Factors affecting the decline in bus use in metropolitan areas.

Peter White

School of Architecture and the Built Environment

This is a reproduction of a report produced for the Passenger Transport Executive Group (pteg) in April 2008 and is reprinted here with permission.

The report is available on the pteg website, at:

http://www.pteg.net/NR/rdonlyres/5E0EA29C-EED4-4DF6-9F0F-9A9896159B78/0/FactorsAffectingtheDeclineofBusUseintheMetropolitanAreas200804.pdf

FACTORS AFFECTING THE DECLINE OF BUS USE IN THE METROPOLITAN AREAS

Commissioned by ***pteg***

April 2008

Peter White
Professor of Public Transport Systems
University of Westminster
35 Marylebone Road
London NW1 5LS

INTRODUCTION

Evidence on trends in bus use in Britain, following introduction of deregulation outside London and Northern Ireland in October 1986, has indicated a general decline outside London. By 1990 a broadly stable market was observed in London, but a noticeable drop elsewhere, especially in the other major conurbations, despite a greater growth in bus-kilometres run (an indicator of service frequency and availability) outside London in the first few years after deregulation. After allowing for changes in real fares and bus-kilometres run (a proxy for service level) together with an underlying decline assumed to result from rising car ownership, a greater decline than expected was observed outside London, notably in the metropolitan areas [1]. The benefits of high frequency associated with an increase in bus kilometres appeared to be offset by an unstable pattern of services and poor passenger information. Fragmentation of integrated ticketing systems resulted in a shift back to on-bus cash ticketing, increasing boarding times at stops. Competition policy deterred inter-operator co-ordination in ticketing and timetabling outside London.

In broad terms, the same pattern has continued, London out-performing other regions of Britain, and especially the other major conurbations, in terms of ridership. In both cases, a more favourable trend may be seen in recent years, with a striking absolute growth in London, and a lower rate of decline in aggregate elsewhere. The other striking feature is a sharp growth in bus-kilometres run in London, compared with a net reduction elsewhere. Both in London and other regions, a sharp reduction in real operating cost per bus-kilometre was attained, as a result of increased labour productivity, reduced overhead costs, and lower real wages. However, in recent years this has inevitably been reversed, in a tighter labour market.

At the aggregate level, good quality statistical data is available in Britain on the key variables, such as ridership, bus-kilometres run, total revenue, unit costs and financial support. However, measurement of real fares changes is less precise, given the rapid change in market composition, notably the shift to almost wholly off-bus ticketing in London. Data is published for London, the metropolitan areas (covered by the Passenger Transport Executives), Scotland, Wales and the English regions[2]. Further data for London is produced by Transport for London[3]. However, at a more local level, wide variations are found, with some individual cities (such as Edinburgh, Brighton, York, Oxford and Cambridge) reporting much better performance than the regions in which they are located, and in some respects comparable to London.

PRINCIPAL FACTORS AFFECTING RIDERSHIP

Although some local factors will be unique, a number of common factors may be identified. Many of their effects can be quantified in terms of elasticities. The TRL study ‘Demand for Public Transport’[4] provides the principal reference source.

Major factors include:

Real fare level. An overall short-run elasticity of about -0.4 is applicable, rising in the medium-term. In this paper the -0.4 value has been used, with a sensitivity test of -0.55 for the seven-year period analysed.

Service level. Bus users respond to changes in frequency, waiting time and other quantifiable aspects of service such as speed. In aggregate, the only consistent indicator available is total bus kilometres run, which in general acts as a proxy for average service frequency (however, it will also encompass effects of variation in length of operating day or week, and size of network). A similar short-run magnitude of +0.4 may be assumed (likewise with +0.55 for the medium term). Speed and reliability may also be quantified, the latter in terms of waiting time effects, but a systematic data series is rarely available.

Car ownership. Rising car ownership obviously has major effects, especially when a household moves from the 'Zero car' to 'One car' category, resulting in the loss of around 200-300 person trips per year to the bus system.

Vehicle quality. Increased emphasis has been placed in recent years on improving vehicle quality. As yet, there is little firm evidence for ridership impacts, except in the case of low-floor buses, for which a growth of about 5% may be assumed, averaged from recent cases in Britain. Although access for wheelchair users was the principal rationale for such designs, they form a very small proportion of passengers. However, the low-floor layout is also much more convenient for those with children in buggies, or shopping trolleys, which in turn stimulates ridership growth, especially in the off-peak. In the London case, rapid fleet renewal resulted in all buses being to low-floor layout by the end of 2006.

Population change. Factors listed above will affect trip rate per head. A simple assumption would be that ridership would change *pro rata* to total population. This could be disaggregated by identifying trip rates for categories such as children, pensioners and working-age adults, then applying changes in those to total ridership.

In addition, many other aspects of service quality may be important, as highlighted in the recent report for the 'Ten Per Cent Club' [5]. They include the 'image' of bus travel, better marketing, passenger information, improvements in vehicle quality other than low-floor accessibility, and closer attention to the local market by management. However, it is important to disentangle such effects from those which can be more easily quantified, as described above. For example, if frequencies are increased at the same time as other quality changes, part of the ridership growth may be attributable simply to the increased frequency. One approach is to estimate the expected effect of quantifiable factors, the extent to which these 'explain' the observed ridership changes, and hence the net impacts (positive or negative) attributable to other factors.

