9 MONOPOLY (HL ONLY)

9.1 Monopoly: assumptions of the model

Learning outcomes

- Describe, using examples, the assumed characteristics of a monopoly: a single or dominant firm in the market; no close substitutes; significant barriers to entry.

Three famous monopolists: John D Rockefeller, Bill Gates and Carlos 'Slim' Helu.

A monopoly is a market where one firm dominates the market for a good that has no substitutes and where significant barriers to entry exist.

A monopoly is a market where one firm dominates the market for a good that has no substitutes and where significant barriers to entry exist. To most people, monopoly might seem akin to autocracy, where one company makes the rules, sets the prices and controls its destiny. As you will see, monopolies can occur in different types of market and take many forms.

A traditional view of monopoly is of a company whose power has been forged through the personality of its chief. John D Rockefeller, of Standard Oil, once famously sought to control the entire world market for the refining of oil. At its peak, Standard Oil processed 80% of global crude oil. Public sentiment against this control led to restrictions on this kind of market power.

Eventually Standard Oil was broken into smaller companies by the US government. But for decades, Rockefeller was the world's richest man. More recently, Bill Gates's company Microsoft has widely been considered a monopolist in the market for operating systems. This, too, drew significant government interest, as Microsoft lost major anti-trust cases in the US and Europe. Courts ruled that Microsoft engaged in predatory and anti-competitive behaviour, and ordered the company to change many of its practices. The EU courts threatened to break the company apart. Those rulings were eventually softened, especially as the technology sector changed, but Gates emerged one of the wealthiest men in the world.

Meanwhile, in Mexico one man's companies control 80% of the cellphones and 90% of the landlines. Carlos 'Slim' Helu is now generally regarded as the world's wealthiest man, with assets of over $60 billion. These examples suggest that monopoly ownership is synonomous with profit-making. Why is this so?

This chapter explores the market structure of monopoly: its characteristics, advantages and disadvantages, as well as government policy towards monopolies. The following are some of the characteristics of a monopoly.

- **Single seller**. When a firm controls the market entirely and is the only producer of the good, it is called a pure monopoly. The term 'monopoly' is derived from the Greek *mono* (single) and *polein* (to sell). However, the case where a single firm controls a dominant share of the market is much more common than a pure single seller.
- **No close substitutes**. Being the single seller of a good would hold little value if that good were easily replaceable with something else. Therefore, for true monopoly power, a firm must be selling something that has no substitutes.
- **Price-maker**. As the single seller of a good without substitutes, the firm will have some power to set the price of the good. The extent of that power is limited by the overall demand for the good, but this power can be considerable. In contrast to the perfect competitor, which must accept whatever price is set in the larger market, the monopolist has significant price-making power.
- **Barriers to entry**. A monopolist keeps the dominant position because there are significant barriers to other firms' entry into the market. In the absence of competition, the firm can maintain its price-making power, and will continue to make abnormal profits.

To learn more about monopoly, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 9.1.

9.2 Barriers to entry

Learning outcomes

- Describe, using examples, barriers to entry, including economies of scale, branding and legal barriers.

Market power

Market power (also known as monopoly power) is the ability to set the price of the good. Monopolies, although still limited by the market demand, have considerable power to set their prices.

Barriers to entry are defined as the characteristics of a market that make it difficult for firms to join the industry, such as:

- economies of scale
- legal barriers
- ownership of essential resources
- aggressive tactics.

Barriers to entry are the technical, competitive or cost-related impediments to joining a market and competing against the existing firms.

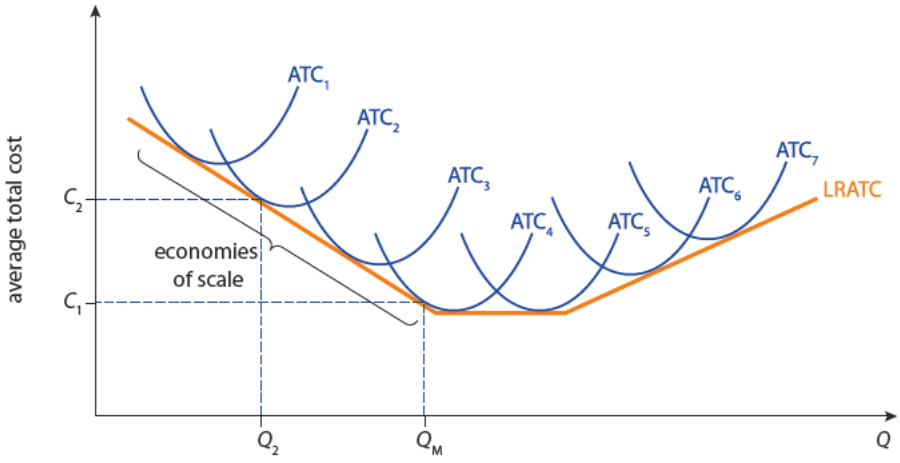
Economies of scale

Economies of scale were explained in Chapter 7 (page 161). If economies of scale occur over a large amount of output, it is possible that the total market demand may be too low to warrant the existence of more than one firm in the industry. The established firm may have achieved a size that has lowered their long-run average costs of production. New entrants would not produce enough to reach the same level of cost reduction. As a result, potential new competitors are deterred from entering because they would be 'too small to compete' with established firms.

Figure 9.1 shows the long-run average total cost (LRATC) decreasing as the individual firm grows larger and larger, moving from ATC_1 (having one factory) to ATC_4 (having four factories). At this monopolist's current level of output (Q_M), it is achieving a low average total cost of C_1, made possible by its multiple plants and the economies of scale it has already achieved while becoming as large as it is. Were another firm to enter the market it would, at best, split the market between the two firms and each would produce smaller quantities, operating fewer factories and having a higher average cost. If each of the two firms shared the market and produced at C_2, the costs would be much higher than only one firm producing at C_1. The ability of one firm to produce the total output at a lower average cost creates a barrier to entry to any new competitors thinking of entering this market.

Industries such as airplane building, shipbuilding and other major manufacturing businesses are relatively uncompetitive, because the total demand for such products is insufficient to attract more than a handful of extremely large-scale firms. In each of these industries, the existence of significant economies of scale poses a major barrier to entry for potential new firms, because in order to compete with existing firms, they would have to produce at a level of output that is simply unachievable over any reasonable period of time and at a reasonable cost.

Figure 9.1
Economies of scale.



Legal barriers

Patents, copyrights and government licences present barriers to entry in certain markets. For example, Microsoft's patent on its Windows operating system and Apple's patent on the 'click wheel' on its early iPods presented barriers to entry to other firms which may have wanted to compete in these markets. This keeps competition out, and makes the industries less competitive. In another instance, government-granted licences on radio and television bands have limited competition in the past. Tariffs, quotas and other trade barriers can also effectively achieve barriers to foreign entry into the market as well.

Ownership of essential resources

Industries in which certain firms own access to the resources essential to their goods' production tend to be less competitive than those in which resources are readily available to any firm wishing to compete. A few large firms control most of the richest mines for many important mineral resources, making it hard for new mining companies to enter the industry. Professional football and basketball teams have contracts with the top athletes in those sports, making it nearly impossible for a new club to form and compete at the highest levels.

I think it's wrong that only one company makes the game *Monopoly*.

Steven Wright, Comedian

Aggressive tactics

Faced with competition, a monopolist can buy out a rival firm. Indeed, if the expected profits without competition exceed the reduced profits and the amount of the purchase price, it would be prudent to do so. The monopolist can also engage in a price war, cutting prices to cost or below-cost levels. This might hurt profits in the short run, but the monopolist has large reserves of profit. The new competitor is not likely to survive by charging the same low prices, and so will be driven out of the business.

