

12

Chapter

Profit maximisation under imperfect competition

Business issues covered in this chapter

- How will firms behave under monopolistic competition (i.e. where there are many firms competing, but where they produce differentiated products)?
- Why will firms under monopolistic competition make only normal profits in the long run?
- How are firms likely to behave when there are just a few of them competing ('oligopolies')?
- What determines whether oligopolies will engage in all-out competition or instead collude with each other?
- What strategic games are oligopolists likely to play in their attempt to out-do their rivals?
- Why might such games lead to an outcome where all the players are worse off than if they had colluded?
- Does oligopoly serve the consumer's interests?

Very few markets in practice can be classified as perfectly competitive or as a pure monopoly. The vast majority of firms do compete with other firms, often quite aggressively, and yet they are not price takers: they do have some degree of market power. Most markets, therefore, lie between the two extremes of monopoly and perfect competition, in the realm of 'imperfect competition'. As we saw in section 11.1, there are two types of imperfect competition: namely, monopolistic competition and oligopoly.

MONOPOLISTIC COMPETITION

12.1

Monopolistic competition is nearer to the competitive end of the spectrum. It can best be understood as a situation where there are a lot of firms competing, but where each firm does nevertheless have some degree of market power (hence the term 'monopolistic' competition): each firm has some discretion as to what price to charge for its products.

Assumptions of monopolistic competition

- There is *quite a large number of firms*. As a result, each firm has only a small share of the market and, therefore, its actions are unlikely to affect its rivals to any great extent. What this means is that each firm in making its decisions does not have to worry about how its rivals will react. It assumes that what its rivals choose to do will not be influenced by what it does.

This is known as the assumption of **independence**. (As we shall see later, this is not the case under oligopoly. There we assume that firms believe that their decisions do affect their rivals, and that their rivals' decisions will affect them. Under oligopoly we assume that firms are interdependent.)

- There is freedom of entry of new firms into the industry. If any firm wants to set up in business in this market, it is free to do so.

In these two respects, therefore, monopolistic competition is like perfect competition.

- Unlike perfect competition, however, each firm produces a product or provides a service that is in some way different from its rivals. As a result, it can raise its price without losing all its customers. Thus its demand curve is downward sloping, albeit relatively elastic given the large number of competitors to whom customers can turn. This is known as the assumption of **product differentiation**.

Petrol stations, restaurants, hairdressers and builders are all examples of monopolistic competition.

When considering monopolistic competition it is important to take account of the distance consumers are willing to travel to buy a product. In other words, the geographical size of the market matters. For example, McDonald's is a major global and national fast-food restaurant. However, in any one location it experiences intense competition in the 'informal eating-out' market from Indian, Chinese, Italian and other restaurants (see Box 12.1). So in any one local area, there is competition between firms each offering differentiated products.

Definitions

Independence (of firms in a market)

When the decisions of one firm in a market will not have any significant effect on the demand curves of its rivals.

Product differentiation

When one firm's product is sufficiently different from its rivals' to allow it to raise the price of the product without customers all switching to the rivals' products. A situation where a firm faces a downward-sloping demand curve.

Equilibrium of the firm

Short run

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As with other market structures, profits are maximised at the output where $MC = MR$. The diagram will be the same as for the monopolist, except that the AR and MR curves will be more elastic. This is illustrated in Figure 12.1(a). As with perfect competition, it is possible for the monopolistically competitive firm to make supernormal profit in the short run. This is shown as the shaded area.

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Just how much profit the firm will make in the short run depends on the strength of demand: the position and elasticity of the demand curve. The further to the right the demand curve is relative to the average cost curve, and the less elastic the

Pause for thought

Which of these two items is a petrol station more likely to sell at a discount: (a) oil; (b) sweets? Why?

demand curve is, the greater will be the firm's short-run profit. Thus a firm facing little competition and whose product is considerably differentiated from its rivals may be able to earn considerable short-run profits.

Long run

If typical firms are earning supernormal profit, new firms will enter the industry in the long run. As new firms enter, they will take some of the customers away from established firms. The demand for the established firms' products will therefore fall. Their demand (AR) curve will shift to the left, and will continue doing so as long as supernormal profits remain and thus new firms continue entering.

Long-run equilibrium will be reached when only normal profits remain: when there is no further incentive for new firms to enter. This is illustrated in Figure 12.1(b). The firm's demand curve settles at D_L , where it is tangential to (i.e. just touches) the firm's $LRAC$ curve. Output will be Q_L : where $AR_L = LRAC$. (At any other output, $LRAC$ is greater than AR and thus less than normal profit would be made.)

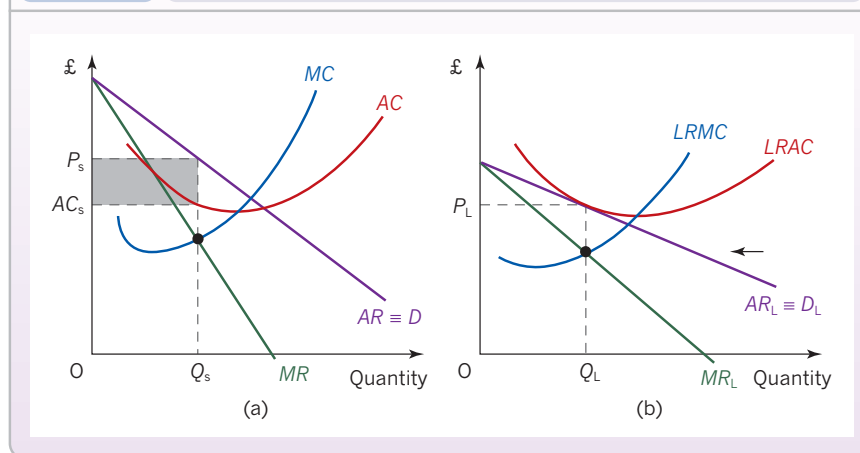
Limitations of the model

There are various problems in applying the model of monopolistic competition to the real world:

- Information may be imperfect. Firms will not enter an industry if they are unaware of the supernormal profits currently being made, or if they underestimate the demand for the particular product they are considering selling.
- Firms are likely to differ from each other, not only in the product they produce or the service they offer, but also in their size and in their cost structure. What is more, entry may not be completely unrestricted. For example, two petrol stations could not set up in exactly the same place – on a busy crossroads, say – because of local authority planning controls. Thus although the typical or 'representative' firm may only earn normal profit in the long run, other firms may be able to earn long-run supernormal profit. They may have some cost advantage or produce a product that is impossible to duplicate perfectly.

Figure 12.1

Equilibrium of the firm under monopolistic competition
(a) Short run (b) Long run



- Existing firms may make supernormal profits, but if a new firm entered, this might reduce everyone's profits below the normal level. Thus a new firm will not enter and supernormal profits will persist into the long run. An example would be a small town with two chemist shops. They may both make more than enough profit to persuade them to stay in business. But if a third set up (say midway between the other two), there would not be enough total sales to allow them all to earn even normal profit. This is a problem of indivisibilities. Given the overheads of a chemist shop, it is not possible to set up one small enough to take away just enough customers to leave the other two with normal profits.
- One of the biggest problems with the simple model outlined above is that it concentrates on price and output decisions. In practice, the profit-maximising firm under monopolistic competition will also need to decide the exact variety of product to produce, and how much to spend on advertising it. This will lead the firm to take part in non-price competition (which we examined in Chapter 8).

Comparing monopolistic competition with perfect competition and monopoly

Comparison with perfect competition

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It is often argued that monopolistic competition leads to a less efficient allocation of resources than perfect competition.

Figure 12.2 compares the long-run equilibrium positions for two firms. One firm is under perfect competition and thus faces a horizontal demand curve. It will produce an output of Q_1 at a price of P_1 . The other is under monopolistic competition and thus faces a downward-sloping demand curve. It will produce the lower output of Q_2 at the higher price of P_2 . A crucial assumption here is that a firm would have the *same* long-run average cost (LRAC) curve in both cases. Given this assumption, we can make the following two predictions about monopolistic competition:

- Less will be sold and at a higher price.
- Firms will not be producing at the least-cost point.

By producing more, firms would move to a lower point on their LRAC curve. Thus firms under monopolistic competition are said to have **excess capacity**. In Figure 12.2 this excess capacity is shown as $Q_1 - Q_2$. In other words, monopolistic competition

Definition

Excess capacity (under monopolistic competition)

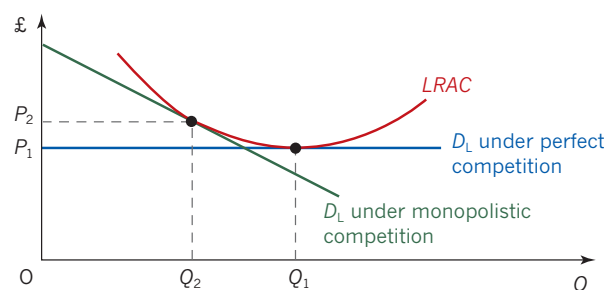
In the long run, firms under monopolistic competition will produce at an output below their minimum-cost point.

