RAC Foundation

# Public Transport Effects on Road Traffic: Potential and Limitations


**Royal Automobile Club Foundation**

**Motoring Towards 2050 – Roads and Reality**
**Background Paper No.4**

**David Bayliss OBE**
**October 2008**

**In December 2007 the RAC Foundation published its report on 'Roads and Reality' along with a supporting Technical Report. As part of this exercise a series of background papers was produced and these are to be published during the course of 2008. This is the sixth of the series.**

**The Royal Automobile Club Foundation for Motoring Limited is a charity established to promote the environment, economic, mobility and safety issues relating to the use of motor vehicles.**

**RAC Foundation**
**89-91 Pall Mall**
**London**
**SW1Y 5HS**

**Tel no: 020 7747 3445**
**www.racfoundation.org**

**Registered Charity No. 1002705**

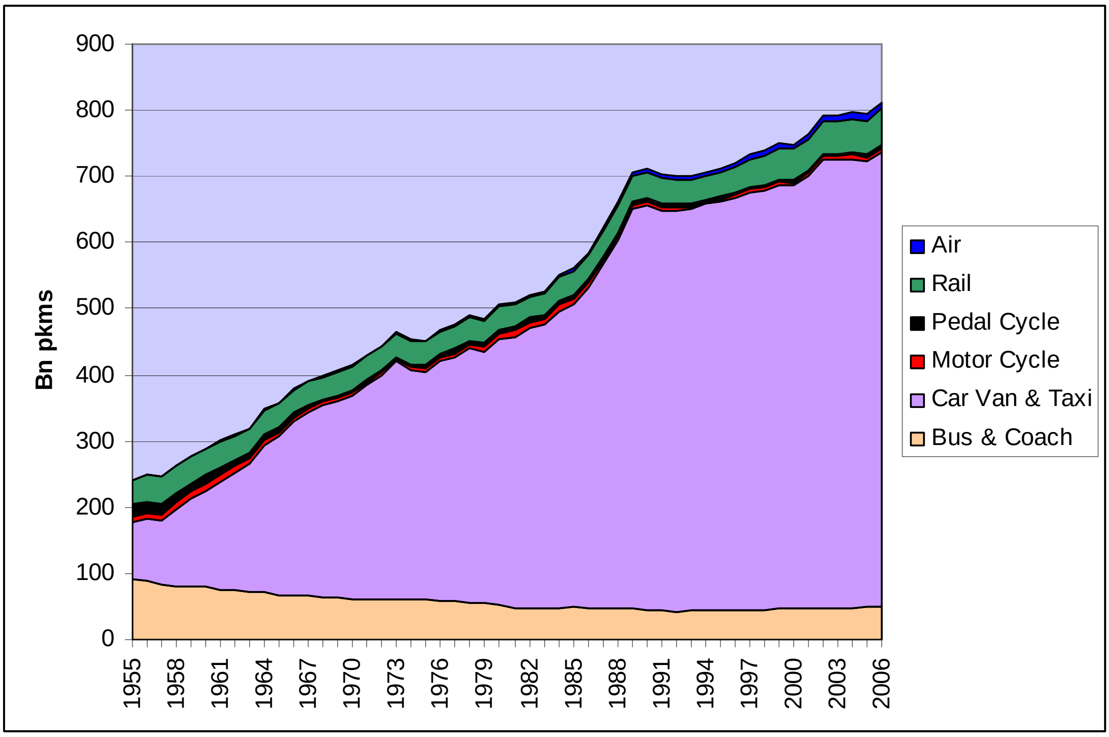

***This report has been prepared for the RAC Foundation by David Bayliss. The report content is the view of the author and does not necessarily represent the views of the RAC Foundation.***

## Introduction

The use of roads depends on transport modes used by people and those moving goods. Clearly rail, water and airborne transport do not make direct demands on the road network, but in many situations access to their terminals requires road transport. The use of public transport depends on its price and service characteristics in relation to current travel needs and these in turn depend on modal characteristics network coverage and capacity. This note looks at the use of public transport today, how it has changed over recent years and the role it is likely to play in future.

The use of different means of transport depends on the types and patterns of service required by people and those involved in logistics. These have changed over the years with increasing reliance on road transport, with its greater ubiquity and flexibility, and individualised forms of transportation that can quickly and conveniently adapt as the demands made upon them change. Figure 1 illustrates this for personal travel.

Figure 1: Trends in Personal Travel in Great Britain 1955 – 2006

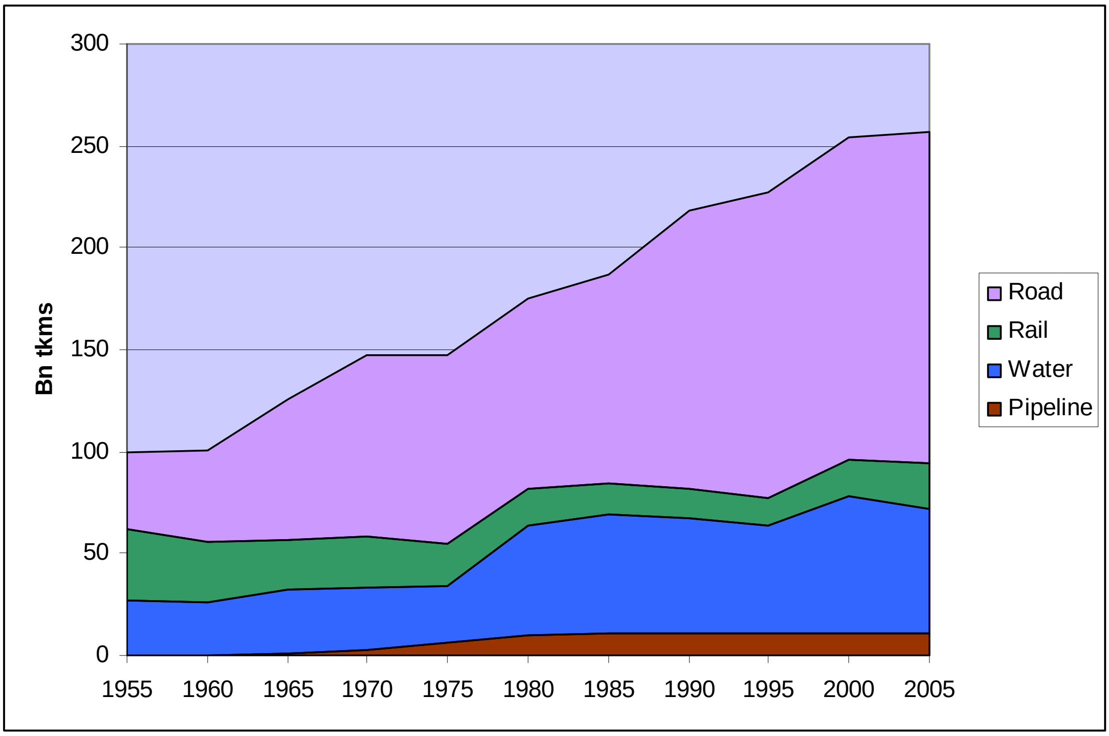



*Source: Transport Statistics Great Britain 2007, table 1.1.*

The notable feature of these trends is not so much the reduction in public transport use (although this has occurred) but the growth in new travel by the more flexible modes of car, van and taxi.

A similar picture emerges for non-road transport modes, which have grown over the last fifty years but not to the extent of road transport, which has grown faster as a consequence of the changing industrial and commercial scene and the new transportation needs that have flowed from this.

Figure 2: Trends in Goods Transport in Great Britain 1955 – 2005




*Source: Transport Statistics Great Britain 2007, table 4.1.*

Whilst these trends are underlain by strong social and economic changes they are susceptible to policy influences. The 86% increase in bus use in London compared with the 23% decline in the rest of the country[1] is an outstanding example of how different policies can impact on travel behaviour.

