Applied Transport Economics

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Applied Transport Economics

Policy, Management & Decision Making

THIRD EDITION

STUART COLE

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About the Author

Professor Stuart Cole has been Professor of Transport and Director of the Wales Transport Research Centre at the University of Glamorgan since March 2001. He was invited to be the first Director following three years as Visiting Professor of Transport.

He has been a Specialist Adviser on Transport at the House of Commons for 20 years, having advised at his first inquiry in 1984. Advising the Select Committee on Welsh Affairs has involved him in 12 inquiries since then. He was the adviser for 'Transport in Wales', published in December 2002, and is currently advising the Committee on its 'Railway Services in Wales' inquiry (2003–04).

Professor Cole is Cadeirydd (Chairman) of the Chartered Institute of Logistics and Transport Cymru/Wales (2002–04) and a member of the Institute's UK national council. His involvement with the Institute began as a member of the Chester and North Wales branch; he was a committee member of the Metropolitan (London) Section, and Chairman (1990–92), as well as a member of the UK Council. He is a past Chairman of the Institute of Highways and Transportation South Wales branch (2002–03); Chairman, PTI Cymru Steering Group, Welsh Assembly Government (2002–04); Chairman, Wales Transport Strategy Group (1999–) and a member of the Assembly Government's Welsh Transport Forum, chaired by the Minister of Economic Development and Transport (2001–).

He was recently asked to join the First Great Western Stakeholders Advisory Group representing travellers, business and academia. Its role is to provide a forum to discuss FGW plans and operations in South Wales and the West of England.

His recent research has included the 'Information needs of the independent traveller' report (published in May 2003 by the Welsh Assembly Government); he is the joint author of *Capitals United*, a report on rail services between the south of Wales and London (2003), published by the Institute of Welsh Affairs; creator of the 4 I's concept of information, interchange and investment as a basis for integration (a report for the British Tourist Authority); and has worked on the changes in the governance of transport post devolution and new approaches to public transport in rural areas. He prepared the Transport Appendix for the Cardiff 2008 European City of Culture bid. Professor Cole has also advised the Bwrdd Croeso

(Wales Tourist Board), and provided input into the National Assembly's inquiry into its 'Policy review of public transport'.

He has recently been involved in the use of GPS and demand responsive transport as a means of improving rural accessibility; an international project, funded by the EU and the NAfW, on ports and hinterlands – the economic impact, the modal shift and the infrastructure requirements; and the provision of yellow school buses. All have involved the use of economic appraisal techniques.

Professor Cole is a regular broadcaster on BBC radio and television and on S4C in both Welsh and English.

He was previously Director of Transport Research and Consultancy (TRaC) at the University of North London (now London Metropolitan University) with a personal professorial chair (1979–2001) and Transport Adviser to the English Tourist Board (1998–2000).

Professor Cole is the author of numerous articles and conference papers at a national and international level on transport economics and policy and was editor of the *Transport Economist* journal for eight years. His transport economics and policy research has covered public transport, rail and road economics, including rail and bus privatisation, the Channel Tunnel rail link, the policy structure of public transport operations, integrated transport policy and the transport issues facing the European Union. His research has been carried out in the European Union, Eastern Europe, North America, South America and Southern Africa in addition to Great Britain. He has been the director of several European Commission research projects into transport issues and policy both within the European Union and in central and eastern European states.

His experience in these fields extends over 30 years, from joining Cheshire County Council's Transportation Unit as economic adviser in 1974 following a career as an economist in the City, with an electricity board and with a major hotel and leisure company.

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Many of my previous students on courses at North London and at Glamorgan have achieved senior positions in the industry or in government all over the world and have of course been presumed upon in many ways since then. Few professors see the world otherwise. I am most grateful to them and proud of their achievements; much satisfaction in polytechnic and university teaching derives from this.

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Introduction

The earlier editions proved popular and the best of their characteristics have been retained but the third edition has been largely rewritten to reflect the many changes in the transport market and in the industry since the publication of the second edition. However, it retains its basic purpose. Its approach is to introduce the reader to economic theory through the *application* of those concepts. It is designed for managers, policy makers and those economists who wish to see the use of economic tools in providing practical solutions, and students of transport, economics, business, management, public policy and business strategy.

The previous editions have been welcomed for providing an approach that does not dwell extensively on theoretical aspects; rather it uses them to underpin decision making. All have found the example-led approach to transport economics using the minimum of economic theory and jargon gave them an understanding of the subject matter in a policy or management context.

This is intended to give managers and policy makers an insight into transport economics, into the use of a range of techniques in decision making and into the rationale behind such decisions, for example in fares policies or transport investment.

The approach in this book is to begin with the practical managerial issue, look at examples and then where necessary derive the principles and theoretical concepts in varying degrees of depth, thus making it easier to understand those concepts and their application. The case study approach which proved so popular in the first and second editions has been extended in this third edition.

In Part 1 on transport dynamics, the significant changes brought by low cost airlines are considered, with the consistent problem of meeting peak demand for a product that cannot be stored.

These chapters bring up to date case studies and data that explain economic concepts such as supply and demand, elasticity, cost levels and structures, pricing policy and market segmentation and forecasting within the business context.

Part 2 of the book applies economic concepts to the public sector – the evaluation of expenditure by public sector bodies on transport infrastructure or on revenue support. It considers (in Chapters 9 and 10) the techniques and methods of valuing the elements when carrying out economic

appraisal. The trend towards investment partnerships between the public and private sectors and the economic and financial issues that arise are dealt with in Chapter 11, based on the discussion of the techniques in Chapter 9.

Two contrasting aspects of transport policy – integrated transport and free competition and their impacts in different areas – are discussed in Chapters 12 and 13 together with the use of market forces in public policy (eg cross elasticity and price discrimination).

Part 3 looks at the role of transport in urban development and in economic activity.

The book also has a wide geographical range and uses the author's experience in applying economic techniques in the older European Union member states and in those states that have moved from the planned economy of the Soviet Union to the market led economies of the 'West'. It also uses experiences drawn from Africa, South America, Canada and the United States.

Each chapter is referenced to enable the reader to follow up the topic in more depth.

Part 1: Transport Market Dynamics

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CHAPTER 1

Market Demand

TRANSPORT AS A DERIVED DEMAND

Transport is a service rarely in demand for its own characteristics. Demand for public transport, road freight facilities or airline services is usually derived from some other function. A company producing clothes or food sees transport as a means of moving its products from factory or warehouse to the retail store. As the demand for products increases so the demand for transport facilities will increase.

As retail companies, such as Sainsbury, Carrefour and Marks & Spencer increase their number of stores, they increase the number of vehicles operated on their behalf, by contractors such as BOC Transmark and Hay's or through in-house fleets. A large national public house chain such as JD Wetherspoon delivers beer to its pubs and off-licence outlets; the number of miles operated and the number of journeys per day made by each delivery vehicle will depend on the demand pattern. At Christmas time or at major sporting events or during prolonged hot weather there may be two or three loads per day in place of the usual one. The Post Office hire additional vehicles to cope with the Christmas mail peak. TPG, the UK/Netherlands mail express and logistics company (TPG, 2003), indicates the seasonal experience where business is affected by public holidays and summer/year end plant closures (lower demand for the logistics division) and the distribution of Christmas cards and parcels during December (high demand for the mail division). In all these cases, the demand level for transport (measured in numbers of vehicles or vehicle miles) is related directly to the demand level for the product or service.

One objective of a transport operator (or in-house transport fleet) is to establish a demand pattern for its service. It also has to relate its prices to the perception and consequent demand of its customers, and derive a pricing policy and a development or operating strategy for the transport operation which will optimise the use of the fleet. This applies equally to National Express coaches, the Stagecoach bus group, Avis, Hertz, British train operating companies, SNCF, English, Welsh and Scottish Railways, TDG, Wincanton, Ryanair, BMI, British Airways, KLM, P & O cruise ships, Evergreen or Hapag Lloyd.

There are some markets where transport itself is the product demanded. The Venice Simplon Orient Express (VSOE, 2003) is a luxury train operating between London and Venice. Passengers do not use it simply to make the journey from London to Venice – it is more convenient, quicker and cheaper to travel by air (VSOE £2540; BA £105, business class £600). The Express is sold as a travel experience. The British train (British Pullman or Northern Belle) may also be used for excursions involving, for £170 in 2003, lunch of five courses with wine and a return trip in a luxurious moving restaurant.