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9.3 Demand and revenue curves under monopoly

Learning outcomes

- Explain that the average revenue curve for a monopolist is the market demand curve, which will be downward sloping.
- Explain, using a diagram, the relationship between demand, average revenue and marginal revenue in a monopoly.
- Explain why a monopolist will never choose to operate on the inelastic portion of its average revenue curve.

The demand curve facing the monopolist is quite different from that facing the perfectly competitive firm. Figures 9.2b and 9.2c show the contrast between the two. You will recall that the perfect competitor is one of very many firms and the proportion of the market it sees is quite small. This, in part, explains the perfectly elastic demand curve in 9.2b. Such firms are price-takers, they receive a price set in the overall market at P_E. The monopolist in Figure 9.2c, however, faces the entire market alone, selling to all types of customer. The monopolist therefore faces a downsloping demand curve that looks rather like that facing the whole industry for the perfect competitor. For the monopolist, the firm is the industry, and so it faces a downsloping market demand curve.

This has important implications for price and quantity for the monopolist. For the perfectly competitive firm, any price above the market price will be rejected by buyers. For the monopolist, an increase in price will reduce the quantity demanded. However, this may still be desirable for the monopolist, if revenue increases as a result. Also, the perfect competitor can seemingly sell whatever it can produce at the market demand price. The monopolist is constrained from increasing quantity. It is limited by the demand curve, and must reduce the price from P_1 to P_E to increase quantity demanded from Q_1 to Q_E.

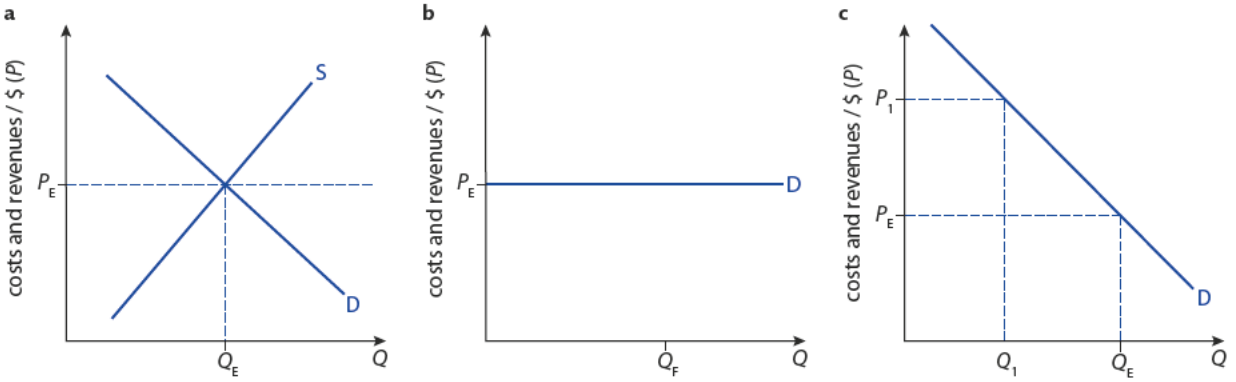


Figure 9.2
a Perfectly competitive industry demand; **b** perfectly competitive firm demand; **c** monopolist demand.

The shape of the demand curve also has implications for the revenue earned by the monopolist.

Table 9.1 lists a downsloping demand curve's revenues.

TABLE 9.1 MARGINAL AND AVERAGE REVENUE FOR DOWNSLOPING DEMAND CURVE

Output (Q)	Price (P)/$	Total revenue (TR = $P \times Q$)/$	Marginal revenue (MR = $\Delta TR/\Delta Q$/$	Average revenue (AR = TR/Q)/$
0	–			
1	10	10	10	10
2	9	18	8	9
3	8	24	6	8
4	7	28	4	7
5	6	30	2	6
6	5	30	0	5
7	4	28	–2	4
8	3	24	–4	3
9	2	18	–6	2
10	1	10	–8	1

Note the following points about Table 9.1.

- As price (P) decreases, the quantity demanded (Q) increases. Thus, demand is downsloping as we would expect for a monopolist.
- Average revenue (AR, column 5) is consistent with P because we are assuming that the monopolist is charging the same price to all customers. As a single-price monopolist, if P is lowered for one it is lowered for all. For this reason P = AR.
- Total revenue (TR = $P \times Q$) initially rises as P is lowered and more Q is consumed. It stops rising at the 5th and 6th unit, and then drops consistently afterwards.
- TR decreases at exactly the point where marginal revenue (MR) is 0. This suggests that further production adds nothing to revenue and may reduce it.
- MR is the amount earned from the next group of units sold. In column 4, you can see that MR decreases as P decreases. Moving from a price of $10 to a price of $9 means that two units are now sold at $9 each. TR at a price of $10 was $10. TR at a price of $9 is $18. The difference between TR before and after the decrease in price is $8. This pattern holds true for a single-price monopolist: as P decreases, MR decreases at twice the rate of the price change. In Table 9.1, each time P drops by $1, the MR drops by $2. Thus, the MR curve will fall below the demand curve as price decreases.

Figure 9.3 demonstrates the relationship between total revenue (TR) and marginal revenue (MR) and demand for the monopolist. As price drops, the demand curve slopes down to the right. MR falls below it at a faster rate, eventually dropping to zero at the price of $5.

In Table 9.1, as P drops from $6 to $5, TR stalls at $30, meaning that no additional revenue has been added, so MR = 0. In Figure 9.3, this is shown as MR crossing the x-axis at the point that corresponds to $5 on the demand curve.

Again in Table 9.1, as price drops from $10 down to $5, TR is increasing. This tells us something about the elasticity of demand over this range of prices. You will recall that the total revenue test states that as price decreases and total revenue increases, demand must be elastic (PED > 1). We can therefore conclude that demand is elastic in the upper portion of the demand curve, as price drops from $10 to $5 (Figure 9.3). When the price drops below $5, total revenue decreases (as marginal revenue actually becomes negative). The

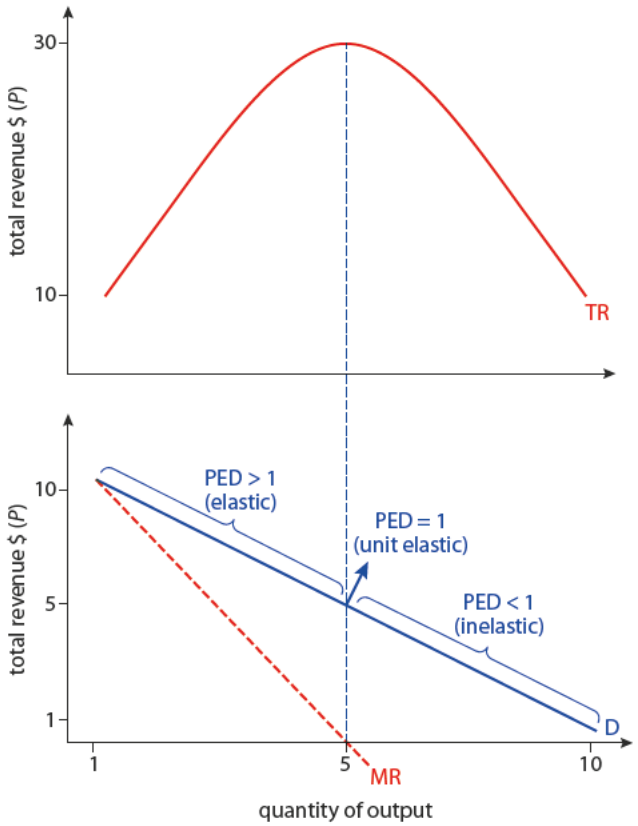


Figure 9.3
Monopolist total revenue and price elasticity of demand.

total revenue test here says that as price decreases from $5 to $1 and total revenue drops, demand must be price inelastic (PED < 1) (Figure 9.3, above).

