Chapter 3

The market for transport services

Learning Outcomes:

In the course of this chapter, you will learn:

- The law of demand and the main factors that impact upon the general demand for transport services as well as individual transport modes
- The theory of supply and the main factors that impact upon the supply of transport services
- The market and economic principles that underpin the provision of transport services and ensure that such services are provided to those that are willing and able to pay the market price
- The important role of the price mechanism in balancing the needs of the users and providers of transport services
- That even where transport markets are closely controlled and regulated by public authorities, underlying economic principles still apply.

INTRODUCTION

We have already seen that within modern society, all individuals need to use transport services in order to access a range of work and leisure activities that lie out with the immediate vicinity of the home. This chapter will take a closer look at the main factors that impact upon the demand and supply of these services. It will consider the economic principles that affect both sides of the market; the demand side in the case of consumers and the supply side in the case of suppliers. The chapter seeks to put across the basic ideas of the workings of the market, and hence assumes a completely free market in the provision of transport services. In the analysis of transport markets, such an understanding is not only important in its own right, but is also required as a basis for understanding government policy, as much of this policy is enacted through intervention in transport markets. Furthermore, many of the problems associated with the provision of transport services and facilities are because the market as such does not work, and hence we need to consider first how it 'should' work before going on to consider in subsequent chapters why that is not always the case and the possible solutions that may be available.

We begin first however with a simple definition of a 'market' in order to clarify what is meant by this key concept. In simple terms, a market is a meeting place for buying and selling. A simple illustration is the traditional market place in towns which normally consists of a large number of self-assembled stalls selling a variety of goods. Car boot sales would be a further illustration or eBay where online buyers bid for various goods. This last example illustrates that a market does not have to be a physical location. In a transport context a market is where the consumers of transport services are brought together with the provider of such services. In some cases, therefore, this market is quite rigidly defined, although it is difficult to consider a bus as an actual market-place! In other instances, however, the 'marketplace' is less well defined, as it may not be an actual physical location and the market as such can be made up of a high number of inter-related activities that contribute towards the final transport service. This can involve a large number of different bodies, both public and private, all of which contribute different aspects to the activity. Private motoring would be a good example of such an activity, where generally the infrastructure, i.e. the roads and related equipment, are supplied by government bodies, the vehicles, fuel and related equipment by private companies for profit, and finally the skills required to use such facilities by the actual consumers themselves.

In the analysis of transport or indeed all markets, the assumption of *ceteris paribus* is made, which is the original Latin phrase meaning 'all else remains equal'. Thus for example when examining the effect of a change in the price of petrol on private car usage, it is assumed that this is the only change impacting upon the demand for private car usage at that time. Thus other factors, such as the knock-on effect this will have upon public transport markets, are ignored. This allows focus to be given to the issue being considered, otherwise there is a danger that the whole thing could become a mess of interconnected loops and kickbacks in which the original issue becomes completely lost. Thus in the following text, whilst not specified, the underlying assumption is of *ceteris paribus*.

THE LAW OF DEMAND

The demand for a good is the 'number of units per unit of time that consumers purchase at any given price'. Notice therefore that demand relates to actual purchases, and not wants or 'demands' as such. Demand is a result of consumers expressing their own preferences between goods at the relative prices that they face, taking into account all money that they have available to them. The term 'demand' may be used in different contexts to describe an individual's preferences, the preferences of a particular market segment or the whole market.

In examining the demand for transport services, we start with the very basic assumption that the decision as to whether to travel or not is based solely upon the price of that journey. Common sense would therefore clearly suggest that as the price of transport services rises, the quantity demanded will fall. In simple terms, less people will travel. For a better understanding as to why this may be the case, however, we need to supplement common sense with something that can be rationalised. The basic argument lies in the idea of the opportunity cost of any (economic) decision. As the price of transport rises, individuals will then have to weigh up the benefits of continuing to travel against all other goods and services they purchase or could purchase. This is because the increased price or fare will mean they have less of their income remaining to spend on

those other goods and services. Economic rationality would state that as all individuals have a limited income, they will seek to maximise the benefit obtained from that income. This is termed utility (satisfaction) maximisation. Should the price of any (including transport) of the goods and services that an individual consumes change, this would cause them to re-evaluate the basket of goods and services that they currently purchase to determine if there would be another 'mix' that would better meet their wants and needs. Consumers are therefore said to seek to maximise their utility. Following that logic, therefore, if the price of a particular mode of transport was to rise we would expect demand to fall as individuals switch to alternative modes or do something else with their income that gives them greater satisfaction.

Using the assumption of consumer utility maximisation, the basic price/quantity relationship can be graphed for transport services. This is known as the Demand Curve, which is shown in both a theoretical and a simplified form in Figure 3.1.

Price is graphed on the vertical axis and quantity demanded on the horizontal, thus the demand curve for transport services slopes downwards from left to right. Note however on the diagram on the left (the theoretical shape) that as price falls increasingly larger quantities are purchased. This is because at very high prices, small price reductions will have little impact on the quantity demanded as most still cannot afford to buy it. As the price falls, however, the good or service is becoming increasingly accessible to more potential consumers, hence at the bottom end price changes have far larger impacts on the quantity demand. On the right is drawn a simplified version of the demand curve, where the demand 'curve' is shown as a simple straight line. Except in special cases, this is the representation that will be used in the rest of this text; however, always remember that the demand curve is in fact curved or non-linear!

The demand curve gives the basic price/quantity demanded relationship; however, the assumption that quantity demanded is only dependent upon the price is far too restrictive for any meaningful analysis of transport markets. Relaxation of that underlying assumption allows other determinants of demand to be introduced into the analysis. Importantly, however, all factors

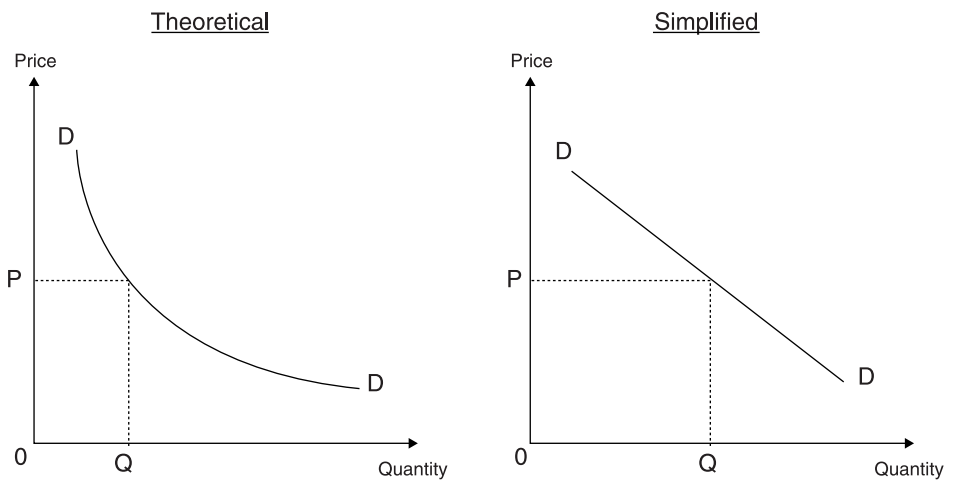

Figure 3.1 *Basic relationship between the price and the quantity demanded for transport services (theoretical and simplified)*

identified impact upon the basic price/quantity relationship, i.e. the demand curve. We first examine the effect of changing incomes.

Income

If everything else remained equal, a general increase in incomes would enable more people to afford the use of transport services and hence increase demand. A decrease in incomes on the other hand would be expected to have the opposite effect. Such changes would be shown by a shift of the demand curve, to the right in the case of an increase in income and to the left in the case of a decrease. Both of these cases are shown in Figure 3.2.

In Figure 3.2 before any changes in income occur, the market demand curve is shown by the line labelled D. Hence at price P the quantity demanded is given by Q. If incomes rise, more transport services would be demanded at each and every price. This would be shown by a shift in the demand curve to the right and labelled D_{inc}. Hence at price P, demand increases to Q_{inc}. If on the other hand incomes were to fall, this would be illustrated by a shift in the demand curve to the left and labelled D_{dec}. Thus at price P, demand would fall to Q_{dec}.

Whilst increases in income will cause an overall increase in the demand for transport services, rising incomes may not be expected to have a uniform impact across all transport modes. Indeed the demand for some may actually be expected to fall. Whereas the demand for private transport, rail services, freight services and air services for example may all be expected to rise with an increase in income, the demand for bus services may be expected to fall. This is because some individuals, with an increased income, will 'trade up' to a perceived better quality of transport –

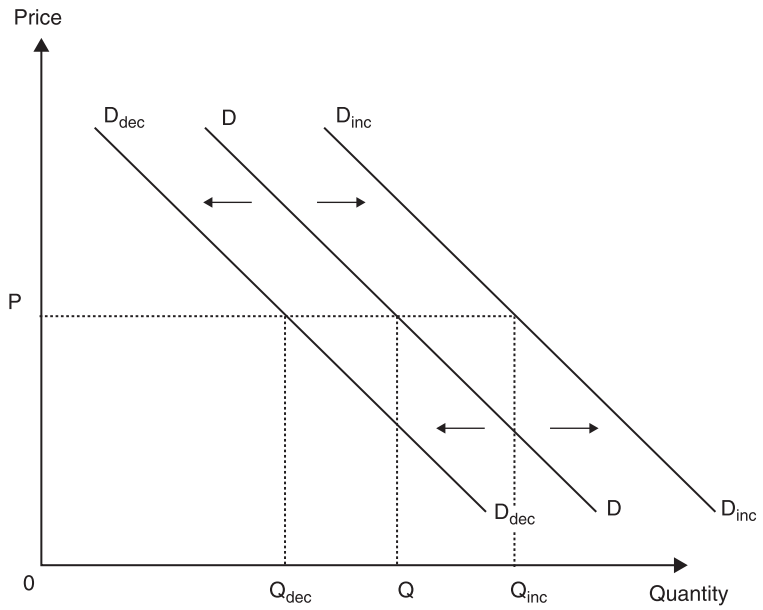

Figure 3.2 *Change in the conditions of demand for transport services shown by a shift in the demand curve*

some for example will buy a car and hence no longer need or use public transport. This example allows a distinction to be drawn between what are referred to as 'normal' and 'inferior' goods. A normal good is where demand increases with increases in income, whilst an inferior good is one that falls with increases in income. All of the following analysis, except where otherwise stated, concerns normal goods.