A sea cruise is a close parallel to this. Luxury ships which were built to serve regular runs to Australia or to New York have been replaced by aircraft with a very high standard of comfort in business class or first class cabins. The cruise is a floating hotel and leisure centre with meals, entertainment, sunbathing and sports, as well as a form of transport to ports *en route*. Passengers on P & O's (2004) *Oriana* pay from £1500 to £9000 to cruise the Mediterranean, the Atlantic or North and South America, but the cruise and the ship's facilities are their reason for travelling in this manner. Similarly, travelling from London to New York by the *QE2* and (previously) Concorde (£3000) compares favourably in price terms with the return Concorde price (£7400), but the journey takes five days rather than four hours by Concorde. BA's Concorde operations ceased in 2003.

Two-hour Concorde final days' 'supersonic experience' flights around the Bay of Biscay (£800), the Palace of India Maharajas steam-hauled train, the Blue Train (South Africa), the Great South Pacific Express (Australia), the Canadian/the Rocky Mountaineer, the privately owned steam railways in Britain such as the Severn Valley Limited and the Great Little Trains of Wales narrow-gauge railways are other examples where there is no reason for travel other than the enjoyment of the journey itself. Here, transport is the end product.

FACTORS DETERMINING DEMAND

1. Physical characteristics

In the case of commodities, the choice of mode will depend largely on the physical characteristics of the goods. High cost, low volume goods are usually moved by air. Electronic component parts for machinery whose down time, particularly in 'just-in-time' contexts, has a high loss-of-output cost. Clothing (especially fashion goods), and food with short shelf life (eg fruits) will often be air freighted. Gold or diamonds will be air freighted in chartered aircraft which can provide the security level required, while urgent medical supplies are also likely to be moved by private jet or military aircraft. All these goods require urgent and guaranteed delivery internationally or internally. Companies (eg TPG, TNT, UPS) provide services

involving the collection, storage, sorting, transport and distribution within 'specific timeframes' enhanced by data/document management systems (TPG, 2003). Low value goods (eg coal, cotton, steel) will be moved by rail and heavy tonnage ships. US railroads (eg Burlington Northern) have a large part of their business in moving such goods.

2. Price

The lower the price, the more people are likely to demand the transport service offered. That is generally true of transport as it is of most other products, with the exception of some exclusive goods and services. In a large urban area like London, the size of the passenger transport market will be determined by price. More trips will be made when fares and petrol prices are low than when prices are high.

The level of transport costs will also be an element in determining factory location. If transport costs are low compared with other costs, a company will be able to take advantage of lower land costs away from its large urban markets; thus more tonne miles are operated. The decision by Courage plc to close two central London and two other breweries and locate a 'megabrewery' near Reading was in part due to the lower land and production costs and easy access via the M4/M25 to its south-east England market, contributing to lower transport costs.

The reduction in air fares following Laker Airways' Skytrain service in the late 1970s led ultimately to lower fares, price competition and continued high levels of traffic on many routes. People who had never considered air travel at 'conventional' fares have been attracted by low cost services provided by such airlines as Virgin, easyJet, Ryanair, bmibaby, Go, Buzz and excel.

3. Relative prices charged by different modes or different operators

This transfer of business between modes or companies in passenger transport is determined to a large extent by the relative levels of fares on rail, coach, bus and air services, and the perceived costs of car travel (ie petrol prices and parking charges).

In the North American air travel market low fare operators (eg South West Airlines, arguably the first 'low cost' airline), and new companies (eg Jet Blue, Spirit America West) have attracted entirely new passengers or those who previously flew at higher prices (Field, 2003). For those passengers the inhibitors (such as Saturday night away) have also been removed giving more flexibility of travel. In Europe, easyJet and Ryanair still dominate the market. This has led to significant rises in demand (2002) for low cost airline services (a rise of 10 per cent in 2002 and representing 23 per cent of domestic capacity) and falls in passenger traffic

(RPK) of the 'continental' United States airlines: American – 15.3 per cent; United – 13.8 per cent; US Airways – 15.8 per cent; Continental – 6.3 per cent. Buzz and Go have been taken over and bmibaby has emerged as a fast growing airline. The overall European market has responded to low cost operators through own price elasticity (new passengers) or cross-price elasticity (passengers attracted from competitor airlines) leading to increased sales. Transatlantic fares have also fallen but other factors (eg international conflicts) have driven the operators' desire to attract passengers. Virgin Atlantic, British Airways, United Airlines, American Airlines and Asian airlines (eg Air India) have all introduced special deals and lower fares, which have attracted new travellers, but more are from Europe to the USA than the reverse.

Table 1.1 *Traffic growth: low cost airlines 2001–02*

Operator	**RPK/M Change (+) %**
USA:	
Jet Blue	226
West Jet	54
Atlantic Coast	49
Sky West	41
Spirit	20
European:	
Ryanair	45
Go	33
easyJet	25

Source: Airline Business, September 2002
PRK/M: revenue per passenger kilometre/mile

In freight transport the effects of different prices are confidential to the haulier and client. However, it is clear that given the same quality of service between, say, three national hauliers, the company with the lowest price is likely to get the contract.

4. Passenger income

Overall income available for travel and other consumer/business expenditure is linked to growth in gross domestic product (GDP), representing an income elasticity effect (see Chapter 2).

As income increases so the amount of travelling for both business and leisure (either of trips or number of miles) will increase. This reflects a higher income household or individual having more disposable income and increasingly likely to travel further on a summer holiday, make more

and longer evening and weekend leisure trips, and take an additional winter holiday. This traveller is also likely to travel as part of a job particularly with multinational, City financial and legal organisations.

5. Speed of service

This is often analysed in qualitative terms for passenger traffic. Business people travel to New York in seven hours by Boeing 747 rather than four days because the firm or the person considers his/her time to be valuable. The development of new high speed trains in Europe (eg the Paris–Lyon Train à Grande Vitesse (TGV) service since 1984 and the London–Paris Eurostar since 1996) has led in both cases to a significant loss of airline patronage to the rail service (a reduction of 40% in passenger loadings in 1998 between Paris and London from a forecast 450,000 passengers in 1998 to 250,000 per annum.

The journey time from Paris to Lyon by train is 2 hours compared with 3 hours by air (centre to centre), while the Eurostar (ES 2003) has achieved 3 hours from London to Paris (2¼ hours with the high speed Channel Tunnel Rail Link). The air journey (centre to centre) with 2-hour check-in times is 4 hours. The train service has fewer hassle factors for business travellers (see Chapter 4) which contributes to SNCF's objective of 'offering customers rail safety, speed, comfort and steadiness' (SNCF 2002).

In operational cost terms, if a freight or passenger road vehicle can travel from London to Birmingham in three hours one way by motorway instead of six hours on a single carriageway road, then the number of journeys per 24 hours that the vehicle can make is four instead of two. Its productivity is increased and its capital cost per tonne mile reduced, with consequent reductions in operating costs and the tariff charged to customers. The lower price will encourage greater use by customers and the increased productivity will improve vehicle availability to meet the increased demand without the need to purchase additional vehicles.

6. Quality of service

(a) Frequency

The departure times or arrival times must be those which the customer requires. To be successful, commuter coaches must arrive at the central business district by 09.00 and depart after 17.30. To encourage long term growth there must also be departures during the day for those leaving work early, and in the evening for those staying on late, working or for entertainment reasons. A high frequency, rapid transit system (eg the Piccadilly line on London's underground); frequent, regular clock face, departures such as the 15 minute service on Stagecoach Oxford's Tube, which has maintained its passenger loadings since 1997, or the Nederlandse

Spoorwegen (NS) frequent direct services to most Dutch stations (including Amsterdam Centraal every 10–15 minutes) from Schipol Airport are examples.

(b) Standard of service

The quality of service provided has been a key marketing strategy of, for example, railways in northern Europe. French Railways have a reputation for time keeping enhanced by reliability and speed of the Train à Grande Vitesse (TGV) services. The strategic objective of train operating companies is focused on the principal competition in the market place – the motor car and the airline.

The competition between car and train is clearly illustrated on the western transport corridor from London. First Great Western (operating an intercity franchise) has identified their principal competitor as the private car, and it is from that market sector that growth will come.

The Great Western Trains franchise plan to have more trains above the Passenger Service Requirement, to increase the commitment to certain locations, to refurbish HST's as new, to provide a secure environment (in particular car parks at parkway stations), to provide integrated transport links with buses, cars, motorail and bicycles and to look at new trains 'and above all customer service excellence' was set out in 1997 and most have been achieved or are well advanced (Carroll, 1997).

