Chapter 6

Perfect competition in transport markets

Learning Outcomes:

On reading this chapter, you will learn:

- The theory of the firm
- The position of profit maximisation for the provider of transport services
- The underlying conditions required in order to ensure that competitive pressures on transport operators are maximised
- That such a level of 'maximum' competition ensures that economic efficiency is attained in the provision of transport services
- A formal definition for what constitutes 'market failure' in transport markets.

INTRODUCTION

This chapter will examine competition within transport markets by identifying the key elements that shape both the number and the structure of firms competing in the market place. The general view regarding competition in markets would be that it is a 'good' thing, and no competition, a monopoly, a 'bad' thing. On the whole that lay person's perception would be correct; however, it neither explains why it is a good thing except in very general terms nor the actual process of competition amongst transport firms that brings about such good things. More importantly, it does not highlight those situations where competition may not produce the best outcome, and this is particularly relevant where transport services are concerned.

One of the key issues in this and the subsequent chapter, if not the key issue, is to try and provide an understanding as to how competition works to produce economically efficient transport services, why that very often is not the case, and hence give a better perspective of the need for intervention in the form of government policy and involvement in transport markets. As you will see, the rationale for this form of intervention would be based on the notion of market failure.

BACKGROUND

Much of what is outlined in this chapter is drawn from what is known as the theory of the firm as applied to transport organisations and firms. The theory of the firm is a neo-classical concept that has been widely used and applied to examine industry structures and productive efficiency. It was one of the main theoretical underpinnings for Margaret Thatcher's privatisation programme in Britain during the mid to late 1980s which had, and continues to have, such a profound effect on transport industries in Britain and further afield. As such, its applications have been far and wide reaching. Much economic change concerning the organisation of transport industries over the last 30 years has as its basis a practical application of the theory of the firm. Whilst most extensively applied in Britain, further re-organisations have followed and continue to this day throughout the European Union and the rest of the world. The principal concern has revolved around introducing competition into transport markets as the theory predicts that such markets are more economically efficient.

One of the major problems with transport markets however is a general lack of competition. This leads to various problems, many of which reach far beyond 'simple' transport issues due to the derived nature of demand and the close association between transport services and economic development. Consideration of these types of 'imperfect' market structures however is left for the following chapter, as here only 'perfect' competition is considered.

As has already been seen in Chapters 3 and 4, demand can vary between highly elastic right through to highly inelastic. Unsurprisingly, price elasticity of demand, both in the market and that facing the individual firm, is heavily dependent upon the prevailing market conditions the firm encounters and thus an indicator of the level of competition within a given transport sector. This in turn is partly dependent upon how production costs vary with the level of output, i.e. the division between fixed and variable costs, as this will determine the number of firms in the market and thus the level of competition, i.e. the market structure. All of this you should already be aware of, since a basic market is made up of the forces of demand and supply that interact to produce an equilibrium price. That in turn will ultimately determine the price paid by the consumer, the level of subsidy required in order to meet transport policy objectives and finally the level of costs and profit associated with that level of supply of transport services. In this chapter we more closely examine the supply side of the basic market and specifically the impact of prevailing market conditions on the price, costs, efficiency and profits of transport companies. Taken together, all of these factors determine the balance of benefit from the provision of those services between the consumer and the provider of the service. This adds up to what is known as 'economic efficiency'. This and the next chapter thus bring together all of the concepts examined previously to develop a number of scenarios each of which represent a precise set of market conditions. In doing so, this should highlight some of the problems with transport markets and why in many, if not most, situations they cannot be left entirely to market forces.

The ideas developed in this chapter are key to understanding what follows in the rest of the text as applied specifically to transport services. This is because much of the understanding of the economics of transport is directly related to a basic understanding of market principles and why they do not always 'work' in transport situations. The structure of the chapter therefore is heavily dependent upon theoretical underpinnings; however, practical illustrations are given where relevant and the chapter ends with a case study on the road haulage industry. The topic is

continued in the following chapter, where comparisons are drawn between perfect and imperfect markets in the provision of transport services.

PROFIT MAXIMISATION

Until now we have simply taken profit maximisation as a general assumption that underpins the transport firm's behaviour in the market; however, the issue has not been addressed beyond that general assumption. This issue can now be further examined by drawing together the basic concepts covered in previous chapters. Profit maximisation is said to occur at that level of output where:

Marginal Cost (MC) = Marginal Revenue (MR)

You should recall that marginal cost is defined as the 'rate of increase in costs with respect to output'. A more basic way of expressing this is that the marginal cost is the cost of the last unit produced. Hence for a bus company, the marginal cost would effectively be the cost of the last person carried. We have not however come across the idea of the marginal revenue before. This can be defined as the additional total revenue gained by selling one more unit (per time period). In our example, therefore, is this a case of identifying how much the last person on the bus paid for their journey? In some respects the answer is yes but unfortunately it is not quite as straightforward as that. In order to sell more journeys per time period the bus company will have to charge a lower price for *all passengers*, not just a lower fare to the last person. This is simply the law of demand. Marginal revenue therefore should not be mistaken with the idea that a firm can sell a number of units at one price and then in order to sell an 'extra' unit in that time period simply cut the price. Rather, marginal revenue is the difference in total revenue per time period as a result of cutting the price in order to carry one extra passenger, and thus includes the possibility of a negative value when market demand is inelastic. Marginal revenue will therefore always be lower than average revenue as the firm must reduce the fare in order to increase patronage, even if this is only by one. An illustration of marginal revenue would look something like Figure 6.1.

In Figure 6.1 the demand curve has also been labelled as the average revenue curve (AR), because if the firm sells say 100 units at £5 each the average revenue gained for each unit is simply the price of £5. Notice also that the marginal revenue curve is twice as steep as the average revenue curve and thus at all levels of output, as explained above, marginal revenue is always less than average revenue. What the firm actually does regarding the price charged and the level of output produced will be dependent upon the elasticity of demand (as cutting the price may increase revenue) and the cost of production. It will produce where profits are maximised; however, this leads back to the key question of identifying the level of output at which that occurs. This is found where:

MC = MR

In order to understand further why this is the case, it is easiest to consider when this position does not exist. This is shown graphically in Figure 6.2.