## National Rail

The rail networks are much sparser than road and this limits their ability to offer an alternative to road travel. This is compounded by the need to change modes for most trips on entering and leaving the network. Of the three main markets that national rail serves intercity and the London commuter system are the most cost effective. Despite its appeal for long distance travel the sparseness of the network means rail has only a minority share of this market.

[1] Public Transport Statistics Bulletin GB: 2007 Edition, table A2.

Similar factors apply to rail freight compounded by the limited range of commodities for which it has a cost advantage. There has been growth in recent years of both passenger and freight traffic and this is putting pressure on the capacity of the rail network that will start to limit future growth potential. Even a new North/South High Speed line would reduce traffic on Motorways in the corridor by less than five years growth. Metros and light rail carry a significant amount of passenger traffic but this is confined to the bigger cities – mostly London and the prospects for their expansion outside London are not good.

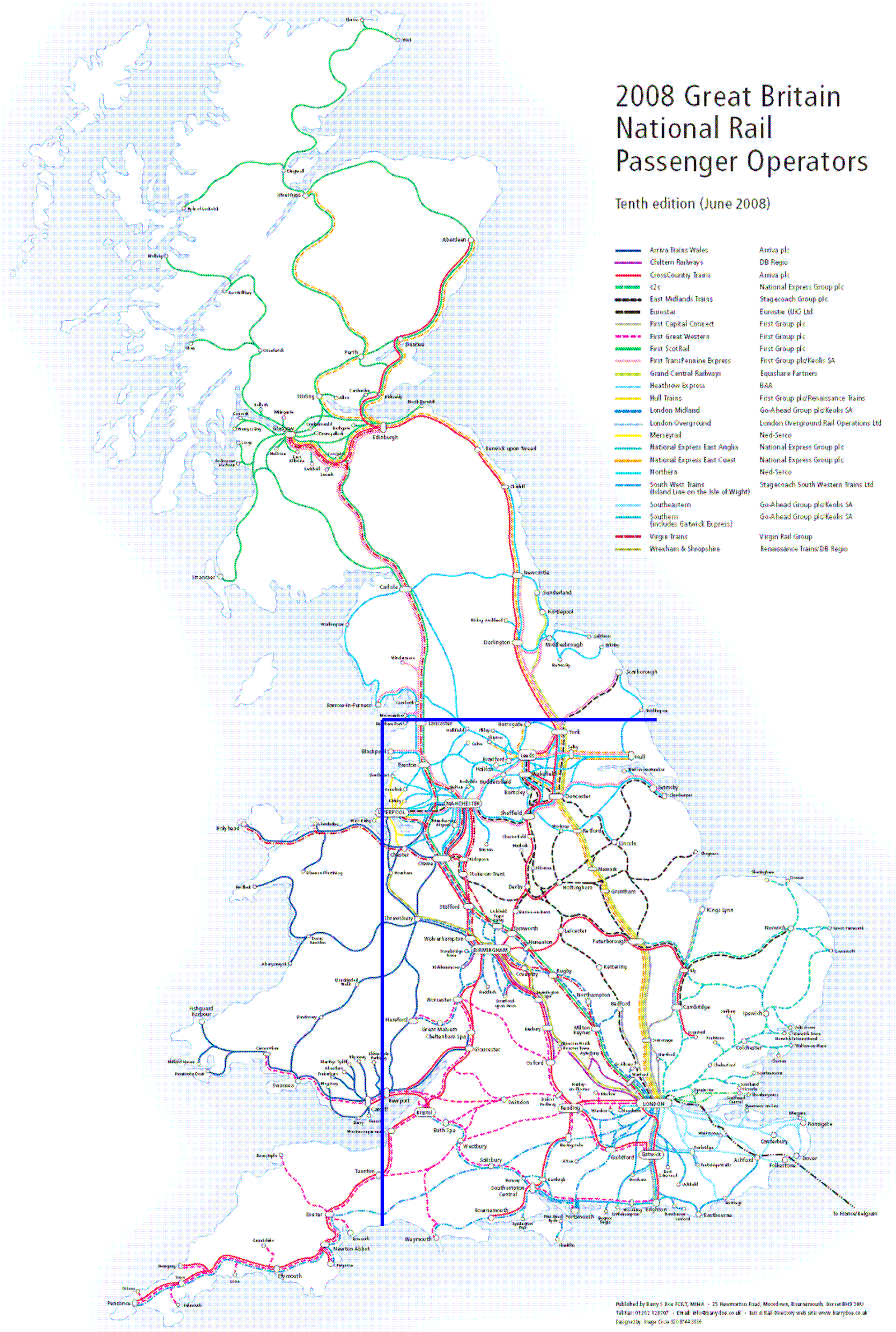
The rail network is relatively sparse compared with roads with a total length of 15.8 thousand kilometres of which 14.3 thousand kilometres is open to passenger services[2]. As such it is only 4% of the length of the road network[3]. This means that, even though it is heavily focussed on the main centres of population, it will be closely aligned with only a fraction of peoples travel 'desire lines'.

Figure 3 shows the pattern of the passenger rail network and makes clear that there are substantial areas north of a line passing through Fleetwood and Hull and west of a line passing through Fleetwood and Cardiff that have no nearby rail connections. However it is not the route length alone that determines rail accessibility. Bus station density and the average station density[4] of the National Network is one per 91 $kms^2$ whereas virtually every property has a road at its doorstep. This means that rail tends to be better suited to relatively long journeys where speed and/or cost advantages outweigh the inconvenience and sometimes expense of getting to and from the station. Average rail freight hauls have risen from about 150kms in 1996 to 200 kms currently[5] and the average passenger rail journey length is 41kms[6]. The national rail passenger market however is made up of different sectors with rather different characteristics (See: Figure 4).

---

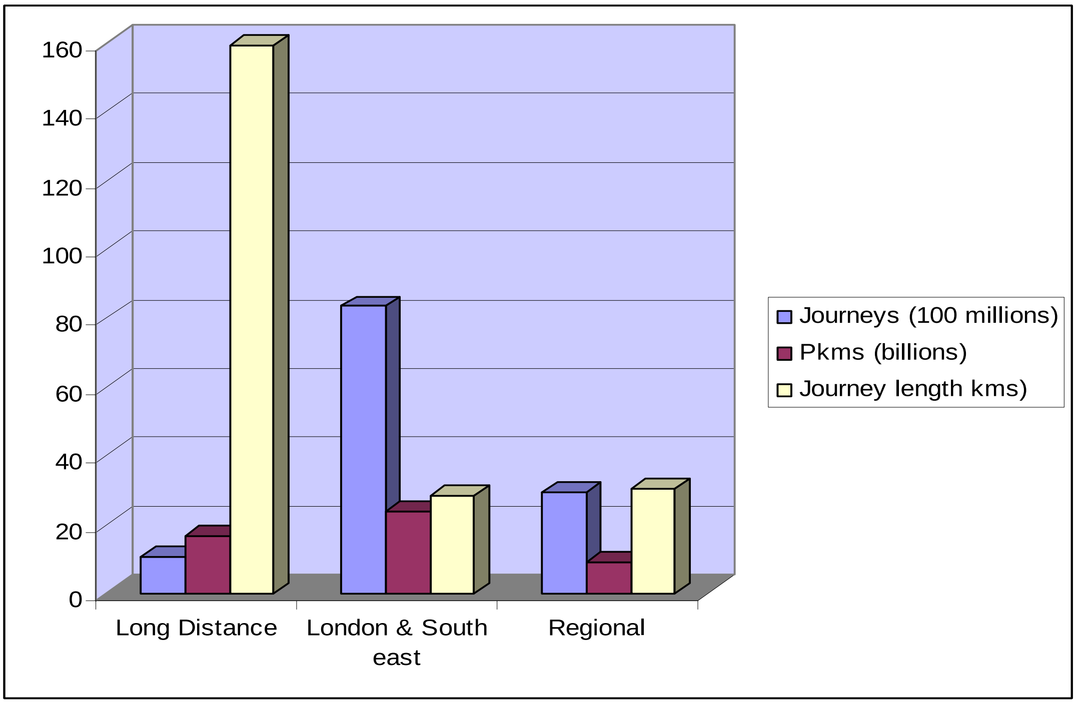
[2] TSGB 2007 table 6.1.
[3] 388 thousand kilometres in 2004, TSGB 2006 table 7.6.
[4] Total area of GB is 228,919 $kms^2$, ONS Annual Abstract of Statistics 2006, table 1.1. Number of stations – 2,516, National Rail Trends 2007-08 table 6.4.
[5] TSGB 2007, table 4.3
[6] TSGB 2007, table 6.1.