Why is this important? One conclusion we can draw from this concept is that a monopolist will not produce where marginal revenue is negative. This would violate the basic assumption that producers are rational. Therefore, we can assume that the monopolist will produce in the elastic portion of the demand curve, where marginal revenue is positive. In Figure 9.3, the monopolist will not produce any more than five units. Any more output would lower TR, as MR becomes negative.

9.4 Profit maximization for the monopolist

Learning outcomes

- Explain, using a diagram, the short- and long-run equilibrium output and pricing decision of a profit-maximizing (loss-minimizing) monopolist, identifying the firm's economic profit (or losses).
- Explain the role of barriers to entry in permitting the firm to earn economic profit.

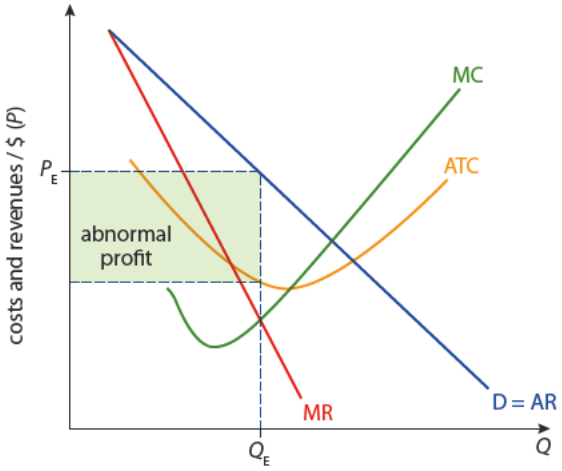
The monopolist firm determines output and profit maximization the same way perfect competitors do, by producing where marginal costs are equal to marginal revenue (MC = MR). However, for the monopolist or any other imperfect competitor, the MR = MC point is reached at a different quantity from the perfect competitor because of the different demand and MR curves they face. (It is also possible to determine the profit-maximization level using TC and TR. This is covered in detail in Chapter 7.)

In the short run, firms can experience abnormal profits, losses, or normal profits. The firm uses the same approach to production in any case, because MR = MC will either maximize any profits or minimize whatever losses may be occurring. Whether profits or losses are occurring depends on the amount of demand and corresponding level of revenue received.

Short-run profits for the monopolist

To understand these cases more clearly, let's examine Figure 9.4. You will recall from Chapter 7, the nature of the average cost (AC) and marginal cost (MC) curves. Marginal costs decrease initially, but as the law of diminishing marginal returns sets in, marginal costs rise. Also note that as a mathematical imperative, MC will intersect average total cost (ATC) at the minimum of ATC. Remember that the firm will produce where MR = MC to maximize its profits. Producing any quantity beyond that will increase MC above MR, and will reduce the profit of the firm. The monopolist sets the price at P_E, the point on the demand curve that corresponds with Q_E. Why this price? Because the monopolist will charge the highest price it can, as a good profit maximizer.

Figure 9.4
Profit maximization for the monopolist.



Thus, the price a monopolist charges is set by the demand curve at the profit-maximizing level of output, in this case P_E. As shown in Figure 9.4, price (AR) is above average cost (ATC), which means there is profit being made. The distance between AR and ATC at Q_E shows the per-unit profit. That amount, multiplied by the quantity, will give us the value of the shaded rectangle, or total abnormal profit.

Short-run losses for the monopolist

However, even a monopolist can suffer losses. This can occur when either (a) costs rise to a point at which they are no longer covered by the amount of demand and revenue or (b) demand shrinks thus lowering revenues to a point below costs. In either case, the firm still applies the same rule of profit maximization for the purpose of minimizing losses. By producing at MR = MC, the firm will lose less than it would if it produced at any other point.

In Figure 9.5, demand for the monopolist's product is lower, relative to the costs, than in Figure 9.4. The firm still produces at MR = MC, producing Q_E, and selling at a price P_E set by the demand curve. Above the demand curve at that output level is the ATC, telling us that the firm is losing money. The amount of the per-unit loss is shown by the distance between ATC and the demand curve, and the total loss is shown by the pink rectangle.

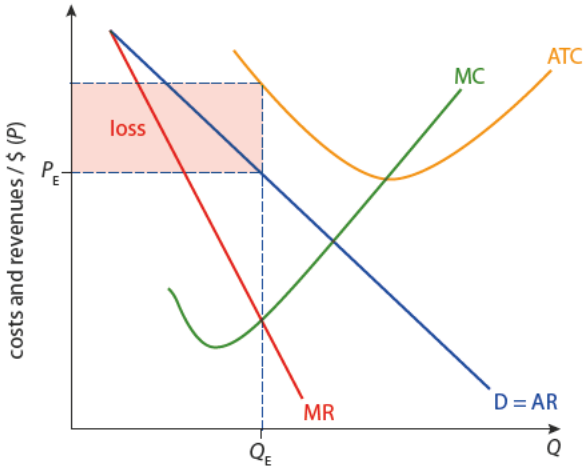


Figure 9.5
Loss minimization for the monopolist.

A monopoly firm can continue to produce while making losses, just as the perfectly competitive firm can, as long as variable costs are covered. However, in the long run, the monopolist is much more likely to continue earning profits because barriers to entry prevent any competitors from entering the market.

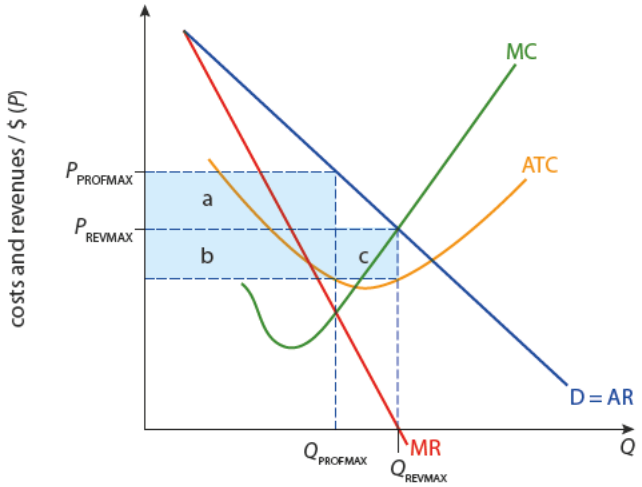
HL EXERCISES		
1	a	Create a diagram showing a profit-maximizing monopolist earning short-run profits.
	b	From the diagram, describe two possible events that might eliminate these profits.
2	a	Create a diagram showing a profit-maximizing monopolist making short-run losses.
	b	From the diagram, describe two possible events that might eliminate these losses.

9.5 Revenue maximization

Learning outcomes
- Explain, using a diagram, the output and pricing decision of a revenue-maximizing monopoly firm.
- Compare and contrast, using a diagram, the equilibrium positions of a profit-maximizing monopoly firm and a revenue-maximizing monopoly firm.
- Calculate from a set of data and/or diagrams the revenue-maximizing level of output.

While economists traditionally assume that firms seek to maximize profits, there are other views of the market that emphasize revenues rather than profits. If the monopolist were to produce for the sake of maximizing revenues, the resulting levels of output may be quite different. Figure 9.6 (overleaf) shows the monopolist maximizing revenues rather than profits. Under the rules of profit maximization, the monopolist would produce at $Q_{PROFMAX}$, setting a price at $P_{PROFMAX}$. If the monopolist were maximizing revenues, it would be producing where marginal revenue intersects the lower axis, where MR = 0 and TR is at its highest. Producing less than this level of output would be to miss out on extra revenue, since MR is still positive up to this point. Producing beyond Q_{REVMAX} would be to produce where marginal revenue is negative, reducing revenues. (This corresponds to producing at five units in Figure 9.3 (page 201), as this is where TR is at its peak, and just as MR = 0.)

Figure 9.6
Monopoly revenue maximization.