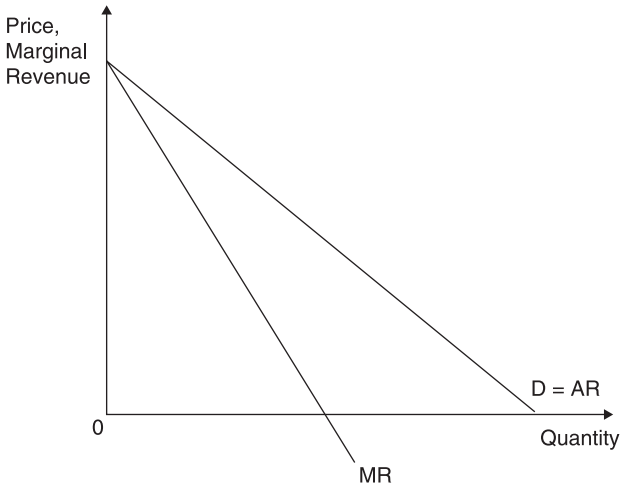

Figure 6.1 *Marginal and average revenue curves*

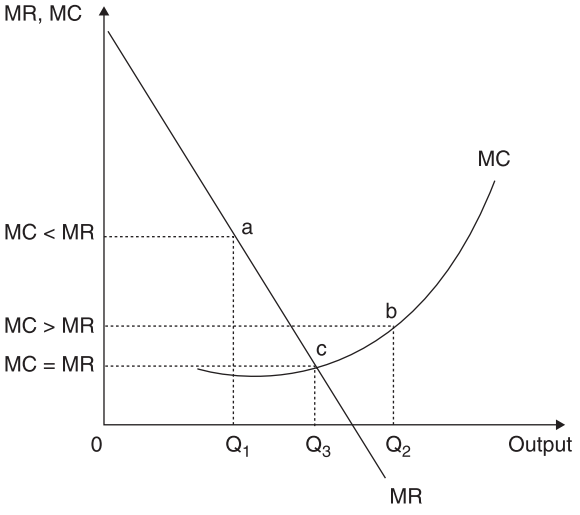

Figure 6.2 *Basic profit maximisation*

For simplification, Figure 6.2 only shows the marginal cost and marginal revenue curves. As output increases these two variables move in opposite directions, thus as output rises marginal costs rise and marginal revenue falls. This is because if the firm wants to sell more it needs to always lower its price, hence falling marginal revenue, whilst increasing output will have rising marginal costs over most of the range of output (see Chapter 5 for a reminder). Therefore, beginning at position a, for output level Q_1 marginal revenue is greater than marginal cost. The last unit produced therefore generated more revenue than it cost to produce, thus this unit made a profit. However, in order to increase total profit the firm should actually increase production as this

will generate more profit from these units produced. Note that this may reduce the profit margin achieved on each individual unit, but the extra volume sold will more than offset any reduced profit margin and increase total profits. In this way profits can be maximised by increasing output. Moving to point b, however, at the level of production Q_2 marginal cost is greater than marginal revenue. In this case, the last unit sold cost more to produce than the revenue which it generated, hence making a loss on these units and reducing total profit. The firm should therefore reduce production and not produce that last unit, as this will increase total profit. It should continue to reduce production until marginal cost equals marginal revenue. In Figure 6.2 this occurs at point c and output level Q_3. Note that because marginal costs and marginal revenue move in opposite directions with the level of output there will always be a point of convergence and it is at that point where profits are maximised.

In order to determine the actual level of profits (or indeed losses) incurred by the firm at the profit maximising position, the demand and average cost curves need to be added to Figure 6.2, as shown in Figure 6.3.

Whilst to some this may at first appear as simply a mass of lines, there is nothing that has been added to Figure 6.3 that has not been introduced before either in this or previous chapters. What it shows is the basic production and market conditions facing a theoretical provider of transport services. Hence, the profit maximising position is found as above where marginal cost equals marginal revenue, i.e. where the MC and MR curves intersect. This is found at point a and gives a profit maximising output level for the provision of these services of Q. At that level of provision, the prevailing market conditions allow a fare of P to be charged, as shown by point c on the demand curve. The average cost of each passenger carried is found at point b on the average cost curve. Total revenue is therefore given by the area outlined by 0, P, c, Q and total costs by the area outlined by 0, AC, b, Q. The net difference, i.e. the area AC, P, c, b, is the profit, or to be more exact the abnormal profit, to the operator and this is the maximum profit that can be returned for the provision of these services under the prevailing production and market

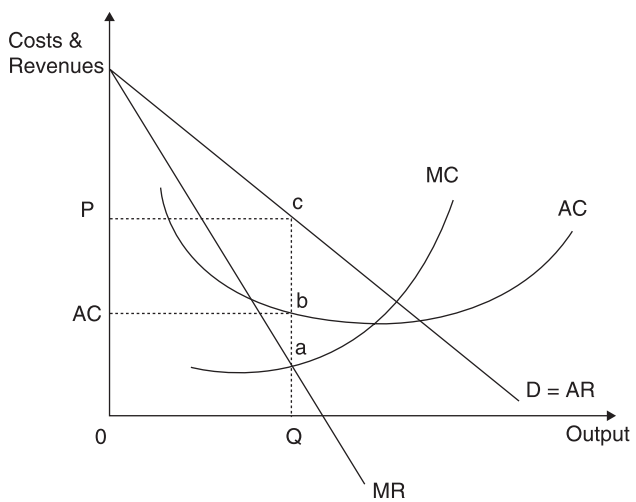

Figure 6.3 *Profit maximising position for the firm*

conditions. It is also useful, certainly in the context of transport operations, to consider that the profit maximising position need not necessarily produce a profit. Study the situation shown in Figure 6.4 below.