OVERALL TRENDS IN BRITAIN

Passenger Trips

Within this paper, the period between the 1995/96 and 2006/07 financial years is examined, and especially that between 1999/2000 and 2006/07. Table One shows trends in bus passenger trips: note that 'trips' as reported by operators to the DfT correspond more closely to 'boardings', i.e. each time a person boards a bus it is regarded as the start of a trip. The Great Britain (GB) total rose by 9.5% between 1999/2000 and 2006/07, but this was the result of a 54% growth in London offsetting an aggregate 3.3% decline elsewhere. However, Scotland and Wales also showed small increases over the period. Net decline was greater in the PTEs, at 8.6%. Note that in the last year shown, free local travel for those aged 60 and over was extended to all parts of England, resulting in some growth, notably in the 'rest of England' category.

Table 1 : Trends in Bus Passenger Trips 1996/97 to 2006/07

Region	1995/96	1999/2000	2005/06	2006/07
London	1193	1294	1881	1993
English PTEs	1358	1213	1111	1109
Rest of England	1303	1297	1204	1269
Scotland	506	455	477	482
Wales	130	117	118	119
GB total	4489	4376	4791	4792
GB excluding London	3296	3082	2911	2979

Trips are shown in millions.

Source **:** Public Transport Statistics Bulletin GB: 2007 Edition. Department for Transport Statistics Bulletin SB(07)22, Table C, and 1995/96 data from 2006 edition supplement, table1.

Bus kilometres run

Bus-kilometres run are shown in table 2

Table Two : Trends in bus-kilometres run 1995/96 – 2006/07

Region	1995/96	1999/2000	2005/06	2006/07
London	353	362	461	465
English PTEs	695	661	565	584
Rest of England	1102	1160	1070	1113
Scotland	350	363	357	377
Wales	123	123	120	124
GB total	2623	2670	2573	2663
GB excluding London	2270	2308	2105	2198

Units : millions

Source **:** Public Transport Statistics Bulletin GB: 2007 Edition. Department for Transport Statistics Bulletin SB(07)22, Table C, and 1995/96 data from 2006 edition, table C

As in the case of passenger trips, London displays strong growth, increasing by 28.5% between 1999/2000 and 2006/07, largely offsetting decline elsewhere, especially in the PTE areas where there was a reduction of 11.6%. Growth also occurred in Scotland and Wales. The ridership growth in London was stronger still, implying an increase in average load per bus, also confirmed by TfL data as rising from 12.7 in 1999/2000 to 15.3 in 2006/07 [6].

Bus-kilometres as such are not an ideal indicator of service supply. They do not show changes in capacity as such (which will also be affected by vehicle size), nor the temporal distribution. For example, elimination of closely-duplicated daytime services of competing operators on trunk routes may have little effect on waiting times, whereas reduction or introduction of evening or Sunday services may represent a radical change in provision. It is noteworthy that in the London case, the greatest growth in bus use been in the evenings, at night, and on Sundays: 78%, 135% and 96% respectively between 1999/2000 and 2006/07[7].

Real fare levels

Turning to real fare changes, data is somewhat more ambiguous. An index is produced by the DfT (on the base 1995 = 100). However, as proportions of bus passenger types change - for example, an increase in free concessionary travel,

or a shift from high cash fares to lower costs using off-bus tickets - a marked change in average fare paid can occur in a short period.

An alternative approach is to estimate average real revenue per trip received from passengers as such, by taking total passenger revenue received by operators, and deducting from this the compensation paid on behalf of concessionary travellers, then dividing this by trips made to give average real revenue per trip. While involving some crude 'averaging out' - for example, between those travelling free and those paying high cash fares - it nonetheless provides an a consistent and explicit indicator. The DfT publish a figure of the passenger receipts per passenger boarding by area, at 2006/07 prices (shown to the nearest penny)[8] . This has been multiplied by total passenger boardings to make an estimate of total revenue, from which concessionary compensation has been deducted to estimate average user payment per passenger trip.

Table 3 shows the estimates from these sources, for the period 1996/97 to 2005/06.

Table 3: Trends in real fares 1996/97 – 2005/06

Region	Data source	1996/97	1999/2000	2005/06
London	DfT index	102.3	105.0	107.8
London	Revenue/trip (p)	-	48.0	43.7
PTEs	DfT index	103.2	110.7	128.1
Rest of England	DfT index	105.1	109.9	128.3
Scotland	DfT index	104.5	111.2	111.1
Wales	DfT index	100.5	109.2	123.4
GB total	DfT index	103.0	109.1	121.6
GB total	Revenue/trip (p)	55.9	63.4	66.4

Sources : Public Transport Statistics Bulletin GB: 2007 edition, table G for the fares index; and Public Transport Statistics Bulletin GB: 2007 supplement, table 1.5 for concessionary fares compensation. 'Real' fares in pence are at 2005/06 prices.