Figure 3: The National Rail Passenger Network.




*Source: Barry Doe*

Figure 4: National Rail Passenger Traffic by Market Sector 2007/08



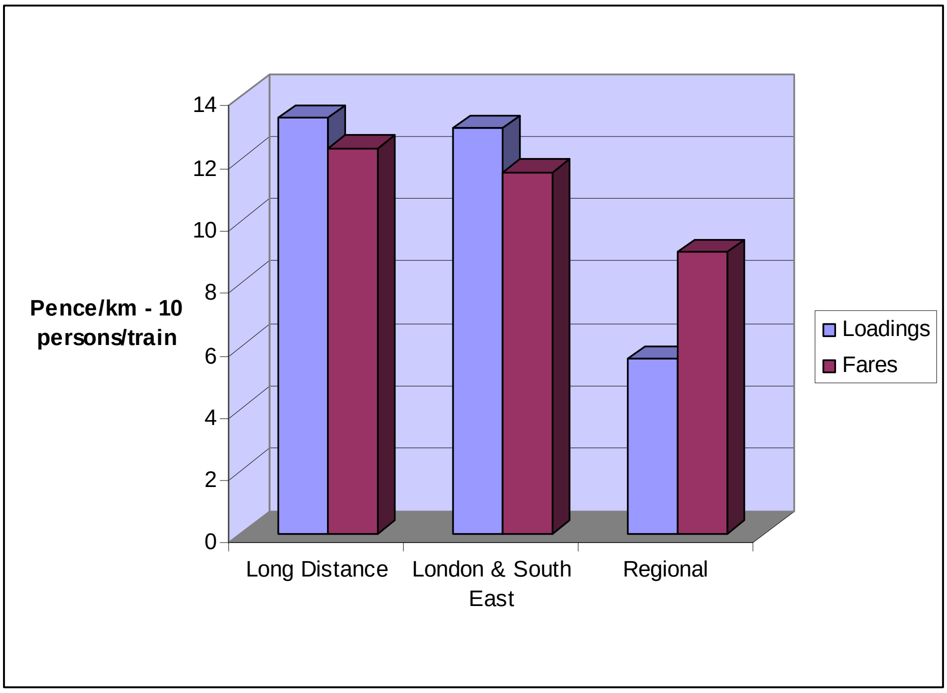

*Source: National Rail Trends 2007/08, tables 1.1b and 1.2b*

From figure 4 it can be seen that the London & South East (L&SE) market and the Regional market have average journey lengths of roundly 30 kms, whilst the long distance market has an average journey length of 160 kms.

Figure 4 also illustrates that much rail passenger traffic is focused on London and the South East, which as well as being the source of L&SE traffic is the main hub for long distance rail services. The London commuter rail system serves all parts of the London metropolitan area and its hinterland and is especially important south of the River Thames where Underground services are sparse. The regional rail market is less focussed and as a result train loadings are much lower as can be seen from figure 5. Receipts are also lower on regional rail services as a consequence of which subsidies have to be higher as shown in figure 6.

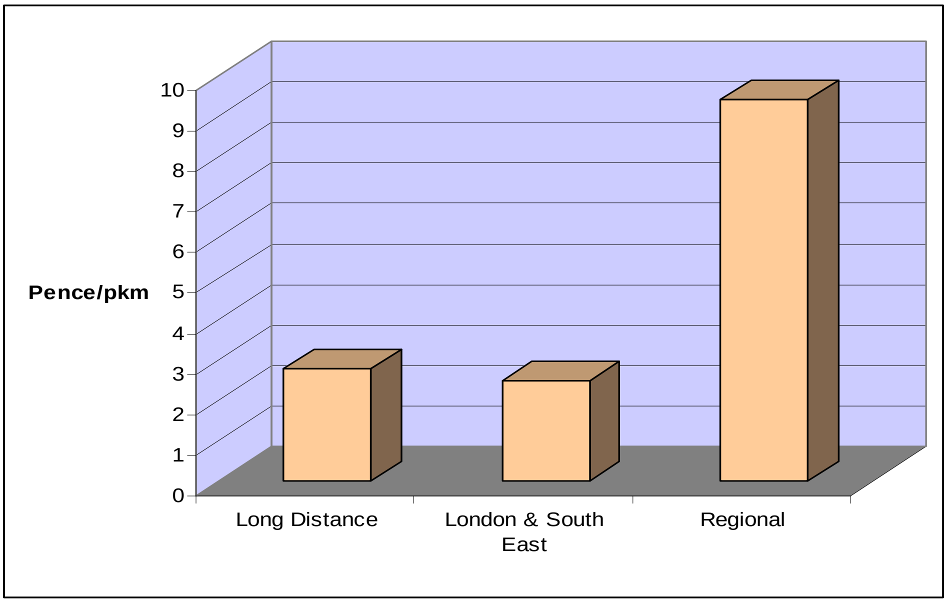
The speed of rail gives it a clear advantage over longer distances – however this is only effective where journeys are well aligned to the network such as between larger towns and cities with direct connections; and other locations in these corridors. This results in rail's share of longer distance travel being only 10% as can be seen from figure 7.

Figure 5: Average Train Loadings and Revenue Rates by National Rail Market Sector, 2007/08



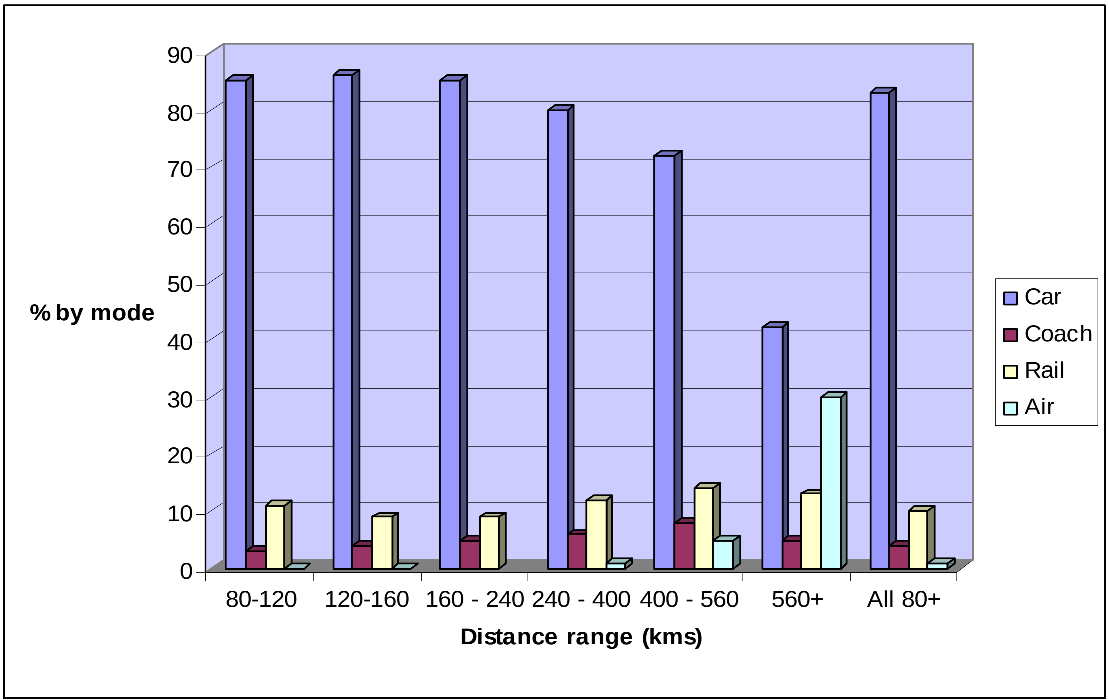

*Source: National Rail Trends 2007/08, tables 1.1b 1.3b and 1.4.*

Figure 6: Franchise Support per Passenger Kilometre 2006/07 by Type of Rail Service.