As with above, the 'profit' maximising position is found at point a where marginal cost equals marginal revenue. The associated average cost of each passenger carried is again found at point b, giving an average cost of AC. Finally, the fare that can be charged is found at point c on the demand curve, giving a fare of P. As can be clearly seen, the fare paid by each passenger is less than the cost to the operator of providing the resources for that journey, thus in this case the company is making a loss. The total amount of loss is outlined by the cross hatched area P, AC, b, c. In the long run however this is not the 'loss minimising position' as by simple logic that will always occur where zero output is produced. In the short run, as long as the firm is covering its variable costs, in most cases it will continue in operation until the capital is life expired, at which point it will close down. In this case note that where only a single price can be charged in the market the operator can never make a profit from providing this service. This is because at no point is the demand curve, i.e. what the market will bear, above the average cost curve. We will see a similar case in Chapter 8 however where the ability to charge users of the service different prices may enable the operator to make a profit. Whilst Figure 6.4 was produced essentially by manipulating how the diagram was drawn, such a situation is not purely theoretical and is one that often prevails in the provision of transport services. This is particularly the case where services are provided on equity grounds, such as those deemed to be social necessities in which the total revenue gained from the passenger will never cover the costs of providing the service. Subsidy is thus required in order to allow production of the service and bridge the gap between costs and revenue, and in this case the amount of subsidy paid would be the cross hatched area in Figure 6.4. Note however that in some ways this is a market-based solution, i.e. where the transport company produces at the 'profit' maximising level of output. Given however that the provision of such a service would have little or no market basis, the level of provision would be set at a point by the relevant authorities deemed to be consistent

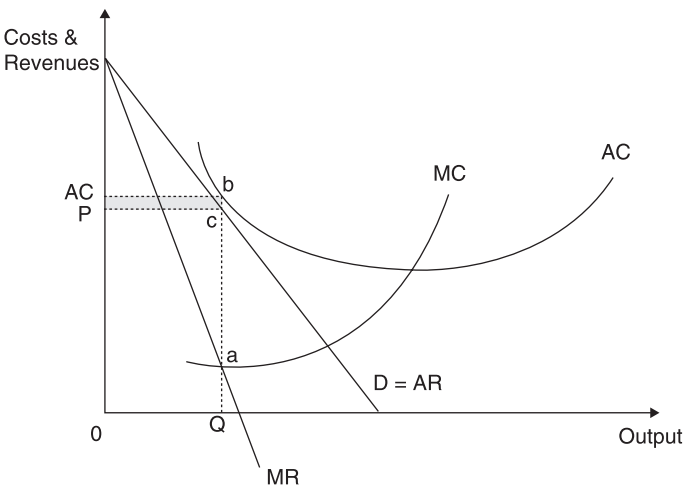

Figure 6.4 *Losses at the 'profit' maximising position of the firm*

with meeting their objectives. This may mean however that the authority would have to pay a higher level of subsidy, as would be the case for example for output levels to the right of Q in Figure 6.4. This is an important issue to which we return later in Chapters 10 and 11.

This basic framework of profit maximisation for a theoretical provider of transport services can now be used to examine the effect of competition, i.e. a change in one of the basic market and production conditions, on the fare charged, the average cost incurred and the profit attained from providing the service. These three aspects are important, as in simple terms they add up to what is known as economic efficiency, at which point the benefits arising out of the production of a given transport service are maximised and shared equitably between the operator and the consumer. We begin with a position of 'maximum' competition, more commonly known as 'perfect' competition, before looking at the other extreme in the form of a monopoly market in the following chapter.

PERFECT COMPETITION

As allocative efficiency was described in Chapter 5 as almost the holy grail of the economics discipline, perfect competition is the mechanism by which that holy grail is found. This is because perfect competition is one of the major requirements in order to achieve allocative efficiency, and we will see exactly why this is the case by examining the concept further. In simple terms, perfect competition is a highly competitive market where competition itself 'regulates' the market and ensures economic efficiency is achieved. In order for competition to be maximised, however, a number of market and production conditions must be met. The full list of these assumptions will be considered later in the chapter, as these are almost always overlooked in introductory texts but many are of particular significance to transport markets. In order to introduce the topic, however, the basic four conditions or assumptions of perfect competition are considered, namely:

- Freedom of entry and exit
- Homogeneous product
- High number of buyers and sellers
- Perfect information.

Freedom of entry and exit means that buyers and sellers are free to enter and leave the market as they see fit, there are no obstacles preventing them from doing so. The opposite of this is where barriers to entry exist and these may have a strong impact upon the market structure through limiting the number of firms in the market. Under perfect competition, however, no such barriers exist, thus new entry is always possible. Within transport markets, therefore, any operator would be at liberty to enter the market and compete on equal terms with existing firms. Freedom of exit means that they can exit the market without financial penalty.

A homogeneous product means that all firms produce identical products, thus a bus service is a bus service is a bus service, there is no difference between say a red bus service and one that is operated by a blue bus, on the same route, with the same frequency and quality of service. As all operators produce identical services, or at the very least services that are perceived to be identical, the consumer can switch from one operator's service to another's at a zero (transaction) cost. In

more formal terms, all services are said to be perfectly substitutable, i.e. the demand curve for the individual firm is therefore perfectly elastic.

The third assumption of a high number of buyers and sellers is hardly one that should come as a surprise as a pre-requisite of competitive markets. What it means however is that no single operator or buyer of transport services has any degree of market power. If any operator was to leave the market then their market share would be so small that in simple terms it would have no impact on the prevailing fare charged. As a consequence, it is the market that sets the fare, not individual firms or buyers, and all buyers and sellers are 'price takers' not price setters. Contrast this with a 'pure' monopoly situation where there is only one operator, thus the firm would have a very strong market position and could exercise a high degree of control on the market through the level of output it produces. Restricting the level of output would increase the price, while increasing output would reduce the price. The OPEC countries in the mid and late 1970s for example operated very successfully as a cartel (née monopoly) to restrict the supply of oil to the world market and by so doing brought about major increases in the price of oil. Similarly, a small number of buyers in the market can impose great control over sellers – grocery retailers such as Sainsburys, Morrisons and Tescos are in a position to exert strong downward pressure on the prices charged by their suppliers. With a high number of buyers and sellers, however, this means that no single individual or organisation has any control over the market, hence all are price takers.