In contrast, the profit-maximizing monopolist would produce at $Q_{PROFMAX}$, where MC = MR, and would charge $P_{PROFMAX}$. The profit maximizer charges more and produces less. To become a revenue maximizer, this firm would lower the corresponding price to P_{REVMAX}, and expand output to Q_{REVMAX}. From Figure 9.6, we can see that the revenue-maximizing firm earns less profit, going from shaded area a + b to the area b + c. Thus, we can conclude that monopolists who seek to maximize revenues will sell at lower prices and produce more output, but also earn less profit than monopoly firms seeking to maximize profits.

HL EXERCISES

3 Assume a monopolist faces a demand curve with prices and quantities of $8 and 3 units, $7 and 4 units, $6 and 5 units, $5 and 6 units, $4 and 7 units, $3 and 8 units. With this information, create a table showing prices, quantities demanded, total revenue and marginal revenue.

4
- **a** Plot these points on a graph showing the demand (AR) curve, and marginal revenue (MR) curve.
- **b** Show the point at which marginal revenue equals zero.
- **c** Add an MC curve to your diagram and identify the profit-maximizing price and output level.
- **d** Identify the revenue-maximizing price and output level.

9.6 Natural monopoly

Learning outcomes
- With reference to economies of scale, and using examples, explain the meaning of the term 'natural monopoly'.
- Draw a diagram illustrating a natural monopoly.

When a single large firm can produce more cheaply than two or more smaller firms, it is called a natural monopoly. More specifically, a natural monopoly typically occurs when production of a good or service requires significant fixed costs. Because the fixed costs are so large, the average costs decrease only after very large runs of output (in a way very

similar to the existence of economies of scale). Long-run average total costs (LRATC) decrease only with exceptionally large quantities. Figure 9.7 demonstrates this occurrence. One firm, producing 2000 units for the entire market, lowered short-run average total costs to $SRATC_{1FIRM}$. If the market were split between two firms, with each firm producing 1000 units, the cost at $SRATC_{2FIRMS}$ is much higher. Thus, it is more efficient for a single firm to produce in this market.

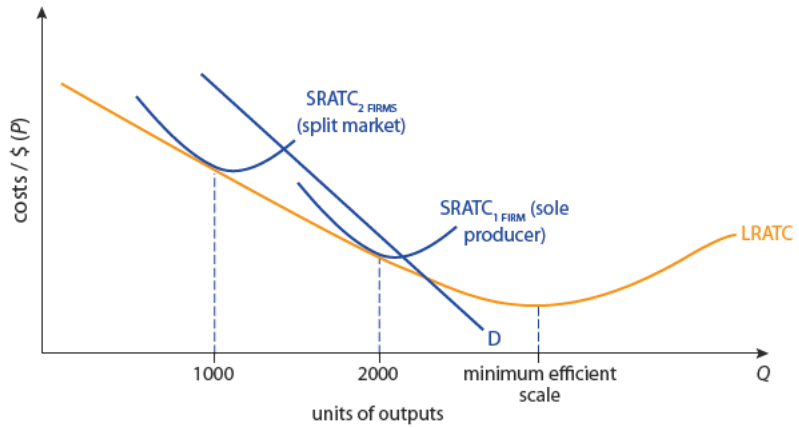


Figure 9.7
Natural monopoly.

Typical natural monopolies are public utilities such as power, sewage, and water production. These firms have enormous infrastructure costs, including the cost of running pipes and power lines from the production facility into each home. To have more than one firm, for the sake of consumer choice, could mean having several sets of pipes and power lines. The high fixed cost of infrastructure was the rationale behind creating (state-run) power and utility monopolies. In the UK, the National Grid carries all electrical power, and functions as a kind of regulated monopoly. But there are several companies providing energy to households. Why do these companies not have their own power grids? Because the high fixed cost of infrastructure would make them inefficient.

A natural monopoly occurs in a market where the lowest costs can be achieved when only one firm sells to the market. It is typically associated with large fixed start-up costs.

9.7 Disadvantages and advantages of monopoly

Learning outcomes

- Draw diagrams and use them to compare and contrast a monopoly market with a perfectly competitive market, with reference to factors including efficiency, price and output, research and development (R & D) and economies of scale.
- Explain why, despite inefficiencies, a monopoly may be considered desirable for a variety of reasons, including the ability to finance research and development (R & D) from economic profits, the need to innovate to maintain economic profit, and the possibility of economies of scale.

Disadvantages

Higher prices and lower quantity produced

Compared to industry output for the competitive firm, monopolies produce less and charge higher prices (this is an industry-wide comparisons, not firm-to-firm). Figure 9.8 (overleaf)

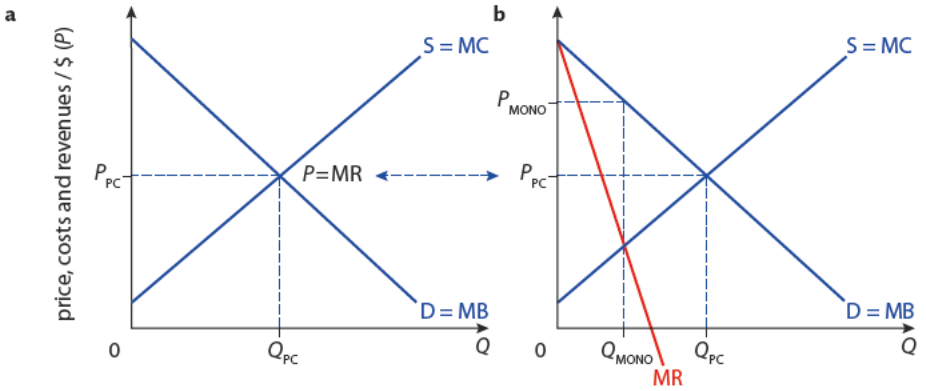


Figure 9.8
Perfect competition *vs* monopoly prices and quantities. **a** Perfectly competitive industry; **b** monopoly.

compares production by the competitive firm to that of the monopolist. The competitive market produces at Q_{PC} at a price P_{PC}, where supply and demand intersect. Recall that this sets the price for all firms, and thus their marginal revenue. Therefore, P = MR for the competitive industry.

If those firms produced as a single firm, that firm would follow the same rules for profit maximization, but would be operating under different revenue conditions. For the monopolist, marginal revenue is far below the demand curve, pulling production back to Q_{MONO}, and raising price to P_{MONO}. This reduces the amount made available to the market, compared to competitive markets, as well as increasing the price.

This obviously benefits producers and hurts consumers. More specifically, it can harm relatively poor consumers the most. Where the good is a necessity, low-income consumers will not be able to purchase the good in sufficient quantities.

Producer welfare gains at the expense of consumers

The degree to which producers gain at the expense of consumers can be understood using the concept of consumer and producer surplus. Figure 9.9a shows consumer and producer surplus for the competitive market, producing where supply and demand intersect at Q_{PC} and charging P_{PC}. Consumer surplus is shown by triangle A and producer surplus by triangle B. In Figure 9.9b, as the monopolist marginal revenue falls below demand, the intersection point with marginal cost is further back, and output is at Q_{MONO} with price at P_{MONO}.

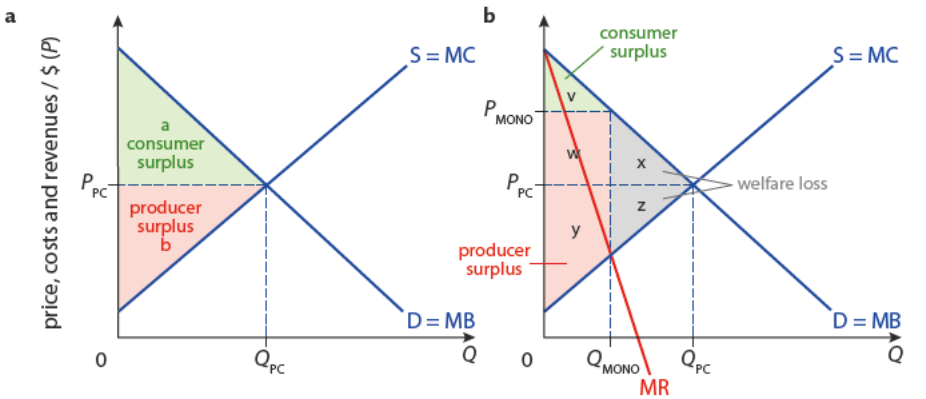


Figure 9.9
Perfect competition *vs* monopoly consumer and producer surplus. **a** Perfectly competitive industry; **b** monopoly.