Train company mission statements indicate a desire to make themselves 'first choice' through 'accurate, easily obtainable, up to date information; ease of purchase of the correct ticket; fast frequent direct on-time trains; platform information; clean, comfortable, enjoyable stations and trains and safety and security' – desires not dissimilar to those of airlines. The extent to which these changes are sufficient to stimulate demand varies according to investment levels. This level of quality will attract the traveller (including the high yield business traveller) from car or air transport.

Some of the world's major airlines believe an important way to enhance market share is to provide integrated service timings and ticketing resulting in the establishment of alliances. KLM and Northwest Airlines established a worldwide alliance in 1986 to link their strengths: KLM in Europe and to/from Europe and transatlantic; Northwest in transatlantic, internal US and Pacific (including the Japanese market). In similar markets the Star alliance, One World and Sky Team have the objective of increasing market share, and American Airlines are putting their case (1998). The impact can be significant in terms of the extension of the network. To be a global operator an airline now needs to have either by itself or more likely in an alliance a significant presence (ie 15% of market share) in four out of seven major markets in the world – Europe, TransAtlantic; United States Internal, Europe to South East Asia, internal South East Asia and TransPacific (Maynard 1992).

Table 1.2 *Airline alliances*

Airline/alliance	Passengers	Areas of significant operation						
		E	NA	TA	A	P	SEA	SM
One World:								
Air Lingus	6.3	*		*				
American	80.7		*	*				
British	40.0	*		*	*			
Finland	7.5							
Iberia	24.9	*		*				*
Lan Chile	5.2							*
Qantas	22.1					*	*	
Total	187.0							
World share	11.5%							
Star Alliance:								
Air Canada	18.8		*	*		*		
Air New Zealand	20.2					*	*	
ANA	38.4					*		
Austrian	4.9	*						
bmi	6.7	*						
Lufthansa	39.7	*		*			*	
Mexicana	8.5							*
SAS	23.1	*		*			*	
Singapore	14.7					*	*	
Thai	18.3					*	*	
United	75.4		*	*		*		
Varig	10.5							
Total	279.0							
World share	17.2%							
Sky Team:								
Aero Mexico	9.2							*
Air France	43.3	*		*				
Alitalia	25.0	*		*				
CSA (Czech)	2.9	*						
Delta	104.5		*	*		*		
Korean	22.1					*	*	
Total	207.0							
World share	12.8%							
Wings:								
KLM	16.0	*		*	*			
Northwest	54.1		*	*			*	
Total	70.0							
World share	4.3%							

Key: E Europe; NA North America; TA Transatlantic; A between Europe/North America and South East Asia; P Transpacific; SEA Southeast Asia internal; SM between Europe and South America.

Source: Airline Business, July 2002 (AB, 2002): ICAO traffic results 2000/01.
The objective of most alliances has been to maximise their position in six primary market areas (Maynard, 1992). The alliances above have achieved that in four or five. Thus, if countries served is a standard of service criterion, One World is ahead of Star (the largest in passenger numbers) in its provision of a global network (AB, July 2002). Wings, although the smallest alliance, provides the widest range of well used routes through a simple two-airline partnership.

Comfort

In the new millennium the standards of living of the majority must be reflected by passenger carriers if they are to continue to attract a demand for their services.

Reliability

A frequent reason for loss of patronage by both passenger and freight carriers lies in the failure to deliver goods on time or to get passengers to their destination or to a connecting service at the scheduled time. One factor put forward by SNCF (French Railways) for the high patronage levels on their trains is their good timekeeping.

Safety

This is always a concern of passengers, government authorities and most operators. The adverse publicity attached to coach or rail accidents reduces demand for the particular mode, especially in the short term. United States owned companies in many parts of the world have reduced executive travel, because of their perception of the terrorist threat and Middle Eastern instability.

The customer's dilemma

The quality of service in terms of all these factors – frequency, regularity, convenience, standard of service, comfort, reliability and safety – will act as a stimulus to demand if the quality is good and seen by the customer to give value for money. Demand is dependent on the operation of each of these factors and the operator company has to consider continually (Webster and Bly, 1980) what effect a change in price, income or quality will have on the demand for its services.

Meanwhile, the customer will often make a choice between price and quality in transport as s/he does in purchasing any other consumer good. A business traveller may decide that first class rail travel is worth the very large cost increase over a second class discount priced ticket. Similarly, the business class air passenger has a choice of services with better in-flight catering, while a tourist class passenger has restrictions on travel times. The business traveller needs flexibility and a work-like atmosphere on board for which companies may be prepared to pay a substantially higher cost.

A downturn in premium class passengers on British Airways (2003) is a consequence of several factors – global economic weakness, political instability, terrorism and downtrading to economy class or transfer to lower priced seats on the 'no frills' carriers such as easyJet and Ryanair.

Figure 1.1 *Global Alliance Route Network (KLM, Northwest and others)*
Source: KLM

The very low advance fares and a perception of generally low prices led to ticket promotions during bank/school holiday periods by the 'conventional' airlines – KLM, Lufthansa, BA and others.

However demand is down in general (2003) and even 'low cost' airlines are being affected, with losses being made despite continual growth. Thus even low prices cannot stimulate demand to its pre-2000 level on some major routes.

A similar situation faces Eurostar trains (London–Paris/Brussels). Forecasts of 9.0 million passengers in 2003 are well above actual performance of 6.0 million (down from 6.6 million in 2002). Causes include competition from the low cost airlines between Paris and Luton/Stansted; and the link to economic slowdown (income elasticity) effects.

The market outside London has the characteristics of the customer's dilemma between price and quality. However, price and journey time from northwest England to Paris are both lower by air than by train. One journey time impact that ought to help Eurostar is check-in time for boarding, but this remains at 30 minutes compared with 5 minutes on international trains between those EU member states in the Shengen league.

Time/price comparisons: coach/air/train/car

The customer might also compare time and price in coming to a decision, as shown in Table 1.3, for a journey from London to Paris. Each customer will trade off time against cost and if there is a greater emphasis on cost, more

Table 1.3 *London (central) to Paris (central) 2003*[1]

Mode		Fares Return (£) Full[2]	Discount[3]	Frequency (daily M–F)	Journey times (hours)
Coach (National Express)		59	32	2	10.0
Rail (Eurostar)	1st	520	159	16	3.6
	2nd	318	59		
Air BA (LHR)	Business	530		6	4.0
	Tourist	372	95		
Air easyJet (LLU)		102	25–77	5	5.0

Source: Author's analysis of fare tables (BA, Eurostar, easyJet, National Express) and estimated timings.

Notes:

1. London Charing Cross to Paris Chatelot Les Halles, by specified mode and local travel to/from city centre.
2. Fully flexible for change of date, time, cancellation.
3. Lowest off-peak discount fares with restrictions booked up to one month before travel, but excluding cardholder discounts and special offers. Fares available May 2003. Note early booking fares of under £1 are offered by some low cost airlines.

people will travel by coach or car if available; while those travellers to whom time is important will choose the train or plane. The number of people likely to switch modes can be measured through demand elasticity (see Chapter 2).

The customer therefore compares one operator's fares with those of competing operators. In addition, there is competition from the private car where the difference between actual and perceived cost is important. The actual cost of running an average family saloon is estimated by the AA to be 33.4 pence per mile for a 1600 cc family saloon (2003). This includes depreciation, capital (and interest) repayments, servicing, tyres, oil, repairs, petrol (at £0.80 per litre) and parking. The perceived cost may be as low as 7 pence per mile and includes only petrol and possibly parking – those costs which the user relates directly to one specific journey. If two or more people travel together the perceived cost is even less.

Time valuation

The operator is able to reduce journey time with vehicles travelling at higher average speeds and reduced stops. Many long-distance motorway/autoroute-based coach services (eg National Express) provide on-board toilets and a snack service, thus eliminating the need for one or more 'natural breaks'. Direct services reduce the number of scheduled pick-up points *en route*. The passenger may, however, take convenience into account in deciding between plane, train, coach and car. The valuation of time is considered in detail as an element in road construction investment appraisal, but both leisure time and work time have a value either in opportunity cost terms or in marginal product terms. The consideration is the alternative use of the time involved and whether its value is great enough to justify the extra travel cost.

However, the entry of low cost airlines into the market has provided a competitor in terms of both price and journey time to all other modes. The central origin and destination points were selected as an 'average' travel point. For people living near appropriate airports the fare by air might be as low as £20 plus £20 tax with no other large travel cost. Coach fares are no longer necessarily the cheapest but have considerably longer journey time, although the advance booking requirements by low cost airlines to achieve the lowest fare can make coach prices competitive on a 'turn up and go' basis.