In practice, changes in income have had a major impact on the demand for transport services, and the full extent of this is illustrated later in Case study 3.1.

The price of other goods and services

There are two categories of other goods and services that may impact upon the basic price/quantity relationship: substitute and complementary goods. Substitute goods can either be inter modal, e.g. the bus verses the train, the car verses the bus and so on, or intra modal, such as the red bus versus the blue bus, the no frills 'low cost' airline versus the traditional airline. Substitute transport services therefore are those that can be used to fulfil the same basic transport need. In some cases different services may fit that basic need almost as well, such as in the previous example of the red bus versus the blue bus service. In other cases, however, although the same basic need is met the competing service may not do the purpose as well, such as in the case of the no frills versus the traditional airline. Thus the closeness of the substitute goods will determine the actual size of the impact on the market. To take as an example the demand for bus services, a rise in the price of rail travel will cause the demand curve for bus services to shift to the right, i.e. an increase in demand. This is because rail travel now represents less value for money, and as consumers seek to maximise utility, some will switch to alternative modes such as the bus. Not all will switch, however, because in those areas where rail travel provides the only viable means of transport there will be little alternative but to pay the increased rail fare. Overall, however, demand for bus services will increase. A decrease in the price of rail services on the other hand will cause some consumers to switch from the bus to the train, hence the demand curve would shift to the left (a decrease in demand). Note again that only those that have that alternative available to them, i.e. where the train is a close substitute, can make such a switch. Note also that although in this example the price of rail has decreased, the fare may still be more expensive than the bus. Despite this higher fare, some may switch because they would feel that rail is a higher quality service and now the decrease in the price differential between the two is of such a level that it is worthwhile to 'trade up'.

Complementary goods on the other hand are goods or services that are consumed at the same time. The price of petrol, for example, may be expected to impact upon the use of the car, as fuel costs are one of the major determinants of private motoring. If for example the price of petrol was to increase, this would cause a shift of the demand curve for private motoring to the left. This is because some consumers will be more conservative with their car usage whilst others may take their car off the road or sell it and use public transport. It is not always clear however what actually constitutes a complementary good. For example, before rail freight transport can be used a company would need to install a railway siding to its premises; hence rail freight and railway sidings are actually complementary goods. Furthermore, there may be a large number of separate markets that are complementary to each other. Thus whilst the price of petrol may well impact on the use of the car, it is not the only good or service required to (legally) use the car. Thus the price of car insurance, vehicle excise duty, vehicle servicing and so on will all impact on the level of private

motoring. The point to stress with complementary goods is the idea of the overall cost of consumption, and that a change in the price of any component will impact upon all other components that are consumed when undertaking a certain activity, in this case, private motoring.

Fashions or trends

At first it may seem odd to include an item such as fashions or trends as a determinant of the demand for transport services – when was transport ever fashionable or trendy? For every good and service, however, not just those associated with the fashion related or image conscious industries, fashions or trends may turn in favour or against the item over time. A move towards the good or service will cause an increase in demand and shift the demand curve to the right, whilst a move away will have the opposite effect. Cigarettes provide a very good example, with old movies from the 40s and 50s highlighting that smoking was once highly fashionable, whilst today to smoke is to almost be a social outcast. Transport is no different, and over time this determinant has had a massive impact upon transport markets. Over the last thirty or so years, for example, there has been a big swing towards more fuel-efficient vehicles and less environmental harmful fuels, e.g. unleaded petrol.

Unlike the first three determinants of demand already outlined, however, it is difficult to make generalisations about fashions and trends. In simple terms, each case needs to be treated on its own merits. A rise in environmental awareness, for example, may cause a decrease in demand for transport services or a switch to less environmentally harmful modes of transport, e.g. from private to public transport. More directly, the recent trend away from bike geek to bike chic has resulted in increased use of the bike, particularly those of a vintage nature, as a mode of transport.

Fashions and trends can also be manipulated through various measures, with the most commonly used being advertising. Through advertising consumer awareness of the good or service can be raised and the positive attributes associated with consumption reinforced. The whole point of advertising is to change or reinforce consumer demand. Other measures exist, however, such as more directly raising awareness by education or through research. It is knowledge of the harmful effects of smoking for example that have brought about the aforementioned radical change in smoking habits. As mentioned, however, each case needs to be treated on its own, as similar knowledge of the harmful effects of vehicle emissions, whilst having had some impact, has not produced the same radical change in consumer behaviour.

Expectations of future price rises

With the only possible exception of hangovers, how people behave today will be affected by their expectations of what will happen tomorrow. The demand for transport services is no different. Hence how the price of transport services will change in the future will affect what is purchased today. For example, an individual may delay purchasing a motor vehicle if the situation regarding the future price of oil is unknown. On the other hand, a daily commuter may purchase a one-year season ticket if fares are expected to rise in the foreseeable future. Thus individuals may pull forward purchases where prices are expected to rise in the future, thereby increasing demand, whilst they will delay purchases where prices are expected to fall in the future, hence decreasing demand.

Other factors specifically relating to the demand for transport

The five basic factors outlined above, the price of the good, income, the price of other goods and services, fashions or trends and future price expectations will impact upon the demand for any good and service. This applies to everything from a lowly tin of beans through to a luxury yacht moored at Monte Carlo. There exists however a further three factors that need to be considered when examining the demand for transport services.

Demand for transport is a derived demand

Modern life, as already outlined, is structured around accessing goods and services that are outside of the home and require some form of transport in order to be obtained. It follows therefore that an individual's demand for transport is instigated through their demand for something else. Hence the need to work in order to earn an income generates a demand for transport. Demand for transport is therefore said to be a derived demand. Few individuals demand transport services purely for their own merit. Even those with flashy cars only have a flashy car for some other purpose, i.e. to impress others! There are always exceptions to the rule, however, such as 'Mad Hamish' who spent his time happily travelling around the 9 miles of the Cathcart Circle line on the south side of Glasgow. Fortunately, such exceptions tend to be very rare.

Demand for transport is time specific

In simple terms, when transport services are demanded they are demanded NOW. Unlike say a chocolate bar that can be purchased and consumed later, on the whole the demand for transport is required at an exact, or near exact, time. Another way of putting this is that the demand for transport has a very short expiry date, and due to the derived nature of demand, once that expiry date has passed then the need to make that particular journey will almost certainly no longer exist. Even where the ticket is purchased in advance, the actual journey that is purchased is made at a fairly specific time period in the future. Demand for transport is therefore time specific.

Demand for transport follows peaks and troughs

Hard to believe, but the demand for most goods and services follows some kind of cyclical pattern, whether that be throughout the year, throughout the month, week or day. For example, the demand for the aforementioned chocolate bar will be higher in the winter than in the summer and will also vary at certain points over the day. With transport services, however, this particular issue is a major factor and especially acute. Most if not all will be familiar with the terms 'the morning rush hour' and 'the evening rush hour', and it is this very factor that these relate to. Basically a substantially higher number of people need to travel (because demand is derived and time specific) to and from work between certain hours of the day. This has a significant impact upon the way in which transport services are provided and indeed the whole 'economics' of transport operations.

In order to underpin some of these ideas, we end the examination of the determinants of demand with a practical look at the effect of income on the demand for transport services in Case study 3.1.

Case study 3.1 Determinants of the demand for transport services – a practically based discussion on the effect of income on demand

As outlined above, income is a major determinant of the demand for transport services. This is almost exclusively due to the derived nature of demand. It could be strongly argued that the demand for transport is derived from a combination of the pursuit of income earning opportunities – namely financial profit and/or employment – and in the subsequent spending on essentials and leisure pursuits of that hard earned income. As already seen in Chapter 2, there is a close relationship between the demand for both passenger and freight transport and national income as represented by Gross Domestic Product (GDP). Again as we saw, as economic activity increases this increased trade creates a demand for the transport of goods and services from one location to another, thus creating increased demand for freight transport. Passenger travel however also increases for a number of reasons. Firstly, increased trade creates a need for more individuals to travel in the course of business. Secondly, higher incomes affect labour markets and will almost certainly result in increased commuting as individuals travel further in order to access higher paid jobs. Finally, higher incomes require more spending and this in turn requires more transport. The relationship between GDP and passenger transport has already been outlined in Chapter 2; however, here we examine this relationship in more depth in order to identify some of the wider impacts on transport demand of increasing incomes.