As a result, consumer surplus shrinks from a to the smaller triangle v for consumers in the monopoly. Producer surplus expands from b in perfect competition to the larger w + y under the monopoly. Finally, the decreased quantity results in a loss to both producers and consumers. These welfare losses are shown by triangles x and z, respectively. Triangle x is consumer surplus that is not enjoyed under monopoly, whereas triangle z represents the loss of surplus for producers. In sum, production under monopoly clearly benefits the

welfare of the single producer at the expense of consumers and the multiple producers that would exist in a more competitive market.

Incentive problems

The monopolization of a particular industry may result in a loss of the incentives that make markets efficient in the first place.

Lack of innovation

Because the monopolist is insulated from competition, monopolies are likely to be complacent. Research and development can be costly, which will reduce profits, and the monopolist may conclude that it is not worth the cost when profits are guaranteed. As a result, monopoly firms are unlikely to innovate to improve product quality or to reduce costs. As costs will not decrease through innovation, the quantities produced on the market will not increase.

Incentive to avoid competition

Monopolies may choose to preserve their market power by using the aggressive tactics described earlier, rather than by innovating or lowering costs. In particular, where such monopolies are granted by government licence, there is significant incentive for the firm to persuade lawmakers to preserve the monopoly. With their profits at stake, they can spend money on advertising and influencing the process, rather than improving their production.

Firms like Facebook, Google and Apple currently dominate the market for online activities, suggesting we may be entering a new era of monopoly power. Many industrial monopolies of the past failed to innovate their products, but some online superpowers provide endless innovation. Do consumers benefit from the market power of firms like Facebook and Google in ways which might not be possible if more firms participated in the market for online products such as search engines and social networks?

Advantages of monopoly

Economies of scale

Among the more serious advantages to monopoly is the reduction in costs through economies of scale. In some cases, the high fixed costs of production mean that lower costs can only be achieved through massive runs of output. As shown in Figures 9.1 and 9.7, the average costs can be lowered as production expands to greater and greater levels by the single firm. If the firm is able to reduce costs sufficiently, it may be able to lower prices to a point that is more competitive than that of the perfect competitor. This is especially true of a natural monopoly, and in the specific case of public utilities (Figure 9.10). Here, the monopoly price and output are shown with those of perfect competition. Again, because the marginal revenue curve of the monopolist falls below demand, it intersects MC at a smaller level of output than that of the perfect competitor.

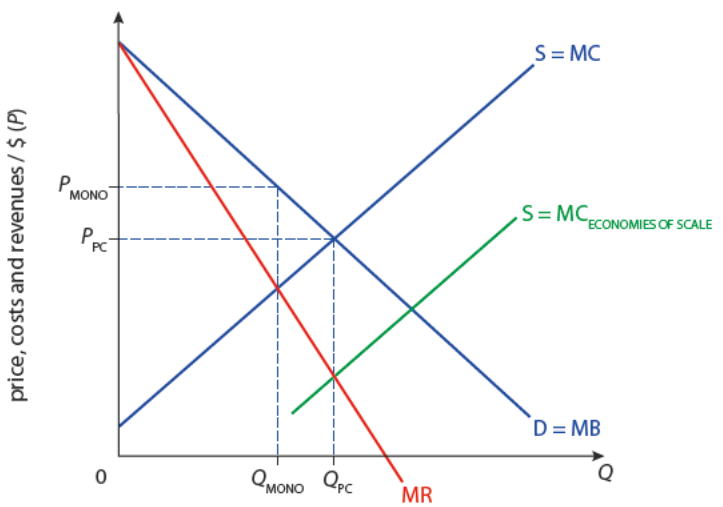


Figure 9.10
Economies of scale.

To achieve the same level of output and to lower price to P_{PC}, the marginal costs of the typical monopolist must be lowered through economies of scale. This would shift MC to the right, hypothetically to the point where it sets a quantity and price equal to that of the competitive firm.

Higher profits enable greater research and development

To learn more about economies of scale, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 9.3.

Perfectly competitive firms achieve profits only in the short run. Therefore, they have fewer resources available to improve efficiency. In contrast, while the monopolist may have little incentive to invest in research and development, they have much greater capacity to do so because of their long-run profits. If they do invest wisely, these firms may yield even greater profits with new products and services, or may be able to entrench their position with even more significant barriers to entry.

9.8 Monopolies and efficiency

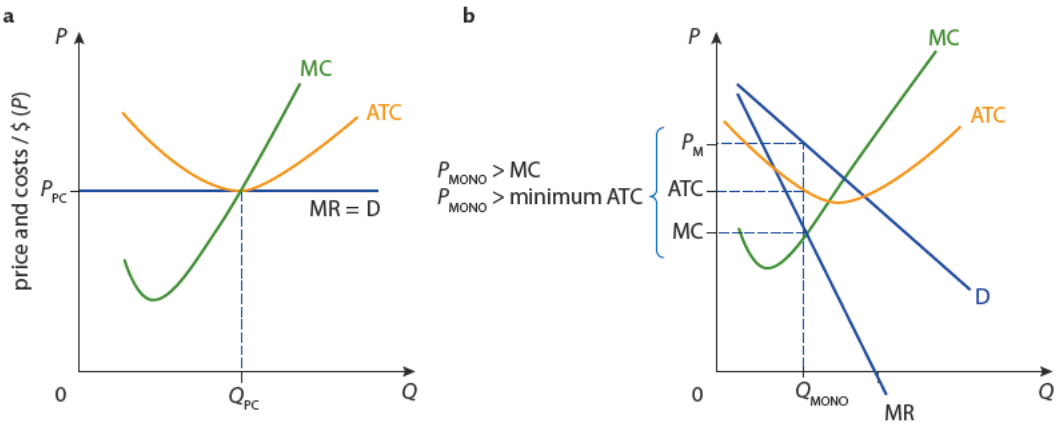
Learning outcomes

- Explain, using diagrams, why the profit-maximizing choices of a monopoly firm lead to allocative inefficiency (welfare loss) and productive inefficiency.

So far, our comparisons of perfect competitors and monopolists have been at the industry level. Our analysis of efficiency will consider the individual firm. This is because the firm-view level allows us to consider the cost and revenue curves that are relevant to discussions of productive and allocative efficiency.

Figure 9.11 shows each type of firm in long-run equilibrium. For the perfectly competitive firm, this means a condition of normal profits because of the ease of entry and exit. For the monopolist, this most likely means a condition of economic profits because barriers to entry prevent other firms from competing and causing a reduction in profits.

Figure 9.11
Perfect competition *vs* monopoly, allocative and productive efficiency.
a Perfectly competitive firm; **b** monopoly.



Recall that allocative efficiency is achieved by having P(AR) = MC at the profit-maximizing level of output. For the competitive firm, price is equal to marginal cost in the long run, so allocative efficiency is achieved. For the monopolist, at the profit-maximizing level of output, price at Q_{MONO} is considerably higher than marginal cost. This suggests that the monopolist under-produces the good, and would need to produce more to achieve allocative efficiency, but does not in order to maximize profits.