*Source: National Rail Trends 2006/07, tables 1.1b, 6.2c and Appendix 3.*
*Note: This is based on 463.5m scheduled train kilometres of which 442.27m were operated.*

Figure 7: Modal Split for Long Distance Journeys in GB 2004/06




*Source: NTS 2006 table 3.9.*

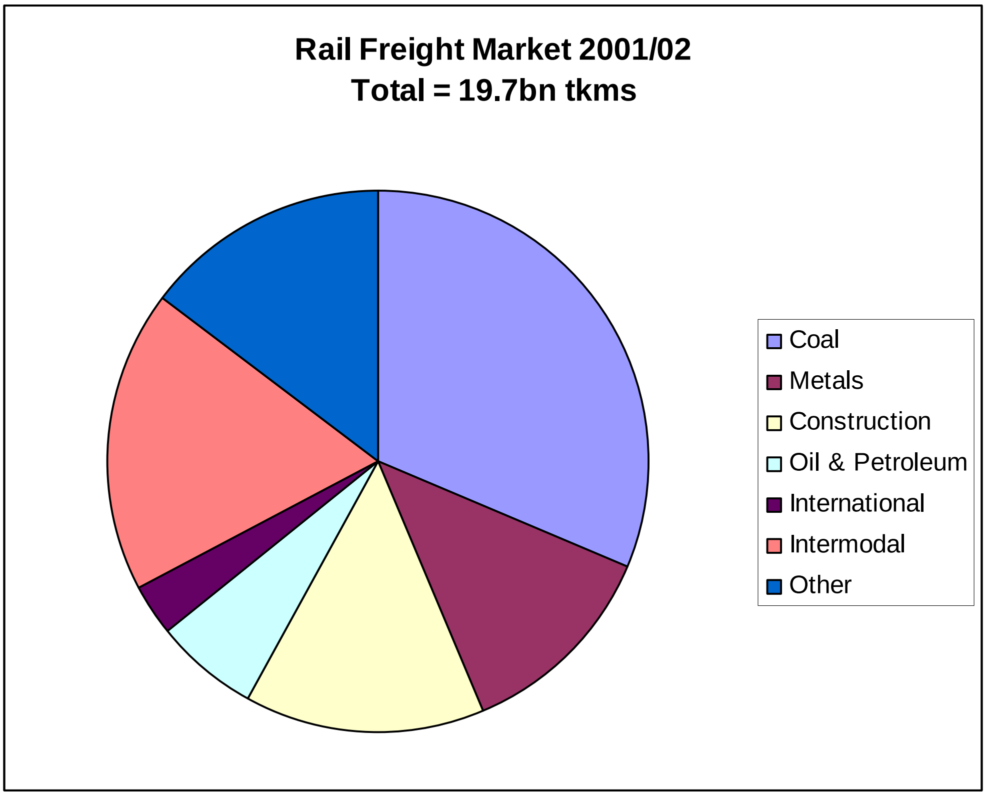
The geography of the rail network affects its use for freight as well. This is also conditioned by its suitability for heavy lower value products where transportation costs can form a significant proportion of the final price. Thus over 40% of rail freight is to and from ports[7] and much freight traffic is bulk goods. In 2007/08 rail freight operators ran 44.7m train kilometres[8] which compares with 29.1bn HGV kms in 2006[9] - a service ratio of 1:650. This is illustrated in figure 8.

Rail freight has been growing and there are ambitious plans for it to grow further – to 2.4 times the 1994/95 levels of traffic by 2010[10]. If this is achieved then the total of 31bn tkms would be about 10bn tkms more than is carried by rail currently. Clearly this would provide some relief to the 170bn or so tkms of road freight expected by then[11] – of the order of 6%.

---

[7] Freight on rail submission to the Eddington Study: www.freightonrail.org.uk/ConsultationsEddingtonReview.htm
[8] Network Rail Annual Return 2008, table 2.12.
[9] Transport Statistics Great Britain 2007, table 7.1.
[10] Network Rail Business Plan 2006, figure 5.
[11] Road freight in 2006 was 167bn tkms (TSGB 2007, table 4.1 and has been growing at about 1% a year.

Figure 8: Rail Freight in 2001/02[12]




*Source: Freight Progress Report 2003, SRA May 2003, Part 8.*

A good deal of road freight is by public haulage – 72% in 2006 - up from 61% in 1984[13]. This allows for economies of scale to be realized and shippers to employ the specialist skills of third party logistic managers (who also ship goods by rail, shipping and air). This trend seems likely to continue so aiding the slight downward trend in empty lorry running that has been seen over recent years[14]. However as ‘own account’ and public hauliers use much the same equipment and infrastructure the use of ‘public’ road transport does not make a great deal of difference to the demands on the road system.

Another notable trend in transportation over the past decade has been the 40% growth in van traffic[15]. This has been driven by the requirement for smaller/more frequent consignments consequent on tighter itinerary controls, increased home deliveries with the growth of internet shopping and an expansion of mobile services (cleaning, gardening, equipment maintenance etc).

[12] Source: Freight Progress Report 2003, SRA May 2003, Part 8.
[13] Road freight Statistics 2006, table 1.9.
[14] From 28.7% in 1996 to 26.8% in 2006: Road freight Statistics 2006, table 1.16.
[15] Transport Statistics Great Britain 2007, table 7.1.

These transport tasks are ill suited to rail or water transportation and, in some cases, common carrier road services.

Many key sections of the national rail network are operating close to capacity[16]. Consequently squeezing the planned additional freight and passenger traffic on to the system will not be easy. Upgrading and extending the rail system is very costly and may not provide good value for money. At present the Government spends about nine times per passenger kilometer[17] on the rail system as it does for trunk roads so these high costs must be a significant constraint on expanding rail capacity.

It has been suggested[18] that new high-speed rail lines should be built in the UK. A line between London and Glasgow might carry 200 passenger trains a day carrying 8¼bn pkms a year[19]. Much of this traffic would be attracted from air and slower rail services so the reduction in road traffic would only be a proportion of this – say 2bn vkms[20]. Undoubtedly this would provide some relief to motorway traffic in this corridor. The roads affected would be the M40, M1, A1(M), M42 and M6 which between them carry of the order of 30bn – 35bn vkms a year[21] so the reduction in traffic could be of the order of 6% - 8%: a useful reduction but less then the 26% growth in Motorway traffic seen over the last ten years[22]. The Eddington study estimated that such a line would cost £33bn so[23], whatever the merits of such a line are on other grounds it could not possibly be justified on road traffic diversion grounds.

**Other Passenger Rail**

London dominates the metro/light rail market with 92½% of the national market[24]. The London Underground provides a vital service for much of London north of the River Thames and some corridors to the south. The Docklands Light railway is the backbone of the public transport system in that part of London and Croydon Tramlink acts as a feeder to the sub regional centre as well as to the commuter rail service in the area.