Pause for thought

Which would you rather have: five restaurants to choose from, each with very different menus and each having spare tables so that you could always guarantee getting one; or just two restaurants to choose from, charging a bit less but with less choice and making it necessary to book well in advance?

Figure 12.2

Long-run equilibrium of the firm under perfect and monopolistic competition



BOX 12.1 EATING OUT IN BRITAIN**A monopolistically competitive sector**

The 'eating-out' sector (i.e. takeaways and restaurants) is a vibrant market in the UK, with sales of some £30.5 billion in 2007 according to Mintel.¹ Although the sector has grown less strongly in recent years than in the late 1990s, it has still grown in real terms by around 7 per cent per annum since 2000.

The sector exhibits many of the characteristics of a monopolistically competitive market.

- **Large number of local buyers.** According to the Mintel survey in 2008, around 93 per cent of UK adults had eaten out within the previous three months.
- **Large number of firms.** In 2007 there were nearly 150 000 hotel, restaurant and pub enterprises in the UK. Other information shows that there were 101 motorway service areas, 10 500 fish and chip shops, over 10 000 Indian restaurants and countless fast-food outlets. Although the sector has some large national and global chains, these are usually competing in local markets.
- **Competitive prices.** Margins are very tight (around 2 per cent in the hotel business) because firms have to price very competitively to catch local custom. Only around 60 per cent of these businesses survive longer than three years.
- **Differentiated products.** To attract customers, suppliers must each differentiate their product in various ways, such as food type, ambience, comfort, service, quality, advertising and opening hours. Firms have to cater for

the dynamic nature of consumer preferences and constantly adapt or go under.

Changing consumer tastes

Most of the growth in the eating-out sector is in the fast-food segment. Consumers value convenience because they lead busy lives. However, they are expressing a growing preference for more healthy food. There has thus been a shift towards buying healthy snacks from retail outlets and away from hamburger bars. For example, McDonald's, which had dramatically increased the number of outlets in the 1990s, suffered a downturn in fortunes because its products were not associated with healthy eating. In 2003 the company fundamentally changed its product menu to accommodate healthier eating options, such as porridge, bagels, fruit and a variety of salads alongside the traditional meals.

In addition, the traditional hamburger bars are facing active competition from the chicken burger bars such as KFC and (the relatively new entrant) Nandos, because of the quality problems associated with beef in recent times (i.e. BSE and Foot and Mouth).

Ethnic foods

Ethnic food forms a substantial part of eating out in the UK. Around 62 per cent of those who had eaten out in 2007 had been to an Indian, Chinese or other ethnic restaurant, according to Mintel. However, in terms of *market value*, ethnic takeaways and restaurants accounted for only 5.8 per cent and 6.7 per cent respectively in 2007 – a slight fall from 2003. With the exception of the

¹ *Ethnic Restaurants and Takeaways*, Mintel (2008).

is typified by quite a large number of firms (e.g. petrol stations), all operating at less than optimum output, and thus being forced to charge a price above that which they could charge if they had a bigger turnover.

So how does this affect the consumer? Although the firm under monopolistic competition may charge a higher price than under perfect competition, the difference may be very small. Although the firm's demand curve is downward sloping, it is still likely to be highly elastic due to the large number of substitutes. Furthermore, the consumer may benefit from monopolistic competition by having a greater variety of products to choose from. Each firm may satisfy some particular requirement of particular consumers.

Comparison with monopoly

The arguments are very similar here to those when comparing perfect competition and monopoly.

On the one hand, freedom of entry for new firms and hence the lack of long-run supernormal profits under monopolistic competition are likely to help keep prices down for the consumer and encourage cost saving. On the other hand, monopolies

medium and premium brand end of the market, there has been limited innovation in the ethnic eating-out sector. Consumers are looking for alternative cuisine when they eat out and have become tired of the traditional format.

Ethnic restaurants are also facing problems on the supply side. The sector has been hit by minimum wage legislation since 1999 (see section 19.6) and global food price inflation during 2007/8, both of which raised costs. Moreover, there has been a tightening up of the immigration laws which makes it difficult to recruit suitably qualified people, and younger members of these largely family-owned businesses are looking to careers outside of the sector because hours are long and rewards low.

The Indian restaurant

The traditional Indian curry house – the institution that made curry the UK's favourite dish – accounted for 24 per cent of meals eaten out by UK adults in 2007. In recent times, however, Indian restaurants have suffered from changing British preferences and supply-side pressures. They are also facing direct competition from ready-to-eat curries sold in local supermarkets and the sale of curry in local pubs.

Competition to attract the discerning local customer is keen *within* the Indian restaurant trade too. In the 1990s 'Curry Wars' developed around the country, with local Indian restaurants undercutting each other's prices. Profits tumbled. Eventually, strong cultural ties among the local Asian communities helped to avert such cut-throat competition. It was realised that, as prices in Indian

restaurants were considerably less than in Italian and French ones, fixing minimum curry prices would raise incomes. In effect 'curry cartels' were being proposed.

Such activity – however well intentioned – is illegal in the UK. It is also unlikely to last for long as other segments of the market develop to undercut curry-house prices or attract consumers with a new culinary offering.

The Indian restaurant has to relaunch its appeal. One reported method of attracting customers to Birmingham's 'Balti Belt' in the early 2000s was for rival Indian restaurants to have the most visible Las Vegas-style neon sign. This, however, has not been a common response and the lower end of the market is still stagnating.

Innovation is starting to develop in the premium end of the market where returns are greatest. Mintel reports, for example, that some of the high-end Indian restaurants in London have achieved Michelin stars. There is growth in this market segment but there is some debate about the sustainability of these high-end ventures, given the nature of international competition for high-quality chefs. It will be interesting to see how the market develops over the next 10 years.



- 1 What has happened to the price elasticity of demand for Indian restaurant curries over time? What can be said about cross-price elasticity of demand for pub meals?
- 2 Collusion between restaurants would suggest that they are operating under oligopoly, not monopolistic competition. Do you agree?

are likely to achieve greater economies of scale and have more funds for investment and research and development.

OLIGOPOLY

12.2

Oligopoly occurs when just a few firms between them share a large proportion of the industry. Some of the best-known companies are oligopolists, including Ford, Coca-Cola, BP and Nintendo.

There are, however, significant differences in the structure of industries under oligopoly, and similarly significant differences in the behaviour of firms. The firms may produce a virtually identical product (e.g. metals, chemicals, sugar, petrol). Most oligopolists, however, produce differentiated products (e.g. cars, soap powder, soft drinks, electrical appliances). Much of the competition between such oligopolists is in terms of the marketing of their particular brand. Marketing practices may differ considerably from one industry to another.

The two key features of oligopoly

Despite the differences between oligopolies, there are two crucial features that distinguish oligopoly from other market structures.

Barriers to entry

Unlike firms under monopolistic competition, there are various barriers to the entry of new firms. These are similar to those under monopoly (see pages 222–3). The size of the barriers, however, will vary from industry to industry. In some cases entry is relatively easy, whereas in others it is virtually impossible.

Interdependence of the firms

Because there are only a few firms under oligopoly, each firm will have to take account of the others. This means that they are mutually dependent: they are **interdependent**. Each firm is affected by its rivals' actions. If a firm changes the price or specification of its product, for example, or the amount of its advertising, the sales of its rivals will be affected. The rivals may then respond by changing their price, specification or advertising. No firm can therefore afford to ignore the actions and reactions of other firms in the industry.

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Definitions

Interdependence (under oligopoly)

One of the two key features of oligopoly. Each firm will be affected by its rivals' decisions. Likewise its decisions will affect its rivals. Firms recognise this interdependence. This recognition will affect their decisions.

Collusive oligopoly

When oligopolists agree (formally or informally) to limit competition between themselves. They may set output quotas, fix prices, limit product promotion or development, or agree not to 'poach' each other's markets.

Non-collusive oligopoly

When oligopolists have no agreement between themselves – formal, informal or tacit.



People often think and behave strategically. How you think others will respond to your actions is likely to influence your own behaviour. Firms, for example, when considering a price or product change will often take into account the likely reactions of their rivals.

It is impossible, therefore, to predict the effect on a firm's sales of, say, a change in its price without first making some assumption about the reactions of other firms. Different assumptions will yield different predictions. For this reason there is no single, generally accepted theory of oligopoly. Firms may react differently and unpredictably.

Competition and collusion

Oligopolists are pulled in two different directions:

- The interdependence of firms may make them wish to *collude* with each other. If they can club together and act as if they were a monopoly, they could jointly maximise industry profits.
- On the other hand, they will be tempted to *compete* with their rivals to gain a bigger share of industry profits for themselves.