Productive efficiency is achieved when the price at the profit-maximizing level of output is equal to the minimum average costs (P = minimum ATC). For the competitive firm, in the

long run, price is at the lowest point of the ATC, and so productive efficiency is achieved. For the monopolist, the marginal revenue curve intersects marginal cost at a quantity less than that needed for the firm to achieve its minimum average total cost. This suggests that the monopoly does not produce enough of the good to achieve productive efficiency.

9.9 Policies to regulate monopoly power

Learning outcomes
- Evaluate the role of legislation and regulation in reducing monopoly power.

Natural monopoly

Governments will grant exclusive production rights to single firms where a natural monopoly is likely to yield lower costs and more output for consumers. However, even the natural monopolist still has the incentive to set a price above and a quantity below that of a perfect competitor. And, in the case of public utilities, there are likely to be significant extra welfare benefits to all of society to having water, sewage and power enough for all citizens. As a result, most governments subsidize these public monopolies, paying them to provide more services at lower prices.

While perhaps initially counter-intuitive, the policy of subsidizing natural monopolies is widely accepted as a necessary method to achieve greater social good. With this in mind, public monopolies are usually subject to regulation and government oversight.

We don't have a monopoly. We have market share. There's a difference.

Steve Ballmer, CEO of Microsoft

Anti-trust legislation

Economists and governments are highly suspicious of monopolies that occur in the private sphere. As a result, most countries have some degree of anti-trust legislation to protect consumers against anti-competitive behaviour. While the firms prosecuted under these laws rarely qualify as pure monopolies, all of them are seeking a degree of monopoly power by seeking to act as a single firm. They collude and set prices or agree to stay out of each other's markets in ways that drive up profits at consumer expense.

Many mergers between large firms are investigated under these laws (e.g. when major IT companies or airlines want to combine). The laws seek to preserve open competition to keep markets working efficiently. When firms are found to have flouted these laws, punishments are usually in the form of corporate fines, but bosses can sometimes be held accountable. In 2009, the US jailed 35 corporate officers for an average of two years each.

To access Worksheet 9.1 on regulation of monopoly prices, please visit www.pearsonbacconline.com and follow the onscreen instructions.

9.10 Price discrimination

Learning outcomes
- Describe price discrimination as the practice of charging different prices to different consumer groups for the same product, where the price difference is not justified by differences in cost.

- Explain that price discrimination may only take place if all of the following conditions exist: the firm must possess some degree of market power; there must be groups of consumers with differing price elasticities of demand for the product; the firm must be able to separate groups to ensure that no resale of the product occurs.
- Draw a diagram to illustrate how a firm maximizes profit in third-degree price discrimination, explaining why the higher price is set in the market with the relatively more inelastic demand.

Price discrimination occurs when different people are charged different prices for the same good. There are many examples:

- air travel ticket prices in the same section of a flight can vary tremendously
- movie tickets are cheaper for older people and students
- shoppers willing to spend time cutting out 'coupons' from newspapers enjoy lower prices than those who do not bother.

Whether it agrees with our sensibilities or not, such pricing inequities are rather common. This section examines the conditions necessary for price discrimination, how it works in practice, and evaluates the effects of this pervasive business practice.

Price discrimination occurs when different prices are charged to different consumers for the same good by the same provider.

Necessary conditions for price discrimination

Price-setting ability

The firm must be able to charge different prices to different customers, so it must have some market power. Thus, it cannot be a perfectly competitive firm, which can only charge the market price. As a kind of imperfect competitor, the firm will have a downsloping demand curve, suggesting that it sees a large portion of the market, with customers of many types.

Varied consumer elasticities

There should be a variety of price elasticities of demand among customers. If demand is more rigid among some customers, the price discriminator can, in theory, compel them to pay more than those who are more sensitive about the price. In other words, high-elasticity customers and low-elasticity customers can be charged differently according to their sensitivity to the price.

Where, how, and when you buy airplane tickets makes a difference to the price. Book your tickets the week before a flight, and you will pay more than the traveller who booked months in advance. But if you wait until just hours before the flight, you may get the cheapest ticket of all. If you use a travel agent, the price will differ from what you pay online or over the phone. What accounts for the variety of prices paid by different passengers on the same flight?

Ability to separate consumers

People who were aware of the difference between their higher price and the lower one could take steps to avoid the extra charges. For price discrimination to work, it must be difficult or impossible for those able to buy at the cheaper price to resell at a discount to high-price customers. Firms seek to separate customers in the following ways.

- **Time**. Demand for a service can peak at different times. Christmas is often a high-travel time and the prices of air tickets and hotel rooms rise accordingly. Train and taxi services are often higher at peak travel hours. Taxi service can also be more expensive late at night, when other transport options are unavailable.
- **Age**. A popular form of discount for theatre or movie tickets is that given to children, students and older people. Older people can also receive lower rates on meals, hotels, and a variety of goods. This may be in recognition of the belief that seniors have less money to spend and more time to shop around for the best deals.

- **Income**. Professional services often charge more to high-income clients. Dentists, for example, might charge the children of a low-income customer a fraction of the price charged to rich families. Lawyers perform *pro bono* work (i.e. for low fees or for free) which is subsidized by their wealthier customers.
- **Taste**. A subtle form of price discrimination: producers can market products with only the slightest amount of differentiation and charge significantly higher prices to a willing segment of consumers. This happens in the car market (e.g. cars with special 'sport' styling) or in your local coffee shop (e.g. espresso being much cheaper than a fancy latte).
- **Gender**. Firms sometimes charge different prices for men and women. In some countries, bars are banned from staging 'ladies' nights' where women pay no admission or reduced prices, on the grounds of gender discrimination. Dry-cleaners in America are known to charge men less than women for cleaning shirts. Conversely, Austrian beauty salons have stopped a long-standing practice of charging men more than women for manicures and pedicures. In the EU, insurance companies have recently been told they must stop charging men more than women for car insurance.
- **Location**. Distance between markets means that firms in one market may charge a higher price, based on greater inelasticity of demand. Transport costs make it too costly to ship and resell those goods priced more cheaply into the high-price area.
- **Consumer type**. Airlines are able to discriminate between leisure travellers and business travellers. Leisure travellers are not limited to specific times, so these customers probably have a higher elasticity of demand. Business travellers have less choice about travel times and often pay higher prices as a result. Large industry can be charged lower rates for power than residential customers. This is a form of a volume discount, and could be done to encourage industrial production in the area.

Types of price discrimination

First degree: by customer

First-degree price discrimination occurs when firms are able to charge exactly the maximum price that each customer is willing to pay. This presumes some insight by firms into the precise elasticity of demand for the good. It also presumes the ability of the firm to separate customers individually and charge the exact reservation price for each customer. This type of price discrimination is called perfect price discrimination. Because of the extremity of these assumptions, it may seem an improbable occurrence. It is difficult to imagine that a firm would have the kind of specific insight into the desires of its customers. Being able to separate so distinctly (down to the individual level) also seems unlikely.

Nevertheless, some real-world situations approximate first-degree price discrimination. In the US, car salesmen often have significant discretion over the specific price of any single car on the lot. Effective salesmen talk to buyers and assess their knowledge of the car market, their enthusiasm for the specific car, their income based on their appearance and education level, as well as a number of other visual and verbal cues. This is all geared towards estimating the buyer's price elasticity of demand for the car, so the salesman can charge the maximum price possible.