The last assumption is perfect information. This means that buyers, sellers, potential buyers and potential sellers know everything there is to know about the market. Hence there are no trade secrets (as this may also be a barrier to entry) and all profit and market information is common knowledge. In simple terms, therefore, consumers know the prices of all competing services and potential entrants know the level of profits being made in the industry. Perfect knowledge is thus a pre-requisite to ensure that buyers and sellers come to the right economic decisions regarding the goods they purchase and the markets served.

One may wish to question the highly restrictive nature of these four basic assumptions and ask if perfect competition exists in practice. The market which is usually given as the nearest example is that of agriculture, as this tends to operate on a global scale and thus has many suppliers (i.e. individual farmers) and consumers, and the produce is similar if not absolutely identical. The US bicycle industry has also been cited as a case in perfect competition (Townley, 2006). In both these industries however there are deviations from the perfect competition model, and thus the simple answer is that the assumptions of the model are too restrictive to exist in reality. Perfect competition is simply a 'benchmark' to be used to compare an ideal with reality to allow market failures to be identified. Whilst the term 'market failure' is commonly used in everyday (business) English as a general term for when things go 'wrong', by definition market failure occurs when one of the assumptions of perfect competition is breached and hence the market does not achieve economic efficiency. We will constantly return to this issue later as transport markets suffer from a high degree of market failure. For now, however, these assumptions can be used to examine the effect on the price, average cost and profits of perfectly competitive firms. This is shown in Figure 6.5.

One obvious difference with Figure 6.5 to previous figures in this chapter is that there are effectively two diagrams. What is not so obvious at first, however, is that the figure on the right is the effect of imposing the assumptions of perfect competition on the previous Figure 6.4, i.e. changing the market conditions facing the individual operator. On closer inspection, it should be

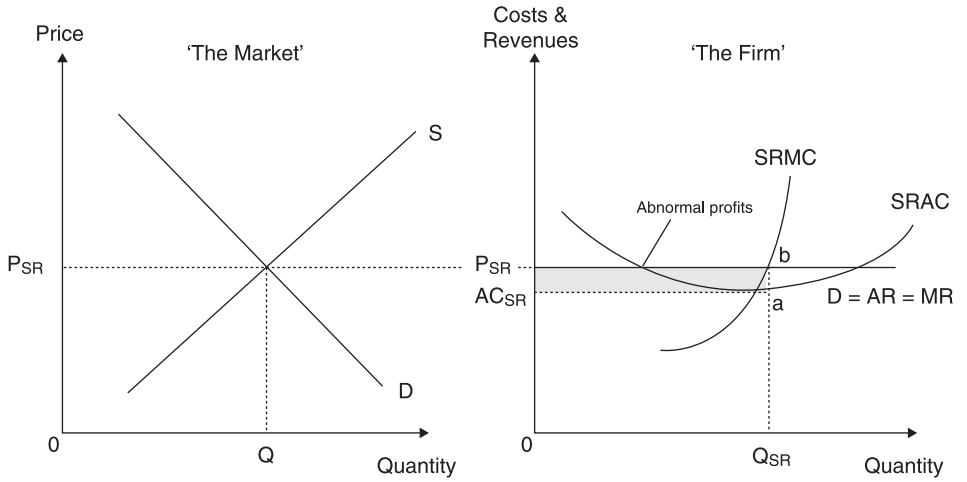

Figure 6.5 *Perfect competition, short run position (profits)*

clear that the only difference is that the demand curve facing the individual firm is perfectly elastic, i.e. horizontal at price P_{SR}, due to perfect substitutability between rival services. Thus under the conditions of perfect competition, average revenue equals marginal revenue. The rest of the figure relating to costs is identical. Turning to the figure on the left, the market sets the price at P_{SR} and due to a high number of buyers and sellers the firm is a price taker. It can therefore only sell at the market price P_{SR}. Note that if the firm was to charge a price above P_{SR}, demand for its service would drop to zero. This is because all services are the same (homogeneous), and further that all consumers know that all services are the same because of perfect information. Note also that there is little point in the operator charging a price below P_{SR}, as it can sell as much as it wants at the prevailing market price, hence any price reduction is simply cutting its own profits. This is a further reason why under this scenario marginal revenue is equal to average revenue, as the firm does not have to cut its price in order to sell more.

As normal the firm is assumed to be a profit maximiser, hence produces where marginal cost is equal to marginal revenue, highlighted by Q_{SR} for the individual firm. This however is purely a short-run position. As the firm is making abnormal profits, shown by the cross hatched area AC_{SR}, a, b, P_{SR}, then perfect information and an absence of barriers to entry ensure that new operators know of such abnormal profits and enter the market in the long run to compete these away.

This effect of new firms entering the market is shown in Figure 6.6, where as a result the supply curve has shifted to the right. The market price therefore falls to P_{LR}. The individual firm adjusts its level of output to the new profit maximising position, which is now at Q_{LR}. Note that at this point the firm is producing at the lowest point on the long-run average cost curve, hence productive efficiency is ensured, and as this is the long-run situation there is no incentive to change from this position. Note also that the firm is only making normal profits, which means it is covering all its costs including the cost of capital. In some ways, the abnormal profits that were being made in the short run have now been 'transferred' to the consumer in the form of lower prices. It is for these reasons that perfect competition is said to be the most economically efficient market structure, as