As such these services form a major part of the London transport system carrying about 9% of all daily person journeys (rail in all totals 17%)[25].

---

[16] Delivering a Sustainable Railway, chapter 4.
[17] 9.8p compared with 0.11p.
[18] Commission for Integrated Transport, Factsheet No 15: High Speed Rail.
[19] 220 trains x 200 passengers per train x 640 kms x 320 annualisation factor.
[20] Car use elasticity with inter-urban rail times is low at 0.057 (The demand for public transport: a practical guide, table 9.13).
[21] 1,300kms length x 80k vpd flow x 320 annualisation factor = 33.3bn vkms a year.
[22] Transport Statistics Great Britain 2007, table 7.3.
[23] High Speed Line Study.
[24] 7,914 pkms out of a total of 8,688 (table 1).
[25] London Travel Report 2007, table 1.1.2.

In the rest of the country metros/light rail serves much more limited purposes – invariably along one or two radial corridors into the city centre. Taking Tyne and Wear, which has the most substantial light rail system outside London, only 1% of people use the Metro to get to and from work compared with 9% using buses and 10% walking[26]. To make a significant impact on urban travel patterns in Britain the extent of the light rail systems would have to be increased several fold. Given the considerable difficulties that have been encountered by promoters of fairly limited light rail schemes[27], such an expansion seems highly unlikely.

Table 1: Some British Passenger Railway System Characteristics 2006/07

| SYSTEM | Length (kms) | Stops | Train kms/year (millions) | Pkms/year (millions) |
|---|---|---|---|---|
| National Rail | 15,034 | 2,508 | 463.5 | 46,497 |
| London Underground | 408 | 253 | 69.8 | 7,665 |
| Docklands Light Rail | 31 | 34 | 3.3 | 246 |
| Croydon | 28 | 39 | 2.5 | 128 |
| Glasgow Underground | 10 | 15 | 1.2 | 42 |
| Tyne & Wear | 78 | 59 | 5.8 | 296 |
| Midlands Metro | 20 | 23 | 1.6 | 51 |
| Nottingham NET | 14 | 23 | 1.2 | 43 |
| Manchester Metrolink | 39 | 37 | 3.8 | 208 |
| Sheffield Supertram | 29 | 48 | 2.4 | 42 |
| Blackpool Trams | 18 | 121 | 0.9 | 10 |

*Sources: Public Transport Statistics Bulletin GB 2007, tables 3.1 & A2; Transport Statistics Great Britain 2007, table 6.2.*

### Bus and Coach

Local buses carry less than 4% of passenger traffic and this is largely confined to urban areas. Bus speeds are low and traffic congestion affects these; and bus priorities can help but are unlikely to improve bus travel much because on access and stopping times. Even ambitious growth – which would bring other benefits – would do little to affect car use and this would be in the main towns and cities.

[26] Regional Transport Statistics 2007, table 1.5a.
[27] Plans for light rail schemes in Hampshire, Liverpool and Leeds were scrapped by the government in December 2005.

The use of non-local buses has been growing. They now carry almost as many pkms as local buses and could be increasingly attractive if road conditions were improved. However the effects on road traffic would be small and there would be some abstraction for rail.

Local buses carry about 26bn pkms a year[28] out of a total of 812bn[29] - about 3¼%. Whilst this is a small percentage, buses serve a range of important functions and help relief pressure on congested urban road space. However like other forms of road transport they suffer from the effects of congestion which can increase journey time and unreliability for passengers and operating costs for bus companies. Bus speeds are low averaging 13.2 kph compared with 39.6 kph for cars[30]. This means that the area that can be accessed by bus in a fixed time will, on average, be only about 11% of that accessible by car.

Bus priority measures can help combat this, but nature of local bus journeys; where almost as much time is spent by passengers walking to and from stops, waiting for the bus to come and stopping to pick up and drop of passengers; as is spent by the vehicle operating in traffic - means that overall journey times are only modestly affected by these[31].

The Government's target for bus use is that it should increase by 5.5% between 2004/05 and 2010/11. If this was achieved and progress continued to be made a further 10% increase by 2020 is not beyond the bounds of possibility. Not all this additional bus traffic would substitute for car use, as it would include former car passengers, pedestrians, and cyclists as well as newly generated bus traffic. On this basis, if a third of the new bus passengers were former car drivers the road traffic relief is unlikely to be more than 1⅓bn vkms year or about ¼% of current road traffic levels[32]. This could be of some limited help in tackling inner urban road congestion; but would have minimal effects elsewhere.

Non-local bus and coach services carry about 24.3bn pkms/year and their use has been growing[33]. Many of these journeys will be 'private hire' and others on scheduled interurban services. Private hire coach operations provide low cost, group social and leisure travel and as such occupy a unique niche in the transport market. Scheduled coach travel receives little subsidy yet provides a valuable service and intercity services providing low cost direct connections between towns and cities. For coaches to provide a high quality of service an un-congested inter-urban road network is needed.

---

[28] Public Transport Statistics GB: 2007 Edition, table A2.
[29] TSGB 2005, table 1.1.
[30] National Travel Survey: 2006, tables 3.1 & 3.5.
[31] In an 8km bus journey walking, waiting, slowing, accelerating, boarding and alighting times can easily exceed 20 minutes whilst, at a running speed of 20 kph, the bus takes 24minutes. A 20% reduction in running delays reduces overall travel time by 11% and the gain is even less if the disutility of walking and waiting times are taken into account.
[32] 506.4bn vkms, Transport Statistics Great Britain SGB 2006, table 7.1.
[33] Public Transport Statistics Bulletin GB: 2007, table A2.

If congestion of the inter-urban road network continues to worsen and coaches are given preferential access (e.g. HOV lanes) their role could expand but probably taking more from rail services as from car use[34].

**Taxis and Private Hire Vehicles**

Taxis and private hire cars carry only about 1% of passenger journeys and are very similar to cars in their infrastructure needs so development in this sector would have little effect on road traffic levels.

These carry about 1% of all person journeys[35] and make little difference to the demands on the road system. Indeed if the driver is discounted – as in bus and train occupancy calculations – then taxi and PHV occupancy is probably lower than that of private cars. However, amongst other things they provide a valuable adjunct to scheduled public transport and a valuable service to people unable or unwilling to go by car on journeys for which conventional public transport is not well suited. High quality personalized public transport, including ‘public car’ schemes can help reduce car ownership in certain environments and contribute to lessening road traffic. However these appear to cater for limited niche markets in inner cities and their overall effect on traffic will be very limited.

**Air Transport**

Air transport has been growing rapidly and is set to continue to do so in the immediate future; however in the longer run this may not be sustainable. Even if present domestic air travel growth trends continue the net effect on road traffic will be small although there would be some distribution with more road traffic to and from airports.

This has been the most rapidly growing means of transport in recent years. However, like the railways it suffers from having only a limited number of system entry and exit points and requires the use of other modes for their access. There were 54 operating domestic passenger services in 2007[36]. In 2006 22.7m domestic journeys were made between these (not all, of course, are connected directly) generating 9.9bn passenger kilometers[37]. This is expected by Government to grow by 3½% annually[38], which means a doubling every 20 years. If this continued up to 2050 – which is doubtful given concerns about the impacts of aviation emissions - then domestic air travel would grow to about 45bn pkms.

---

[34] The demand for public transport: a practical guide, table 9.13.
[35] Public Transport Statistics GB: 2007 Edition, page 29.
[36] CAA UK Airport Statistics 2007, table 01.
www.caa.co.uk/default.aspx?categoryid=80&pagetype=88&sglid=3&fld=200606
[37] Transport Statistics Great Britain 2007, tables 1.1 & 2.2.
[38] The Future of Air Transport Annex A.

If a third of this additional traffic were abstracted from car driving the reduction in car traffic would be about 12bn vkms (about 2½% of the current total) less the generated airport access traffic.