In theory, the perfect sales force would be able to discriminate the market perfectly, and negotiate the maximum price for each customer. If so, the result would appear as shown in Figure 9.12 (overleaf). This compares the community surplus and revenue differences between perfectly competitive markets and a perfect price discriminator. In a perfectly competitive market, the consumers retain some surplus (triangle a), because firms in the

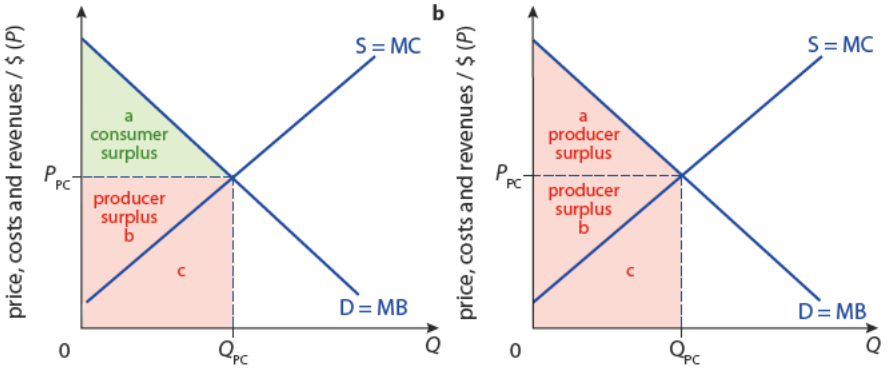


Figure 9.12
Perfect price discrimination. **a** Perfect competition industry level; **b** perfect price discrimination industry level.

market can only charge a single price. Some consumers will gain extra utility as a result. And total revenue is confined to the area of b + c. However, as a perfect price discriminator, all consumer surplus disappears and goes to the producers, who now gain surplus of a + b. Total revenue is defined by all three shaded areas, a, b, and c. Thus, the firm enjoys significantly higher revenue (and mostly likely higher profits), than if it were charging a single price.

Figure 9.13 demonstrates the advantage to a monopolist who is able to discriminate perfectly. Figure 9.13a shows the profit and surplus levels for the single-price monopolist. The green shaded area represents the consumer surplus and the yellow area the abnormal or economic profits earned by the firm. Figure 9.13b shows the perfectly price-discriminating monopolist. There is no single price for the market on the diagram. Also, here demand is equal to marginal revenue because the firm is not charging a single price for each good, it is charging a different price for each customer. Therefore, the marginal revenue is equal to whatever the next price will be (MR = D).

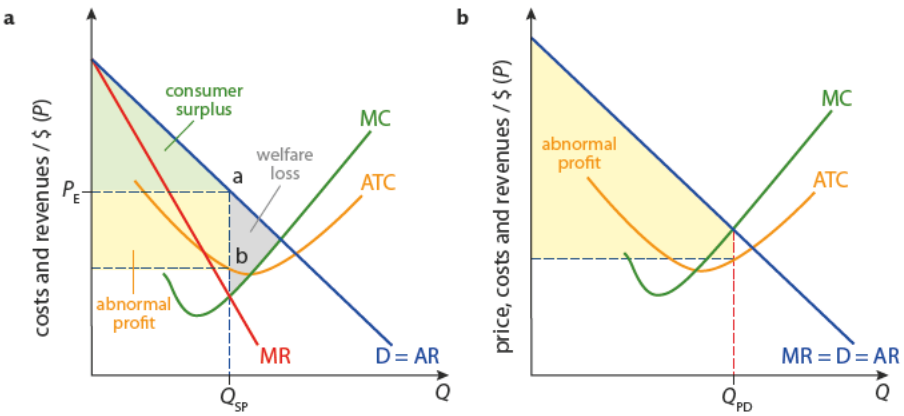


Figure 9.13
a Single-price monopolist; **b** perfectly discriminating monopolist.

Several conclusions are evident here.

- Consumer surplus is completely eliminated.
- Profits are greatly expanded.
- Output is greater (Q_{PD} compared to Q_{SP}).
- The area of welfare loss is also eliminated. This suggests that there may be some benefit to price discrimination. The ability to discriminate has allowed the firm to charge the maximum to all its customers, but it will also serve some customers who would not have afforded the product before – quantity Q_{SP} to quantity Q_{PD}.
- Allocative efficiency is achieved with price discrimination when final price = MC.

Examples of this kind of price discrimination include the perfect car salesmen above. Real estate agents, as well as the hagglers in open markets, may also have a similar degree of price-discriminating power.

● Examiner's hint

First-degree price discrimination may be rare in the real world, but it should be emphasized that such practice may increase overall welfare in society. While there are certainly losers (e.g. those who end up paying higher prices for the product), society benefits overall as output approaches a more socially optimal level, and consumers who otherwise would be excluded from a market can better afford goods that may improve their welfare.

Second degree: by quantity

Second-degree price discrimination acknowledges the observation that consumers may choose to buy additional amounts of a good if the price decreases. Thus, firms may offer lower prices with the purchase of successively larger quantities: the first batch sold will be at the highest price, the second at a lower price, and so on. Instances of this kind of price discrimination by quantity include:

- 'buy two, get one free' offers in retail markets of food and consumer items (here, buying items in threes reduces the average price, while technically preserving the higher price of the first two units)
- frequent-flyer programmes that award free or reduced rate flights to good customers
- season tickets for concerts or sports team events
- public utility companies charging less for extra units of power or water
- bulk buying on behalf of a company (a manufacturer of large family cars probably pays less per unit for auto-quality steel than does a much smaller sports car company)
- rewards programmes of all kinds, offered by many retail stores, which offer special deals and discounts to loyal buyers.

Figure 9.14 shows the likely results of second-degree price discrimination. Compared to the perfectly discriminating firm, the second-degree discriminator earns extra revenue in distinct blocks. These blocks correspond to the discounted price levels.

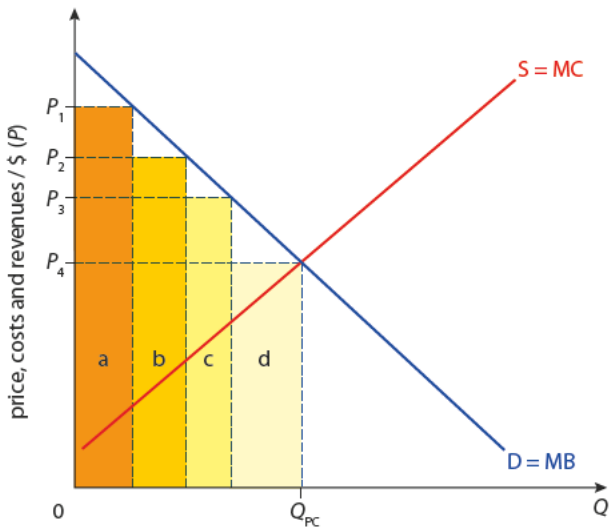


Figure 9.14
Second-degree price discrimination.

When compared to first-degree price discrimination, some results are evident. Total revenue increases over the single-price firm. The shaded areas a, b, c and d represent increases in total revenue as the price is lowered for larger quantities. The firm may approach, but not achieve, allocative efficiency (P = MC). Further more, it is likely to earn greater economic profits than the single-price firm.

Third degree: by consumer groups

Third-degree price discrimination acknowledges and takes advantage of the fact that different consumer groups have differing price elasticities. It moves to separate the groups and charge them the highest price possible. This type of price discrimination is quite prevalent, and can be seen in:

- bars offering 'happy hours' when drink prices are lower to draw customers in at unusual or off-peak times

- women being charged more for dry cleaning than men
- phone companies offering lower prices at off-peak times (weekends and evenings)
- airlines charging more to customers who book closer to flight date
- restaurants and cinemas charging less to children, elderly people and students.

In each instance, the consumer group being charged differently has different price elasticities. Students and elderly people are more price-sensitive than 30-year-olds. Businesses require phone services during office hours, and so are compelled to pay higher prices than those who are making social calls later in the day or at the weekend. Someone looking to book flights for tomorrow will not have very many options (possible substitutes), and so will pay a higher price than those who shopped for fares weeks earlier.

To maximize profits, the firm must take the differing demand elasticities into account. In Figure 9.15, the markets are separated into the inelastic demand group (market A), the elastic demand group (market B), and the combined markets (market A + B).