Figure 3.3 below shows two trends, one for GDP since 1980 and one for total passenger kilometres (measured in billions) since 1980. GDP is measured in terms of constant prices (i.e. adjusted for changes in inflation) and both variables are specified as index numbers (with

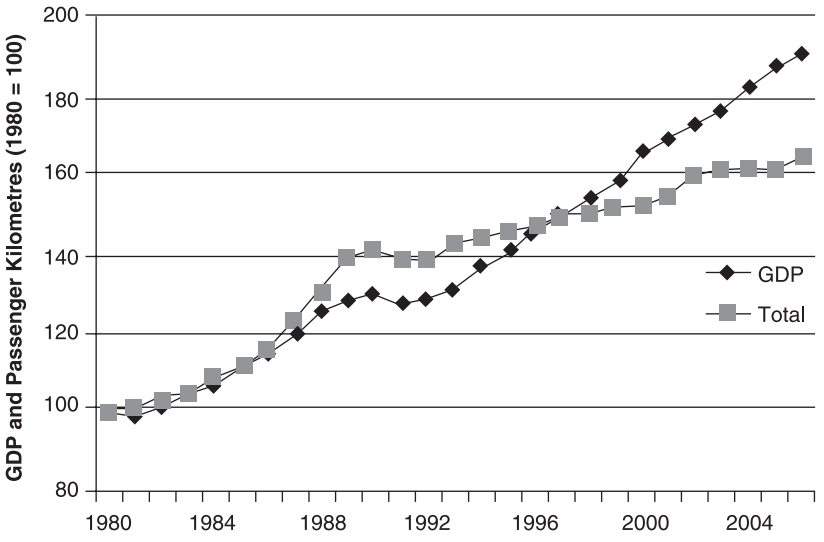

Figure 3.3 *GDP and passenger kilometres, 1980 to 2006*

Source: Compiled from DfT Statistics (DfT 2007)

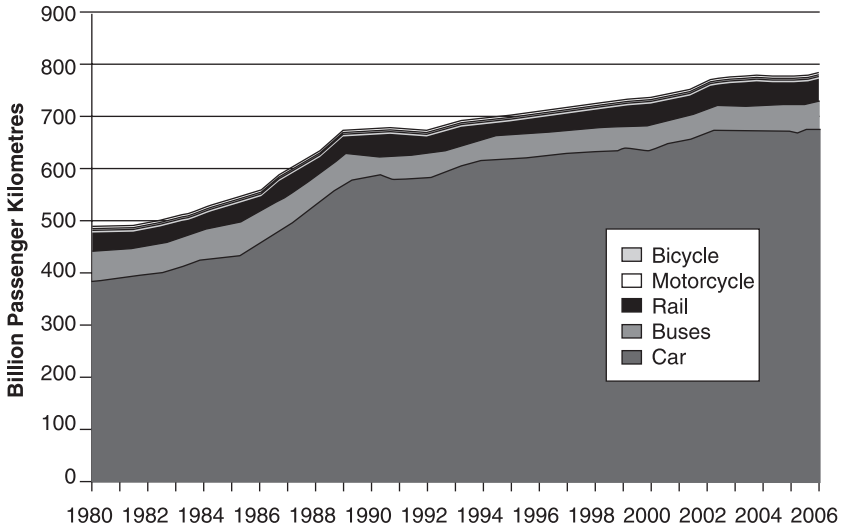

Figure 3.4 *Passenger kilometres modal split, 1980 to 2006*

Source: Compiled from DfT Statistics (DfT 2007)

1980 = 100) to show the overall trends over the last twenty-five years. The figure shows a very clear association between the two, and also highlights the impact of the previously mentioned Lawson Boom of the mid to late 1980s. What is interesting is that until that period changes in national income were matched almost exactly by the same percentage changes in billion passenger kilometres. Since the early 1990s, however, whilst the two are still closely related, increases in GDP have been matched with smaller increases in passenger kilometres. For example, over the whole twenty-six-year period GDP rose on average by 2.4 per cent per year and passenger kilometres by an average of 1.8 per cent per year. Since 1992, however, a 1 per cent change in GDP has been associated with a 0.4 per cent change in passenger kilometres. Whilst this does not suggest the two are now completely de-coupled, it does suggest that the effects of increases in income are now far less direct, and this may well be the result of considerably improved communications over the period. It does nevertheless underline that transport services clearly constitute a normal economic good, although it should be noted that in this case the relationship between income and transport demand is (still) particularly strong.

Figure 3.4 above breaks down the total passenger kilometre figures into five different modes of transport – car, bus, rail, motorcycle and bicycle. What this clearly shows is that most, if not all, of this growth in passenger kilometres has been due to a significant increase in car usage. Rising incomes therefore would appear to have had little impact upon all other modes of transport apart from the car. This can be examined further by breaking down the modal split for non-car-based modes of transport, as is done in Figure 3.5.

This shows a clearer picture for non-car-based modes of transport and indicates that since 1980 use of the bus has decreased, use of the train has increased and the other two modes have shown reasonably (low) constant values over the period. This would confirm the bus as an inferior good and that with rising incomes many individuals have, over time, 'switched' from the

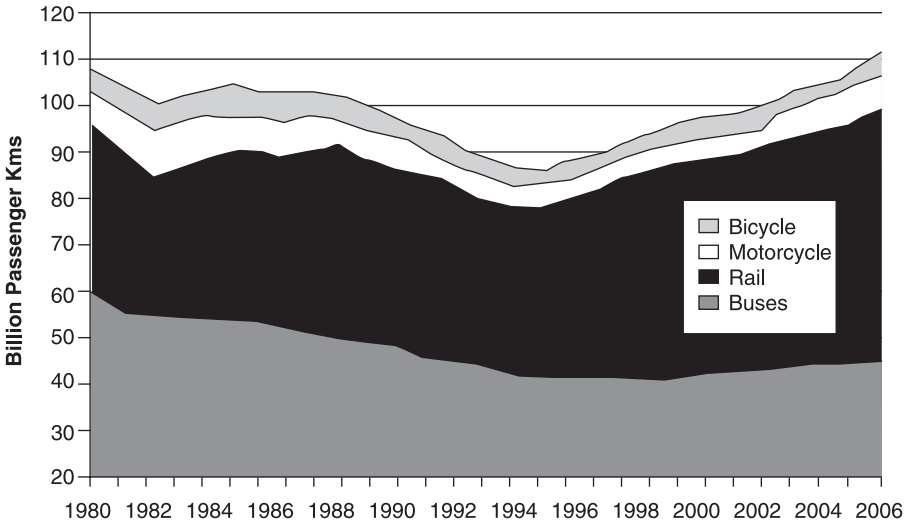

Figure 3.5 *Modal splits, non car modes of transport, 1980–2006*

Source: Compiled from DfT Statistics (DfT 2007)

bus to the car and the train. Bus usage however appears to have bottomed out from around 1998 onwards, which almost exclusively relates to increased use in London counteracting continued decline elsewhere in the country. For 2006, however, there was also a small overall increase in bus usage in other parts of the country as well.

Whilst rising incomes therefore have changed the conditions of demand away from the bus, some other determinant, particularly in the case of London, has in more recent years produced a shift back towards this mode of transport. This particular period has seen the introduction of many bus priority measures on most of the main corridors in all major UK cities and increased investment from bus operators. With this increase in the quality of the service provided, the travelling experience of bus users has significantly improved and resulted in attitudes that are more favourable towards bus use. At the same time usage of the car, particularly at certain times during the day, has become far more problematic. Therefore tastes or 'fashions' in bus usage have improved, whilst the general cost of the car, i.e. one that includes the time element, has increased.

What this example shows is the impact of the determinants of demand on market conditions and that in many cases these operate over a protracted period of time, underlining that nothing remains constant over time. Incomes may have increased allowing more individuals access to private transport, but this has brought its own problems in the form of increased traffic congestion. This in turn has impacted back upon transport markets and particularly the determinants of demand for other transport modes.

The determinants outlined in this section are the main factors that affect the demand for transport services. This however is only half of the market; that relating to the consumers of such services. The other half relates to the providers of these services, whose market actions are explained by the theory of supply.

THE THEORY OF SUPPLY

As most individuals have a basic need to travel from one location to another, in a market based economy this presents an opportunity for other individuals to profit from that basic need. Trade is never a zero sum game, hence both parties should benefit otherwise the trade would never take place. In this example the first individual benefits by getting to where they want to go, whilst the second benefits from a financial reward for transporting that person to that location. Where a basic need exists, therefore, there will always be individuals willing to provide a good or service to meet that need at a given price. Central to any such trade is the price mechanism, as this allows the exchange to take place. Consequently when examining the theory of supply we begin with the same basic assumption that, in this case, the level of transport services provided to the market is only dependent upon the price of the service. As before, this raises the question of the relationship between price and the quantity supplied.

Again common sense would suggest that as the price rises the quantity supplied to the market will increase. The basic rationale as to why this would be the case once more revolves around the idea of opportunity cost. As the price of any mode of transport rises, producers weigh up the benefits of supplying to that particular market against all other markets they could operate in. This is akin to the idea of the venture capitalist seeking the maximum return for their capital and who is not particularly bothered where those funds are actually invested. Consistent with such a view, the underlying assumption used to explain producers' behaviour is that they seek to maximise profits. If prices are (relatively) low within a given market, few (if any) producers will be able to make a profit in that market as revenues may not cover costs. As the price rises, however, this represents better profit opportunities for producers and the quantity supplied would increase. This is because at higher prices the profits to be made in a given industry are higher than the next best alternative, i.e. the opportunity cost. Again if the price was to change then this may cause producers to re-evaluate their position, voluntarily or otherwise. As an example, price cuts may force certain operators out of business.