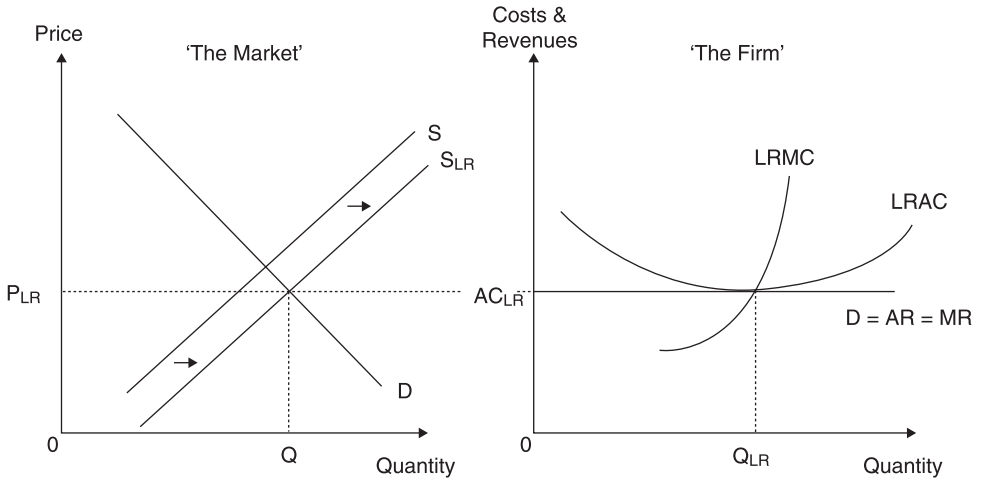

Figure 6.6 *Perfect competition, the long run position*

the first two conditions of allocative efficiency, that is technical and cost efficiency, are both achieved. We will see shortly that the third requirement, producing goods and services that will maximise consumers' benefit or utility, i.e. ones that they really want, is also met through such a market structure. One final point to note from both Figures 6.5 and 6.6 is that the level of output of the individual firm will be found by the profit maximising position on the marginal cost curve, thus the marginal cost curve is the supply curve of the individual firm. Consequently, the market supply curve is the summation of each firm's marginal cost curves.

To further underpin the ideas of perfect competition, outlined in Figure 6.7 is an example where there is a long-term shift in demand away from a good or service. There are numerous examples of goods or services that have become obsolete or whole industries that have disappeared

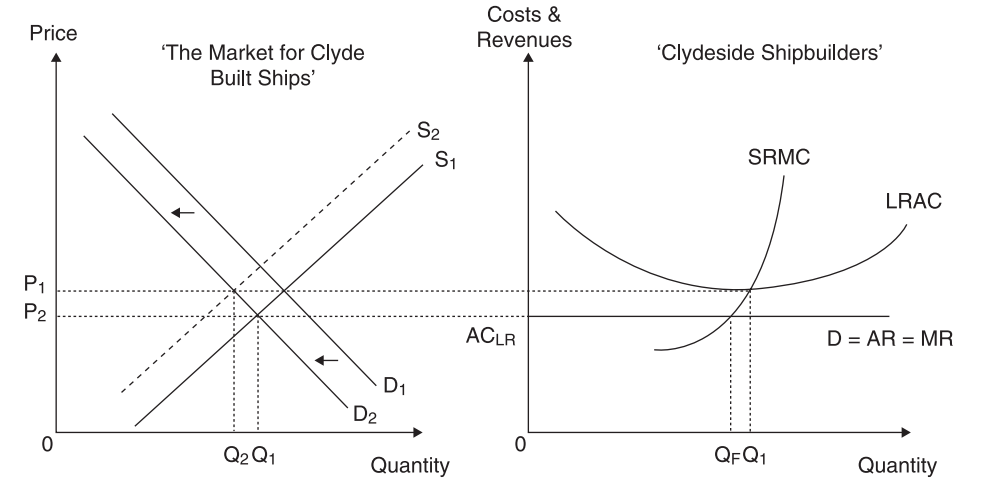

Figure 6.7 *Short run perfect competition – losses*

as they have simply been unable to continue to compete in the prevailing market conditions. The latter is what is known as 'structural' economic change, and an obvious example is the long-term decline of shipbuilding on the Clyde Estuary. In Figure 6.7, this would be represented by a shift in the demand curve to the left, as in this specific example, substitute goods in the form of lower cost non British shipbuilders take demand away from the Clyde shipyards.

In this situation, due to the shift in the demand curve from D_1 to D_2, at the market price P no Clydeside yard can make a profit. What subsequently occurs is a contraction in the industry (supply), in this case represented by a shift in the supply curve to the left from S_1 to S_2, as shipbuilders leave the Clyde and output is slowly reduced. This process would continue until the market is back in equilibrium and the market price re-established for Clyde-built ships. Note however the industry on the Clyde would now be smaller ($Q_2 < Q_1$). Ultimately, only those firms that produced at the lowest cost could survive in this market. Further note however that in many cases the shift in demand will be a long-term decline. Thus the demand curve will continually shift leftwards increasing downward pressure on prices. Therefore only firms able to lower costs in the long run, i.e. move to a lower average cost curve by achieving economies of scale, are ultimately able to survive in the industry. This is exactly what happened on the Clyde through a large number of mergers and acquisitions and considerable consolidation in the industry. Even this however failed to stem the long-term decline, as what was ultimately required to remain competitive was a very long-run downward shift in the average cost curve. Most shipbuilders however were unable to keep pace with this technical change and this led to the almost complete demise of shipbuilding on the Clyde.

Note also from this discussion that through the market mechanism there is what is termed consumer sovereignty. In simple terms, firms respond to the demands of consumers by producing what consumers want. Firms that fail to do so will be forced to leave the industry due to the losses being incurred. Consumer sovereignty also dictates that a longer-term shift in (consumer) demand away from a particular good or service will result in it no longer being produced. The resources that were thus employed in producing that good are now 'freed' to produce something that consumers actually want. As highlighted above, therefore, perfect competition is said to be an ideal as it does produce economic efficiency, i.e. in the long run scarce resources are used efficiently to produce what consumers want. An indicator of market efficiency, therefore, is that the price should equal the marginal cost.

MARKET FAILURE

What has been outlined in the previous section are the four basic assumptions of perfect competition that are normally outlined at an introductory level as the conditions required for perfect competition. As highlighted, breach of any of these assumptions constitutes market failure. With regard to transport markets, however, it is worth going beyond these basic assumptions and detailing the full list that are required for perfect competition to exist. These are:

Basic Assumptions:

- Many buyers and sellers
- No barriers to entry or exit

- All firms are profit maximisers
- All consumers are utility maximisers
- Perfect information
- Homogeneous product.