Whilst a significant amount of international freight goes by air there is little domestic air freight – 68 thousand tonnes in 2006[39]. This adds up to a fraction of a percent of road freight and this is unlikely to change much.

**Waterborne Transport**

Waterborne passenger travel in the UK makes up less than 0.1% of all journeys and is confined to ferry, inter island and cross-sea trips. The scope for attracting road travel, which by its nature carries very little of these types of traffic, is insignificant. Domestic waterborne freight comprises movements on inland waterways, between coastal ports and between ports and sites at sea. As such, much of it is very specialized and is typified by long hauls and movements of bulk liquids. Making very generous assumptions about how much increased shipment over water might reduce road freight for both inland and coastwise traffic together this would be most unlikely to be no more than 2¼%. There could be greater effects on rail freight.

Hardly any domestic passenger travel goes by water and there is little prospect of the changing in the foreseeable future. In the UK in 2006 there were 40.5 million domestic waterborne journeys (less than 0.1% of the national total[40]) of which 18.8m were between islands, 17.9m were by ferries and 3.8m were sea crossings. All of these were largely determined by the need to cross water and consequently any modal shift is likely to be mainly between water and air (Channel Tunnel apart). Ferry crossings can relieve river bridge traffic but any impacts would be confined to a very few longer estuarial crossings. Therefore any development will have negligible impacts on road travel demand except on roads to and from major passenger port terminals.

A substantial volume of freight traffic is waterborne some of which is carried by shippers' own vessels but probably most goes as part of mixed cargoes or by specialist shipper. Of the total of 126.3m tonnes of freight shipped in 2006 30.6m tonnes were between ports and sea locations (e.g. oil rigs), 58.1m tonnes between UK ports and 37.6m tonnes on internal waterways[41]. The one port traffic, comprising crude oil, dredged aggregates and waste is tied to shipping. Of the 58.1m tones of coastwise traffic 61% was bulk liquids (mostly oil) and 24% unitised traffic and the inland waterway traffic was more mixed with unitized traffic forming the largest single type with 90% foreign.

[39] Transport Statistics Great Britain 2007, table 2.2
[40] 41.2m out of a total of approximately 59.8m people at 1,000 journeys each per year.
[41] Waterborne Freight in the United Kingdom 2006 Summary Statistics.

Like airports the number of ports in the UK is limited – 120 are currently listed as being commercially active out of a total of 650 ports and wharfs [42] and, of these 36 had 2m tones year pass through them in 2004[43]. This low density, coupled with the relative slowness of transportation, limits the type of products that can be cost effectively transported by water. Part of the problem of waterborne transport for domestic freight is the time and cost of the transshipment needed at either end of the waterborne leg for most traffic. This favours roll on/ roll off and flow on/flow off operations. Thus 79% of waterborne freight is petroleum products. Whilst Ro/Ro is important for international traffic it comprises less than 5% of domestic waterborne traffic[44] as there are few links where this is competitive with direct road transport, the exceptions being between the mainland and Northern Ireland using Belfast, Heysham, Fleetwood, Larne and Liverpool[45]. Of all container traffic through UK ports less than 5% is domestic[46].

Non-seagoing waterborne freight lifted in the UK has steadily dropped in recent years from 7.1m tonnes in 1994 to 2.6m in 2004 but tkms have changed little at about 0.2bn[47]. If this could be doubled, the effect on road freight would be no more than to reduce it by 0.125%[48]. Even if the same could be achieved for coastwise inland waterway freight the impact would be of the same order making a total of ¼%.

Coastwise traffic has an average journey length of almost six hundred kilometres and, as described above, carries mainly liquid bulk products. Given this it is unlikely that there is much road freight that would be suitable to switching to waterborne carriage but if an additional 50% of dry coastwise freight could be attracted to water from road this would amount to about 4bn tkms a year less the access traffic to and from ports. In all this would be unlikely to amount to more than 2%[49]. It is more likely that increased use of coastwise shipping would compete with rail given the greater similarity in the types of products carried by these two modes.

[42] Focus on Ports 2006, Foreword.
[43] Focus on Ports 2006, table1.1.
[44] Waterborne Freight in the United Kingdom 2006, table 1.2.
[45] Maritime Statistics 2006: Ports – data tables; tables 3.8.
[46] Focus on Ports 2006, table 2.10.
[47] Waterborne Freight in the United Kingdom 2006, table 1.1.
[48] Total road freight was 160 bn tkms: TSGB table 4.1.
[49] Say 3¼bn tkms out of a total of 160bn – 2.03%.

## Park and Ride

Park and ride is an important feature of the London rail system and, to a lesser extent, those of other Metropolitan areas. It helps relieve peak pressure in inner urban roads but its overall impact on traffic volumes is currently small. Bus based park and ride, despite its merits, cannot be credited with any significant traffic reduction - and might have the opposite effect. Long distance rail based park and ride might have a small road traffic effect but it has the disadvantage of generating vehicle movements around main railway stations many of which are in busy urban areas.

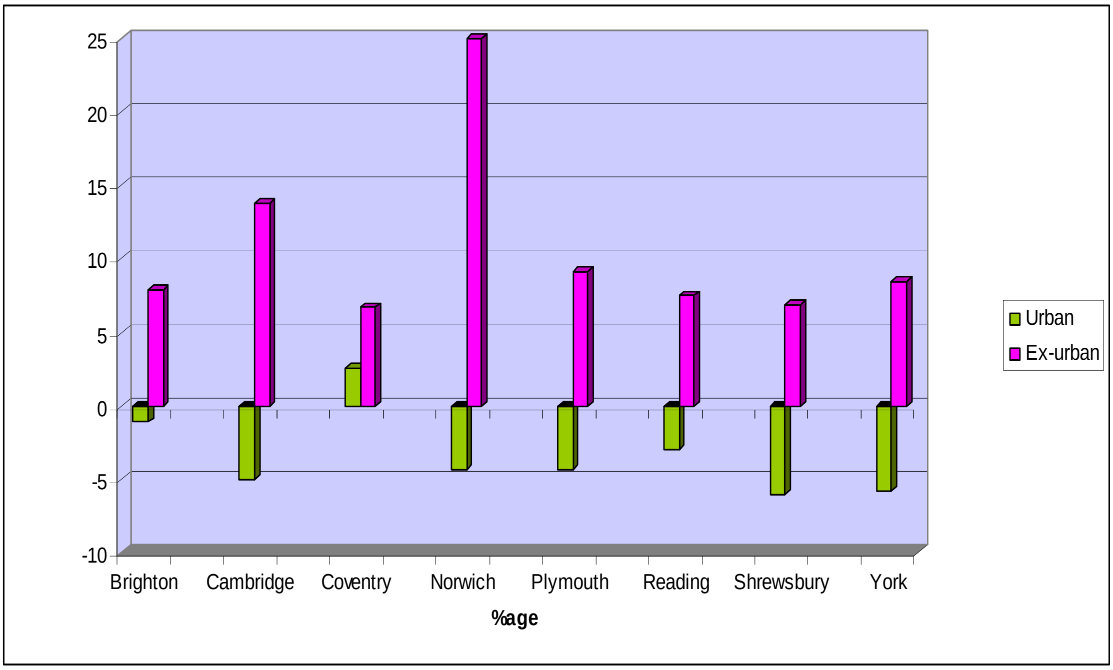
Park and Ride can provide a valuable addition to public transport services. The largest park and ride network in Britain is that on London's Underground and commuter rail networks and, coupled with inner London parking constraints, this undoubtedly increases the amount and attraction of rail travel to central London. To a lesser extent this phenomenon can be found on other Metropolitan rail systems. Over the whole of Britain there are in the order of two hundred thousand park and (rail) ride spaces[50].