While broad trends from the different indicators are similar, the revenue per trip indicators show a lower change than the DfT index – for example, in London a drop of 9% between 1999/2000 and 2005/06, compared with a rise of 3% in the DfT index. For the GB total, the index over the same period shows a growth of 11%, but real revenue per trip rises by 5%. A shift toward off-bus ticketing, and

growth in free concessionary travel (especially in Wales and Scotland), are the likely explanations. Note that the period covered is prior to the extension of free concessionary travel to all areas within England from April 2006

Observed and expected ridership changes

It could be argued that much higher levels of financial support in London (discussed further below) are a major explanation of the ridership growth. In effect, in a market which is relatively inelastic in the short term, one can 'buy' ridership growth through financing lower real fare levels than would otherwise be the case, and higher service levels, which will produce growth in ridership, albeit not sufficient to cover the extra costs.

In considering what changes in ridership might be expected, prior to considering other factors, it is useful to estimate the expected effect of bus-kilometre and real fare changes. Short-run elasticities of -0.4 (fares) and +0.4 (bus-km) have been applied in table four to illustrate changes between 1999/2000 and 2005/06.

In the London case, it is clear that growth is much greater than would be expected from the real fares and service level changes alone, these accounting for only about one third of the growth on the revenue per trip basis.

Table Four: Actual and Expected ridership changes due to real fare and service level changes 1999/2000 – 2006/07

Region	Basis of real fare Change	Actual	Expected
London	Revenue/trip	+54.0	+17.8 (+24.7)
PTEs	Revenue/trip	- 8.6	-10.5 (-14.4)

Units: percentage changes on a base of 1999/2000

Data shown in the 'expected' column is based on short-run elasticities of -0.4 and +0.4 for real fares and bus-kilometres respectively, with data in brackets on the medium-run values of -0.55 and +0.55 respectively. A fuller example of the method of calculation is shown in the detailed discussion on PTE trends later in this report.

For all three regions in England, the outcomes are substantially better than would be expected from applying the published changes in net revenue per trip and bus km run. In London, the net difference (using short-run elasticity values) is 36.2 percentage points, in the PTEs 1.9 percentage points. Initial calculations for the rest of England also suggest a positive difference, due to a low traffic loss in relation to the increase in real revenue per trip.

Applying medium-run elasticities of -0.55 for fare and +0.55 for service level produces somewhat greater expected change. In the case of London, this reduces the difference between observed and expected outcomes (since real fares fell and service levels rose) to 29.3 points, but increases to 5.8 for the PTEs.

EXOGENOUS FACTORS

One would expect population change to affect ridership as described above. Nationally, population grew by 3% between 2001 and 2006, and also in the London case, but by 4% in inner London[8].

Car ownership growth has been very low in London, the level per capita rising from 0.324 in 1996 to 0.330 in 2006[9] , i.e. by about 1.9% - note that total cars in the London area have risen slightly faster, due to population growth. This contrasts with much greater growth nationally, from 0.376 in 1996 to 0.450 in 2006[10], i.e. by 19.7%. Growth was especially strong in some of the regions which traditionally had low car ownership, such as the North East. In such cases, many of the new cars represented the first car in previously non-car households, with particularly marked effects on bus ridership. Hence, in the London case, car ownership trends do not represent a 'growth' factor as such, but rather the absence of a negative factor.

Generally speaking, car ownership is seen as an exogenous factor, driven primarily by population growth, real prices and rising real incomes, rather then being influenced by public transport service provision. However, a noteworthy feature in the London case is the low level of two-car households – 17% in 2005/06, compared with 32% nationally. It could be argued that the very extensive public transport network (notably at evenings and weekends as well as the working day) enables a lifestyle without the car to be much more feasible than elsewhere. However, it would be very difficult to disentangle this factor from other constraints on car ownership, such as limited parking provision (both at home and other destinations). Hass-Klau et al[30] have suggested that relationships can be identified in a number of cities, including London, between higher public transport service quality and lower growth in car ownership.

OTHER FACTORS AFFECTING GROWTH IN LONDON

A fuller analysis of London trends to 2005/06 as such is provided elsewhere by the author[12]. In addition to effects of lower real fares and higher service levels, about 5% of the growth can be attributed to implementation of the congestion charge in 2003, up to 5% to achieving a complete low-floor fleet, and 3% to rising population (on *pro rata* basis)

This leaves a large proportion still be explained by the factors other than those readily quantified in time-series analysis. Possible contributory factors are:

Greater stability in patterns of service provided

More comprehensive coverage of service, by time of day and day of week. In addition to evening, Sunday and all-night services, it is also noteworthy that London provides a consistent and fairly high level of service on most public holidays, with the exception of Christmas Day. Conversely, even in other large conurbations in Britain, levels of service in the Christmas/New Year period in particular are low and inconsistent (operators may not be willing to run their normal levels of commercial service on these days, and the ability of PTEs and local authorities to fill the gaps by tendering varies). This may affect attitudes toward

bus use and car purchase. The growth in Sunday shopping has reversed the decline in demand on this day of the week previously found, and operators are improving services to reflect this. London has retained a higher level of service during this day of the week, which has been further improved in recent years. A systematic approach has been adopted to network planning, in which data is collected on current passenger movements, and proposed changes are assessed to compare passenger benefits with changes in costs.

