes a price ceiling of $P_1$ the firm’s average and marginal revenue are constant and equal to $P_1$ for output levels up to $Q_1$.

For larger output levels, the original average and marginal revenue curves apply.

The new marginal revenue curve is, therefore, the dark purple line, which intersects the marginal cost curve at $Q_1$. 

Marginal revenue curve when price is regulated to be no higher than $P_1$
When price is lowered to $P_c$, at the point where marginal cost intersects average revenue, output increases to its maximum $Q_c$. This is the output that would be produced by a competitive industry.

Lowering price further, to $P_3$, reduces output to $Q_3$ and causes a shortage, $Q_3' - Q_3$. 

Figure 10.11 (2 of 2)
Natural Monopoly

- **natural monopoly** Firm that can produce the entire output of the market at a cost lower than what it would be if there were several firms.

**Figure 10.12**

REGULATING THE PRICE OF A NATURAL MONOPOLY

A firm is a natural monopoly because it has economies of scale (declining average and marginal costs) over its entire output range.

If price were regulated to be $P_c$ the firm would lose money and go out of business.

Setting the price at $P_r$ yields the largest possible output consistent with the firm’s remaining in business; excess profit is zero.
Regulation in Practice

The regulation of a monopoly is sometimes based on the rate of return that it earns on its capital. The regulatory agency determines an allowed price, so that this rate of return is in some sense “competitive” or “fair.”

- **rate-of-return regulation**  Maximum price allowed by a regulatory agency is based on the (expected) rate of return that a firm will earn.

Although it is a key element in determining the firm’s rate of return, a firm’s capital stock is difficult to value. While a “fair” rate of return must be based on the firm’s actual cost of capital, that cost depends in turn on the behavior of the regulatory agency. *Regulatory lag* is a term associated with delays in changing regulated prices.

Another approach to regulation is setting price caps based on the firm’s variable costs. A price cap can allow for more flexibility than rate-of-return regulation. Under price cap regulation, for example, a firm would typically be allowed to raise its prices each year (without having to get approval from the regulatory agency) by an amount equal to the actual rate of inflation, minus expected productivity growth.
10.7 Limiting Market Power: The Antitrust Laws

Excessive market power harms potential purchasers and raises problems of equity and fairness. In addition, market power reduces output, which leads to a deadweight loss.

In theory, a firm’s excess profits could be taxed away, but redistribution of the firm’s profits is often impractical.

To limit the market power of a natural monopoly, such as an electric utility company, direct price regulation is the answer.

- **antitrust laws**  Rules and regulations prohibiting actions that restrain, or are likely to restrain, competition.

It is important to stress that, while there are limitations (such as colluding with other firms), in general, it is not illegal to be a monopolist or to have market power. On the contrary, we have seen that patent and copyright laws protect the monopoly positions of firms that developed unique innovations.
Restricting what Firms can do

- **parallel conduct**  Form of implicit collusion in which one firm consistently follows actions of another.

- **predatory pricing**  Practice of pricing to drive current competitors out of business and to discourage new entrants in a market so that a firm can enjoy higher future profits.
Enforcement of the Antitrust Laws

The antitrust laws are enforced in three ways:

1. Through the Antitrust Division of the Department of Justice.
2. Through the administrative procedures of the Federal Trade Commission.
3. Through private proceedings.

Antitrust in Europe

At first glance, the antitrust laws of the European Union are quite similar to those of the United States. Article 101 of the Treaty of the European Community concerns restraints of trade, much like Section 1 of the Sherman Act. Article 102, which focuses on abuses of market power by dominant firms, is similar in many ways to Section 2 of the Sherman Act. Finally, with respect to mergers, the European Merger Control Act is similar in spirit to Section 7 of the Clayton Act.

Nevertheless, there remain a number of procedural and substantive differences between antitrust laws in Europe and the United States. Merger evaluations typically are conducted more quickly in Europe.

Antitrust enforcement has grown rapidly through the world in the past decade.
CHAPTER 11
Pricing with Market Power

CHAPTER OUTLINE
11.1 Capturing Consumer Surplus
11.2 Price Discrimination
11.3 Intertemporal Price Discrimination and Peak-Load Pricing
11.4 The Two-Part Tariff
11.5 Bundling
11.6 Advertising
Appendix: The Vertically Integrated Firm

Prepared by:
Fernando Quijano, Illustrator
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.

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

The additional profit from producing and selling an incremental unit is 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.
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.
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.
Let $P_1$ be the price charged to the first group of consumers, $P_2$ the price charged to the second group, and $C(Q_T)$ the total cost of producing output $Q_T = Q_1 + Q_2$. Total profit is then

$$\pi = P_1 Q_1 + P_2 Q_2 - C(Q_T)$$

$$\frac{\Delta \pi}{\Delta Q_1} = \frac{\Delta (P_1 Q_1)}{\Delta Q_1} - \frac{\Delta C}{\Delta Q_1} = 0$$

MR$_1$ = MC

MR$_2$ = MC

$$\text{MR}_1 = \text{MR}_2 = \text{MC} \quad (11.1)$$

**DETERMINING RELATIVE PRICES**

$$MR = P (1 + 1/E_d)$$

$$\frac{P_1}{P_2} = \frac{(1 + 1/E_2)}{(1 + 1/E_1)} \quad (11.2)$$
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 $\text{MR}_1 = \text{MR}_2 = \text{MC}$.
NO SALES TO SMALLER MARKETS

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.
11.3 Intertemporal Price Discrimination and Peak-Load Pricing

- **intertemporal price discrimination**  Spending money in socially unproductive efforts to acquire, maintain, or exercise monopoly.

- **peak-load pricing**  Spending money in socially unproductive efforts to acquire, maintain, or exercise monopoly.

**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.
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.
11.4 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 $MC$ and entry fee $T^*$ equal to the entire surplus of the consumer.
**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 $2T^* + (P^* - MC)(Q_1 + Q_2)$. Note that this profit is larger than twice the area of triangle $ABC$. 

![Diagram](Image)
MANY CONSUMERS

**Figure 11.11**
**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. Therefore

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

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.
11.5 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 our two films are as follows:

<table>
<thead>
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<th>GETTING GERTIE’S GARTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theater A</td>
<td>$12,000</td>
<td>$3000</td>
</tr>
<tr>
<td>Theater B</td>
<td>$10,000</td>
<td>$4000</td>
</tr>
</tbody>
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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.
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.

Suppose demands were positively correlated—that is, Theater A would pay more for both films:

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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.
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.
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.
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 $P_B$.
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.
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.
**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.
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>
<thead>
<tr>
<th>TABLE 11.4</th>
<th>BUNDLING EXAMPLE</th>
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<tbody>
<tr>
<td></td>
<td>( P_1 )</td>
</tr>
<tr>
<td>Sold separately</td>
<td>$50</td>
</tr>
<tr>
<td>Pure bundling</td>
<td>—</td>
</tr>
<tr>
<td>Mixed bundling</td>
<td>$89.95</td>
</tr>
</tbody>
</table>

As we should expect, pure bundling is better than selling the goods separately because consumers’ demands are negatively correlated. But what about mixed bundling?
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>
<thead>
<tr>
<th>TABLE 11.5</th>
<th>MIXED BUNDLING WITH ZERO MARGINAL COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P₁</td>
</tr>
<tr>
<td>Sold separately</td>
<td>$80</td>
</tr>
<tr>
<td>Pure bundling</td>
<td>—</td>
</tr>
<tr>
<td>Mixed bundling</td>
<td>$90</td>
</tr>
</tbody>
</table>
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.
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.