Assuming that producers seek to maximise profits, therefore, the basic price/quantity relationship can be outlined. This is known as the Supply Curve and is shown in Figure 3.6, again as theoretical and simplified versions.

Figure 3.6 shows that the supply curve for transport services slopes upwards from left to right, hence more is supplied at higher prices. On the theoretical diagram, while the supply curve slopes upwards, ever higher prices will produce smaller changes in the quantity supplied. This is due to the scarcity of resources available to produce a given good or service, in which it becomes physically much harder to find the resources required to produce ever increasing quantities. This can only be done therefore if a considerably higher price is gained from production of the good or service. In fact, there is a finite maximum value at which point the supply curve becomes vertical. This would occur at the unlikely point where all resources are used in the production of a single

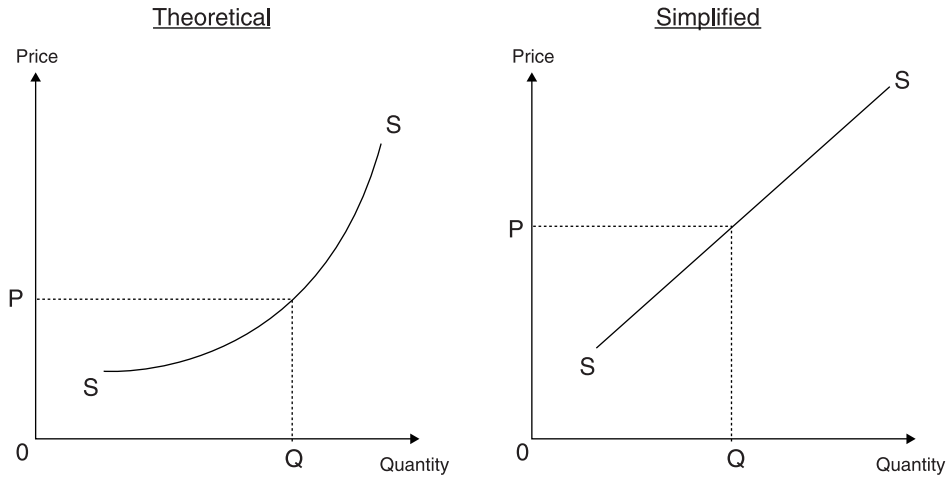

Figure 3.6 *Basic relationship between the price and the quantity supplied for transport services (theoretical and simplified)*

good or service, hence in simple terms as all resources are already employed in the production process none remain to produce any increases.

This basic supply curve is shown on the right in a simplified form in which the curve is drawn as a straight line, and again this is the representation that will be used in the rest of the text. As above however you should remember that like the demand curve, the supply curve is curved!

Having established the basic relationship between price and the quantity supplied, other factors can now be introduced into the analysis to give a more complete picture of the conditions of supply. Again all factors identified will impact upon the basic price/quantity relationship, i.e. the supply curve, and a change in any of these factors will constitute a change in the conditions of supply.

The cost of production

Cost is a large determinant of the supply of transport services. Production costs are one half of the profit equation (profit = revenue − cost), and hence a change in the cost of transport operations will impact upon profits and thus the supply of services to the market. In simple terms, an increase in costs will reduce the level supplied. As all operators are assumed to be profit maximisers, an increase in costs reduces profits and hence some, but not all, operators will leave the market to seek better profit opportunities elsewhere. Others will be driven out of business as revenues fail to cover costs. Conversely, a reduction in costs will bring about an increase in supply. Existing suppliers/operators will supply more to the market (as all else being equal this will increase profits) and new entrants will enter the market as profit opportunities are now higher than before.

A change in costs therefore will impact upon the basic price/quantity supplied relationship. An increase in costs is shown by a shift in the supply curve to the left, whilst a reduction in costs is shown by a shift in the supply curve to the right. Both situations are outlined in Figure 3.7.

In Figure 3.7, prior to any change in costs, the market supply curve is shown by the line labelled

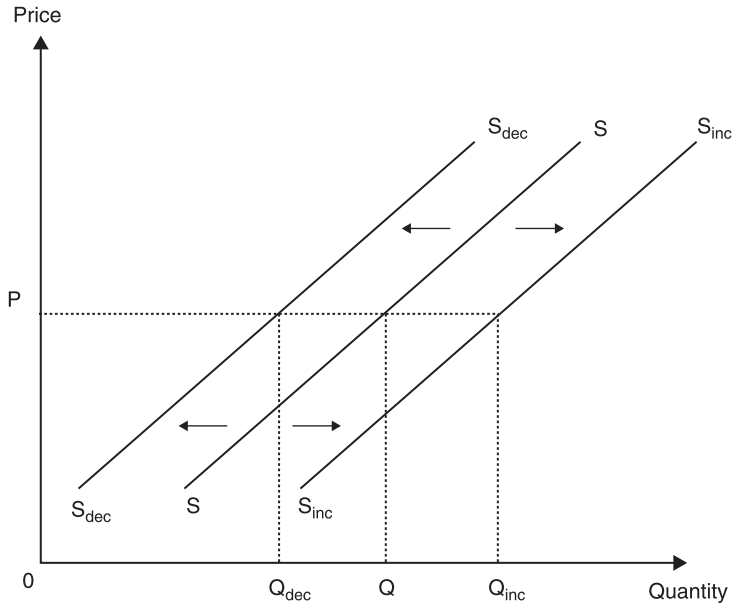

Figure 3.7 *Change in the conditions of supply for transport services shown by a shift in the supply curve*

S. At price P, the quantity supplied is given by Q. If costs increase, less transport services would be supplied at each and every price. This would be illustrated by a shift in the supply curve to the left to S_{dec}. Thus at price P, the quantity supplied would fall to Q_{dec}. Conversely, if costs were to fall this would be shown by a shift in the supply curve to the right. At price P, supply would increase to Q_{inc}. A practical illustration of the effect costs have had on the provision (supply) of transport services is given later in the chapter in Case study 3.2, which examines the consequences of changing costs on the supply of British bus services.

Government policy

As already seen in Chapter 1, governments intervene in transport markets to 'guide' the market to meeting its policy objectives. Government policy as such, particularly in public transport markets, has a very large impact on the supply of transport services. For instance, without state intervention the provision of rail services throughout Europe would be considerably diminished – the Scottish rail network for example would probably only consist of a single 60 kilometre line between Glasgow and Edinburgh rather than the 4,000 kilometres of lines that currently exist. For the whole of Britain, the notorious Beeching in his report of 1965 (BRB, 1965) identified only 11,250 kilometres of railway for 'development' in order to make the railways profitable by 1980. Switzerland is probably an even more extreme case, where outside of the main intercity routes all of the branch lines and the multiplicity of locally owned and controlled railways are very large loss makers.

At the most basic level government policy can be implemented through one of three general policy tools. Firstly by direct provision, where the state takes on the full responsibility for

providing transport services through public ownership of the means of production. A second approach is where services may be provided by private sector companies however the state 'steers' the market to its desired objectives through the imposition of taxes and the provision of state subsidies. The third and final general policy tool is through regulatory/legislative measures, where the state directly commands or prevents by law certain actions in order to achieve policy aims. All three forms of measures can impact directly upon the supply of transport services. Thus for example a 'change' to direct provision, i.e. nationalisation, may result in an increase in supply, as transport services are no longer provided for profit but rather in the public interest. With regard to taxes and subsidies, the effects of these policy tools on supply are very similar to the impact of the costs of production, and are often listed as a sub-category of costs. An increase in a tax on a good or service will decrease supply, as the cost of providing such services would rise. For example an increase in fuel duty would decrease the supply of road haulage as this will directly increase the overall cost of haulage operations. The payment or increase in a subsidy on the other hand would result in an increase in the supply of that good or service. This is because subsidies to operators have the effect of off-setting production costs. Thus the payment of a subsidy to rail freight operators would result in the increase in the supply of rail freight services. The effects on supply of regulatory or legislative actions on the other hand are very difficult to generalise, as some may limit market supply whilst others increase it. A night ban on lorries for example would reduce the supply of road haulage, whilst an increase in legal maximum vehicle weights would increase it. This whole issue of the impact and implementation of government policy on both the supply and demand sides of transport markets is a key area, and hence is developed further in Chapters 10 and 11.

The price of other goods and services that can be produced using the same factors of production

Given that producers are assumed to profit maximise, then if the price of any good or service that could be produced using the same factors of production was to rise, producers are likely to switch production to that particular market. This would cause a reduction in the level of supply at each and every price for the current good or service. Within transport markets opportunities for such changes are limited – a bus and a bus driver can only produce bus services. There may however be some movement between different transport market segments. For example, a rise in the price of scheduled air fares may cause a decrease in the supply of chartered services. This is because the resources required to meet the higher volume of demand for scheduled services are virtually the same and, in the short run at least, have to be found from somewhere else.