Even within the fare range of one operator (Eurostar) there are significant fares differences (see Table 4.2). This is also typical of airline pricing policies that make even more flexible fare ranges possible, through internet booking.

CASE STUDY 1: URBAN BUS OPERATIONS

Factors determining demand – urban municipal operator

1. Restructuring routes to provide higher frequency services along primary routes radiating from a city centre. This may result in some loss

of patronage from adjacent routes but traffic generation has outweighed this. A sense frequency of under 10 minutes results in passengers not requiring a timetable as the average waiting time is under 5 minutes.
2. Simplifying fees structures using zonal fares with no variation. Fare levels and therefore price elasticity appear to have little effect (LT 1993, 1997). This may reflect the low proportion of traveller's income represented by the fare in absolute terms.
3. Marketing – often reflecting a simple network and high frequency. This suggests a high service elasticity impact.
4. New vehicles with low floors guaranteed on these routes and advertised as such – service elasticity.
5. Reliability – quality of service/regular clock-face timetable/staff training as elements of service elasticity.
6. Concessionary fares (eg free travel for over 60s, students, disabled) may increase demand on a one-off basis following their introduction. This suggests an own price elasticity or cross-price elasticity effect from the motor car. However, this revenue increase has also provided a business case for higher frequency and newer vehicles. This is a combination of price and service elasticity.

Table 1.4 *Demand growth – urban operators: percentage change over previous years*

Year	Passenger growth %	
	Concessionary fares	Other (eg services factors)
2002/03	2.0	4.7
2003/04	0.0	5.0

Source: National Assembly for Wales

The national concessionary fares scheme had increased bus journeys across Wales by 5% from 104 million to 109 million per annum.

Table 1.5 *Peak vehicle requirement – Cardiff*

Vehicles	Morning	Evening
200	08.00–09.00	15.00–18.00
170	09.00–15.00	18.00+

Source: Cardiff Bus

The experience shown in the Bradford Study (Figure 1.5, Table 1.8) might illustrate: a different market between the two cities; and a shift in demand patterns with more off-peak travel for shopping, business and leisure, and the concessionary fares effect. Some companies currently make use of high capacity vehicles for a school journey followed by a peak-scheduled journey, affecting the peak vehicle requirement (PVR) by 25–30 buses. In this analysis, without efficient interworking of such vehicles the Cardiff figure could be a 230 PVR, putting it nearer to the Bradford position.

DEMAND PATTERNS NOT INFLUENCED BY OPERATORS

1. Peak demand

The peak in transport operating terms is the period of maximum demand and affects freight operators and passenger carriers alike. However, more data are freely available on passenger movement, so the examples here are largely taken from that sector of the industry.

(a) Time of day
The morning journey-to-work peak is related to the starting times of factories (07.30–08.30), schools (09.00), and offices or shops (08.30–09.30). The problem is slightly alleviated in towns with industrial and commercial activity, as one vehicle can make two peak journeys with high load factors. Large commercial centres (eg London, New York) will often have trains, underground trains or buses which only operate on peak load service.

(b) Day of the week
There is a summer weekend leisure peak on roads and on public passenger transport services. The pricing of most European main line discount tickets reflects their peak: for example, a Friday 'saver' ticket from London to Bath costs £40 compared with £33 on other days, but is not available on departures between 16.00 and 18.00, when the full second class fare of £80 applies (May 2003). There is also a peak period on the M4 out of London on Fridays between 15.00 and 19.00. Paris suffers the same problem with Friday outbound traffic, particularly to the south and west, setting off for *le weekend* from 14.30 onwards. The returning traffic creates problems on Sunday evening. Bank holidays present an added one day peak flow, particularly on roads, and are worsened by good weather. In towns serving rural areas (eg Marlborough, Groningen) traffic congestion often occurs on market days when they accommodate the market and its associated freight traffic.

(c) Seasonal peak
The seasonal peak results from a concentration of summer holiday traffic, with accentuates the weekend traffic flows on roads and from airports with a high percentage of package holiday traffic. Airlines serving the package tour market have average daily utilisation rates (CAA, 2002) for an Airbus 320 of 10.8 hours (Air 2000) but increasing to 12.6 hours for a Boeing 747–400 on transatlantic routes. This compares with a scheduled operations figure of 6.3 hours (BA) in the summer months to cover the demand on routes to Spain, Italy and Greece. Aircraft departures from Alicante to Luton and Manchester leaving from 04.00 hours are indicators of the summer demand pattern

and aircraft utilisation rates. Their winter flight programme is considerably less frequent.

Coach operators have a similar weekend peak. For example, the coach departures from Victoria Coach Station, one of Britain's major hubs, have substantial increases in passenger throughput on Friday and Saturday and the major coach operator National Express's pricing policy reflects this. For example, fares from London to Manchester (May 2003) are £30 on Friday and Saturday but £25 on other days. This peak cannot be influenced by the coach operators and is serviced mainly through hired coaches.

This seasonal peak in northern Europe is at its highest point from late July through to the end of August, and corresponds with school holidays. Peaks in winter skiing holidays occur in January but are often moves to fill in the transport operators' period of previously low demand. Peak demand for passenger transport also builds up around the Christmas holidays. Operators may try to influence these demand patterns, through the use of off peak discounts (see below).

2. Changes in social habits

Leisure time has increased as a result of shorter working hours, increased unemployment and early retirement and in consequence, more leisure journeys are being made. The changed pattern of leisure journeys is outside the control of passenger transport operators.

The traditional British holiday destinations have been exchanged by many travellers for Mediterranean holidays, which has led to an increase in the demand for aircraft and airport accommodation. The increase in car ownership has changed social habits. It is now possible for people to make short visits and to travel to places not served by public transport. The development of out-of-town shopping centres and sports complexes has led to a demand for roads and car parks and a reduction in the demand for public transport for evening leisure travel. The 1950s pattern of social visits at weekends and evening trips to theatre, cinema and bingo has been largely replaced by a wider variety of car-based journeys. Demand for cinema seats has been superseded by television thus reducing demand for evening bus and train services, although in London there are still high load factors on central area route sections until late evening. The reluctance of car drivers to drink and drive has been exploited by operators such as Yellow Buses, Bournemouth (YB, 1984) and Gemeentevervoerbedrijf (GVB) Amsterdam and Transport for London (TfL) night bus network in campaigns such as 'sensible drinking can make you go yellow' – a map showing pubs and winebars together with bus routes passing their doors.

3. Changes in competitors' services or prices

The improvement in alternative services, particularly at a reduced price, may lead to changes in demand for a particular operator's services. Reduced prices by Laker Airways in the late 1970s led to some British Airways passengers transferring in the short term to Laker services. However, more recent changes in demand for European air travel have been influenced by the low cost airlines such as easyJet, Ryanair, Germanwings, bmibaby and excel. The 'conventional' airlines such as BA, KLM and British Midland established Go (sold via a management buyout to easyJet (Cassani and Kemp, 2003), Buzz (now part of easyJet) and bmibaby respectively in order to match the competitors' low fares. However, competition rules will encourage new entrants and the expansion of existing low cost operators at new hubs (eg Ryanair to Milan-Berganio; bmibaby to Cardiff). Changes in service quality such as punctuality, improved seating and at-seat films are now becoming part of the low cost airlines' branding strategy. Although price is the paramount selection criterion by passengers and has proved a successful strategy, greater competition is leading some brands towards a middle market image where airlines 'need to give more' (Bierwirth, 2003). In addition, the older established airlines are introducing low fares on their own routes with less limiting inhibitors such as an overnight Saturday stop (eg minimum of two nights away) (Pilling, 2003).

4. Changes in population distribution

Over the last 40 years, there has been a trend towards the construction of out-of-town housing and shopping developments, reflecting an expanding population and a need to replace older housing stock.

The construction of new housing estates on the edge of a town provides a bus or rail operator intending to serve such an area with two choices. It can operate services at a loss when a few houses are built in the hope that patronage will build up as the housing estate grows. Alternatively, the operator can wait for the estate to be complete, but by that time house owners will have purchased cars or arranged car sharing and the market is lost or difficult to retrieve. The desire for new housing in less crowded conditions is growing and increased car ownership in such estates cannot be influenced by the operator. Government intervention in the market place has then to be evaluated using forecasting techniques and socioeconomic cost benefit techniques described later (see Chapter 8, 9 and 10).

The changes in population may also be regional: from rural into urban areas and from the north and west of Britain into the more prosperous south. The decline in population means reduced demand for services in those areas and thus reduced supply unless government subsidy is forthcoming.