Bus priority

Very extensive bus priority provision, in the form of bus-only nearside lanes, priority at junctions, etc. The ability of TfL to initiate such measures London-wide is an important benefit, and red routes provide higher levels of enforcement of kerbside parking restrictions. The high proportion of off-bus ticketing can be seen as complementary to bus lane provision, both helping to speed up services and improve reliability. Conversely, where substantial proportions of cash fare payment remain these continue to slow buses down and might also affect the political acceptability of bus lanes (if buses are seen to occupy a bus lane for substantial periods while payments take place at bus stops, this may not be the strongest way of justifying bus lanes to motorists).

Information

Comprehensive passenger information at stops. A single, co-ordinated network makes it easier to provide consistent up-to-date information. Use of ‘spider maps’ has enabled clearer information to be given to users. It is noteworthy that in the national ratings given by bus users for service quality, London is noticeably higher in this respect, at around 74% compared with 65% in metropolitan areas[11]. This also reflects the efforts made by the transport authority in updating such information.

Fares

Simplified fares, with almost complete elimination of cash payment on buses. The latter has applied for some time within the central area and the whole length of routes run by articulated single-deckers. Over the network as a whole, only about 3% of passengers now pay cash. Even outside the central area, the proportion of cash fare payment is now very low, around 5%.

Interchange

Ease of interchange. Considerable improvements have taken place in signing and layout. Extensive use of tickets as such travelcards and Oyster pay as you go reduces or eliminates the financial penalty imposed by interchange, enabling users to select the most appropriate route through the network – for example, taking the first bus to arrive at stop and interchanging en route rather than waiting for a less frequent through service. However, this could cause some exaggeration of the number of linked trips.

Other Factors

The use of Quality Incentive Contracts (QICs) has helped to raise service quality, but can involve additional costs (for example, an extra bus and crew to improve reliability in maintaining a given frequency).

It could be argued that some of the bus growth has simply represented a transfer of the growth trend previously associated with the Underground, on which demand growth 'flattened out' between 2000 and 2005. So far as off-peak traffic is concerned, there may be some validity in this, and bus service expansion coincident with congestion charging in 2003 partly reflected an inability of the underground to take more peak traffic. However, by journey purpose the Underground is dominated to far greater extent than bus by the adult journey to work and radial trips to the central area, in which the bus market share is small. The majority of bus use and growth is outside the central area, but only about 21% of underground trips do not involve zone one. While some bus routes outside the central area do parallel underground lines, this would only apply to a very small proportion of the total bus network.

For example, in 2001/02, 78% of all bus trips did not involve zone one, while in 2006/07 the percentage was 77%[31]. These were equivalent to 1115m and 1446m trips respectively. Hence of the net growth in trips of 450m over that period, 331m (74%) occurred wholly outside zone one.

A COMMENTARY ON TRENDS IN BUS USE IN THE PTE AREAS 2000 TO 2006

Changes in bus use

Following the national picture described above, trends in the six English PTE areas were examined in aggregate for the period 1999/2000 to 2006/07, using the latest available statistics[13]. The main results are summarised in table five.

During this period total trips reported by bus operators to the DfT fell from 1203 million to 1109 million, an aggregate change 104 million, or 8.6% over the eight-year period (seven year-on-year intervals), or just over 1% per annum, a somewhat lower rate than in previous years. The change in the final year (2005/06 to 06/07) was very small, at -0.2%, probably due to expansion of free travel for those aged 60 and over within all districts in England from April 2006 (however, this had much bigger impacts outside the PTEs where previous schemes were less generous).

Over the same period, bus-kilometres run fell from 661 to 584 million, by 77 million (or 11.7%). Average revenue per passenger reported by the DfT rose by 18.8%. This would appear to include concessionary fare compensation as revenue to operators. If this is deducted, then a lower revenue per trip (representing costs perceived by passengers, on average) is found, for example 59 pence instead of 82 pence in 2006/07, and the overall increase over the period becomes 15.5%.

One would thus expect, on typical short-term elasticities (-0.4 for real revenue per trip, and +0.4 for bus-km), a drop of about 6% due to the increase in real revenue per trip and a further 5% due to reductions in bus-kilometres.