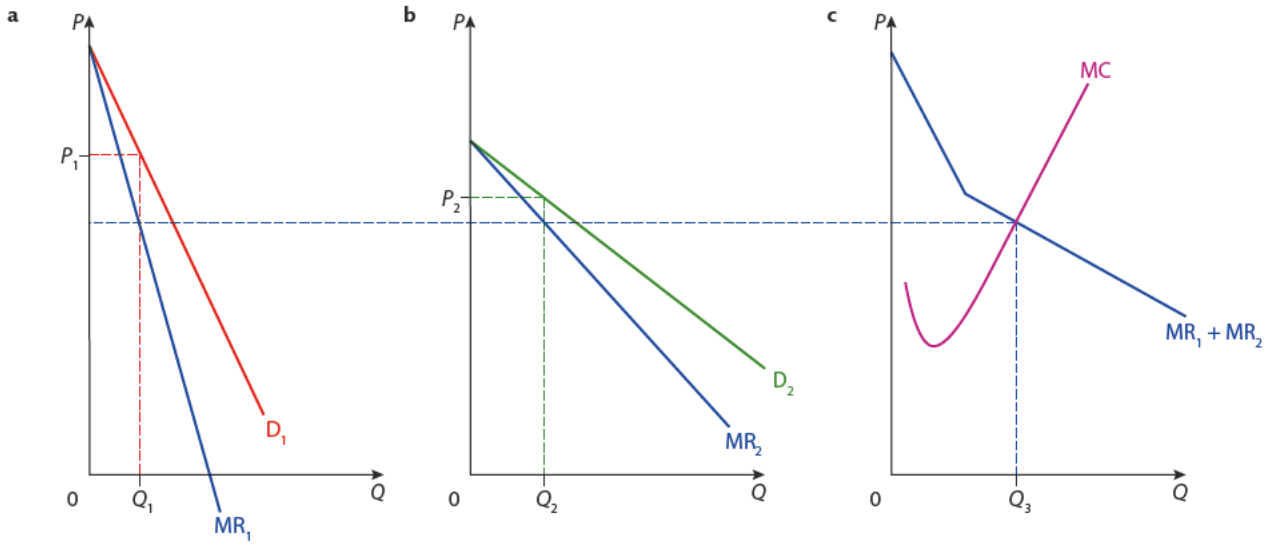


Figure 9.15
Third-degree price discrimination. **a** Market A; **b** market B; **c** market A + B.

In Figures 9.15a and 9.15b, the marginal revenue curves are shown for each market. In Figure 9.15c, marginal revenues for markets A and B are added together to get the kinked MR curve. Figure 9.15c also shows the firm's marginal cost. Starting with Figure 9.15c, the firm produces the output where $MR_1 + MR_2 = MC$ which equals an output of Q_3. Then, the firm calculates the point where MR = MC for the separate markets, MR_1 and MR_2.

- For Market A, the dotted line shows where MC intersects MR_1, determining an output of Q_1 and a price determined by the demand at Q_1, which is P_1.
- For Market B, the dotted line shows where MC intersects MR_2 at Q_2. At Q_2, the demand determines the price to be P_2. They will influence the price charged through the demand curve and the amount produced through the intersection of marginal revenue and marginal cost.
- P_1 in market A is higher than P_2, reflecting the lower price elasticity of these consumers.
- P_2 in market B is lower than P_1, reflecting the higher price elasticity of demand there.

As a result, it appears that profits and total revenue are likely to increase over those of the firm that does not price-discriminate. Allocative efficiency will not be reached, as P will not equal MC in either market. Prices may increase for some groups and decrease for others. As with other forms of price discrimination, this may result in some being drawn into the market who would not otherwise afford it, such as students, children and elderly people.

To access Worksheet 9.2 on everyday price discrimination, please visit www.pearsonbacconline.com and follow the onscreen instructions.

Evaluation of price discrimination

The results of price discrimination resist simple summary as the effects depend on the type of discrimination practised. Nevertheless, some generalizations can be made.

- **For firms.** Profits and total revenues will increase. It is possible that price discrimination will enhance monopoly power over consumers. Deadweight losses may be reduced or eliminated.
- **For consumers.** Total output increases in first-degree and second-degree price discrimination, and may also increase for third-degree price discrimination. This probably extends the market to consumers who would otherwise miss out, typically those who couldn't pay the single price-equilibrium price. Consumers generally will pay higher prices overall, however, as firms take advantage of their ability to separate the market. Consumer surplus is reduced, sometimes completely.

Overall, it is possible that society benefits from some degree of price discrimination as firms extend output to lower-income groups and welfare loss is reduced. Greater allocative efficiency is sometimes achieved as well. And it is possible that the greater levels of output may inspire the firm to reduce costs and achieve economies of scale.

To access Worksheet 9.3 on price discrimination 101, please visit www.pearsonbacconline.com and follow the onscreen instructions.

CASE STUDY

Market insight

The costs of most of Starbucks coffee drinks are very similar, from the small cappuccino to the largest café latte, costs vary by only a few cents. However, the prices are dramatically different, as the largest latte can be nearly $5.00, with the smallest cappuccino being around $2.50. What's going on? Starbucks is trying to separate the market between price-conscious customers and those who are 'price blind.' By setting distinct prices for slightly different products, Starbucks allows some customers to reveal themselves as having lower price elasticities than others.

Tim Harford, author of *The Undercover Economist* books and columns, sees Starbucks as practising a particularly subtle form of price discrimination.

To learn more about price discrimination, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 9.4.

HL EXERCISES

5 **a** Does charging coffee drinkers widely different prices for very similar products qualify as price discrimination?

b If so, what degree of price discrimination applies here?

PRACTICE QUESTIONS

1 **a** Explain, using an appropriate diagram, why price and marginal revenue are not equal for the monopolist. (10 marks) [AO2], [AO4]

b Evaluate a government's decision to use anti-trust legislation to break a large technology company up into dozens of smaller companies. (15 marks) [AO3]

2 **a** Explain, using an appropriate diagram, how the monopolist determines the profit-maximizing level of output and price. (10 marks) [AO2], [AO4]

b Discuss the view that competitive markets are always more efficient than monopolies. (15 marks) [AO3]

To access Quiz 9, an interactive, multiple-choice quiz on this chapter, please visit www.pearsonbacconline.com and follow the onscreen instructions.

3 **a** Explain, using an appropriate diagram, why the monopolist would choose to operate in the elastic portion of their demand curve. (10 marks) [AO2], [AO4]

b Compare and contrast the different objectives a monopoly may pursue in its price and output decisions. (15 marks) [AO3]

4 **a** Explain, using examples and an appropriate diagram, the concept of a natural monopoly. (10 marks) [AO2], [AO4]

b To what extent do natural monopolies act against the best interest of society? (15 marks) [AO3]

5 **a** Explain how a third-degree price discriminator will determine price and output. (10 marks) [AO2], [AO4]

b Price discrimination of any kind only brings harm to consumers. Discuss. (15 marks) [AO3]

6 With the aid of at least one diagram, explain one way a consumer might gain from the behaviour of a monopolist and one way a consumer might lose from the behaviour of a monopolist. (10 marks) AO2], [AO4]

7 **a** Explain how a monopolist may earn economic profits in the long run. (10 marks) [AO2], [AO4]

b Evaluate the view that, compared to competitive markets, monopolies will always harm the consumer. (15 marks) [AO3]

8 'Monopoly price is higher and output smaller than is socially ideal. The public is the victim.' (JK Galbraith, 1974)

a Explain the economic reasoning behind the statement that 'monopoly price is higher and output smaller than is socially ideal'. (10 marks) [AO2], [AO4]

b Do you agree that the public is always the 'victim' of monopoly? Justify your answer. (15 marks) [AO3]