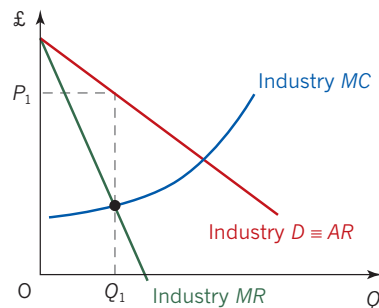
These two policies are incompatible. The more fiercely firms compete to gain a bigger share of industry profits, the smaller these industry profits will become! For example, price competition drives down the average industry price, while competition through advertising raises industry costs. Either way, industry profits fall.

Sometimes firms will collude. Sometimes they will not. The following sections examine first **collusive oligopoly** (both open and tacit), and then **non-collusive oligopoly**.

Collusive oligopoly

When firms under oligopoly engage in collusion, they may agree on prices, market share, advertising expenditure, etc. Such collusion reduces the uncertainty they

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Figure 12.3 Profit-maximising cartel

face. It reduces the fear of engaging in competitive price cutting or retaliatory advertising, both of which could reduce total industry profits.

Cartels

A formal collusive agreement is called a **cartel**. The cartel will maximise profits if it acts like a monopoly: if the members behave as if they were a single firm. This is illustrated in Figure 12.3.

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The total market demand curve is shown with the corresponding market *MR* curve. The cartel's *MC* curve is the *horizontal* sum of the *MC* curves of its members (since we are adding the *output* of each of the cartel members at each level of marginal cost). Profits are maximised at Q_1 where $MC = MR$. The cartel must therefore set a price of P_1 (at which Q_1 will be demanded).

Having agreed on the cartel price, the members may then compete against each other using *non-price competition*, to gain as big a share of resulting sales (Q_1) as they can.

Alternatively, the cartel members may somehow agree to divide the market between them. Each member would be given a **quota**. The sum of all the quotas must add up to Q_1 . If the quotas exceeded Q_1 , either there would be output unsold if price remained fixed at P_1 , or the price would fall.

But if quotas are to be set by the cartel, how will it decide the level of each individual member's quota? The most likely method is for the cartel to divide the market between the members according to their current market share. That is the solution most likely to be accepted as 'fair'.

In many countries cartels are illegal, being seen by the government as a means of driving up prices and profits and thereby as being against the public interest. Government policy towards cartels is examined in Chapter 21.

Where open collusion is illegal, firms may simply break the law, or get round it. Alternatively, firms may stay within the law, but still *tacitly* collude by watching each other's prices and keeping theirs similar. Firms may tacitly 'agree' to avoid price wars or aggressive advertising campaigns.

Tacit collusion

One form of **tacit collusion** is where firms keep to the price that is set by an established leader. The leader may be the largest firm: the firm which dominates the

Definitions

Cartel

A formal collusive agreement.

Quota (set by a cartel)

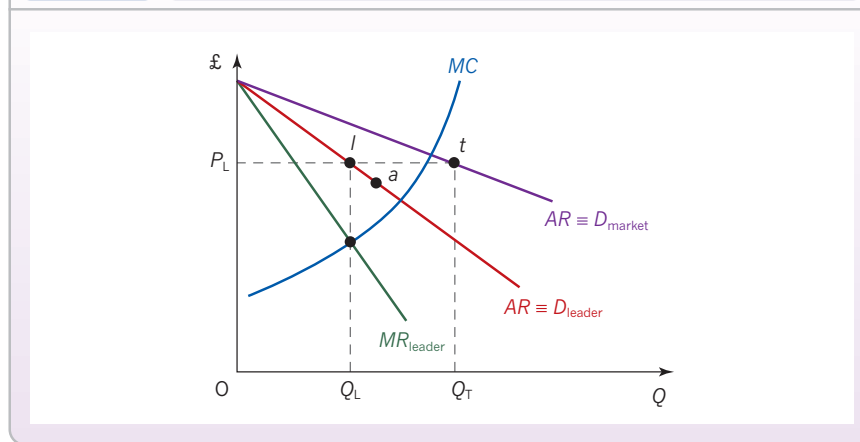
The output that a given member of a cartel is allowed to produce (production quota) or sell (sales quota).

Tacit collusion

When oligopolists take care not to engage in price cutting, excessive advertising or other forms of competition. There may be unwritten 'rules' of collusive behaviour such as price leadership.

Pause for thought

*If this 'fair' solution were adopted, what effect would it have on the industry *MC* curve in Figure 12.3?*

Figure 12.4 A price leader aiming to maximise profits for a given market share**Definitions****Dominant firm price leadership**

When firms (the followers) choose the same price as that set by a dominant firm in the industry (the leader).

Barometric firm price leadership

Where the price leader is the one whose prices are believed to reflect market conditions in the most satisfactory way.

industry. This is known as **dominant firm price leadership**. Alternatively, the price leader may simply be the one that has proved to be the most reliable one to follow: the one that is the best barometer of market conditions. This is known as **barometric firm price leadership**. Let us examine each of these two types of price leadership in turn.

Dominant firm price leadership. How does the leader set the price? This depends on the assumptions it makes about its rivals' reactions to its price changes. If it assumes that rivals will simply follow it by making exactly the same percentage price changes up or down, then a simple model can be constructed. This is illustrated in Figure 12.4. The leader assumes that it will maintain a constant market share (say 50 per cent).

The leader will maximise profits where its marginal revenue is equal to its marginal cost. It knows its current position on its demand curve (say, point *a*). It then estimates how responsive its demand will be to industry-wide price changes and thus constructs its demand and MR curves on that basis. It then chooses to produce Q_L at a price of P_L : at point *l* on its demand curve (where $MC = MR$). Other firms then follow that price. Total market demand will be Q_T , with followers supplying that portion of the market not supplied by the leader: namely, $Q_T - Q_L$.

There is one problem with this model. That is the assumption that the followers will want to maintain a constant market share. It is possible that, if the leader raises its price, the followers may want to supply more, given that the new price (= MR for a price-taking follower) may well be above their marginal cost. On the other hand, the followers may decide merely to maintain their market share for fear of invoking retaliation from the leader, in the form of price cuts or an aggressive advertising campaign.

Barometric firm price leadership. A similar exercise can be conducted by a barometric firm. Although the firm is not dominating the industry, its price will be followed by the others. It merely tries to estimate its demand and MR curves – assuming, again, a constant market share – and then produces where $MR = MC$ and sets price accordingly.

In practice, which firm is taken as the barometer may frequently change. Whether we are talking about oil companies, car producers or banks, any firm may take the initiative in raising prices. If the other firms are merely waiting for someone to take

the lead – say, because costs have risen – they will all quickly follow suit. For example, if one of the bigger building societies or banks raises its mortgage rates by 1 per cent, this is likely to stimulate the others to follow suit.

Other forms of tacit collusion. An alternative to having an established leader is for there to be an established set of simple ‘rules of thumb’ that everyone follows.

One such example is **average cost pricing**. Here producers, instead of equating *MC* and *MR*, simply add a certain percentage for profit on top of average costs. Thus, if average costs rise by 10 per cent, prices will automatically be raised by 10 per cent. This is a particularly useful rule of thumb in times of inflation, when all firms will be experiencing similar cost increases.

Another rule of thumb is to have certain **price benchmarks**. Thus clothes may sell for £9.95, £14.95 or £39.95 (but not £12.31 or £36.42). If costs rise, then firms simply raise their price to the next benchmark, knowing that other firms will do the same. Average cost pricing and other pricing strategies are considered in more detail in Chapter 17.

Rules of thumb can also be applied to advertising (e.g. you do not criticise other firms’ products, only praise your own); or to the design of the product (e.g. lighting manufacturers tacitly agreeing not to bring out an everlasting light bulb).

Factors favouring collusion

Collusion between firms, whether formal or tacit, is more likely when firms can clearly identify with each other or some leader and when they trust each other not to break agreements. It will be easier for firms to collude if the following conditions apply:

- There are only very few firms, all well known to each other.
- They are open with each other about costs and production methods.
- They have similar production methods and average costs, and are thus likely to want to change prices at the same time and by the same percentage.
- They produce similar products and can thus more easily reach agreements on price.
- There is a dominant firm.
- There are significant barriers to entry and thus there is little fear of disruption by new firms.
- The market is stable. If industry demand or production costs fluctuate wildly, it will be difficult to make agreements, partly due to difficulties in predicting and partly because agreements may frequently have to be amended. There is a particular problem in a declining market where firms may be tempted to undercut each other’s price in order to maintain their sales.
- There are no government measures to curb collusion.

Non-collusive oligopoly: the breakdown of collusion

In some oligopolies, there may be only a few (if any) factors favouring collusion. In such cases, the likelihood of price competition is greater.

Even if there is collusion, there will always be the temptation for individual oligopolists to ‘cheat’, by cutting prices or by selling more than their allotted quota. The danger, of course, is that this would invite retaliation from the other members of the cartel, with a resulting price war. Price would then fall and the cartel could well break up in disarray.

Definitions

Average cost pricing

Where a firm sets its price by adding a certain percentage for (average) profit on top of average cost.

Price benchmark

This is a price which is typically used. Firms, when raising prices, will usually raise it from one benchmark to another.