Table Five: Changes in bus use in PTE areas 1999/2000 – 2006/07

Year	Passenger Trips(m)	% change yr-on-yr	Real rev. (p/trip)	% change	Bus-km (m)	% change yr-on-yr	Expected (index)
1999/2000	1213		51.0		681		100
2000/2001	1203	-0.8	54.6	+7.2	654	-1.1	96.7
2001/2002	1196	-0.6	54.9	+0.4	646	-1.2	96.1
2002/2003	1182	-1.2	56.7	+3.4	630	-2.5	93.8
2003/2004	1162	-1.7	58.6	+3.3	596	-5.4	90.6
2004/2005	1128	-2.9	61.5	+5.0	575	-3.5	87.5
2005/2006	1111	-1.5	66.5	+8.1	565	-1.7	84.1
2006/2007	1109	-0.2	58.8	-11.6	584	+3.4	89.2
Change over whole period							
(on short-run elasticities)	-8.6%		+15.5%		-11.6%		-10.6%
(on medium-run elasticities)	-8.6%		+15.5%		-11.6%		-14.4%

Notes:

Data taken from 'Public Transport Statistics GB: 2007 Edition supplement' DfT November 2007, tables 1.1 and 1.3
Revenue per trip is calculated by deducting concessionary fares compensation from revenue per passenger trip, at 2006/07 prices.
'Expected' trips are calculated assuming short-run elasticities of -0.4 for real fares, and +0.4 for bus-kilometres, and medium-run of –0.55 and +0.55 respectively.

As a compound effect, the reduction would be about 10% (10.6% by simply applying short-run elasticities to changes measured over the period as a whole, or 10.8% if calculating cumulative change on a year-by-year basis). If slightly higher medium-run elasticities of -0.55 and +0.55 were applied to changes over the whole period, the slightly higher reductions would be estimated, of about 8.5% and 6.4% respectively, a compound change of about 14.4%. Hence, while the drop in trips is worrying, the impact is less than would be expected due to these factors alone.

The appropriate elasticities would also depend on circumstances. For example if closely-duplicating daytime commercial services are cut back, and a good frequency is retained, then a smaller value than +0.4 for bus-km could be appropriate. Conversely, reductions when services are already thin (for example,

at evenings and weekends) could have a higher elasticity. In the absence of any reliable disaggregated evidence, there is no good reason to use values other than the typical ones as assumed above for estimation of the expected overall change.

Exogenous factors

In addition to these effects associated directly with price and quality of service (for which bus-km run is a proxy), we would also expect two major exogenous factors to be important, as discussed earlier:

1. Change in population.
2. Increases in car ownership.

While it is often considered that population is in decline in the metropolitan areas, in aggregate the changes are very small. The 2001 census indicates a total of 10.822 million people[14] in the six metropolitan areas (aggregated from component districts). In 2004 this figure was marginally lower, at 10.761 million (a drop of -0.56%), but ONS forecasts suggest a recovery to 10.794 million in 2007[15], only very marginally below the 2001 figure, and a difference of -0.26%. Hence, this factor has very little effect over the period considered.

Car ownership is much more marked in its effects. Cars per household in the metropolitan areas rose from 0.87 in 1999/2001 to 1.00 in 2006, or by about 13%[16]. There was a marked decline in the percentage of households owning no cars (from 38% to 31% over the same period) and a rise in those owning two or more (from 20% to 26%), while one-car households were the same in each year at 42%. The latest (2006) NTS data indicates that each person in a one-car household makes 199 bus stages per annum, in a one-car household 60, and in a household with two or more cars only 29[17]. Hence the biggest net difference is the drop of 139 stages per person per year in the shift from a zero-car to one-car household. Furthermore, the total loss of trips will be a function of the number of people in the household. The current national average is 2.4[18].

Multiplying these factors together, one could estimate that a reduction of about 11% in bus travel in the metropolitan areas would be due to rising car ownership if a constant household size were assumed.

In practice, zero-car households tend to be smaller (for example, pensioners), with an average size in 2006 of only 1.7, whereas those with 2 or more cars (typically families with children) have an average size of 3.1. Allowing for this factor[19], a drop of about 9% would be expected. Fuller details are shown in table 6. In practice, the situation is somewhat more dynamic, since average household size and bus stages per person in households of different car ownership levels are themselves changing over time, but such effects are unlikely to make much difference to calculations over the short period considered here.

Table 6: Estimated car ownership in metropolitan areas

Period	Cars per household	% of households by car ownership		
		0	1	2 or more
1999/2001	0.87	38	42	20
2003	0.91	35	41	24
2004	0.91	34	44	22
2005	0.99	32	41	27
2006	1.00	31	42	26

Source : National Travel Survey for periods shown as quoted in 'Transport Statistics Great Britain' 2003 table 3.14(c), and 2004 to 2007 inclusive, table 9.14(c).

Expected changes versus the outcome

It would thus be reasonable to conclude that, if these effects of rising car ownership, and higher fares/lower service levels were combined, then over the period 1999/2000 to 2006/07, we would expect to have seen a drop in bus use in the metropolitan areas in aggregate of about 20%. The actual reduction of about 9% is therefore much less worse than would be expected. While the residual difference is not as great as in London (in that case, a larger than expected growth, allowing for increases in service and some reduction in real revenue per trip) it is nonetheless positive. Likely factors include:

1. Growth in low-floor buses. The DfT bus passenger satisfaction survey indicates that of 49% respondents in metropolitan areas reported using a low-floor bus in 2000/01, rising to 78% in 2006/07[20]. Conversion to low-floor access would be expected to produce an increase of about 5% in ridership on the routes concerned.