Not all of these ensure a substitution of rail for car as most of these journeys would not be able to find a parking space in the central/inner city for which they are bound. If a third were abstracted car journeys with an average length of 15 kms, with a daily turnover rate of 1.2 then the traffic saved would amount to about 350 million car miles a year – very valuable in respect of radial peak period metropolitan traffic – but amounting to a fraction of a percentage of the 506 billion vehicle miles a year on Britain's roads in 2006[51]. Again rail capacity limitations restrict the potential to switch more traffic to rail.

Bus based park and ride has increasingly been introduced in larger freestanding towns following the initial permanent scheme in Oxford in 1973. The effectiveness of this depends on its location, relationship to other car accessible destinations and complementary town centre transport polices. There are dangers that car uses switch to other destinations or travel longer distances to access park and ride thus, reducing urban congestion, but increasing total car travel. This effect has been identified by Parkhurst and is shown in figure 9.

[50] Estimate for National Rail – 183k based on a sample of 1,200 stations, London Underground - 11,500 based on a sample of 60 stations plus an allowance for park and ride on other light rail systems.
[51] Transport Statistics Great Britain 2007, table 7.1.

Figure 9: Changes in Traffic per Intercepted Car – vkms in Selected Towns




*Source: Parkhurst (2000)*

The other type of park and ride is associated with longer distance rail travel. Again it is not clear how much substitution of rail for road this causes but, if 10% of all long distance rail travel were the result of switching from car as a result of park and ride, then the reduction in car traffic would be 1.2bn vkms[52]: again only a fraction of a percent of the total traffic – but focused on the main inter urban corridors. However this park and ride will have generated concentrated flows around the main intercity rail stations: most of which are in busy urban centres.

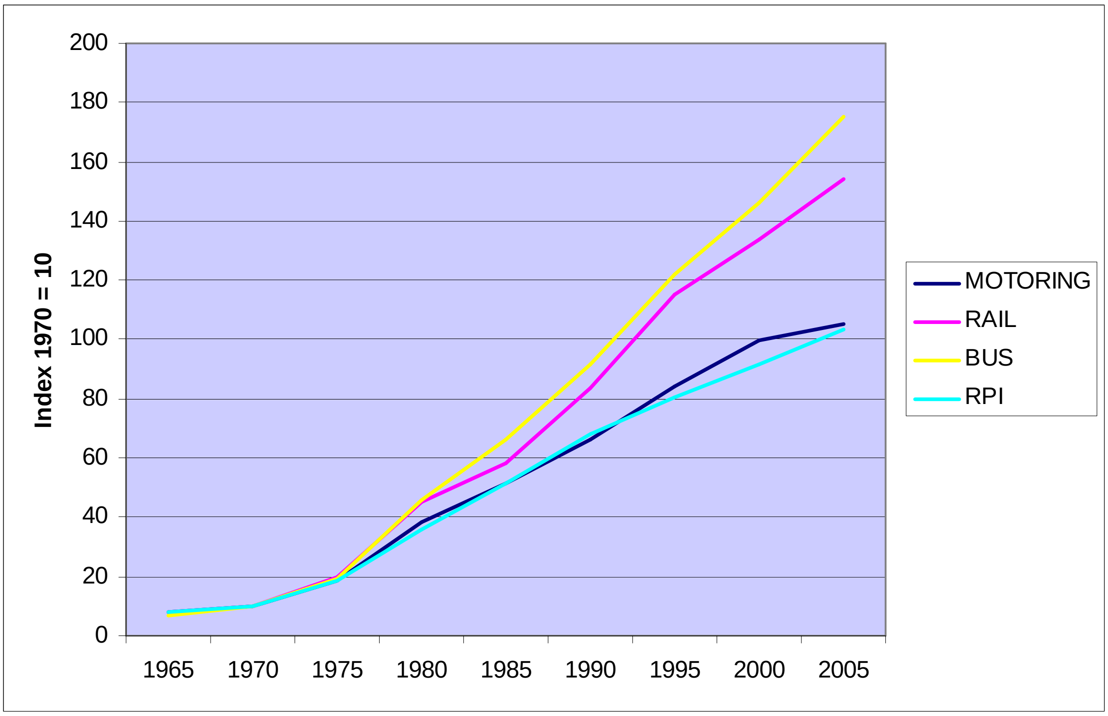
**Prices**

The cost of car travel has been increasing more slowly than the cost of public transport. Despite substantial subsidies public transport fares are generally significantly higher than car running cost and this has helped fuel growth in car usage. Whilst additional bus and rail subsidies could reduce car use an additional several £bns/year would be needed to have a measurable effect. Well-targeted freight grants can have a significant effect on lorry traffic but the effective scope for these is limited to those market niches where rail or waterborne transportation can offer a reasonable alternative to road transport.

[52] 14.2bn pkms (see figure3) x 0.10 ÷ 1.2 (assumed car occupancy) = 1.183bn.

The prices charged for transport services clearly have an influence on their appeal to users. In personal transportation cars have the advantage of a substantial proportion of costs being paid in advance (purchase/VED/Insurance). With buses, trains and taxis the picture is different. In the case of 'commercial' transport (taxis and coaches), pretty well all the costs are paid for, on a pay as you go basis, by fares. Over recent decades motoring cost have been growing less rapidly than public transport fares as shown in Figure 10 and this has contributed to the growth in car use.

Figure 10: Relative Transport Price Trends 1964 – 2005

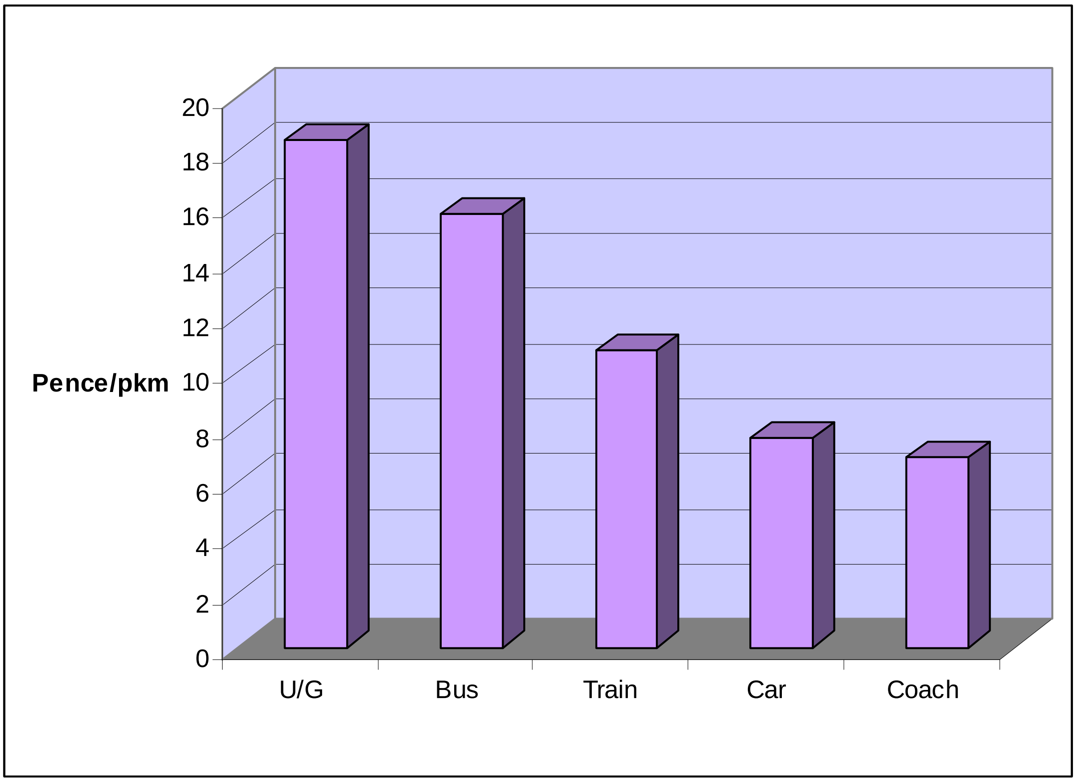



*Sources: Transport Statistics Great Britain 1964-74 to 2007*

With buses and trains taxpayers meet some of the costs. In the case of local buses in 2006/07 this amounted to 8.8p/pkm or 40% of total receipts[53] and in the case of rail in 2006/07 direct subsidies through rail franchises amounted to 7.4p/pkm[54] or, if all government support to national rail is attributed to passenger travel, this comes to 12.9p/pkm[55]. The net effect of this on out of pocket costs for different modes is shown in figure 11.