Pause for thought

If a firm has a typical shaped average cost curve and sets prices 10 per cent above average cost, what will its supply curve look like?

When considering whether to break a collusive agreement, even if only a tacit one, a firm will ask: (1) 'How much can we get away with without inviting retaliation?' and (2) 'If a price war does result, will we be the winners? Will we succeed in driving some or all of our rivals out of business and yet survive ourselves, and thereby gain greater market power?'

The position of rival firms, therefore, is rather like that of generals of opposing armies or the players in a game. It is a question of choosing the appropriate *strategy*: the strategy that will best succeed in outwitting your opponents. The strategy that a firm adopts will, of course, be concerned not just with price, but also with advertising and product development.

Non-collusive oligopoly: assumptions about rivals' behaviour

Even though oligopolists might not collude, they will still need to take account of rivals' likely behaviour when deciding their own strategy. In doing so they will probably look at rivals' past behaviour and make assumptions based on it. There are three well-known models, each based on a different set of assumptions.

Assumption that rivals produce a given quantity: the Cournot model

One assumption is that rivals will produce a particular *quantity*. This is most likely when the market is stable and the rivals have been producing a relatively constant quantity for some time. The task, then, for the individual oligopolist is to decide its own price and quantity given the presumed output of its competitors.

The earliest model based on this assumption was developed by the French economist Augustin Cournot¹ in 1838. The **Cournot model** (which is developed in Web Appendix 4.2) takes the simple case of just two firms (a **duopoly**) producing an identical product: for example, two electricity generating companies supplying the whole country.

This is illustrated in Figure 12.5, which shows the profit-maximising price and output for firm A. The total market demand curve is shown as D_M . Assume that firm A believes that its rival, firm B, will produce Q_{B1} units. Thus firm A perceives its own

Definitions

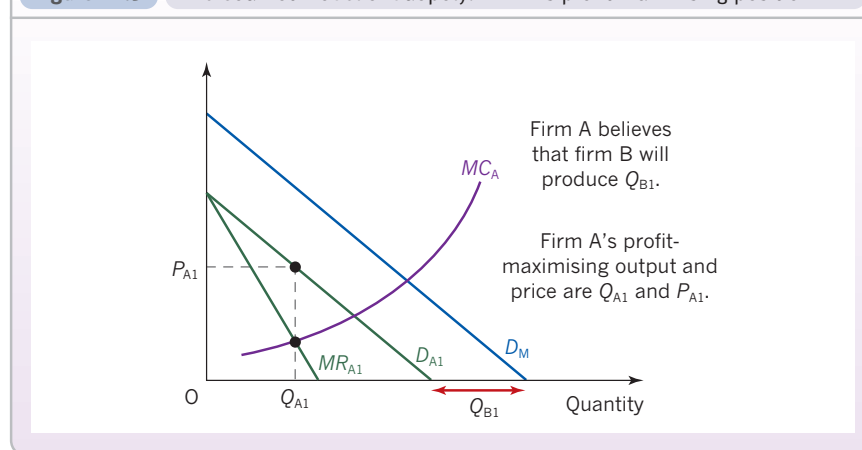
Cournot model

A model of duopoly where each firm makes its price and output decisions on the assumption that its rival will produce a particular quantity.

Duopoly

An oligopoly where there are just two firms in the market.

Figure 12.5 The Cournot model of duopoly: Firm A's profit-maximising position



¹ See <http://cepa.newschool.edu/het/profiles/cournot.htm> for a profile of Cournot and his work.

demand curve (D_{A1}) to be Q_{B1} units less than total market demand. In other words, the horizontal gap between D_M and D_{A1} is Q_{B1} units. Given its perceived demand curve of D_{A1} , its marginal revenue curve will be MR_{A1} and the profit-maximising output will be Q_{A1} , where $MR_{A1} = MC_A$. The profit-maximising price will be P_{A1} .

If firm A believed that firm B would produce *more* than Q_{B1} , its perceived demand and MR curves would be further to the left and the profit-maximising quantity and price would both be lower.

Profits in the Cournot model. Industry profits will be *less* than under a monopoly or a cartel. The reason is that price will be lower than the monopoly price. This can be seen from Figure 12.5. If this were a monopoly, then to find the profit-maximising output, we would need to construct an MR curve corresponding to the market demand curve (D_M). This would intersect with the MC curve at a higher output than Q_{A1} and a *higher* price (given by D_M).

Nevertheless, profits in the Cournot model will be higher than under perfect competition, since price is still above marginal cost.

Assumption that rivals set a particular price: the Bertrand model

An alternative assumption is that rival firms set a particular price and stick to it. This scenario is more realistic when firms do not want to upset customers by frequent price changes or want to produce catalogues which specify prices. The task, then, for a given oligopolist is to choose its own price and quantity in the light of the prices set by rivals.

The most famous model based on this assumption was developed by another French economist, Joseph Bertrand, in 1883. Bertrand again took the simple case of a duopoly, but its conclusions apply equally to oligopolies with three or more firms.

The outcome is one of price cutting until all supernormal profits are competed away. The reason is simple. If firm A assumes that its rival, firm B, will hold price constant, then firm A should undercut this price by a small amount and as a result gain a large share of the market. At this point, firm B will be forced to respond by cutting its price. What we end up with is a price war until price is forced down to the level of average cost, with only normal profits remaining.

Nash equilibrium. The equilibrium outcome in either the Cournot or Bertrand models is not in the *joint* interests of the firms. In each case, total profits are less than under a monopoly or cartel. But, in the absence of collusion, the outcome is the result of each firm doing the best it can, given its assumptions about what its rivals are doing. The resulting equilibrium is known as a **Nash equilibrium**, after John Nash, a US mathematician (and subject of the film *A Beautiful Mind*) who introduced the concept in 1951.

In practice, when competition is intense, as in the Bertrand model, the firms may seek to collude long before profits have been reduced to a normal level. Alternatively, firms may put in a **takeover bid** for their rival(s).

The kinked demand-curve assumption

In 1939 a theory of non-collusive oligopoly was developed simultaneously on both sides of the Atlantic: in the USA by Paul Sweezy and in Britain by R. L. Hall and C. J. Hitch. This **kinked demand theory** has since become perhaps the most famous of all theories of oligopoly. The model seeks to explain how it is that, even

Definitions

Nash equilibrium

The position resulting from everyone making their optimal decision based on their assumptions about their rivals' decisions.

Takeover bid

Where one firm attempts to purchase another by offering to buy the shares of that company from its shareholders.

Kinked demand theory

The theory that oligopolists face a demand curve that is kinked at the current price: demand being significantly more elastic above the current price than below. The effect of this is to create a situation of price stability.

BOX 12.2 REINING IN BIG BUSINESS**Market power in oligopolistic industries**KI 21
p214

In recent years the car industry, the large supermarket chains and the banks have all been charged with 'ripping off' the consumer. Such has been the level of concern, that all three industries were referred to the UK Competition Commission (see section 20.1). In this box we consider developments in each sector in turn.

Car industry

The Competition Commission report, published in April 2000, found that car buyers in Britain were paying on average some 10 to 12 per cent more than those in France, Germany and Italy for the same models.¹ The price discrepancies between Britain and mainland Europe were maintained by car manufacturers blocking cheaper European cars coming into the UK. This was achieved by threatening mainland European car dealers with losing their dealership if they sold to British buyers, and delaying the delivery date of right-hand drive models to European dealers in the hope that British buyers would change their minds and go back to a British dealership.

As the problem involved more than one EU country, the European Commission (EC) also examined the issue. It concluded that the motor vehicle manufacturers had agreements with distributors that were too restrictive. In 2002, the EC changed the 'Block Exemption' regulations governing the sector to allow distributors to set up in different countries and to sell multiple brands of car within their showrooms. Furthermore, distributors which are offered an exclusive 'sales territory' distribution agreement by car manufacturers are now allowed to resell cars to other distributors which are not part of the manufacturer's network. This has helped to develop other sales outlets such as car supermarkets and Internet retailers. In addition, the regulation has opened up the repair and spare parts sector to more firms.

Changes in the regulations, and the addition of ten new EU member states in 2004 and another two in 2007, have made the car market more competitive by increasing the sources of supply. Slowly, prices of new car prices have been converging across the EU towards the lower-price markets.²

But what about the UK? Since 2003 new car prices have, on average, fallen. In the year to January 2008 new car prices fell by 1.1 per cent, while general price inflation over the same period was 2.2 per cent. This is in contrast to the rest of the EU where car prices rose by 0.2 per cent and headline inflation was 3.4 per cent. Nevertheless

there is still scope for shopping around outside of the UK – 27 out of 83 models listed by the EU in January 2008 were at least 10 per cent higher than the lowest EU price.

With the recession of 2008/9, the demand for new cars plummeted. Competition became intense and new cars were heavily discounted. Some dealers went out of business and there were mergers of car manufacturers, such as Fiat and Chrysler. Many car factories went on to short-time working. It will be interesting to see whether these events will make the car market less competitive when the world economy expands again.