2. Improved transport infrastructure, notably higher quality interchanges in some areas (for example South Yorkshire), together with bus priorities.

3. Marketing initiatives by operators and PTEs, including a greater use of off-bus ticketing (while less than in London), which helps to speed up services and makes their use more convenient. The percentage of bus passengers paying a cash fare on the vehicle in the metropolitan areas fell from 38% in 2000/01 to 29% in 2006/07[21].

Where have the lost passengers gone?

To large extent the reduction in bus trips is simply that which would be expected as a result of rising car ownership and use. However, it is also likely that households dependent on buses will have reduced their use as average service levels have declined and real fares have risen.

A shift to rail is another possible factor. Aggregate ridership on the 'heavy rail' (TOC-provided) services in PTE areas rose from 95 million in 2001/02 to 120 million in 2006/07[22], or by 26%. In addition, light rail use rose from 63m trips in 1999/2000 to 77m in 2006/07[23], or by 14 million (about 22%).

Hence, rail use in the six metropolitan areas grew in aggregate by about 40 million trips between 1999/2000 and 2006/07, compared with a decline in bus use of 104 million. However, it would be unwise to assume that the same users have shifted, except perhaps where tramway-style light rail systems offer similar accessibility for short trips (notably in Sheffield). There has been a substantial growth in office-based employment, especially in the finance and business services sector, in a number of older industrial cities, as well as in London. This has helped to revive the central areas of such cities, as can be seen in Leeds, for example. This may have provided particular benefits for rail systems, which focus on the conurbation centre and the journey to work to a much greater degree than buses, and often serve more affluent suburban areas. Hence, there may be a net shift to rail, but this could be the result of new types of journey and user rather than a direct shift from bus.

Local Variations

Table 7 gives trends for each PTE in bus passenger trips. Most are fairly close to the overall trend in table 1 of -8.6% over the period 1999/2000 to 2006/07, but a markedly greater drop occurred in Tyne & Wear (possibly a function of local car ownership growth), and a net increase of about 6% in Greater Manchester (rising from 205m in 1999/2000 to a peak of 223m in 2003/04, then falling slightly). The latter may be associated with marketing initiatives by operators, notably Stagecoach, which has expanded the role of its ‘Megarider’ period ticket, and engaged in initiatives such as the ‘Unirider’ student card. However, it should be borne in mind that the Greater Manchester figure grew from an exceptionally low base in terms of trips per head, and remains the lowest of the six PTEs.

There does not seem to be a notably inverse correlation with rail trends. The Tyne & Wear Metro saw only modest growth during this period, despite network extension, from 33m to 38m trips, i.e. 5 million (compared with a decline in bus trips of 30 million). Manchester saw a rise in ridership on heavy rail services and Metrolink as well as in bus use. Hence factors such as the general condition of the local economy may be more influential

Table 7 : Bus passengers in each PTE area

Area	Bus trips (millions)		Bus Trips per head	Percentage change	PT* trips Per head
	99/2000	2006/07	2006/07	99/00 – 06/07	2006/07
Tyne and Wear	154	124	115	-19.5%	151
Greater Manchester	205	217	85	+5.8%	101
Merseyside	166	150	111	-10.7%	138
South Yorkshire	133	116	90	-12.8%	106
West Yorkshire	198	185	86	-6.6%	97
West Midlands	357	317	122	-11.2%	137

Source : Public Transport Statistics Bulletin GB: 2007 edition, table E
Trips per head calculated using ONS population estimates for 2006[15]

* Public Transport trips per head, 2006/07 figure, based on bus trips, plus light rail, and heavy rail (latter for 05/06)

NB data is that reported by bus operators to DfT, with may differ slightly from that collected directly by PTEs.

OTHER POLICY ISSUES SPECIFICALLY APPLICABLE TO THE PTE AREAS

While the trends in recent years suggest a less worrying picture than in the early years of deregulation, it is nonetheless noteworthy that a low per capita ridership is found in the major conurbations outside London within Britain, both in comparison with London itself and major cities elsewhere in Europe. For example, on a 2001 base (the 2001/2 bus passenger total and 2001 census population estimates as already quoted in this paper) the average per capita ridership in the PTE areas by bus was about 110, falling to about 102 in 2006/07. If heavy and light rail trips are included, the latter figure rises to about 110. In contrast, the London figure (including an estimate for national rail trips within London) is about 428[24]. This can also be seen in market share.

The UITP database of 43 ‘Millenium Cities’ (most in Europe, of about one million and above) indicates an average number of public transport journeys per head of population of 360 in 2001, and a market share of 30.6%[32]. Although this figure is affected by inclusion of some cities with very high per capita trip rates and market shares (including Hong Kong, Singapore and indeed London itself) it also includes some cities in lower-density, high car ownership categories such as Melbourne and Chicago.