[53] Public Transport Statistics Bulletin GB: 2007 Edition, tables F & A2.
[54] Public Transport Statistics Bulletin GB: 2007 Edition, table A10.
[55] National Rail Trends 2007-08 Yearbook, tables1.1a and 6.2a.

Figure 11: Out of Pocket Costs of Personal Transport 2006




*Sources: London Travel Report 2007, chart 3.2.3; Public Transport Statistics Bulletin GB: 2007, tables D, A2 & A4 and AA Motoring Costs 2007.*

These are averages and behind them lies a wide range of prices. Coach fares can be as low as 1p per passenger kilometre and first class rail fares as high as 50p/pkm. The car rate is for running expenses with an average occupancy of 1.58 people[56]. For a single occupant the average rate would increase to 12p/pkm and with four people in the car 3p/pkm.

Reducing the prices charged for public transport can increase its use. With a medium run fares elasticity of 0.56[57] an £1bn/year increase in bus subsidies could increase ridership by 4½bn pkms/year. Not all this would lead to a reduction in car traffic. Car demand is relatively inelastic to bus fares (0.008 – 0.045). On this basis a £1bn a year increase in bus subsidies (applied to fares) would reduce car travel (driver and passenger) by less than ½%.

For suburban rail with a fares elasticity of 0.6[58] an £1bn/year increase in bus subsidies could increase ridership by 2bn pkms/year.

[56] National Travel Survey: 2006, table 6.2.
[57] The demand for public transport: a practical guide, para. 3.1.2.
[58] The demand for public transport: a practical guide, para. 3.1.2.

This would not necessarily lead to a reduction in car traffic either. Car demand is also relatively inelastic to rail fares (0.0022 – 0.018)[59]. On this basis a £1bn a year increase in bus subsidies (applied to fares) would reduce car travel again by less than ½%. Car traffic can be reduced by increasing public transport fares subsidies but an additional several £bns/year would be needed to achieve a measurable impact.

Rail and waterborne freight subsidies might help reduce lorry traffic and the Freight Facilities Grant programme has helped to do this. In Scotland £57.7m of grants have removed 52m lorry kilometres/year[60] (1.9%[61]) from its roads but these are targeted at those sections of the freight market where rail or water can provide a realistic alternative to lorries.

**Conclusions**

The use of public transport has an impact on the demands made on the road system. However the different modes of transport largely serve particular sets of markets for which they have been designed or adapted and are best suited. There is some potential for switching between modes and this note has explored the scope for such switching and has found this to be quite limited.

Recent and prospective growth in passenger and freight on the railways means that the network is getting congested and considerable expenditure will be needed to deal with this let alone carry additional traffic switched from road. A new High Speed Train line from London to Glasgow could reduce motorway traffic in the corridor by up to 5% - 7%; however this would be a costly venture which would attract much of its traffic from air services.

Local bus services, if improved, would attract a limited amount of intra-urban travel from cars and thus have negligible implications for roads between towns although there could be some help to easing congestion on suburban roads. Express coaches do have some limited potential but these require fast and reliable intercity routes for their effectiveness.

Transport on water serves very distinct markets with limited potential for switching between modes. Generous assumptions about switching from road result in no discernable impacts on passenger traffic and a maximum of 2½% for freight.

Park and ride is a valuable part of commuting by rail in London and some other Metropolitan areas but inner city parking constraints and peak rail capacity limitations limit the scope for substantial mode switching in either direction.

[59] The demand for public transport: a practical guide, table 9.15.
[60] Freight Facilities Grant Table of Awards.
[61] Scottish Transport Statistics N0 26 2007 Edition, table 6.2.

Bus based park and ride seems to offer no overall traffic reduction and may have the opposite effect and intercity park and ride almost certainly encourages the use of rail and a small reduction in long distance car travel results from this.

Subsidising passenger transport fares to divert travel from cars is usually not cost effective and billions of pounds of additional subsidy would be needed to have a material effect of road traffic levels.

**References**


1. AA (2007), *The Cost of Motoring 2006*, The AA Motoring Trust, Basingstoke.

2. Atkins (2004), *High Speed Line Study*, Atkins, Epsom.

3. Balcombe R et al (2004), *The demand for public transport: a practical guide, TRL 593*, TRL, Crowthorne, September.

4. Civil Aviation Authority (2008), UK Airport Statistics 2007 – annual, CAA [http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&sglid=3&fld=2007Annual], August.

5. Department for Transport (2003), *The Future of Air Transport*, Cm 6046, London, December.

6. Department for Transport (2007), *National Travel Survey: 2006 SB (07) 21*, DfT, London, October.

7. Department for Transport (2007), *Maritime Statistics 2006*, TSO, Norwich, October.

8. Department for Transport (2007), *Transport Statistics Great Britain 2007 Edition*, DfT, London, November.

9. Department for Transport (2007), *Road Freight Statistics 2006 SB (06) 23*, DfT, London, September.

10. Department for Transport (2007), *Delivering a Sustainable Railway*, Cm7176, London, July.

11. Department for Transport (2007), *National Travel Survey: 2006 SB (07) 21*, DfT, London, August.

12. Department for Transport (2007*), Public Transport Statistics Bulletin GB: 2007 Edition SB (07) 22*, DfT, London, August.

13. Department for Transport (2007), *Focus on Ports 2006*, palgrave Macmillan, Basingstoke, November.

14. Department for Transport (2007), *Waterborne Freight in the United Kingdom 2006 SB (07) 24*, DfT, London, November.

15. Department for Transport (2007), *Regional Transport Statistics 2007Edition*, DfT, London, December.

16. Department for Transport (2007), *Maritime Statistics 2006: Passengers – data tables*, [http://www.dft.gov.uk/pgr/statistics/datatablespublications/maritime/passengers/] DfT, London, October.

17. Department for Transport (2008), *Sea Passenger Statistics 2007*, DfT, London.

18. Doe B (2008), *Great Britain Passenger Rail Operators Ninth Edition* www.barrydoe.co.uk, Bournemouth, January.

19. Parkhurst G (1996), *The Economic and Modal-Split Impacts of Short Range Park and Ride Schemes: Evidence from Nine UK Cities*, ESRC, TSU, UCL, London.

20. Pickett, M.W and Gray S M (1996), *The effectiveness of bus-based Park and Ride TRL Report 207*, TRL, Crowthorne.

21. Network rail (2008), *Annual Return 2008 Delivering for You*, Network Rail London, August.

22. Office of the Rail Regulator (2007), *National Rail Trends 2006-07 Yearbook*, London.

23. Office of the Rail Regulator (2008), *National Rail Trends 2007-08 Yearbook*, London.

24. Strategic Rail Authority (2003) *Freight Progress Report 2003*, SRA, London, May.

25. The Scottish Government (2007), *Scottish Transport Statistics N0 26 2007 Edition*, Edinburgh.

26. The Scottish Government (2008), *Freight Facilities Grant Table of Awards*, [http://www.scotland.gov.uk/Topics/Transport/FT/freightgrants1]

27. Transport for London, *London Travel Report 2007*, TfL, London, May.