Supermarkets

Consumers, suppliers and regulators have commented upon the use (or abuse) of market power in the supermarket sector during recent times. Three major areas of concern have arisen.

Barriers to entry. The most important barrier to entry is the difficulty in getting planning permission to open a new supermarket thus restricting consumer choice. Furthermore, supermarkets own covenants on land ('land banks') suitable for siting new stores and by not releasing them to competitors they thereby restrict competition.

Another barrier are the large economies of scale and the huge buying power of the established supermarkets, which make it virtually impossible for a new player or for the smaller convenience stores to match their low costs. Indeed, the big supermarkets have used their scale to enter the convenience sector with considerable effect. Thus brands like 'Tesco Metro' and 'Sainsbury's Local' have been successful in driving out many small stores from the market.

Relationships with suppliers. One of the most contentious issues concerns the major supermarket chains' huge buying power. They have been able to drive costs down by forcing suppliers to offer discounts. Many suppliers, such as growers, have found their profit margins cut to the bone. However, in many cases these cost savings to the supermarkets have not been passed on to shoppers.

Price competition. National advertising campaigns tell us that supermarkets are concerned about keeping prices lower than their competitors on a number of items. However, this can often mask certain pricing concerns. For some goods the supermarkets have, on occasion, adopted a system of 'shadow pricing', a form of tacit collusion whereby they all observe each other's prices and ensure that they remain at similar levels – often similarly high levels rather than similarly low levels! This has limited the extent of true price competition, and the resulting high prices have seen profits grow as costs have been driven ever downwards.

¹ Competition Commission (2000) 'New cars: a report on the supply of new motor cars within the UK' (Cm 4660). Available at www.competition-commission.org.uk/rep_pub/reports/2000/439cars.htm

² http://ec.europa.eu/competition/sectors/motor_vehicles/prices/report.html

Moreover, the supermarkets have been observed charging high prices where there is little or no competition, notably in rural locations, and charging lower prices on some items, often below cost, where competition is more intense.

But intense price competition tends to be only over basic items, such as the own-brand 'value' products. To get to the basic items, you normally have to pass the more luxurious ones, which are much more highly priced! Supermarkets rely on shoppers making impulse buys of the more expensive lines: lines that have much higher profit margins.

In response to these claims, the Competition Commission reported in 2008 that it found little evidence of tacit collusion.³ Further, the nature of below-cost selling on grocery items by the supermarkets did not mislead consumers in relation to the overall cost of shopping at a particular store. Indeed, temporary promotions on some products, including fuel, may represent effective competition between supermarkets and lower the average price of a basket of goods for customers.

However, the Commission did have some concerns in relation to the existence of a number of stores owned by the same supermarket chain in a particular location (e.g. Tesco Metro and Tesco Superstore) and the covenants on land owned by supermarkets that restrict entry by competitors. To this end it proposed a 'competition test' in planning decisions and action to prevent land agreements, both of which would lessen the market power of supermarkets in local areas.

The Commission also found that the supermarkets had substantial buying power and that the drive to lower supply prices may have had an inhibiting effect on innovation. It therefore proposed the creation of a new strengthened and extended Groceries Supply Code of Practice that would be enforced by an independent ombudsman and incorporated the bigger firms.

The government broadly welcomed the recommendations and is looking to consult further. Tesco, however, launched an appeal to the Competition Appeal Tribunal in July 2008 seeking to have the 'competition test' quashed. We await the outcome of this with interest.

Banks

In 2002, the Competition Commission reported that the then 'Big Four' UK banks (Barclays, HSBC, Lloyds-TSB, RBS Group) charged excessive prices to small and

medium-sized enterprises (SMEs) in England and Wales.⁴ This resulted in excessive profits of some £725 million per year.

It found that each of the four banks pursued similar pricing practices. These included no interest on current accounts; free banking offered only to some categories of SMEs, usually start-ups; the use of negotiation to reduce charges for those considering switching to other banks; lower charges or free banking to those switching from other banks. Switching to another bank, however, requires considerable time and effort for most SMEs. They are therefore locked into a particular bank for a long time. The result is very little competition between the Big Four for the majority of small business customers.

The Competition Commission also found significant barriers to entry to the banking market, and especially to the market for 'liquidity management' services (i.e. the management of current accounts and overdraft facilities) and for general-purpose business loans.

It recommended a reduction in barriers to entry to permit more competition within the industry. This could best be achieved by requiring banks to permit fast and error-free switching by SMEs to other banks (to enable SMEs to shop around for the best value in banking services) and either to pay interest on current account holdings or to offer free banking services.

In May 2005 the OFT referred the supply of current account banking services in Northern Ireland to the Competition Commission. This market is tightly concentrated and the Competition Commission found that the banks impose a number of charges when customers are overdrawn, or in credit, that are not found in the rest of the UK.⁵ Furthermore, it found that there is limited switching by customers to other accounts and that firms do not actively compete on price. The Commission proposed a number of changes to unravel the complexities of personal current account banking and these have been implemented.



- 1 Identify the main barriers to entry in each of the three sectors.
- 2 Update each of the cases and consider the economic implications for consumers.

³ Competition Commission (2008) 'Market investigation into the supply of groceries in the UK'. Available at www.competition-commission.org.uk/inquiries/ref2006/grocery/index.htm

⁴ Competition Commission (2002) 'The supply of banking services by clearing banks to small and medium-sized enterprises: a report on the supply of banking services by clearing banks to small and medium-sized enterprises within the UK' (Cm 5319, March). Available at www.competition-commission.org.uk/rep_pub/reports/2002/462banks.htm

⁵ Competition Commission (2007) 'Northern Irish personal banking'. Available at www.competition-commission.org.uk/inquiries/ref2005/banking/index.htm

when there is no collusion at all between oligopolists, prices can nevertheless remain stable.

The theory is based on two asymmetrical assumptions:

- If an oligopolist cuts its price, its rivals will feel forced to follow suit and cut theirs, to prevent losing customers to the first firm.
- If an oligopolist raises its price, however, its rivals will *not* follow suit since, by keeping their prices the same, they will thereby gain customers from the first firm.

On these assumptions, each oligopolist will face a demand curve that is *kinked* at the current price and output (see Figure 12.6(a)). A rise in price will lead to a large fall in sales as customers switch to the now relatively lower-priced rivals. The firm will thus be reluctant to raise its price. Demand is relatively elastic above the kink. On the other hand, a fall in price will bring only a modest increase in sales, since rivals lower their prices too and therefore customers do not switch. The firm will thus also be reluctant to lower its price. Demand is relatively inelastic below the kink. Thus oligopolists will be reluctant to change prices at all.

This price stability can be shown formally by drawing in the firm's marginal revenue curve, as in Figure 12.6(b).

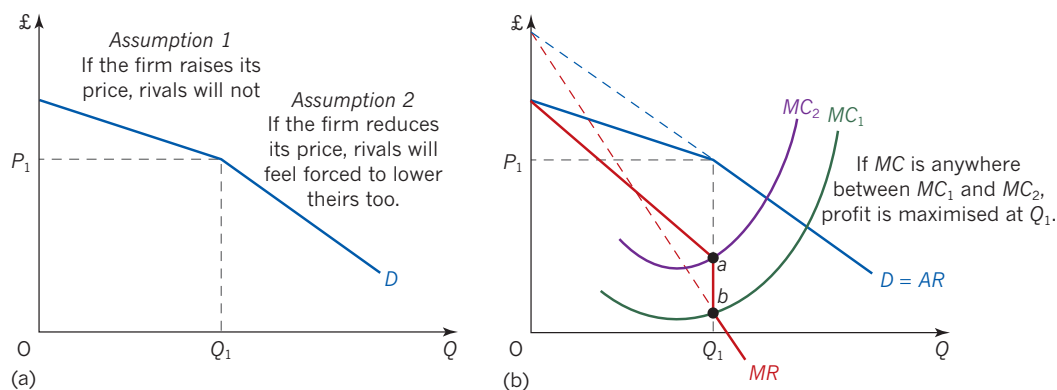
To see how this is done, imagine dividing the diagram into two parts either side of Q_1 . At quantities less than Q_1 (the left-hand part of the diagram), the MR curve will correspond to the shallow part of the AR curve. At quantities greater than Q_1 (the right-hand part), the MR curve will correspond to the steep part of the AR curve. To see how this part of the MR curve is constructed, imagine extending the steep part of the AR curve back to the vertical axis. This and the corresponding MR curve are shown by the dotted lines in Figure 12.6(b).

As you can see, there will be a gap between points *a* and *b*. In other words, there is a vertical section of the MR curve between these two points.

Profits are maximised where $MC = MR$. Thus, if the MC curve lies anywhere between MC_1 and MC_2 (i.e. between points *a* and *b*), the profit-maximising price and output will be P_1 and Q_1 . Thus prices will remain stable *even with a considerable change in costs*.