Further Assumptions:

- Non increasing production technologies, thus there are no economies of scale
- Non rivalry in consumption – consumption by one individual does not preclude consumption by another
- Absence of externalities, all benefits and costs are private and thus taken into account in market based decisions
- No government intervention to 'interfere' between the forces of demand and supply.

Whilst not explicitly mentioned, the basic assumptions of perfect competition also include producer profit maximisation and consumer utility maximisation, two underlying assumptions already outlined in the analysis of the demand and supply of transport services. These however are necessary conditions required to derive the market demand curve and the output level of the individual firm. Both however require perfect information, as without it neither the firm nor the consumer will be in a position to maximise their profits or utility respectively. There are four other conditions required however for perfect competition to exist, the first of which is non increasing production technologies. What this means is that there are no economies of scale and thus no advantages in larger-sized firms. If there were increasing returns to scale, then there would be an in-built incentive for firms to increase in size in order to lower average costs and thus be in a position to undercut smaller rivals and gain a larger share of the market. If increasing returns to scale existed over the whole market size, the ultimate conclusion would be a monopoly, where one firm would face a position of no competition.

Non rivalry in consumption is often confused with non excludability in consumption. What non rivalry basically means is that consumption by one person does not affect the consumption of the good or service by someone else. In simple terms, therefore, if one person consumes the good it does not make it unavailable to others. Hence the market for a rare Picasso painting has rivalry in consumption, as one person's purchase will make the painting unavailable to others. Potatoes on the other hand have non rivalry in consumption; hence one person's purchase of a 5 lb bag of new Ayrshire potatoes is unlikely to impact upon others' consumption of new Ayrshires. Basically, therefore, if consumers want a given product they can get it. This is often confused with non excludability in consumption, where the benefits in consumption cannot be confined to only those that pay for them. Thus consumption of rail services gives some benefit to road users in terms of reduced journey times on the roads. These come under the next assumption, externalities, in this case an external benefit. However, there can also be external costs, where the costs of a given activity fall not only on those that benefit from that activity but also on others who do not. The problem with externalities are that they are not taken into account when making a market-based decision as the externality has no market value. Thus the road user does not consider the costs on the environment when deciding whether or not to use the car. As externalities are a major issue in transport markets, these are dealt with far more extensively later in the text. In this case, however,

it is a market failure that may lead to over or under consumption of a particular good or service due to the presence of externalities.

The last assumption, government intervention, is also a major transport issue, hence will also be returned to, but is outlined here in terms of a condition of perfect competition. Government intervention is a form of market failure as it would interfere with market signals and thus lead to an inefficient outcome. For example, consumer sovereignty above was highlighted as a case where consumers, through their market actions, indicate what goods and services they want to be produced, i.e. the ones they buy, and which ones they don't want to be produced, i.e. the ones they don't buy. Government intervention, by for example paying subsidies for certain goods or services, interferes with these signals by encouraging consumers to buy products they do not really want!! To be more rational, subsidies encourage the tying up of resources in the production of goods or services at a higher cost than the benefit derived from the consumption of those goods or services. Such productive resources therefore would be better employed in some other activity, where the benefit gained matched the cost of production. Note however that this rationale is based upon a single perspective of taking each assumption on its own, i.e. only viewing government intervention in isolation. In most instances, intervention in the market is in order to correct for an existing breach of one of the other assumptions, for example that of no externalities. This is why government action to 'correct' for such market failures is often referred to as a second best solution, as the best solution, the market itself, is incapable of delivering economic efficiency due to market failure.

Apart from the previously cited US bicycle industry, however, does perfect competition exist in any of the transport industries? One that is often cited as being close or near to perfect competition is the road haulage industry, thus Case study 6.1 examines the extent to which this industry meets the conditions of perfect competition. The case should also help to develop further the ideas behind perfect competition, particularly the practical aspects, as well as begin to introduce some of the problems that can be associated with highly competitive markets.

Case study 6.1 Road haulage and the economist's model of perfect competition

Road haulage has often been cited as an example of an industry that meets, or is close to meeting, the conditions of the economist's model of perfect competition. This facet of the industry has long been recognised, with Adams and Hendry stating as long ago as 1957 that:

> *'The problem under study here is of interest because these authors hold that the trucking industry epitomises the classical model of perfect competition. Here is an industry where there appears to be no economies of scale, where the number of firms is large and where, in the absence of restrictions, entry would be brisk.'*

That premise was used as the main thrust of the authors' argument that at that time the US trucking industry should not be subjected to government control and regulation. Not all authors agreed, however, with Smykay (1958), a strong advocate of continued regulation, in particular

showing hostility to this point of view and arguing that such an important industry to the US economy could not be simply left to market forces to decide haulage rates and the level of supply provided. Eight years later Munby (1965), with regard to the British industry, concluded that there was no adequate general case for any licensing system for road haulage beyond control of drivers' hours, the condition of the vehicles used and other safety-related measures. The basis for this conclusion was that the industry would operate along free market principles that would, due to its closeness to the model of perfect competition, ensure economic efficiency.

This case study attempts to investigate the extent to which the road haulage industry does actually adhere to the economist's model of perfect competition by examining industry conditions under each of the four basic assumptions of the perfect competition model, plus the further key assumption of non-increasing returns to scale.

Many buyers and sellers

The first assumption of perfect competition is many buyers and sellers, with the very strong implication that no single buyer or seller is large enough to affect the price, hence the price is set by the market and all firms are price takers.

Examination of the relevant statistics for the UK, taken from a number of different sources, reveals that in 2004/5 there were some 102,000 goods vehicle operator licences, i.e. qualified firms, in the industry. This represented a significant decline over the preceding eleven year period since 1993 when there were some 125,000 licensed operators (FTA, 2008). Nevertheless, this is still a very large number of firms in the industry. Furthermore, a quick look at any local Yellow Pages under 'road haulage services' also produces a large number of firms within the local area, certainly far more than listed under 'bus, coach and tramway'. As regards registered vehicles, the DfT (2007) report that there were some 441,000 registered vehicles in total in 2004/5, an increase of 5.6 per cent since 1993. This would suggest an average fleet size of 4.25 vehicles, which compared to 1993 represents a significant increase from 3.29 vehicles. Average firm size would therefore appear to be increasing over time and most of this would appear to have come through industry consolidation, i.e. company mergers and takeovers.