A detailed set of case studies by Hass-Klau et al[30] indicates values for recent years in a number of regional centres in France (all, in fact, below one million population): Nantes 182, Grenoble 174, Montpellier 131 and Rouen 102. They likewise provide estimates for a range of smaller centres in Germany (the largest being Hannover at 0.52 million): Karlsruhe 380, Freiburg 330, Hannover 290, Köln 250. The German figures may be relatively overstated by referring to the cities only rather than the whole metropolitan area, and the element of bus/rail transfer

may also result in some double-counting, but nonetheless the contrast is a stark one.

While there is a considerable double-counting in the London case, due to greater bus/bus and also extensive bus/underground, rail/underground and bus/rail interchange, the very striking difference is clear. Indeed, the overall PTE figure is lower than that in some smaller, compact urban areas with good levels of bus services, such as Reading at 140 and Brighton at 142[25]. Considerable variation exists within the PTEs, the highest bus figures being found in Tyne & Wear (115) and West Midlands (122). A particularly relevant comparison is that with Lothian Buses in Edinburgh, which remains in public ownership. Patronage has grown substantially in recent years, to give a per capita trip rate of 188 in 2006[26]. The operator is currently profitable, generating funds for fleet replacement. While subject to the deregulated regime, it has retained a strong position despite competition from one of the major private groups on some corridors. The Nottingham area also features a high level of bus use, with reported growth on Nottingham City Transport (NCT) and marketing initiatives by the TrentBarton company. NCT's bus ridership grew by about 3% p.a. up to 2003/04 to reach 73.2m in 03/04, but then fell to 67.4m in 04/05[27]. However, this was offset by growth in tram ridership following system opening in March 2004, to give an aggregate bus + tram trip volume of 75.9 million in 04/05, with further growth since. NCT serves a somewhat larger area than the city itself, but other operators such as TrentBarton can also pick up within the city. Taking a catchment population of about 400,000 this would give a trip rate of about 190.

A similar pattern is also evident from NTS data, indicating fewer bus stages per head in the metropolitan areas than London. Also, if the market is disaggregated by frequency of bus use within the population, it is noteworthy that the metropolitan areas in Britain have a rather low proportion of the population using buses at least once times per week - 36% compared with 51% in London and not greatly above other urban areas of 250,000 and over within Britain of 27%[28].

These differences have emerged over a very long period, associated with major investment in rail and other fixed-track systems. However, there are noteworthy cases elsewhere in Europe where such investment has been relatively recent (for example, in major French cities such as Lyon).

The current position in Britain suggests that such large-scale investment is relatively unlikely in England in the near future (a difference can be observed in Scotland, notably the investment in Edinburgh's tramway). However, a considerable scope may exist for bus rapid transit (BRT) at much lower costs than rail systems, also enabling phased introduction.

Another area worth exploring would be the scope for more extensive park and ride provision in PTE areas. This is found to some degree on heavy rail systems (e.g. in the West Midlands), but only a very limited degree on light rail (the main cases in the British Isles being Nottingham and Dublin rather than Manchester or Sheffield for example). A recent report by CPT has suggested that more scope for bus-based P&R exists[29]. That report also suggests scope through a number of measures of increasing bus ridership by about 10%, varying in PTE areas

(although the exact basis of calculations is not explicit). It also includes many other examples of bus growth in recent years, although rather oddly omitting London as such.

APPLICATION OF LESSONS FROM LONDON TO THE REST OF BRITAIN

As indicated earlier, it is naïve to attribute all of the growth in bus use in London to factors that may be easily replicated elsewhere in Britain. However, even allowing for the effects of greatly increased public spending enabling lower real fares than would otherwise be the same, and much higher service levels (and hence ridership growth), the congestion charge, some population growth, and negligible car ownership growth, we are still left with a substantial proportion of the observed growth due to other factors.

The government has now produced a Bill and supporting documents, which would reform bus deregulation outside London, making it slightly easier (although still difficult) to introduce quality contracts (approximately equivalent to the London tendering system) and also changes in the application of competition rules, which currently hinder inter-operator co-operation in ticketing and timetabling. In this respect London could be seen as fortunate in not being subject to the role of the Office of Fair Trading and the Competition Commission in respect of its bus service provision, enabling a simple system of comprehensive ticketing, route planning and passenger information to be provided.

I suggest that the elements of the London case most readily transferable to other areas would be:

- greater stability of service, avoiding frequent network and timetable changes, and continuity of provision through the year (including public holidays)

- a simple fare structure, associated with a very high proportion of off-bus ticketing, which in turn improves speed and service reliability.

- comprehensive evening and Sunday services, rather than limiting good frequencies to the Monday- Saturday daytime period

- comprehensive passenger information at stops, assisted by real time displays, etc.

It is noteworthy that some of the more progressive companies in the deregulated regions also display similar features, such as the flat fares in Brighton & Hove, and reintroduction of commercially-registered evening and Sunday services by operators such as TrentBarton and Harrogate & District.