Figure 12.6

(a) Kinked demand for a firm under oligopoly
(b) Stable price under conditions of a kinked demand curve



Oligopoly and the consumer

If oligopolists act collusively and jointly maximise industry profits, they will in effect be acting together as a monopoly. In such cases, prices may be very high. This is clearly not in the best interests of consumers.

Furthermore, in two respects, oligopoly may be more disadvantageous than monopoly:

- Depending on the size of the individual oligopolists, there may be less scope for economies of scale to mitigate the effects of market power.
- Oligopolists are likely to engage in much more extensive advertising than a monopolist.

These problems will be less severe, however, if oligopolists do not collude, if there is some degree of price competition and if barriers to entry are weak.

Moreover, the power of oligopolists in certain markets may to some extent be offset if they sell their product to other powerful firms. Thus oligopolistic producers of baked beans or soap powder sell a large proportion of their output to giant supermarket chains, which can use their market power to keep down the price at which they purchase these products. This phenomenon is known as **countervailing power**.

In some respects, oligopoly may be more beneficial to the consumer than other market structures:

- Oligopolists, like monopolists, can use part of their supernormal profit for research and development. Unlike monopolists, however, oligopolists will have a considerable *incentive* to do so. If the product design is improved, this may allow the firm to capture a larger share of the market, and it may be some time before rivals can respond with a similarly improved product. If, in addition, costs are reduced by technological improvement, the resulting higher profits will improve the firm's capacity to withstand a price war.
- Non-price competition through product differentiation may result in greater choice for the consumer. Take the case of stereo equipment. Non-price competition has led to a huge range of different products of many different specifications, each meeting the specific requirements of different consumers.

It is difficult to draw any general conclusions, since oligopolies differ so much in their performance.

Definition

Countervailing power

When the power of a monopolistic/oligopolistic seller is offset by powerful buyers who can prevent the price from being pushed up.

Pause for thought

Assume that two brewers announce that they are about to merge. What information would you need to help you decide whether the merger would be in the consumer's interests?

Oligopoly and contestable markets

The theory of contestable markets has been applied to oligopoly as well as to monopoly, and similar conclusions are drawn.

The lower the entry and exit costs for new firms, the more difficult it will be for oligopolists to collude and make supernormal profits. If oligopolists do form a cartel (whether legal or illegal), this will be difficult to maintain if it very soon faces competition from new entrants. What a cartel has to do in such a situation is to erect entry barriers, thereby making the 'contest' more difficult. For example, the cartel could form a common research laboratory, denied to outsiders. It might attempt to control the distribution of the finished product by buying up wholesale or retail outlets. Or it might simply let it be known to potential entrants that they will face all-out price, advertising and product competition from all the members if they should dare to set up in competition.

Pause for thought

Which of the following markets do you think are contestable: (a) credit cards; (b) brewing; (c) petrol retailing; (d) insurance services; (e) compact discs?

The industry is thus likely to behave competitively if entry and exit costs are low, with all the benefits and costs to the consumer of such competition – even if the new firms do not actually enter. However, if entry and/or exit costs are high, the degree of competition will simply depend on the relations between existing members of the industry.

12.3 GAME THEORY

As we have seen, the behaviour of a firm under non-collusive oligopoly depends on how it thinks its rivals will react to its decisions. When considering whether to cut prices in order to gain a larger market share, a firm will ask itself two key questions: first, how much it can get away with, without inciting retaliation; second, if its rivals do retaliate and a price-war ensues, whether it will be able to ‘see off’ some or all of its rivals, while surviving itself.

Economists use **game theory** to examine the best strategy a firm can adopt for each assumption about its rivals’ behaviour.

Definition

Game theory (or the theory of games)

The study of alternative strategies that oligopolists may choose to adopt, depending on their assumptions about their rivals’ behaviour.

Single-move games

The simplest type of ‘game’ is a single-move or single-period game, sometimes known as a normal-form game. This involves just one ‘move’ by each firm in the game. For example two or more firms are bidding for a contract which will be awarded to the lowest bidder. When the bids are all made, the contract will be awarded to the lowest bidder; the ‘game’ is over.

Simple dominant strategy games

Many single-period games have predictable outcomes, no matter what assumptions each firm makes about its rivals’ behaviour. Such games are known as dominant strategy games. The simplest case is where there are just two firms with identical costs, products and demand. They are both considering which of two alternative prices to charge. Table 12.1 shows typical profits they could each make.

Table 12.1 Profits for firms A and B at different prices

		X's price	
		£2	£1.80
Y's price	£2	A £10 m each	B £5 m for Y £12 m for X
	£1.80	C £12 m for Y £5 m for X	D £8 m each

Let us assume that at present both firms (X and Y) are charging a price of £2 and that they are each making a profit of £10 million, giving a total industry profit of £20 million. This is shown in the top left-hand cell (A).

Now assume they are both (independently) considering reducing their price to £1.80. In making this decision, they will need to take into account what their rival might do, and how this will affect them. Let us consider X's position. In our simple example there are just two things that its rival, firm Y, might do. Either Y could cut its price to £1.80, or it could leave its price at £2. What should X do?

One alternative is to go for the *cautious* approach and think of the worst thing that its rival could do. If X kept its price at £2, the worst thing for X would be if its rival Y cut its price. This is shown by cell C: X's profit falls to £5 million. If, however, X cut its price to £1.80, the worst outcome would again be for Y to cut its price, but this time X's profit only falls to £8 million. In this case, then, if X is cautious, it will *cut its price to £1.80*. Note that Y will argue along similar lines, and if it is cautious, it too will cut its price to £1.80. This policy of adopting the safer approach is known as **maximin**. Following a maximin approach, the firm will opt for the alternative that will *maximise its minimum* possible profit.

An alternative is to go for the *optimistic* approach and assume that your rivals react in the way most favourable to you. Here the firm will go for the strategy that yields the highest possible profit. In X's case this will be again to cut price, only this time on the optimistic assumption that firm Y will leave its price unchanged. If firm X is correct in its assumption, it will move to cell B and achieve the maximum possible profit of £12 million. This approach of going for the maximum possible profit is known as **maximax**. Note that again the same argument applies to Y. Its maximax strategy will be to cut price and hopefully end up in cell C.

Given that in this 'game' *both* approaches, maximin and maximax, lead to the *same* strategy (namely, cutting price), this is known as a **dominant strategy game**. The result is that the firms will end up in cell D, earning a lower profit (£8 million each) than if they had charged the higher price (£10 million each in cell A).

As we saw, the equilibrium outcome of a game where there is no collusion between the players is known as a *Nash equilibrium*. The Nash equilibrium in this game is cell D.



Nash equilibrium. The position resulting from everyone making their optimal decision based on their assumptions about their rivals' decisions. Without collusion, there is no incentive for any firm to move from this position.

In our example, collusion rather than a price war would have benefited both firms. Yet, even if they did collude, both would be tempted to cheat and cut prices. This is known as the **prisoners' dilemma** (see Box 12.3).

More complex games with no dominant strategy

More complex 'games' can be devised with more than two firms, many alternative prices, differentiated products and various forms of non-price competition (e.g. advertising). In such cases, the cautious (maximin) strategy may suggest a different policy (e.g. do nothing) from the high-risk (maximax) strategy (e.g. cut prices substantially).

In many situations, firms will have a number of different options open to them and a number of possible reactions by rivals. In such cases, the choices facing firms may be many. They may opt for a compromise strategy between maximax and

Definitions

Maximin

The strategy of choosing the policy whose worst possible outcome is the least bad.

Maximax

The strategy of choosing the policy which has the best possible outcome.

Dominant strategy game

Where different assumptions about rivals' behaviour lead to the adoption of the same strategy.

Prisoners' dilemma

Where two or more firms (or people), by attempting independently to choose the best strategy for whatever the other(s) are likely to do, end up in a worse position than if they had cooperated in the first place.

maximin. This could be a strategy that is more risky than the maximin one, but with the chance of a higher profit; but not as risky as the maximax one, but where the maximum profit possible is not so high.

Multiple-move games

In many situations, firms will *react* to what their rivals do; their rivals, in turn, will react to what they do. In other words, the game moves back and forth from one 'player' to the other like a game of chess or cards. Firms will still have to think strategically (as you do in chess), considering the likely responses of their rivals to their own actions. These multiple-move games are known as *repeated games* or *extensive-form games*.

Definition

Tit-for-tat

Where a firm will cut prices, or make some other aggressive move, *only* if the rival does so first. If the rival knows this, it will be less likely to make an initial aggressive move.

One of the simplest repeated games is the **tit-for-tat**. This is where a firm will cut prices, or make some other aggressive move, *only* if the rival does so first. To illustrate this in a multiple-move situation let us look again at the example we considered in Table 12.1, but this time we will extend it beyond one time period.

Assume that firm X is adopting the tit-for-tat strategy. If firm Y cuts its price from £2.00 to £1.80, then firm X will respond in round 2 by also cutting its price. The two firms will end up in cell D – worse off than if neither had cut their price. If, however, firm Y had left its price at £2.00 then firm X would respond by leaving its price unchanged too. Both firms would remain in cell A with a higher profit than cell D.