Despite such consolidation a high number of small firms still appear to exist in the industry. The FTA (2008) cite that three quarters of road haulage operators operate a fleet size of two vehicles or less, with a very high percentage of single-vehicle firms operated by owner-drivers. This on its own would suggest a highly competitive industry that despite some industry consolidation still closely resembles the perfect competition assumption of many buyers and sellers. The FTA also quotes however that 10 per cent of fleets operate half the total fleet, suggesting some significantly larger operators with an average fleet size of around 20 vehicles. Thus although the industry has many firms, this appears to consist of a very clear division of small and large companies. There would thus appear to be a significant number of firms that are of a size to influence the market, i.e. not all firms are price takers.

A homogeneous product

Taking a somewhat simplistic view that many industry experts would undoubtedly disagree with, road haulage firms operate a basic low-tech service to transport goods from one location to another, i.e. a driver and a lorry. This would appear to represent an identical product and as such conforms completely to the assumption of a homogeneous product.

In some ways however there can be deviation from that basic assumption, and certainly an element of product differentiation. One factor that plays a key role in the road haulage industry is the firm's reputation. Hauliers with good reputations for high quality services that deliver on time could feasibly charge higher prices and will almost certainly acquire a degree of consumer loyalty. Although the basic service provided can by argued to be identical, these are not perfectly substitutable between suppliers due to variations in how that basic service is actually provided, i.e. there is product differentiation. Nevertheless, most firms operate under contract to large freight-handling firms or big fleet operators (Lacey, 1990) in which there is strong downward pressure on prices due to the relative ease of substitution between firms. How the industry actually operates, therefore, with a high degree of substitutability between operators, would appear to be a very close approximation to the assumption of an identical product.

Perfect information

In reality, there is always a limit to perfect information. In simple terms, no one can know all relevant market information and in any case the transaction costs involved in actually acquiring such information may be economically inefficient. We therefore concentrate only on three aspects of perfect information – prices, production and performance. Regarding haulage prices, another look at the local Yellow Pages or the Internet would suggest that there exists a position that is near to perfect information. It would be relatively easy to make a round of phone calls to produce a reasonable data set of prices on which to base a rational decision as to which haulier to choose on the basis of price, although it is recognised that this is a considerable oversimplification of the issue.

As regards the production of road haulage services, as highlighted above, at the basic level of the transport component this tends to be a relatively low-tech industry. All that is required is a vehicle and a driver and there are few 'secrets' in the basic production of road haulage services. The wider issues of building a company reputation or in successfully running the business may be different issues; however, in this respect there is no reason to suspect that road haulage should be any different to any other type of business and therefore these constitute basic business skills.

The final aspect considered is information relating to performance of the industry. This would obviously be an important dimension for potential new entrants. Certainly in comparison with passenger-related transport, information appears to be far more difficult to obtain. A simple look at government statistics reveals few related to freight whilst many more related to passenger movements. This may reflect a policy bias where there is far more legislation related to passenger services than freight activities, hence the government collects and publishes far more statistics on the former than the latter. Furthermore, information on profitability in the industry has, perhaps not unsurprisingly, proved virtually impossible to obtain in the course of writing this case study. Whilst both the Road Haulage and the Freight Transport Associations provide some general information and support for those within the trade, this does not include market information, hence in the aspects considered here this falls short of what could be termed 'perfect information'.

Information on market prices and production technologies therefore would appear to be relatively easy to obtain; however, potential entrants to the industry may be limited to those with an inside knowledge of the prevailing business environment. In some respects therefore, this last

aspect may be no different to any other industry, where those inside the industry are best placed to take advantage of market opportunities (as exemplified by the numerous insider trading and banking scandals that have occurred in the city over the years!). Thus information may not be 'perfect' as such, but is probably as close as is realistically possible.

No barriers to entry or exit

As with perfect information, the position of no barriers to entry or exit can never be achieved in reality, there will always be some form of cost, either financial or in terms of the opportunity cost, in setting up in business. The issue therefore surrounds the existence of significant barriers to entry that restrict entry to only medium- or large-sized firms. The basic components required for a road haulage firm are a qualified driver, an operator's licence and a suitable vehicle. All of these aspects are in the bounds of possibility for the small firm. The large number of owner-drivers in the industry would also suggest that small firms do enter and survive in the industry. Therefore there would appear to be few barriers to entry and thus this condition of perfect competition in practice would appear to be largely met.

Non-increasing returns to scale

One further crucial element to examine is the assumption of non-increasing returns to scale. In other words, are there any advantages for larger firms with regarded to improved productivity or lower average costs? Most research on the topic relates to the trucking industry in the US because of more readily available data and because it is a crucial element in the operation of the market. It was thus a critical aspect of the whole de-regulation debate in the US before and after deregulation of the market in 1980.

To summarise what is a considerable research area, the balance of evidence would tend to suggest that economies of scale do exist in road haulage, but are not as extensive as in other industries such as rail freight. There are however inconsistencies in the findings. For example Nebesky *et al.* (1995) found no evidence of returns to scale in the less than truck load (LTL) segment of the US market. Giordano (1997) on the other hand examined the 100 largest less than truckload carriers over a period of 20 years. The author found evidence of increasing returns to scale up to firm size that would be consistent with significant fleet sizes, specifically around 28 vehicles.[1] Constant returns to scale were then found beyond that to a point of around 70 vehicles, after which decreasing returns were found. Furthermore, Ying (1990) examined the US trucking industry at three points in time, 1975, 1980 and 1984, in order to assess the impact of the 1980 Motor Carrier Act, the actual act that deregulated the interstate trucking market. With regard to scale economies, a massive swing was found from constant returns to scale in 1975 and 1980 under the regulated market, to very strong increasing returns in 1984 under the deregulated market. The author suggests that the restrictive nature of the regulated market prevented firms from fully utilising their own large networks, hence once the market was deregulated firms exploited the advantages presented with regard to the scale of operations.