Operator attempts to influence demand

In most cases the causes of the changes in demand cannot in themselves be affected by the operator, but the transport company can try to influence the effect on its own operations or finances. There are two ways in which this can be done:

1. Price changes to encourage new travellers or to attract travellers away from other operators. The objectives of all operators are to maximise revenue and to compete more effectively in the whole travel market. In many transport areas the peak problem and its associated costs can also be influenced by pricing policy (see Chapter 3).
2. Improvements in the quality of service in terms of:
   - frequency – to gain more passengers by increasing convenience;
   - reliability – to help passengers and encourage regular traffic;
   - comfort – to match the quality of vehicle seating and cleanliness with the home environment;
   - feeder lines to extend the service area;
   - speed increases, for instance through electrification of railway lines or high speed train services;
   - regular interval clock face departure times to provide an easily remembered timetable. This has been exploited by, for example, the Stagecoach Oxford Tube coach service, and First Great Western: Bristol to London ex Paddington – on the hour/half hour
     ex Bristol – on the hour/ half hour.

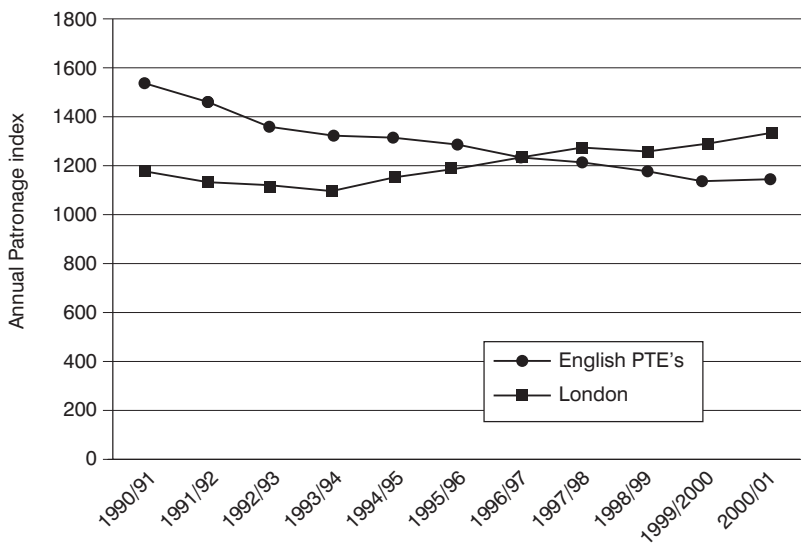


Figure 1.2 *Bus patronage 1990–2000*
Source: House of Commons HC 828, The Bus Industry 2001–2002, London

On some local London services the service interval varies and can lose passengers to more frequent and regular Underground competing services.

PEAK DEMAND

Why the peak problem is particularly bad in transport

There are various reasons why the problem in transport is particularly bad.

1. The transport product cannot be stored; it must be supplied when required and consumed immediately. Therefore, if a bus, train or plane has spare capacity when it leaves, this cannot be used later for the *same* journey. A similar problem occurs in freight transport.
2. Peak demand occurs on the London underground and mainline train commuter services into and out of major cities (from St Petersburg, Madrid and Johannesburg to Lima) from Monday to Friday. It is often the case that only ten loaded train journeys per week in total (five into the central business district and five out) are made by a commuter train set. To achieve a frequency which copes with demand, a far greater number of peak trains or buses is required compared with other times. In consequence there is over-supply in off peak. Operating companies servicing large cities have up to 60 per cent of their rolling stock in sidings or garages over a weekend and during the day or evening. The London underground or Paris Metro could have a similar problem, but the central area demand justifies a higher off peak frequency on most lines on cost/revenue criteria. Costs of depreciation, tunnel and track maintenance and some staff are not eliminated, and if variable costs are exceeded by revenue the service is justified. This same cost/revenue relationship does not often exist on mainline commuter railways except where terminals are in the very centre and where high frequency operations exist within the central area.
3. Transport has a derived demand, whose patterns are determined by the pattern of activities with which the demand is associated. For example, the journey-to-work peak results from working hours being mostly from 07.30–16.30 or 09.00–17.00, resulting in a peak at the start and end of the working day (Monday-Friday). In the case of holiday traffic, the peak demand for aircraft and terminal space for travellers to, for example, Greece and the peak demand for coach seats, additional trains and road space to southern France or Cornwall from major urban centres lasts from June to September with an excessive peak on August weekends.

   Freight transport operators face a peak demand for beer deliveries (summer and Christmas) and ice cream (summer) which results in fleets with reduced utilisation rates in the off peak. The Post Office avoids this

by hiring vehicles to meet the Christmas peak from mid-December. There are daily peaks for retail outlets such as Marks & Spencer and Tesco, which require deliveries to stores by 07.00 hours; milk deliveries have an early morning peak, as do newspapers. The specialist parcel carries, eg TNT/TPG, also face an overnight demand peak at operating hubs with a 2200–0600 operating peak for equipment and trucks.

4. There is a cost implication – if, for example, a vehicle or train is used all day, costs are spread over 18 hours. With a peak-period-only operation, the costs must be covered in that period, for example four hours or two fare-earning journeys. The same principle applies to seasonal peaks. Peak services can therefore be loss making if the price charged is not enough to cover the additional costs. On a marginal basis, off peak operations may be more profitable, although demand in terms of passenger miles per vehicle per train/bus is less.
5. The sequential nature of vehicle running (an example of indivisibility of supply) leads in the morning to full 'into-town' vehicles which are nearly empty on return journeys towards the suburbs. The difference is often only one of scale from outbound buses (whether Chester or Dresden), trams (in Vienna or Amsterdam) to northbound trains from King's Cross Station, London, following high load factor inbound journeys. The reverse is true in the evening. Buses or trains may make only one peak trip in the morning with a high load factor, but some may make two, thus spreading the peak capacity and reducing the total capacity requirements. The indivisibility of supply resulting from track capacity, vehicle size and train size makes the problem more difficult.

Examples of the peak problem in practice

Commuter service operation in London

A typical electric commuter train operated by the West Anglia Great Northern (London) or SNCF/RATP (Paris) would make only one high yield peak journey during the morning and might spend the rest of the day operating low load factor services, or be out of service until the evening peak when it would make a high load factor outbound journey. On its return morning journey out of the central area terminus it might run empty to the depot.

Travel patterns on London Underground show peak (LT, 2002) demand to be three times that at midday when an average of 70 per cent of peak trains operate.

Underground travel increases sharply during weekday peak times, falling to much lower levels during the off-peak. Bus trips and troughs are less pronounced. Weekend travel patterns show a more even distribution of trips during the principal shopping hours.

Table 1.6 *People entering central London during the morning peak, 07.00–10.00 (2001)*

	Number (thousands)	%
All modes	1094	100
National Rail total	467	42.6
Transfers to LUL/DUL	204	18.6
LUL and DLR only[1]	379	34.6
Bus	81	7.4
Coach/minibus[2]	10	0.9
Private car	122	11.2
Taxi[3]	7	0.6
Motor cycle	16	1.5
Pedal cycle	12	1.2
Units:		
Average vehicle occupancy – bus	37.5	
Average vehicle occupancy – car	1.35	

Source: Transport for London, London Travel Report 2002

Notes:
1. In addition to journeys terminating in central London, all journeys passing through central London are included, except those entirely on London Underground.
2. Includes commuter and tourist coaches.
3. Unrecorded prior to 1996.

Table 1.7 *Main mode of travel to work[1] to main job by area: autumn 2001*

	Area of work place				Area of residence			
	Central London %	Rest of inner London %	Outer London %	All London %	Great Britain %	Inner London %	Outer London %	All London %
Car and van	12	38	66	41	70	25	52	42
Motorbike, moped, scooter	2	2	1	2	1	2	1	1
Bicycle	2	3	2	2	3	4	2	2
Bus and coach	9	13	11	11	8	17	10	12
National rail	40	16	4	19	4	12	13	13
Underground	32	17	4	17	3	27	13	18
Walk	4	11	10	8	11	12	8	10
Total[2]	100	100	100	100	100	100	100	100

Source: Labour Force Survey, Office of National Statistics

Notes:
1. Excludes people who work at home; those with no fixed workplace; those on government-related training schemes; and people whose workplace is not available.
2. Includes other models (less than 1% in each area).

81% of people working in central London travel to work using public transport. This compares with 46% for the rest of inner London; 19% for outer London; and 15% for Great Britain. 12% of work journeys to central London are by car, compared with 38% for inner London, 66% for outer London and 70% for Great Britain as a whole. 56% of employees living in inner London used public transport compared with 36% living in outer London.