The price of goods in joint supply

In simple English this means the price of goods that are produced at the same time and best illustrated by an example from aviation. The last twenty years or so have seen a massive increase in the level of air freight services. The reason for this is due to the increase in passenger travel, as most air freight, around 60 per cent, goes via the cargo hold of passenger aircraft. Hence rising passenger demand has been met by large increases in the supply of passenger planes, and with that increase has come more cargo holds within which freight can be carried. Consequently, the

increase in the available supply of passenger aircraft has automatically resulted in the increase of air freight capacity as these two products are goods in joint supply.

Goods in joint supply also relates to the production of by-products that are created as a result of production of the primary product. As firms are profit-maximisers they will attempt to sell any such by-product for which there exists a market. All by-products should not be considered as pure waste, as those that can be sold should be thought of in more lateral terms as goods in joints supply. A good example is bus shelters. An increase in the production of bus shelters would result in the by-product of more advertising space that can be sold to potential advertisers. This is why the maintenance costs of bus shelters in many major cities are paid for by the advertising space sold.

Natural shocks

Natural shocks simply relate to natural events and disasters such as the weather, flood, drought, pests etc, or abnormal circumstances arising from war, fire, political events etc. The oil crisis in the mid-1970s, for example, when the price of oil quadrupled in the space of six months, was originally sparked off by the Yom Kippur Israeli–Egyptian war that affected world supplies of crude oil. As regards the effect of natural shocks on supply, each case should be considered on its own merits. An outbreak of war, for example, will lead to an increase in the supply of armaments, whilst a drought will considerably reduce the supply of agricultural produce.

Aims of the producer

Highly relevant to the supply of transport services to the market are the aims of the producer. Although the underlying assumption is that profit maximisation drives producers' market actions, this may be considered to be a long-term aim that may be pursued in the short term in a number of different ways. A switch in the emphasis of the aims of producers may result in a change in the level of supply to the market. If for example a bus operator decided that in order to maximise profits in the long run it needed to expand its market share in the present, this would almost certainly lead to an increase in supply at each and every price. This is because the operator would have to attempt to enter new markets at a competitive level. Such behaviour would be consistent with the aim of sales maximisation where lower profitability levels are accepted in the present in order to expand market share in the future. There are other situations where the aim of sales maximisation is entirely consistent with the aim of profit maximisation. Passenger railway companies, for example, are said to sales maximise (Cowie, 2002), because the cost of carrying an extra passenger on a train is extremely small. Consequently, any revenue gained comes at a very small additional cost. Thus the aim of the train operator is to attempt to fill the available capacity with revenue-paying customers, and hence if priced correctly this should result in full trains and maximised profits.

After government policy, the cost of production has probably been the next largest determinant on the level of supply of transport services. This is practically illustrated in Case study 3.2, which looks at the cost of bus operations in Britain and the impact that this has had on the supply of bus services.

Case study 3.2 The British bus industry – a practical illustration of the impact of costs on the supply of services to the market

Table 3.1 and Figure 3.8 illustrate the cost per vehicle kilometre in constant 2005/06 prices as calculated by the Department for Transport (2007). They also show the level of vehicle kilometres operated on staged bus services for each year. These are both shown as three point moving averages to smooth out any yearly 'blips'.

Table 3.1 *Annual bus vehicle kilometres and the cost per bus kilometre, 1995/96 to 2005/06*

Year	*Vehicle km (millions)*	*Cost per km (pence)*
1995–96	2639	117
1996–97	2632	113
1997–98	2633	111
1998–99	2647	110
1999–00	2655	112
2000–01	2648	115
2001–02	2631	119
2002–03	2610	122
2003–04	2597	124
2004–05	2581	128
2005–06	2606	131

Source: Adapted from Department for Transport (2007)

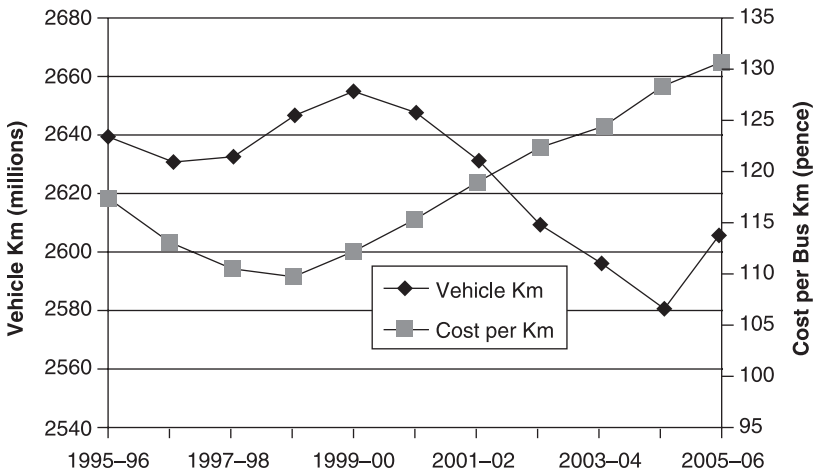

Figure 3.8 *Annual bus vehicle kilometres and the cost per bus kilometre, 1995/96 to 2005/06*

Source: Adapted from Department for Transport (2007)

Figure 3.8 opposite shows that as costs have increased, vehicle kilometres supplied to the market have fallen. Outside of the first three years shown, these two variables have moved in opposite directions. We could therefore state that over the period 1995 to 1999 the supply curve for bus services continually moved to the right (an increase in supply) as costs in the industry were falling. This reduction in costs 'allowed' more services to be provided at the prevailing market prices. From 2000 onwards, however, costs in the industry have risen significantly. This would be consistent with a shift in the supply curve to the left, which would suggest that supply at prevailing market prices would decrease. This is exactly what the vehicle kilometre trend shows, with an increase to 1999 and then a decrease between 2000 and 2005.

The more observant will notice that the scales on the above graph paint an overly pessimistic picture with regard to the decrease in the level of vehicle kilometres supplied to the market. Whilst costs rose by over 14 per cent in the last five years, bus kilometres, despite what the graph may suggest, only fell by just over 1.5 per cent. At this point however all that is important is that there is a clear relationship between the two and that costs impact upon supply to the market. The size of that impact however is a different issue and will be examined in subsequent chapters. Note also that this only examines one dynamic in the market, the effect of changing costs on supply. Other factors were present in the bus market over this period of time, most notably decreasing demand, which not only will have had a direct impact upon the level of supply but also on the quality of that supply. The quality of bus services in 2005/06 was much improved from that of 1995/6, where in some towns and cities services were basic to say the least. In order to attract new bus users and keep the ones that they have, bus companies have been increasingly required to provide a higher quality product (Cowie, 2008), thus impacting both on costs and the quantity supplied.

THE MARKET FOR TRANSPORT SERVICES

So far we have examined the demand and supply of transport services as two distinctly different concepts. They are however simply the two different sides of the transport market, that of buyers (demand) and sellers (supply). These two concepts can be brought together in order to determine the market for transport services. As both the demand and supply curves use the same labelled axes, price and quantity, they can simply be drawn on the same graph. This is shown in Figure 3.9.

As before, demand is shown by the line labelled D and supply by the line labelled S. These two lines intersect and this intersection produces a market price of P_e with the quantity traded shown by Q_e. This is known as the equilibrium price and quantity, i.e. the point at which the market is in balance. It is worthwhile however to consider why P_e is the market clearing price. As it stands, this is simply the case because that is how these lines have been drawn. Consider the example shown in Figure 3.10.

This is the same diagram of the market as before, except in order to help focus thoughts a second price, P_{XS}, has been added. This price is above the market clearing price of P_e, and would result in an imbalance in the quantity supplied, shown by Q_S, and the quantity demanded, shown by Q_D. Such a situation would be known as excess supply, as the quantity supplied exceeds the

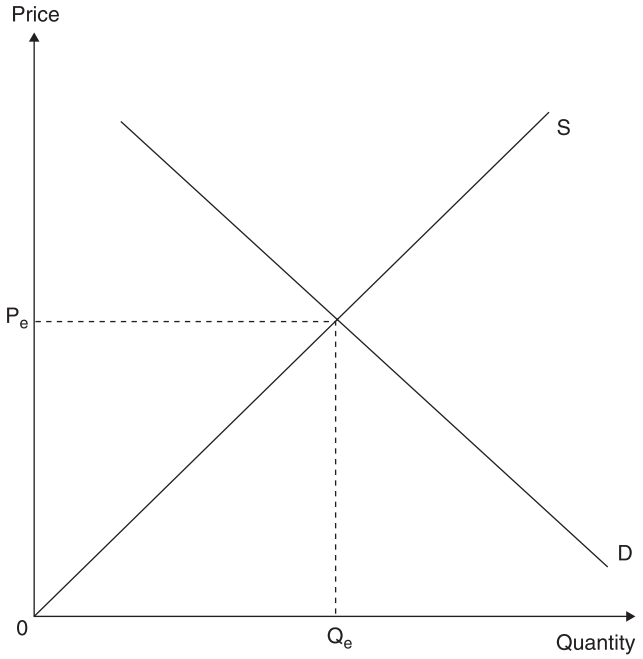

Figure 3.9 *The relationship between supply and demand for transport services*

quantity demanded. As not all that is being produced is being consumed, there would either be a high degree of wastage or stocks of finished goods would pile up. If, for example, this related to the market for bus services, this would result in a high level of capacity for which the operator was not receiving a financial return, i.e. a large number of empty seats on each bus journey. In some cases this would result in losses, either to the entire bus company or on particular routes or services. Several possibilities are likely to result – some bus operators would be driven out of business, hence reducing the quantity supplied, whilst those that remain are likely to withdraw unprofitable services, hence again reducing the quantity supplied. Over time, therefore, the level of excess supply would be reduced. Alternatively (or additionally), suppliers may reduce the price in an attempt to fill the spare capacity, and thus at least generate some revenue from what were empty seats. Quantity demanded would therefore increase. These processes would continue until the market was in balance, which only takes place at price P_e. At that price the market is said to be in equilibrium (balance). Consider the scenario in Figure 3.11.