The current Local Transport Bill and associated documentation sensibly propose to avoid a ‘one size fits all‘ approach, but to offer a range of opportunities for quality contracts or strengthened quality partnerships. What is important from the research angle is that a meaningful sample of each type of scheme is developed, and monitored systematically, so that lessons may be drawn, rather than prolonging an argument about whether the differences in London are due to

unique factors or to elements which can be replicated. For this purpose, it is essential to avoid extreme situations (such as cases where there have been particularly unstable patterns of service) since they will not be representative of the broader picture, and hence results from them will be of little value in guiding future policy. The very comprehensive nature of statistics available in London – used extensively in this paper – is currently not matched elsewhere – and introduction of more comprehensive data collection in those areas where new policies may be tried is essential for effective monitoring to take place.

REFERENCES

1. White, Peter R. 'Bus Deregulation: a welfare balance sheet' Journal of Transport Economics and Policy September 1990, pp 311-332.

2. Public Transport Statistics Bulletin GB: 2007 Edition. Department for Transport Statistics Bulletin SB(07)22, September 2007.

3. London Travel Report 2007. Transport for London, December 2007

4. Balcombe, R., R. Mackett, N Paulley, J.Preston, J.Shires, H.Thitheridge, M.Wardman, P.White *The demand for public transport: a practical guide*. Transport Research Laboratory report TRL593, April 2004.

5. Ten Per Cent Club *Routes to Revenue Growth : the message from nine successful bus services*. Local Transport Today, London, November 2006.

6. London Travel Report 2007. Table 3.3.1

7. London Travel Report 2007, chart 3.3.2 (from 'data' file in <www.tfl.gov.uk>,downloaded 12 March 2008).

8. London Travel Report 2007, Table 7.1.1

9. Derived from London Travel Report 2007, tables 7.1.1 and 4.4.

10. Derived from Transport Statistics Great Britain 2007 Edition table 9.1 (car ownership) and National Travel Survey 2006 table 1.1 (population).

11. Department for Transport *Bus and Light Rail Statistics GB* : October - December 2006, Transport Statistics Bulletin SB(07) 09, March 2007, Table 1.2.

12. White, Peter 'Factors behind recent patronage trends in Britain and their implications for future policy. Paper at Tenth International Conference on Competition and Ownership in Land Passenger Transport ('Thredbo10'), Hamilton Island, Australia August 2007 (unpublished)

13. From Public Transport Statistics Bulletin GB: 2007 Edition Supplement. Department for Transport November 2007 (only published via the website <www.dft.gov.uk/transtat>), table 1.1.

14. From 'Census 2001: First results on population for England and Wales' National Statistics/TSO 2002, Table P1.

15. From 'Metropolitan District Population Projections 2004-based', National Statistics, downloaded from <www.statistics.gov.uk.downloads/theme_population/>, 7 February 2008.

16. From NTS data, as reported in Transport Statistics Great Britain annually (from table 3.14(c) in the 2003 edition and table 9.15(c) in subsequent editions. The NTS sample size was limited prior to 2002, hence three-year averages were used for regional breakdowns in earlier years.

17. Data from NTS, as reported in Public Transport Statistics Bulletin GB: 2007 Edition Supplement, table 3.3.

18. From 'National Travel Survey: 2006' DfT Statistics Bulletin SB(07)21, September 2007, table 1.1, ratio of 'weighted interview samples' of households and individuals.

19. From London Travel Report 2007 (Transport for London December 2007), Table 4.3.1, reporting NTS data.

20. Public Transport Statistics Bulletin GB: 2007 edition, DfT Statistics Bulletin B(07)22, September 2007, table 1.6

21. Public Transport Statistics Bulletin GB: 2007 edition, DfT Statistics Bulletin SB(07)22, September 2007, table 1.3

22. Data provided to the author by PTEG.

23. The sum total of Tyne & Wear Metro, Manchester Metrolink, Sheffield Supertram and Midland Metro, from Public Transport Statistics Bulletin GB: 2007 edition (DfT Statistics Bulletin SB(07)22, September 2007) table D

24. Derived from London Travel report 2007 (TfL). Sum total of trips for bus (table 3.3.1), underground (table 3.4.1), DLR (table 3.6.1), Train Operating Companies within London (table 3.5.1), and Croydon Tramlink (table 3.7.1) of 428 million, divided by population of 7.51m (table 7.1.1).

25. Emmerson, G. 'Three issues dominate 'third way' bus regulation' (quoting data from LTP2 submissions) in Local Transport Today 10 August 2006, page 17

26. Lucy Tennyson 'Shuttle success' Coach and Bus Week 30 May 2007, pp 10/11 (minibus supplement).

27. Coach and Bus Week 17 Jan 2007, p19

28. Special tabulations from 2005 NTS

29. Moving Forward: New Opportunities, New Passengers, Confederation of Passenger Transport, November 2007

30. Carmen Hass-Klau, Graham Crampton and Andreas Ferlic 'The Effect of Public Transport Investment on Car Ownership: the Results for 17 Urban Areas in France, Germany, UK and North America' ETP, Brighton 2007. See pp 83, 117 and 140.

31. Derived from ‘London Travel Report 2002 (TfL 2001) table 2.1 and London Travel Report 2007 (TfL 2007) table 1.2.1

32. Jean Vivier ‘Mobility in Cities Database: Analysis and Recommendations’ UITP, Brussels, 2006.

PRW April 2008