As long as firm Y knows that firm X will respond in this way, it has an incentive not to cut its price. Thus it is in X's interests to make sure that Y clearly 'understands' how X will react to any price cut. In other words, X will make a threat.

The importance of threats and promises

Definition

Credible threat (or promise)

One that is believable to rivals because it is in the threatener's interests to carry it out.

In many situations, an oligopolist will make a threat or promise that it will act in a certain way. As long as the threat or promise is **credible** (i.e. its competitors believe it), the firm can gain and it will influence its rivals' behaviour.

Take the simple situation where a large oil company, such as Esso, states that it will match the price charged by any competitor within a given radius. Assume that competitors believe this 'price promise' but also that Esso will not try to *undercut* their price. In the simple situation where there is only one other filling station in the area, what price should it charge? Clearly it should charge the price which would maximise its profits, assuming that Esso will charge the *same* price. In the absence of other filling stations in the area, this is likely to be a relatively high price.

Now assume that there are several filling stations in the area. What should the company do now? Its best bet is probably to charge the same price as Esso and hope that no other company charges a lower price and forces Esso to cut its price. Assuming that Esso's threat is credible, other companies are likely to reason in a similar way.

Pause for thought

Assume that there are two major oil companies operating filling stations in an area. The first promises to match the other's prices. The other promises to sell at 1p per litre cheaper than the first. Describe the likely sequence of events in this 'game' and the likely eventual outcome. Could the promise of the second company be seen as credible?

The importance of timing

Most decisions by oligopolists are made by one firm at a time rather than simultaneously by all firms. Sometimes a firm will take the initiative. At other times it will respond to decisions taken by other firms.

Take the case of a new generation of large passenger aircraft which can fly further without refuelling. Assume that there is a

BOX 12.3 THE PRISONERS' DILEMMA

Game theory is relevant not just to economics. A famous non-economic example is the prisoners' dilemma.

Nigel and Amanda have been arrested for a joint crime of serious fraud. Each is interviewed separately and given the following alternatives:

- First, if they say nothing, the court has enough evidence to sentence both to a year's imprisonment.
- Second, if either Nigel or Amanda *alone* confesses, he or she is likely to get only a three-month sentence but the partner could get up to ten years.
- Third, if both confess, they are likely to get three years each.

What should Nigel and Amanda do?

Let us consider Nigel's dilemma. Should he confess in order to get the short sentence (the maximax strategy)? This is better than the year he would get for not confessing. There is, however, an even better reason for confessing. Suppose Nigel doesn't confess but, unknown to him, Amanda does confess. Then Nigel ends up with the long sentence. Better than this is to confess and to get no more than three years: this is the safest (maximin) strategy.

Amanda is in the same dilemma. The result is simple. When both prisoners act selfishly by confessing, they both end up in position D with relatively long prison terms. Only when they collude will they end up in position A with relatively short prison terms, the best combined solution.

		Amanda's alternatives	
		Not confess	Confess
Nigel's alternatives	Not confess	A Each gets 1 year	B Nigel gets 10 years Amanda gets 3 months
	Confess	C Nigel gets 3 months Amanda gets 10 years	D Each gets 3 years

Of course the police know this and will do their best to prevent any collusion. They will keep Nigel and Amanda in separate cells and try to persuade each of them that the other is bound to confess.

Thus the choice of strategy depends on:

- Nigel's and Amanda's risk attitudes: i.e. are they 'risk lovers' or 'risk averse'?
- Nigel's and Amanda's estimates of how likely the other is to own up.



- 1 Why is this a dominant strategy game?
- 2 How would Nigel's choice of strategy be affected if he had instead been involved in a joint crime with Adam, Ashok, Diana and Rikki, and they had all been caught?

Let us now look at two real-world examples of the prisoners' dilemma.

Standing at concerts

When people go to some public event, such as a concert or a match, they often stand in order to get a better view. But once people start standing, everyone is likely to do so: after all, if they stayed sitting, they would not see at all. In this Nash equilibrium, most people are worse off, since, except for tall people, their view is likely to be worse and they lose the comfort of sitting down.

Too much advertising

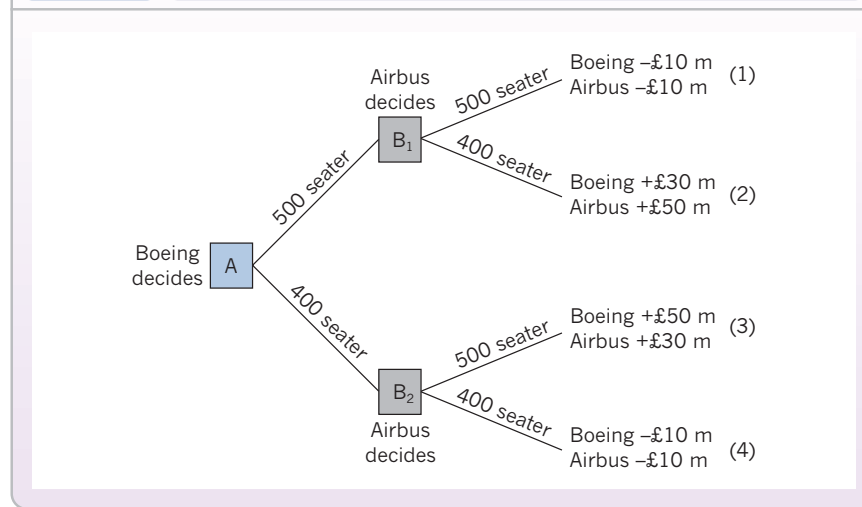
Why do firms spend so much on advertising? If they are aggressive, they do so to get ahead of their rivals (the maximax approach). If they are cautious, they do so in case their rivals increase their advertising (the maximin approach). Although in both cases it may be in the individual firm's best interests to increase advertising, the resulting Nash equilibrium is likely to be one of excessive advertising: the total spent on advertising (by all firms) is not recouped in additional sales.



- Give one or two other examples (economic or non-economic) of the prisoners' dilemma.

market for a 500-seater version of this type of aircraft and a 400-seater version, but that the market for each sized aircraft is not big enough for the two manufacturers, Boeing and Airbus, to share it profitably. Let us also assume that the 400-seater market would give an annual profit of £50 million to a single manufacturer and the 500-seater would give an annual profit of £30 million, but that if both manufacturers produced the same version, they would each make an annual loss of £10 million.

Assume that Boeing announces that it is building the 400-seater plane. What should Airbus do? The choice is illustrated in Figure 12.7. This diagram is called a

Figure 12.7 A decision tree**Definitions****Decision tree
(or game tree)**

A diagram showing the sequence of possible decisions by competitor firms and the outcome of each combination of decisions.

First-mover advantage

When a firm gains from being the first one to take action.

decision tree and shows the sequence of events. The small square at the left of the diagram is Boeing's decision point (point A). If it had decided to build the 500-seater plane, we would move up the top branch. Airbus would now have to make a decision (point B₁). If it too built the 500-seater plane, we would move to outcome 1: a loss of £10 million for both manufacturers. Clearly, with Boeing building a 500-seater plane, Airbus would choose the 400-seater plane: we would move to outcome 2, with Boeing making a profit of £30 million and Airbus a profit £50 million. Airbus would be very pleased!

Boeing's best strategy at point A, however, would be to build the 400-seater plane. We would then move to Airbus's decision point B₂. In this case, it is in Airbus's interests to build the 500-seater plane. Its profit would be only £30 million (outcome 3), but this is better than a £10 million loss if it too built the 400-seater plane (outcome 4). With Boeing deciding first, the Nash equilibrium will thus be outcome 3.

There is clearly a **first-mover advantage** here. Once Boeing has decided to build the more profitable version of the plane, Airbus is forced to build the less profitable one. Naturally, Airbus would like to build the more profitable one and be the first mover. Which company succeeds in going first depends on how advanced they are in their research and development and in their production capacity.

Pause for thought

Give an example of decisions that two firms could make in sequence, each one affecting the other's next decision.

More complex decision trees. The aircraft example is the simplest version of a decision tree, with just two companies and each one making only one key decision. In many business situations, much more complex trees could be constructed. The 'game' would be more like one of chess, with many moves and several options on each move. If there were more than two companies, the decision tree would be more complex still.

The usefulness of game theory

The advantage of the game-theory approach is that the firm does not need to know which response its rivals will make. It does, however, need to be able to measure

the effect of each possible response. This will be virtually impossible to do when there are many firms competing and many different responses that could be made. The approach is only useful, therefore, in relatively simple cases, and even here the estimates of profit from each outcome may amount to no more than a rough guess.

It is thus difficult for an economist to predict with any accuracy what price, output and level of advertising the firm will choose. This problem is compounded by the difficulty of predicting the type of strategy – safe, high risk, compromise – that the firm will adopt.