In this case the second price that has been added to the graph, P_{XD}, is set below the market clearing price and would result in the quantity demanded, Q_D, far exceeding the quantity supplied, Q_S. This would be known as excess demand, shown by $Q_D - Q_S$. In this case there exists a consumer demand that is not being met by producers. Again using bus services as an example, this would be most vividly illustrated by over-crowding on buses and long queues at bus stops. In order to meet this excess demand, some suppliers will increase the quantity being supplied. This however can only be done if the price increases. These 'extra' services (at least in the short term)

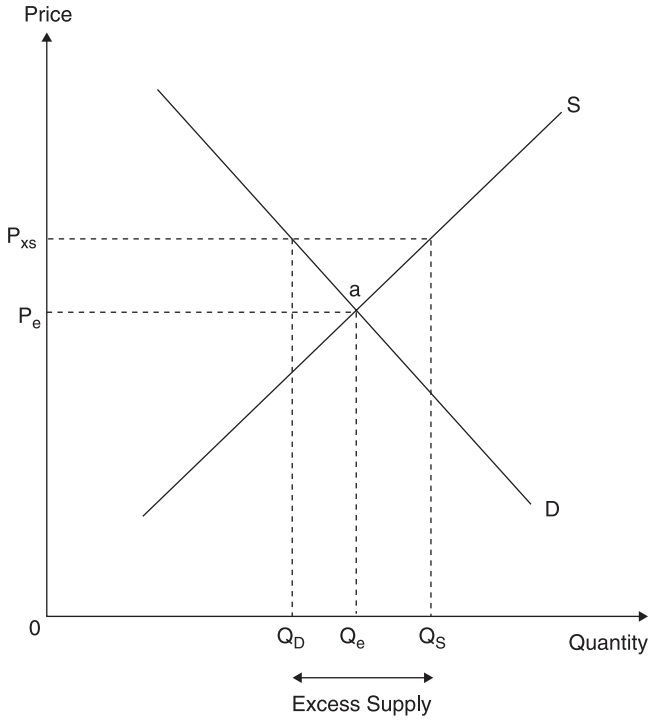

Figure 3.10 *Excess supply in the market*

will have to be provided by buses that are currently operating on other routes or in other market segments. As operators are profit maximisers, quantity supplied can only be increased if a higher level of return can be earned from switching buses to this route/sector. In this case there is an unmet demand at the prevailing market price, hence prices can be increased, i.e. the market will bear it. The increase in price however will reduce the quantity demanded, as being utility maximisers some consumers may decide that the use of the bus no longer represent the best value of their (limited) incomes. Some therefore may either not travel at all or use some other form of transport. Either way, quantity demanded falls. As illustrated before, this process will continue until all excess demand disappears. This only takes place at the market clearing price P_e.

This illustration clarifies the basic workings of the market and the importance of the price mechanism in equating the needs of consumers (demand) with the requirements of producers (supply). It also illustrates the important concepts of excess supply and excess demand and why there is an in-built tendency for the market to be in equilibrium.

The workings of the market

All of the ideas introduced in this chapter can be brought together to analyse the impact upon the market price and quantity if there should be a change in any of the determinants of supply or

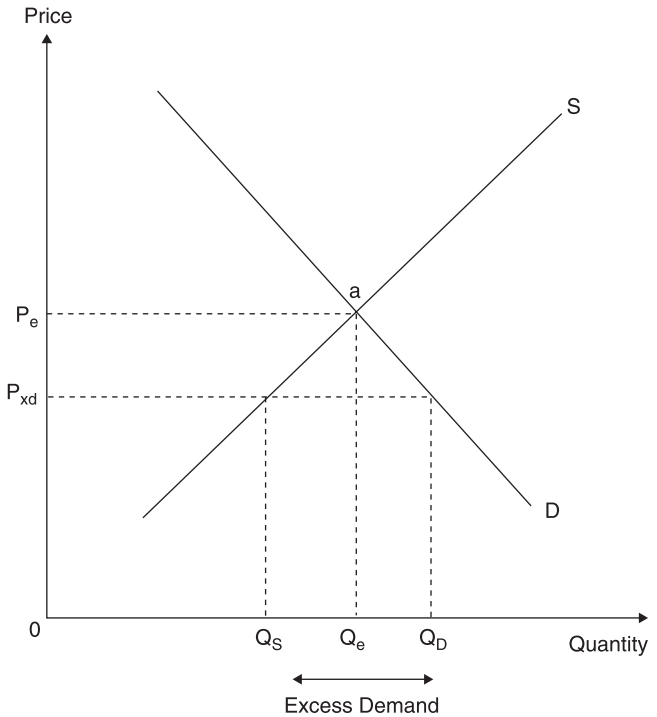

Figure 3.11 *Excess demand in the market*

demand. Continuing with the use of the market for bus services as the example, the impact of a change in the price of a substitute service can be used to illustrate the effect of a demand side factor on the market price and quantity traded. It should be stressed however that the principles outlined apply in the case of any of the determinants of demand introduced earlier. To return to the example, if rail fares were to rise, then the effect on the demand side of the bus market would be illustrated by a shift in the demand curve to the right. This is shown in Figure 3.12, which is a simple expansion of the basic market illustrated in Figure 3.9.

Figure 3.12 shows the market for bus services in equilibrium at point a (demand = supply) with price P_e and quantity traded Q_e. Following an increase in rail fares, some rail consumers will change to a substitute service, in this case the bus. This change in the conditions of demand for bus services is illustrated by a shift of the demand curve to the right from D to D_1. At the existing equilibrium price of P_e, therefore, there is now excess demand, as shown by Q_{xd} minus Q_e. This situation has already been examined under Figure 3.8 and would result in the excess demand being eradicated through an increase in the price/fare by suppliers. This would cause a reduction in the quantity demanded, as shown by a movement along the new demand curve D_1 from point c towards point b. The increased price however will also cause an increase in the quantity supplied, and hence a movement along the existing supply curve S from point a towards point b. This process continues until the market is back in equilibrium at point b with a new market price of P_1 with the associated quantity traded of Q_1. The net outcome therefore of the increase in rail fares on the

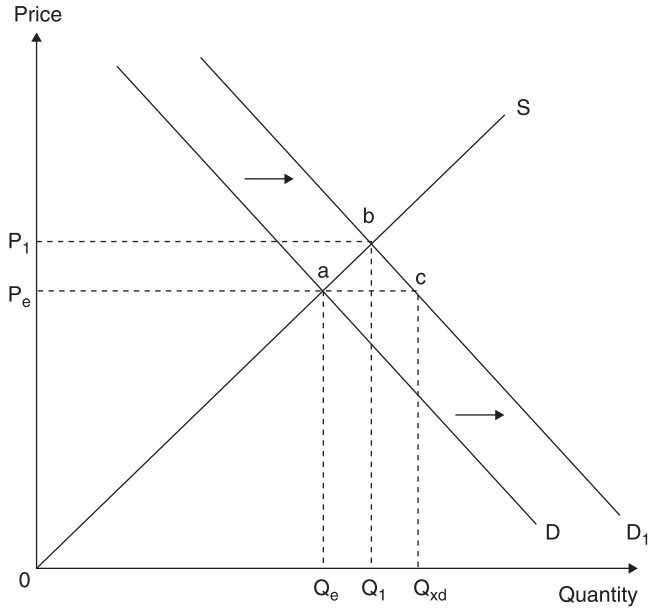

Figure 3.12 *Effect of an increase in the price of rail services on the market for bus services*

market for bus services was to increase the price from P_e to P_1 and an increase in the quantity traded from Q_e to Q_1.

To illustrate the effect of a supply side factor, the effect of an increase in the level of subsidy paid to bus operators is used. Such an increase would be represented by a shift of the supply curve to the right, i.e. more would be supplied at all prices. This is shown in Figure 3.13, which again has been developed from Figure 3.9.

Prior to the increase in subsidy, the market is in equilibrium at point a with a market price P_e and quantity traded Q_e. The increase in subsidy is shown by a shift in the supply curve to the right (this is akin to a reduction in costs), hence at price P_e there is now excess supply of Q_{xs} minus Q_e. This is the same situation as illustrated in Figure 3.10 above and would result in suppliers decreasing the price in order to fill the available capacity. The quantity supplied therefore would move along the new supply curve S_1 from point c towards point b. As the price falls, the quantity demanded would increase, as shown by a movement along the existing demand curve D from point a towards point b. As before, the net outcome would be that the market would end up back in equilibrium at point b with a new price P_1 and quantity Q_1.

The effects of the various determinants of supply and demand on the market price and quantity traded could endlessly be illustrated. In reality, there are constantly forces at work in the market that impact upon demand and supply. In saying this, the basic market principles outlined above hold true. Thus further examples of changes in demand and supply are left to the exercises at the end of this chapter. Meanwhile, these ideas are developed further in Case study 3.3, which examines the market for urban road space.