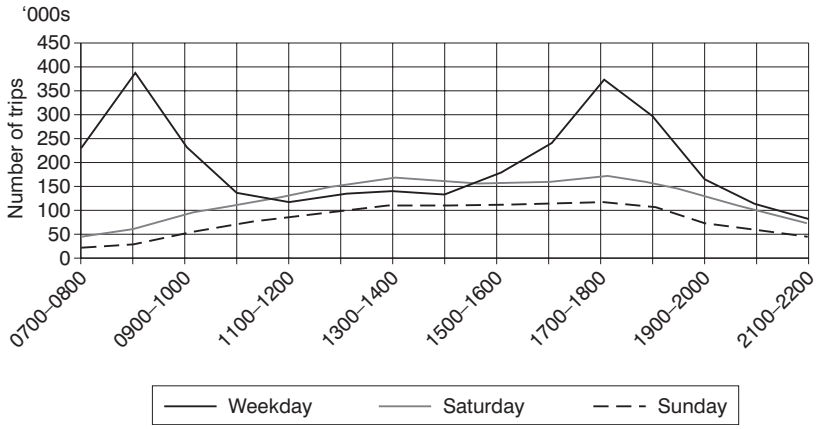


Figure 1.3 *Weekday and weekend Underground trips by hour 2002*
Source: Transport for London, London Travel Report 2003

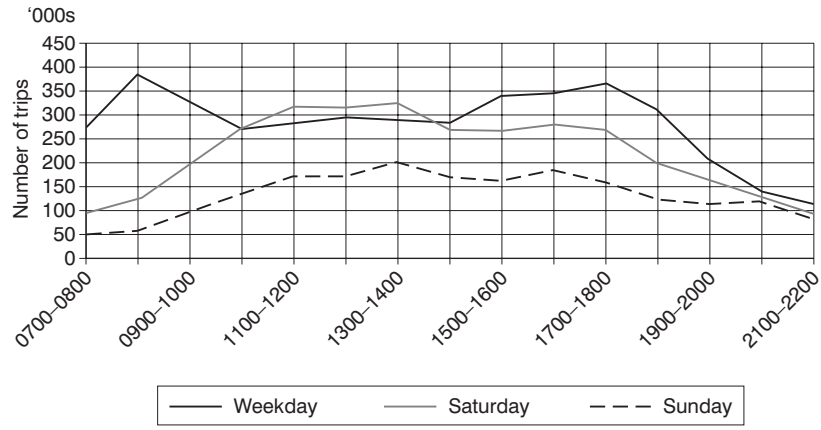


Figure 1.4 *Weekday and weekend bus trips by hour 2002/03*
Source: Transport for London, London Travel Report 2003

Bus operations in a large provincial town (Bradford 1976)

This analysis is based on the use of vehicles and the prospects for cost/revenue ratios of operating under different criteria. Traditionally, bus companies have tried to satisfy peak demand and have run at a loss as a result. If these circumstances changed and a decision was made to operate only the number of vehicles required for the whole of the working day (ie to exclude peak only vehicles), then the financial position would be substantially changed. The Bradford Bus Study still remains one of the

most comprehensive analyses of peak costs and the graph (Figure 1.5) is typical of many provincial town operations. However, some cities provide an even supply of newer vehicles through the day (eg Cardiff Bus) and use older vehicles for afternoon school journeys and evening peak operations (CB, 2005). Different companies will have a different graph in detail and low usage during the inter-peak daytime period can be used for preventive maintenance rather than more expensive night staff. In detail, there is often an earlier build-up in the afternoon with school contract work coming on stream at about 14.30; possibly a lower evening peak and a deeper 'dip' in the middle of the day. Many companies however operate high frequency minibus services with a higher level in the inter-peak period, eg in Edinburgh where the whole fleet is out from 07.00 to 19.00 and 50 per cent fleet operation thereafter. A similar demand pattern exists on the Den Haag tram network (Figure 1.8) where that supply reflects demand. On weekdays there are just over ten trains per hour passing the Ministry of Transport building in Madurodam with an expected peak at 18.00 and, unusually, on Saturday and Sundays there is a mid-afternoon peak caused by a demand for travel to Scheveningen – a popular seaside destination for urban dwellers. The consequences for costs may be derived using the same basis of analysis as shown in the Bradford Bus Study example.

Major British Airports

Major international airports provide a further example of peak operations in the handling of international traffic. The summer peak leads to higher aircraft landing and parking charges as does the morning business peak. However, such is the customer requirement for aircraft arrival times at the

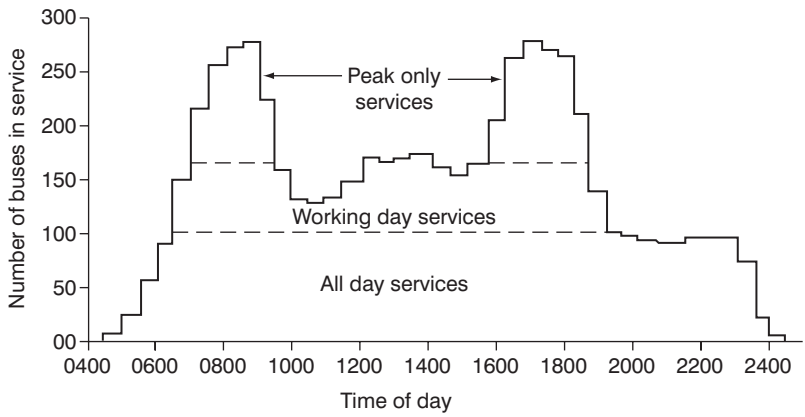


Figure 1.5 *Bus requirements for weekday bus operations in Bradford*
Source: Bradford Bus Study (1976)

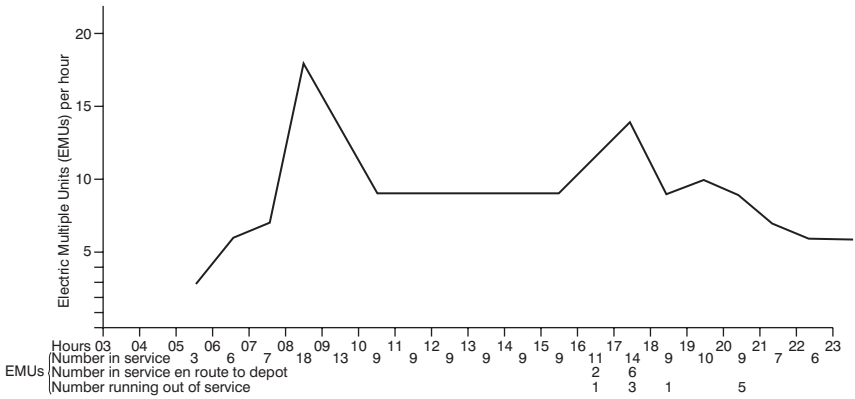


Figure 1.6 *Number of London suburban train units in operation up line to King's Cross/Moorgate (Monday–Friday)*
Source: Network Rail working timetable 2000

start of the business day that high landing charges are not a major factor affecting demand. More important particularly for the large international airlines in recent years (since 2000) have been low cost airlines and terrorist threats.

Smaller aircraft used on for example short haul regional services operating through major international airports may pay more per passenger than users of larger aircraft. However, the financial arrangements between low cost airlines and other airports have introduced a new competitive

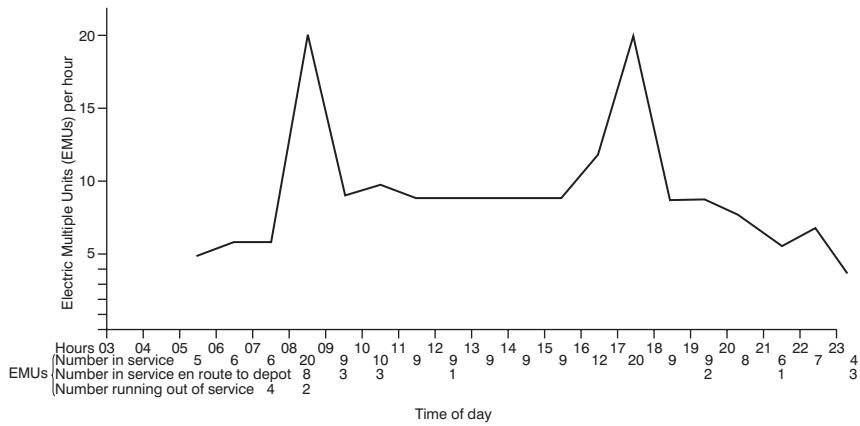


Figure 1.7 *Number of local train units (EMUs) in operation down line from King's Cross/Moorgate (Monday–Friday)*
Source: Network Rail working timetable 2000