In some cases, firms may compete hard for a time (in price or non-price terms) and then realise that maybe no one is winning. Firms may then jointly raise prices and reduce advertising. Later, after a period of tacit collusion, competition may break out again. This may be sparked off by the entry of a new firm, by the development of a new product design, by a change in market demand, or simply by one or more firms no longer being able to resist the temptation to ‘cheat’. In short, the behaviour of particular oligopolists may change quite radically over time.

SUMMARY

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| <p>1a Monopolistic competition occurs where there is free entry to the industry and quite a large number of firms operating independently of each other, but where each firm has some market power as a result of producing differentiated products or services.</p> <p>1b In the short run, firms can make supernormal profits. In the long run, however, freedom of entry will drive profits down to the normal level. The long-run equilibrium of the firm is where the (downward-sloping) demand curve is tangential to the long-run average cost curve.</p> <p>1c The long-run equilibrium is one of excess capacity. Given that the demand curve is downward sloping, its tangency point with the <i>LRAC</i> curve will not be at the bottom of the <i>LRAC</i> curve. Increased production would thus be possible at <i>lower</i> average cost.</p> <p>1d In practice, supernormal profits may persist into the long run: firms have imperfect information; entry may not be completely unrestricted; there may be a problem of indivisibilities; firms may use non-price competition to maintain an advantage over their rivals.</p> <p>1e Monopolistically competitive firms, because of excess capacity, may have higher costs, and thus higher prices, than perfectly competitive firms, but consumers may gain from a greater diversity of products.</p> <p>1f Monopolistically competitive firms may have less economies of scale than monopolies and conduct less research and development, but the competition may keep prices lower than under monopoly. Whether there will be more or less choice for the consumer is debatable.</p> <p>2a An oligopoly is where there are just a few firms in the industry with barriers to the entry of new firms. Firms recognise their mutual dependence.</p> | <p>2b Oligopolists will want to maximise their joint profits. This will tend to make them collude to keep prices high. On the other hand, they will want the biggest share of industry profits for themselves. This will tend to make them compete.</p> <p>2c They are more likely to collude: if there are few of them; if they are open with each other; if they have similar products and cost structures; if there is a dominant firm; if there are significant entry barriers; if the market is stable; and if there is no government legislation to prevent collusion.</p> <p>2d Collusion can be open or tacit.</p> <p>2e A formal collusive agreement is called a ‘cartel’. A cartel aims to act as a monopoly. It can set price and leave the members to compete for market share, or it can assign quotas. There is always a temptation for cartel members to ‘cheat’ by undercutting the cartel price if they think they can get away with it and not trigger a price war.</p> <p>2f Tacit collusion can take the form of price leadership. This is where firms follow the price set by either a dominant firm in the industry or one seen as a reliable ‘barometer’ of market conditions. Alternatively, tacit collusion can simply involve following various rules of thumb such as average cost pricing and benchmark pricing.</p> <p>2g Even when firms do not collude they will still have to take into account their rivals’ behaviour. In the Cournot model, firms assume that their rivals’ output is given and then choose the profit-maximising price and output in the light of this assumption. The resulting price and profit are lower than under monopoly, but still higher than under perfect competition. In the Bertrand model, firms assume that their rivals’ price is given. This will result in prices being competed down until only normal profits remain.</p> |
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- 2h In the kinked-demand curve model, firms are likely to keep their prices stable unless there is a large shift in costs or demand.
- 2i Non-collusive oligopolists will have to work out a price strategy. This will depend on their attitudes towards risk and on the assumptions they make about the behaviour of their rivals.
- 2j Whether consumers benefit from oligopoly depends on: the particular oligopoly and how competitive it is; whether there is any countervailing power; whether the firms engage in extensive advertising and of what type; whether product differentiation results in a wide range of choice for the consumer; how much of the profits are ploughed back into research and development; and how contestable the market is. Since these conditions vary substantially from oligopoly to oligopoly, it is impossible to state just how well or how badly oligopoly in general serves the consumer's interest.
- 3a Game theory is a way of modelling behaviour in strategic situations where the outcome for an individual or firm depends on the choices made by others. Thus game theory examines various strategies that firms can adopt when the outcome of each is not certain.
- 3b The simplest type of 'game' is a single-move or single-period game, sometimes known as a normal-form game. Many single-period games have predictable outcomes, no matter what assumptions each firm makes about its rivals' behaviour. Such games are known dominant strategy games.
- 3c Non-collusive oligopolists will have to work out a price strategy. They can adopt a low-risk 'maximin' strategy of choosing the policy that has the least-bad worst outcome, or a high-risk 'maximax' strategy of choosing the policy with the best possible outcome, or some compromise. Either way, a 'Nash' equilibrium is likely to be reached which is not in the best interests of the firms collectively. It will entail a lower level of profit than if they had colluded.
- 3d In multiple-move games, play is passed from one 'player' to the other sequentially. Firms will respond not only to what firms do, but also to what they say they will do. To this end, a firm's threats or promises must be credible if they are to influence rivals' decisions.
- 3e A firm may gain a strategic advantage over its rivals by being the first one to take action (e.g. launch a new product). A decision tree can be constructed to show the possible sequence of moves in a multiple-move game.

REVIEW QUESTIONS

- Think of ten different products or services and estimate roughly how many firms there are in the market. You will need to decide whether 'the market' is a local one, a national one or an international one. In what ways do the firms compete in each of the cases you have identified?
- Imagine there are two types of potential customer for jam sold by a small food shop. One is the person who has just run out and wants some now. The other is the person who looks in the cupboard, sees that the pot of jam is less than half full and thinks, 'I will soon need some more.' How will the price elasticity of demand differ between these two customers?
- Why may a food shop charge higher prices than supermarkets for 'essential items' and yet very similar prices for delicatessen items?
- How will the position and shape of a firm's short-run demand curve depend on the prices that rivals charge?
- Assuming that a firm under monopolistic competition can make supernormal profits in the short run, will there be any difference in the long-run and short-run elasticity of demand? Explain.
- Firms under monopolistic competition generally have spare capacity. Does this imply that if, say, half of the petrol stations were closed down, the consumer would benefit? Explain.
- Will competition between oligopolists always reduce total industry profits?
- In which of the following industries is collusion likely to occur: bricks, beer, margarine, cement, crisps, washing powder, blank audio or video cassettes, carpets?
- Draw a diagram like Figure 12.4. Illustrate what would happen if there were a rise in market demand.
- Devise a box diagram like that in Table 12.1, only this time assume that there are three firms,

each considering the two strategies of keeping price the same or reducing it by a set amount. Is the game still a 'dominant strategy game'?

- 11 What are the limitations of game theory in predicting oligopoly behaviour?
- 12 Which of the following are examples of effective countervailing power?
 - (a) A power station buying coal from a large local coal mine.
 - (b) A large factory hiring a photocopier from Rank Xerox.
 - (c) Marks and Spencer buying clothes from a garment manufacturer.
 - (d) A small village store (but the only one for miles around) buying food from a wholesaler.

Is it the size of the purchasing firm that is important in determining its power to keep down the prices charged by its suppliers?

Additional Part E case studies on the *Economics for Business* website (www.pearsoned.co.uk/sloman)

- E.1 **Is perfect best?** An examination of the meaning of the word 'perfect' in perfect competition.
- E.2 **B2B electronic marketplaces.** This case study examines the growth of firms trading with each other over the Internet (business to business or 'B2B') and considers the effects on competition.
- E.3 **Measuring monopoly power.** An examination of how the degree of monopoly power possessed by a firm can be measured.
- E.4 **X-inefficiency.** A type of inefficiency suffered by many large firms, resulting in a wasteful use of resources.
- E.5 **Competition in the pipeline.** An examination of attempts to introduce competition into the gas industry in the UK.
- E.6 **Airline deregulation in the USA and Europe.** Whether the deregulation of various routes has led to more competition and lower prices.
- E.7 **The motor vehicle repair and servicing industry.** A case study of monopolistic competition.
- E.8 **Bakeries: oligopoly or monopolistic competition.** A case study on the bread industry, showing that small-scale local bakeries can exist alongside giant national bakeries.
- E.9 **Oligopoly in the brewing industry.** A case study showing how the UK brewing industry is becoming more concentrated.
- E.10 **OPEC.** A case study examining OPEC's influence over oil prices from the early 1970s to the current day.

Websites relevant to Part E

Numbers and sections refer to websites listed in the Web appendix and hotlinked from this book's website at www.pearsoned.co.uk/sloman

- For news articles relevant to Part E, see the *Economics News Articles* link from the book's website.
- For general news on companies and markets, see websites in section A, and particularly A1, 2, 3, 4, 5, 8, 9, 18, 23, 24, 25, 26, 35, 36. See also A38, 39 and 43 for links to newspapers worldwide; and A42 for links to economics news articles from newspapers worldwide.
- For sites that look at competition and market power, see B2; E4, 10, 18; G7, 8. See also links in I7, 11, 14 and 17. In particular see the following links in sites I7: *Microeconomics > Competition and Monopoly*.
- For a site on game theory, see A40 including its home page. See also D4; C20; I17 and 4 (in the EconDirectory section).