As regards the British experience, there is far less evidence and almost all of it dates from the period prior to the Transport Act 1968 which deregulated the UK road haulage industry. As an example, Harrison (1963) reviews studies carried out up to that period and concludes there is little evidence of economies of scale in road haulage. This is despite an apparent increase in

firm size; however, the author attributes this to the greater restrictions on market entry than on increasing capacity in what was then the regulated market. A second factor highlighted interestingly was imperfections in knowledge that influenced choices between established and non-established operators in favour of the former.

This inconsistency in the findings on the existence or otherwise of economies of scale in road haulage would perhaps suggest that within certain sectors there are other factors present that may allow smaller firms to compete with larger competitors on a relatively equal basis. In other words, economies of scale do not destroy competition. As such, therefore, this would appear to be consistent with a near to perfect competition model rather than perfect competition per se.

Conclusion

From this albeit simplistic review of the road haulage industry, it would appear that the industry does closely resemble certain aspects of the perfectly competitive model. What this produces is a very competitive industry, even in specialised segments where the number of firms may be relatively small, e.g. the less than truckload market.

In the past, road haulage has been heavily regulated and controlled, not only in Britain but throughout the whole developed world, not because of market failure but rather due to the strategic importance of the industry to the workings of the whole economy. With the subsequent shift in general economic thinking towards far less state intervention in the economy, the poor economic case for intervention has been exposed and the industry largely de-regulated.

Note however that having a highly competitive market in an industry such as road haulage, where there exist operational safety issues, is not without drawbacks. This breaches the assumption of no externalities, as the cost of operations includes the potential human cost to others in terms of injuries and fatalities if things should go wrong. What it produces therefore is a cut throat scenario in which there are very strong pressures to keep costs down and thus a temptation for some to not follow all of the qualitative regulations that exist. This leads to the idea of cowboy operators and fly-by-night type operations. Building and construction is another industry that exhibits the same characteristics, i.e. a high level of competition and the need for extensive safety precautions.

Due to the presence of such externalities, therefore, road haulage still requires effective qualitative regulation, where the chances of offenders being caught are high and the cost of the penalties imposed far outweigh the potential benefits that may arise from getting away with it. The industry therefore cannot be entirely left to the market; however, the state's role is to ensure that minimum operating standards are set at an appropriate level and that these standards are enforced and maintained. Economic forces should then be able to take the industry forward from there. Of increasing concern with regard to road haulage, however, is the presence and impact of another externality, that of air pollution, and that may require stronger market intervention from the relevant authorities in the future.

CHAPTER SUMMARY AND REFLECTION

This chapter has examined the issue of perfect competition in transport markets. That was defined as the position where the level of competition within the market is maximised. For this to take place, a number of conditions or assumptions are required, and if fulfilled, the market will find the 'right' answer in transport markets. In other words, the correct level of transport services will be produced in a cost efficient manner to those that value them. Operators will only earn a 'fair' reward in the form of normal profits for providing such services.

What we also saw however was that transport markets, even in the case study industry of road haulage, breach at least one of the assumptions of perfect competition. Whilst that is probably true of all industries, in certain transport sectors the problem is that it is particularly acute. We examine some of these issues in subsequent chapters; however, the following chapter considers breaches of at least one of the basic four assumptions of perfect competition, which results in the creation of imperfectly competitive markets.

CHAPTER EXERCISES

The two exercises that follow can be completed after reading this chapter, particularly the first; however, you may wish to also read the following chapter before attempting these questions.

Exercise 6.1 Perfect competition in bus markets

If we assume that a given bus market is in perfect competition which charges a flat fare of £1, and if the formula for the total demand (in thousands) in the market is given by the equation:

$$Q_d = 250 - 60P$$

Where Q_d is the quantity demanded in thousands at a given price P.

If we further assume constant returns to scale, then:

a) What is the total market demand at the £1 flat fare?

b) If the market is shared equally by 4 firms, what is the number of passengers carried by each company?

c) If the cost per vehicle kilometre is £1.60, average utilisation 20 passengers per vehicle kilometre and average trip distance 10 kilometres:[2]

   i What is the level of bus kilometres required to service this market?
   ii What profits are being made?
   iii What type of profit is this, normal or abnormal?
   iv What is the cost per passenger carried (as opposed to the cost per vehicle kilometre)?

d) As this is perfect competition, new firms may enter the market and compete these profits away. What price therefore will ensure that only normal profits are made?

e) The answer to part d should be the same as the answer to c(iv), why?
f) At the lower flat fare, why has market efficiency now been achieved?
g) This exercise assumes that the four firms in the market will behave consistent with the perfect competition model, however is that in their own best interests? What does this tell us about market structures where only a few firms exist?
h) Why in this exercise however would the firms be forced to behave consistent with the perfectly competitive market?

Exercise 6.2 Transport industries' market structures

In this chapter we have only examined perfect competition in transport markets. Nevertheless, this was stated as the position where the level of competition within the market is maximised. As we will see in the following chapter, the other end of the spectrum is where there is no completion at all, i.e. a monopoly. From the following list of transport industries given below therefore:

- The British Bus Industry
- Road Haulage
- Domestic Air Services
- Suburban Rail Services
- National Intercity Rail Services
- Long Haul Air Flights originating in the European Union
- All land-based forms of public transport in Britain
- Rail freight services
- Urban taxi services

Place those industries on a spectrum of market structures that should look something like this:

Monopoly Perfect Competition

where perfect competition represents the position of 'maximum' competition and monopoly the position of no competition.

Questions:

a) What criteria did you use in your assessment of where on the spectrum a particular industry should be placed?
b) On a scale of 1 (very low) to 5 (very high), mark against each industry this (very!) rough indicator of government intervention in that particular transport market. Does there appear to be any particular order in your assessments?
c) What have you learned from this exercise, particularly with regard to the definition of a particular transport market and its associated market structure?