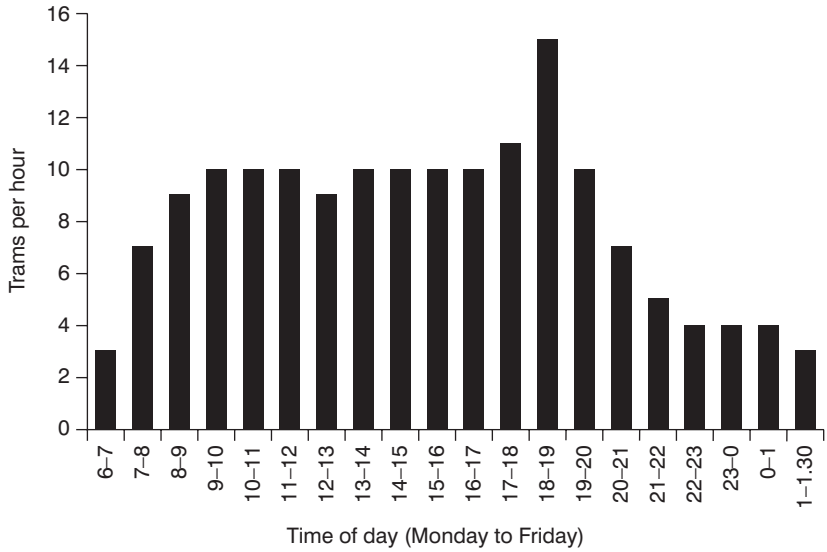


Figure 1.8 *Daily frequency of tram service Line 1/9 Centraal Station – Scheveningen, Den Haag, Netherlands*
Source: HTM timetable, July 2002

position giving new opportunities to operators using lower capacity aircraft. There are also off-peak rates for aircraft at most major international airports. The lower costs of runway maintenance associated with smaller aircraft are not relevant in determining airport charges as such costs form a small proportion of airport total costs.

Airport operators (such as BAA) however were of the view that the economic basis of their pricing policy was the opportunity cost of using the runway which was dependent on the number of aircraft utilising it during a given period. The opportunity cost tended to be higher for a small aircraft

Table 1.8 *The main 'layers' of weekday bus operation in Bradford Resources required to operate weekday service for each layer*

	All day	Working day	Peak	Total
No. of vehicles	99	65	111	
Cumulative	99	164	275	
% of total vehicles	36	24	40	100
Cumulative %	36	60	100	
Total payable hours	2087	892	672	3651
% of hours	57	25	18	100

Source: Bradford Bus Study 1976

Table 1.9 *Financial performance (Daily)*

	Satisfying peak demand (peak service approach)	All day and working day service layers only
Operating costs	26,000	12,970
Revenue	18,500	10,320
Reallocated revenue[1]	–	2,454
Total Revenue	18,500	12,774
Profit (Loss)	(7,500)	(196)
Cost/Revenue Ratio	0.71	0.98

Source: Data extracted from Tables 6.14 and 6.15 of Bradford Bus Study (1976) Reanalysis and revalued at 1997 Costs/Prices

Note:
1. Assumes reallocation of 30% of revenue to spare capacity during or either side of peak. Other 70% changes mode

because if it was following a large aircraft, it needed a larger separation distance on landing compared with two large aircraft in sequence.

Peak and off-peak pricing exists because of the demand characteristics at major airports (eg London Heathrow, Paris CDG, New York JFK) and an attempt by airport operators to even out demand through the day, the peaks continued to exist because of the derived nature of passenger demand to travel between 0700–1000 and 1700–1900.

London Heathrow and Gatwick Airports' monthly demand patterns (Figure 1.10) show the summer peak while the daily tables (Figure 1.11) for Heathrow (a major international airport) and Edinburgh (the

Table 1.10 *Index of airport charges for typical aircraft, 1996/97*

	Boeing 747–400		Boeing 737–400		% of total cost
	Peak	Off-peak	Peak	Off-peak	
Landing fee	334	316	400	284	26
Parking charge	871	290	82	27	14
Total landing and parking charge:	1316	606	482	311	40
Charge per departing passenger	10.95	4.20	10.95	4.20	60
Total passenger changes paid	3219	1235	1217	467	
Total per passenger	7.71	3.13	7.64	3.50	
Seat capacity	393		148		
Passengers carried (average)	294		111		
Parking time (hours)	3		1		
Flight	International		International		

Source: MMC: Based on report on BAA plc (June 1996)
Index based on Boeing 747–400 peak charge = 100.

government and financial capital of Scotland) has typical AM and PM business travel related peaks.

Peak pricing by package tour operators reflects two areas of leisure operations – airlines and hotels – which are hit by the peak demand for their services in the period July to August.

Those travelling to Greece with First Choice (London Gatwick Airport) or Reisen/LTU (Abflughafen, Düsseldorf) on 31 July are in a peak period, involve the operator in additional costs and consequently, should expect to pay a premium price for a holiday (Figure 1.12). Most leisure travel is very competitive with a high elasticity, but the summer family traveller on a holiday to the sun will find all operators offering the same price pattern (TB, 2003; JR, 2003). They have to travel when the schools are closed, and demand is likely to be more inelastic. Both these elements are taken into account by travel operators when pricing their holidays. This form of price discrimination is dealt with in more detail in Chapter 4.

Load factor variations are important in determining the profitability of airline operations. There are variations in mainline scheduled RPK's (see Chapter 7 for definitions) and in the passenger load factor – BA (1998) varied from over 80 per cent in June to 65 per cent in January. Although the airline can reduce costs by cutting services, the fixed costs representing

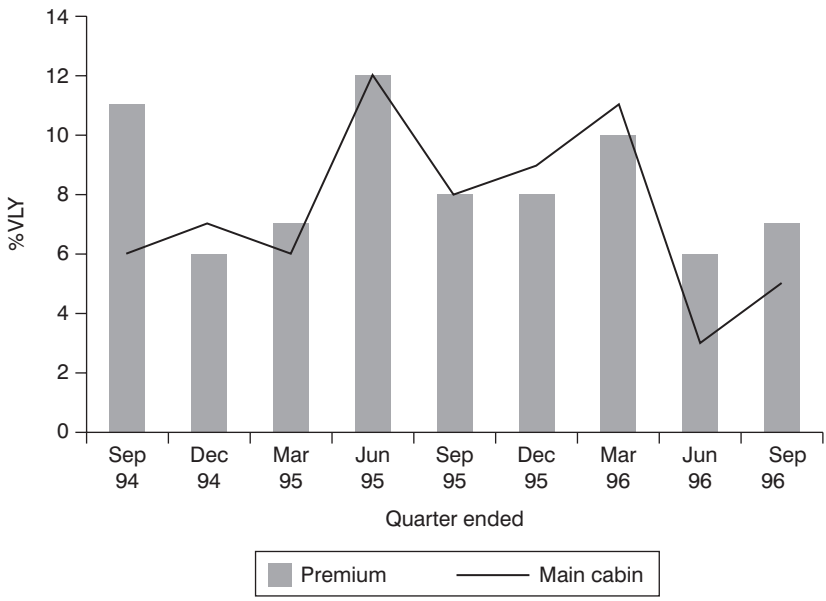


Figure 1.9 *Premium traffic trends – mainline scheduled RPK's: British Airways*
Source: British Airways, 1998

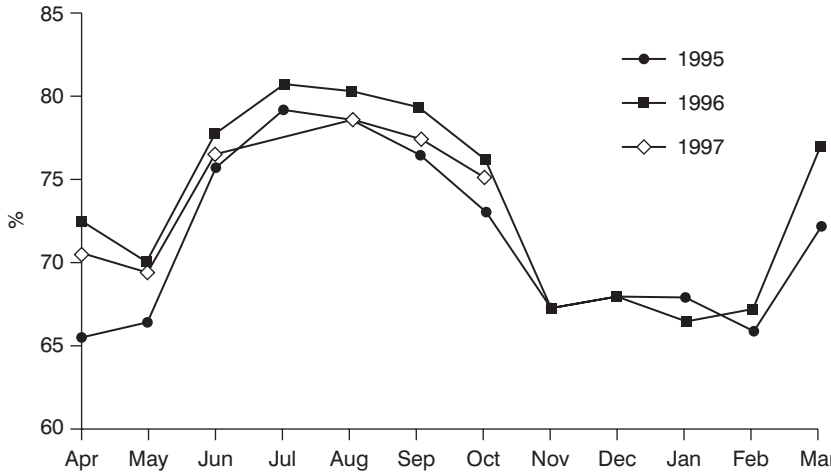


Figure 1.10 *Passenger load factor – mainline scheduled services: British Airways*
Source: British Airways, 1998

nearly two thirds of total costs are still incurred (see Chapter 7). Thus these short term variations in revenue passenger kilometres and in load factors may be overcome using off peak pricing policies such as World Offers (see Chapter 4).