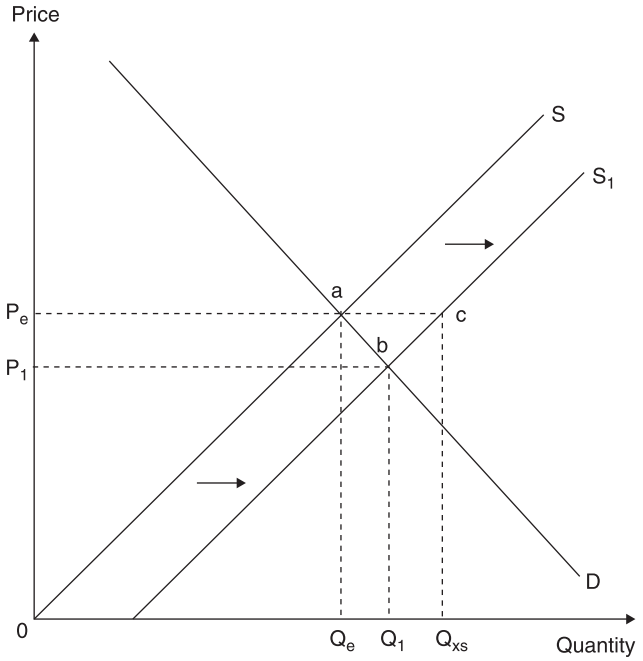

Figure 3.13 *Effect of an increase in the level of subsidy paid to bus operators on the market price and quantity traded of bus services.*

Case study 3.3 The market for urban road space – a practical illustration of the working of the market in transport services in the case of London car and bus usage

The analysis of the market for urban road space provides an interesting illustration of the working of the market with regard to transport services, as it underlines how the market actually works (or often doesn't!). The following case is outlined in theory before the practical aspects are considered. London provides the backdrop, as this allows the impact on the market of a number of the determinants of demand and supply to be examined, with the main focus on the introduction of a congestion charge.

In Figure 3.14, the top diagram shows the market for private motoring, i.e. private car usage. The demand and supply curves follow normal principles and before imposition of a congestion charge the market is in equilibrium at point a, hence there is no excess demand or supply. The diagram below represents the market for road space (which could be viewed as a complementary good for private motoring, i.e. one that is consumed at the same time). The first point to note is the vertical supply curve in the market for road space. This is because this example concerns (London) urban road space; hence no matter what the price the supply of available road space simply cannot be expanded (at least certainly not in the short term). The second point to note is that although prior to the imposition of a congestion charge the price to the user

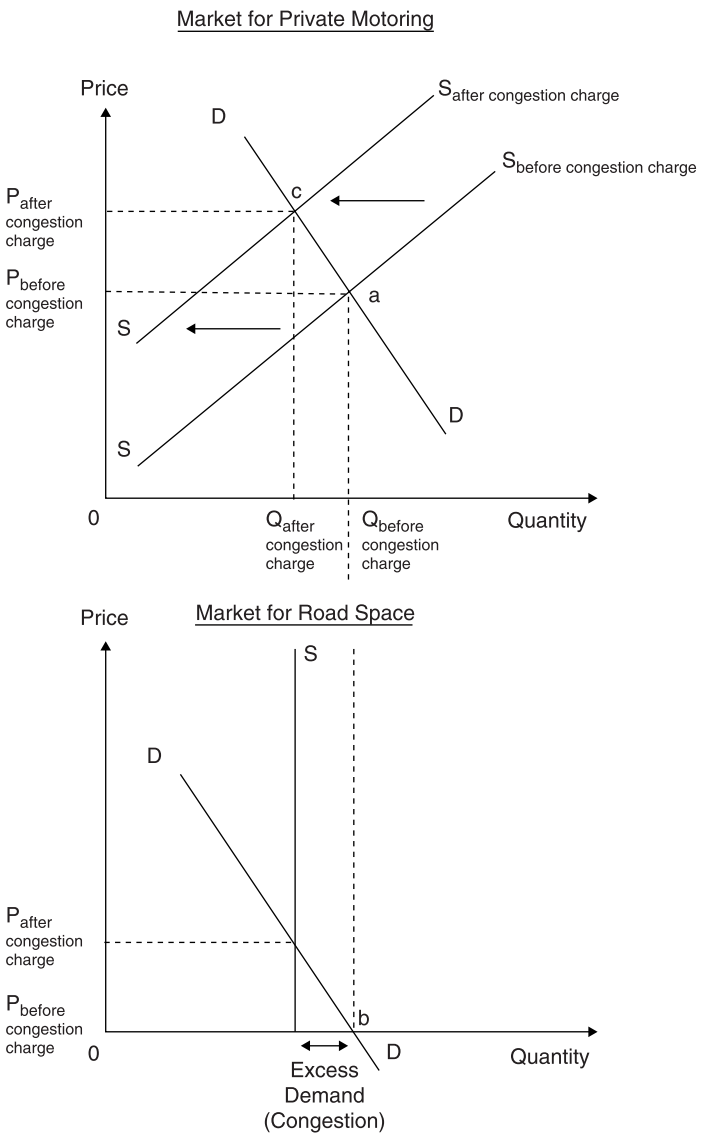

Figure 3.14 *Market for private motoring and the market for road space*

(at the point of use) is zero, market principles still operate and the market equilibrium is at point b. The associated 'price' is actually paid through general taxation and not directly by the user. The same principles for example operate in the UK's National Health Service, which users indirectly fund through the payment of taxes. Returning to this example, because the price to the user is zero there is excess demand. As a consequence, the road network is operating at above its optimum capacity and this results in congestion.

By imposing a congestion charge, this has the effect of increasing the cost of motoring. Cost is a major determinant of supply, hence the supply curve in the market for private motoring

shifts to the left (a decrease in supply). This causes an increase in the price of motoring and a decrease in the quantity demand (a movement along the existing demand curve, from a to c) and a new equilibrium point at c. On the lower diagram, the effect of this reduction in demand is that now the road network is operating at its optimum level (i.e. no excess demand, hence no congestion) and the user is now directly paying a price for road usage.

That is what the theory predicts should have happened after the imposition of a congestion charge, but is there any evidence that this is what actually did happen? Given below in Table 3.2 are travel statistics for the Greater London area taken from the London Travel Report 2007 (TfL, 2007). For the period 1993 to 2006, these show the daily average number of journeys broken down by the modal split.

The figures are for Greater London rather than simply the congestion charge zone, hence to a certain extent the impact of the scheme is dissolved in the aggregated figures. Nevertheless, in many ways the statistics highlight London's traffic problems and show that the issue of congestion was having an impact several years before the charge was implemented (in 2003). Whilst the car has by far the largest modal share, average daily journeys by car increased to 1999 after which they virtually levelled off to the end of the period shown. Thus while in 1993 the car accounted for 46 per cent of all journeys, by 2006 this had fallen to just under 40 per cent. The main effect of the congestion charge therefore appears to have been to restrain growth in car usage, with limited evidence of a small decrease. Thus whilst the lower part of Figure 3.14 predicts that the congestion charge will completely remove congestion, an element of it still exists. Thus a charge considerably in excess of that imposed (£5 initially then increased to £8) would be required to eradicate it. From Table 3.2 what there is more evidence of is a market effect (increased journey times) that was having an impact on the use of the car even before the charge was implemented. The demand for private transport was being affected by the quality of that transport and hence some users (albeit in small numbers) were turning to other modes of

Table 3.2 *Average daily journeys by mode, 1993–2006, Greater London area*

Year	*Rail*	*Under-ground*	*DLR*	*Bus (incl tram)*	*Taxi*	*Car*	*Motor-cycle*	*Bicycle*	*Walk*	*All Modes*
1993	1.4	2.0	–	3.1	0.2	10.5	0.2	0.3	5.2	22.9
1994	1.4	2.1	–	3.1	0.2	10.6	0.2	0.3	5.2	23.1
1995	1.5	2.1	–	3.3	0.2	10.6	0.2	0.3	5.2	23.4
1996	1.5	2.1	–	3.4	0.2	10.7	0.2	0.3	5.3	23.7
1997	1.6	2.2	0.1	3.5	0.2	10.8	0.2	0.3	5.3	24.2
1998	1.7	2.4	0.1	3.5	0.2	10.8	0.2	0.3	5.3	24.5
1999	1.8	2.5	0.1	3.5	0.2	11.1	0.2	0.3	5.4	25.1
2000	1.8	2.6	0.1	3.7	0.2	11.0	0.2	0.3	5.5	25.4
2001	1.8	2.6	0.1	3.9	0.2	11.0	0.2	0.3	5.5	25.6
2002	1.9	2.6	0.1	4.2	0.2	11.1	0.2	0.3	5.5	26.1
2003	1.9	2.6	0.1	4.6	0.2	11.0	0.2	0.3	5.5	26.4
2004	1.9	2.7	0.1	5.0	0.2	11.0	0.2	0.4	5.6	27.1
2005	2.0	2.6	0.1	5.0	0.2	10.9	0.2	0.4	5.6	27.0
2006	2.1	2.7	0.2	5.2	0.2	10.9	0.2	0.5	5.6	27.6

Source: TfL (2007)

transport. In particular, bus usage increased by 68 per cent over the period, the train by 45 per cent and the underground by 36 per cent. The London bus market in particular makes an interesting study.