Reducing the peak – possible action by the operator

The foregoing examples illustrate situations where peak demand incurs costs by the operator and where, in some circumstances, that full cost is not being paid by the customer. There are a number of options which an operator can choose to reduce the impact of the peak on its operations.

First, the operator can decide not to provide the facility thus producing a financially, though not necessarily socially, better result. Train operating companies provide fewer extra summer services than twenty years ago partly because demand has fallen, but also because of the cost of maintaining a back-up fleet of rolling stock to cover such demand. The interworking of services can also result in certain departures being overcrowded because the train set capacity is only adequate for the remainder of the working day (or even working year). Some Friday afternoon peak journeys from London and services to tourist destinations in the north of Wales or West of England provide examples of a decision not to provide the capacity. In the latter case, if new, available rolling stock with higher seating capacity can be interworked then the problem may be solved.

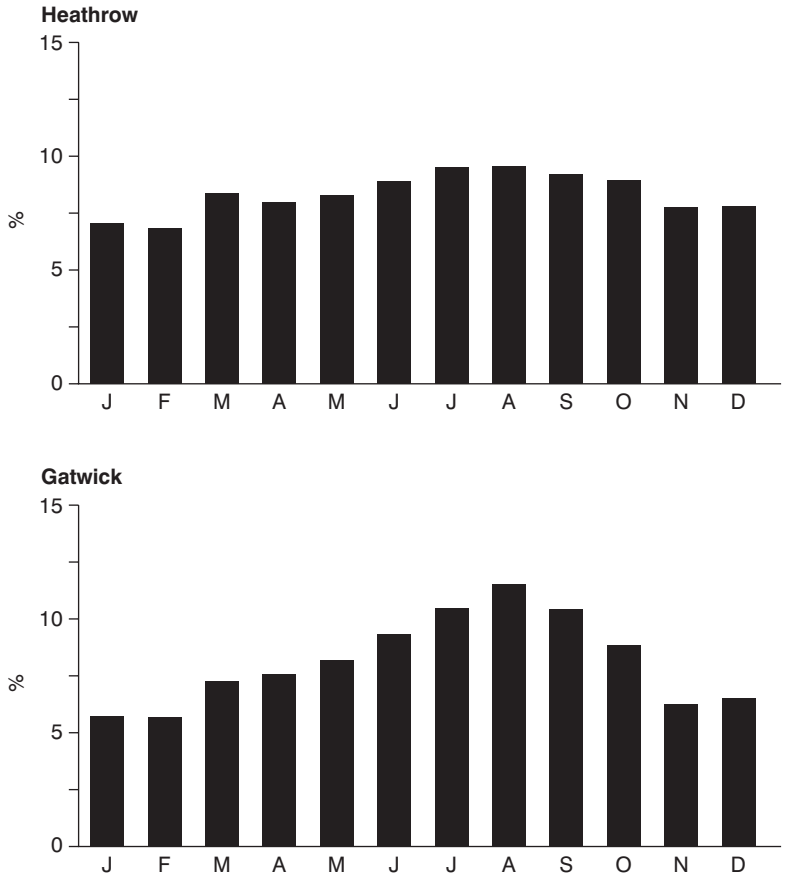


Figure 1.11 *Monthly distribution of passengers: London Heathrow/ Gatwick Airports*
Source: BAA Airports, Traffic statistics, 2001/02

In freight operations, the haulier has a contract to move goods at a given time and the contract price to the customer will reflect any peak operations of this type. Companies supplying haulage services to food and clothing retailers have delivery schedules clearly specified and these additional costs are likely to be catered for. The Post Office, faced with an increasing peak at Christmas time, brought forward its last guaranteed posting date and thus reduced the need for extra vehicles. By not hiring extra freight vehicles costs are cut, but the service level is reduced as a result of spreading the delivery over a longer period and flattening out the peak.

Other techniques have been adopted by operators to flatten out the peak or fill in the trough between peaks:

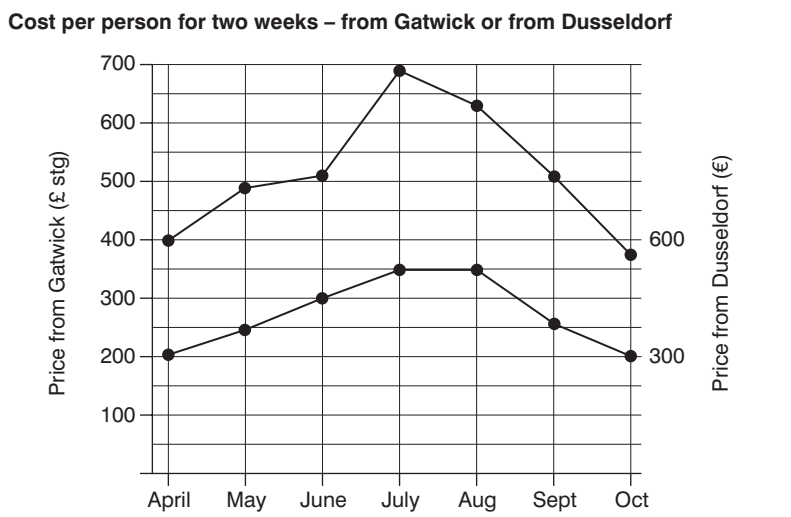
- Pricing through off peak discounts or a peak surcharge. Even if this policy does not flatten the peak, it may increase the overall demand level which may be a better alternative in revenue and profitability terms.
- Flexible hours are not popular with workers generally for family and social reasons. In some cases, however, they have been negotiated with education authorities to move the schools' transport peak, primarily in the afternoon.
- Out-of-service running on contra peak flow vehicles may enable an extra peak journey and thus reduce the number of peak vehicles and crew.
- Out-of-town industry and schools have been suggested as filling seats on out-of-town services and inbound evening services. This is not always a solution since the new demand pattern may not coincide with the radial route pattern.
- Private commuter operators can be used to supplement the existing operators. They are able to use low cost vehicles and staff or use vehicles for a commuter service to the city centre, then for private hire during the day (09.30 to 16.30), and finally on an evening commuter service out of town. In the present deregulated market some peak services will be put out to tender by county councils if demand is to be met.
- Bus lanes reduce bus journey times.
- The use of fully depreciated (usually older) buses, trucks and rolling stock at peak times, thus eliminating part of the financial burden of spare vehicles.

The policy which is most likely to produce increased revenue and (as most off peak costs are marginal or variable) increased profitability, is one aimed at filling in the off peak. This is particularly true if the basic system is retained (for example the London mass transit system).

The current fare structure in London does provide for off peak travel at a lower cost for single tickets and for short period travelcards. It also recognises 'core commuters' as the most important customers and provides a discount on their basic fare from home to work and 'free' additional travel within the zones on the Travelcard. This has achieved two prime objectives:

– increased overall patronage resulting from the convenience of a travelcard.
– the increased use of bus underground and train services during the off peak day, evening and weekend periods.

Package tour operators (Figure 1.12) in northern European states organising holidays to southern Europe have several factors determining their pricing policy:



Location: Skopolos, (Cyclades Island), Greece
Price: Two weeks per person, two people sharing). £1 = €1.60 (2004)
Source: Average GB package holiday companies, Great Britain / Jahn Reisen – LTU Touristik Service, Munchen, Germany

Figure 1.12 *Holiday prices on a Greek island*

- Elasticity of demand is lower during the period 1 July to 31 August, compared with the rest of the year, because of the timing of school holidays and the coincidence of the warmest weather.
- Additional costs of providing extra hotel and airline capacity in that period.
- Competition (since about 1999) from low cost carriers and the availability of booking direct via the internet of both air travel and hotel accommodation. This availability of competitive, alternative and practical air travel has resulted in demand changes from cross-price elasticity. This has therefore affected the pricing levels of package tour companies and their airlines.

Figure 1.12 shows the application of peak pricing in Germany and Great Britain. A similar pattern is found in Italy and in Poland (Tousco, 2003) where package holidays have expanded rapidly following the end of the Soviet Union, the consequent freedom to travel and the rise of a new middle income group intent on taking full advantage of their much improved financial position (Table 1.11).