Bus fares and service levels within London are set by the transport authority, Transport for London, and not by the free market. Nevertheless, the sector still follows market principles. Consider Figure 3.15, which attempts to explain this concept.

Figure 3.15 may at first seem rather complicated. However, if we begin with the market supply without subsidy and the market demand before congestion charging, then the equilibrium price where the market would clear is at point a with a price of $P_{free\ market}$. The regulated price set by the transport authority, however, is set below the market clearing price at $P_{regulated}$. Despite the price being set by the authority, however, market forces still operate, and without any further measures there would be excess demand, shown by the difference between Q_{Supply} and Q_{Demand}. As outlined in the main text, this would be exemplified by long queues and overcrowding on buses. In order to overcome this problem, the transport authority pays a subsidy to operators. This shifts the supply curve to the right from $S_{without\ subsidy}$ to $S_{with\ subsidy}$ (as it effectively reduces the costs to operators), hence bringing the market back into equilibrium at point b with a price $P_{regulated}$ and quantity Q_{Demand}.

With the imposition of a congestion charge, this would cause an increase in the price of private transport, a substitute service to the bus. Some car users would therefore switch to alternative modes, and in the London case this appears to have in the main been the bus. This would cause a shift in the demand curve to the right for bus services (an increase in demand). Under normal free market principles, this would put upward pressure on the price, and the market

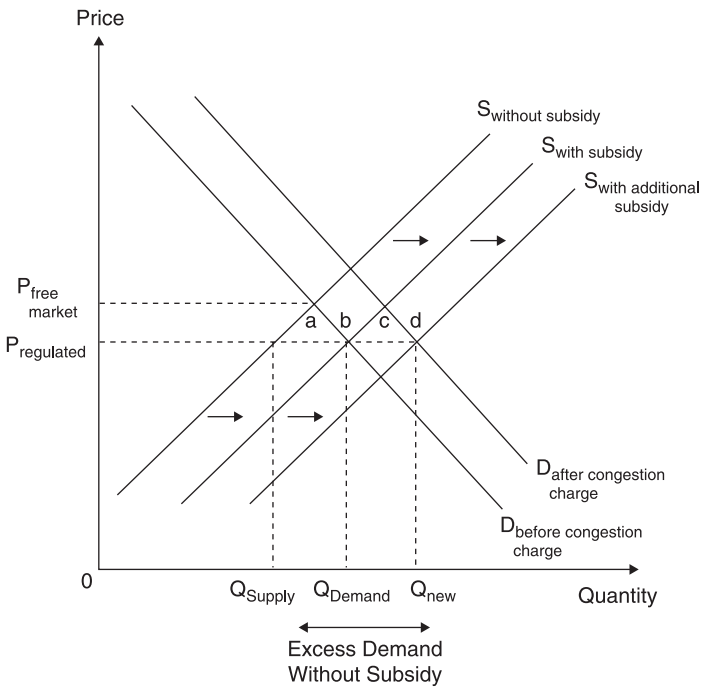

Figure 3.15 *The market for London bus services*

would reach a new equilibrium at point c. Under a regulated market, however, the same market forces would apply; however, in this case the price cannot increase in order to clear the market. The authority would have to either set a higher regulated price or alternatively increase the level of subsidy paid to operators to allow them to provide more services at the current regulated price. This would therefore shift the supply curve further to the right to $S_{\text{with additional subsidy}}$. The result would be a new equilibrium point d with a price $P_{\text{regulated}}$ and quantity Q_{new}. This produces an apparent contradiction of paying more subsidy with increasing passenger numbers; however, this is exactly what has happened in the London case. Furthermore, the authority has been forced to increase the price of Outer London journeys by some 35 per cent.

Despite being a regulated market, the London example provides an interesting case as to how the market operates. It underlines that even where fare and quantity levels are set by an authority, market principles still apply and the economics of the whole system need to operate in order to provide an efficient solution. The London congestion charging scheme will be considered further in Chapter 8, and the public transport market in Chapter 10.

CHAPTER SUMMARY AND REFLECTION

In this chapter the two sides of the market, demand and supply, have been introduced and examined. The general principles relating to all goods and services were introduced along with more specific determinants that affect transport markets. Demand and supply were then combined in order to examine how the market operates in practice. Principally this is through the price mechanism, with price rises caused by excess demand (too many consumers chasing too few goods), and price decreases caused by excess supply (too many producers chasing too few consumers!). Through market price signals, the actions of consumers, in terms of the quantity demanded, and producers, in terms of the quantity supplied, are balanced and the market will always tend towards market equilibrium. Whilst such principles apply to the operation of a pure free market, i.e. one without any government intervention, the illustration of the market for urban road space showed that market principles still apply even where heavy government intervention exists.

As a final point, and particularly for those new to economic analysis, hopefully in the course of this chapter you have not felt too overwhelmed with diagrams. Counting all graphs separately, some sixteen diagrams have been used in order to illustrate the various concepts in this chapter, a large number. In practice, however, when various effects on the market are considered we would never contemplate using as many as that, but only one or two at a time. It is important however to stress the use of diagrams in economic analysis. This should provide a framework for analysing situations and structure thinking around a given situation to give focus to the issue at hand. These basic tools of analysis will be used in subsequent chapters to further examine the major economic issues affecting transport markets.

CHAPTER EXERCISES

Exercise 3.1 Increasing the use of the railways

Almost without exception European governments have as one of their main transport policy objectives an increase in the use of passenger rail travel. The simple question is, using your new-found knowledge of economics, how can these governments assist the market to achieve this aim? If we assume from Figure 3.16 that the government wished to see the quantity used of rail services increase from the current position of Q_e to the level indicated by Q_X, for environmental and social reasons.

Then you should use this diagram as a basis to outline the various options available and consider both direct government intervention in this market as well as intervention in other transport markets that will bring about such a change. Further assume however that the aim would be to increase the level of rail travel without causing a major modal shift from other public transport markets. You should illustrate each of your scenarios with a relevant diagram. You should also consider all of the implications of your decisions, particularly with regard to the political logic of some of the options. (HINT – there are three basic possible scenarios, although you may come up with more!)

Of the scenarios that you have devised, which do you consider would be the most effective?

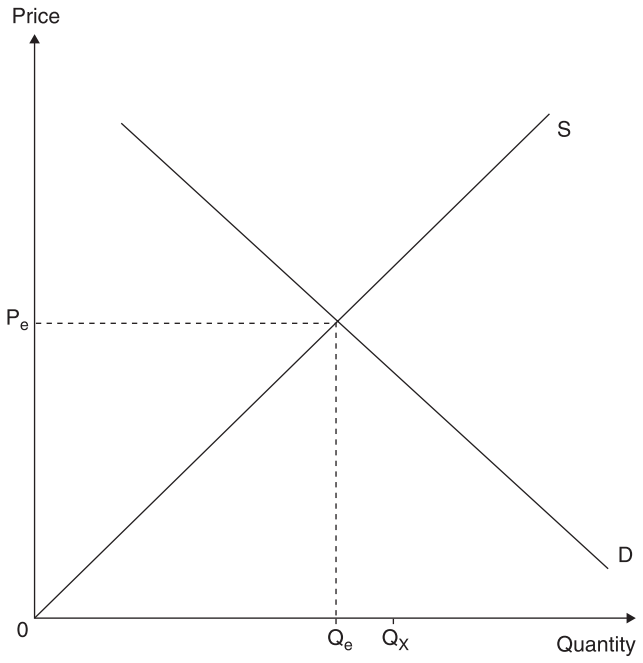

Figure 3.16 *Increasing use of the railways*

Exercise 3.2 Demand and supply exercises

You should now consider each of the following scenarios on the price and quantity traded for the market highlighted. This is a series of straightforward exercises in which you should identify what side of the market, demand or supply, is being affected, which particular determinant has changed and you should explain your reasoning at arriving at your answer.

- A general rise in incomes on the market for bus services
- A rise in the demand for passenger air travel on the market for air cargo
- An increase in fuel duty on the market for road haulage services
- A fall in the costs of production of bus services on the market for rail services
- The publication of a government report on the detrimental effects of environmental change on the market for private motoring
- A weekend ban on lorry movements on the market for rail freight
- The abolition of what had been strict government controls on the entry of new airline operators on the airline market
- The announcement of increased grants available for the installation of rail freight facilities (infrastructure) on the actual market for rail freight services
- A change in the short run aim of a bus operator that has a cost advantage away from profit maximisation to sale maximisation in order to eradicate the competition currently in the market.

Exercise 3.3 Demand and supply curves

The equation for a demand curve for the daily demand of a particular bus service is given by:

$$D = 20 - 15P$$

And the supply curve by the equation:

$$S = 10P$$

Where P is the price and both supply and demand are specified in thousands. Starting at a maximum price of £1.50 and reducing to zero in steps of 10p, sketch out the demand and supply curves for this bus service.

a) What is the equilibrium price and quantity?
b) If a rise in the price of rail fares is estimated to add a daily demand of ten thousand passengers at all prices, specify the equation of the new demand curve and find the new equilibrium price and quantity by adding the new demand curve to your sketch.
c) From the original market demand curve, however, a rise in incomes is predicted to reduce daily demand by five thousand passengers at all prices. Again, specify the equation of the new demand curve and find the new equilibrium price and quantity.