The shape of changing bus demand in England

Scott Le Vine & Peter White

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Note that the evidence and analysis presented here remains the responsibility of the authors and should not necessarily be taken to represent the collective view of the ITC.

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Executive Summary

1. Introduction

1.1 Since the start of the twenty-first century we have seen major changes in road and rail travel behaviour in Britain. The Independent Transport Commission (ITC) has a central research interest in this fundamental topic. Using National Travel Survey (NTS) data we have illustrated the nature of these changing travel trends though our 'On the Move' reports. The most recent edition, compiled by Peter Headicar and Gordon Stokes, demonstrated that bus use outside London has seen a significant decline over the past decade.[1]

1.2 This report explores what has been happening to bus travel demand in England since the late 2000s, and investigates how the bus market has been changing in recent years. More journeys are made by bus in England than on any other mode of public transport, but recent years have seen falling usage in spite of significant population growth.

1.3 In the longer term, the fall in bus patronage is even starker, with local journeys in Britain down more than 60% since the heyday of the bus in 1960.[2] Nonetheless, the bus remains an important source of mobility in England, particularly for people on lower incomes. The ITC has therefore commissioned this research study to investigate recent changes to bus demand and the overall bus market in England. The authors, travel demand experts Dr Scott Le Vine and Emeritus Professor Peter White, have used NTS data as well as the findings from other recent studies on bus demand to provide a picture of these changes. We anticipate these findings will be helpful to both policy makers as well as the wider bus industry in understanding better this complex travel market.

2. Overall Trends

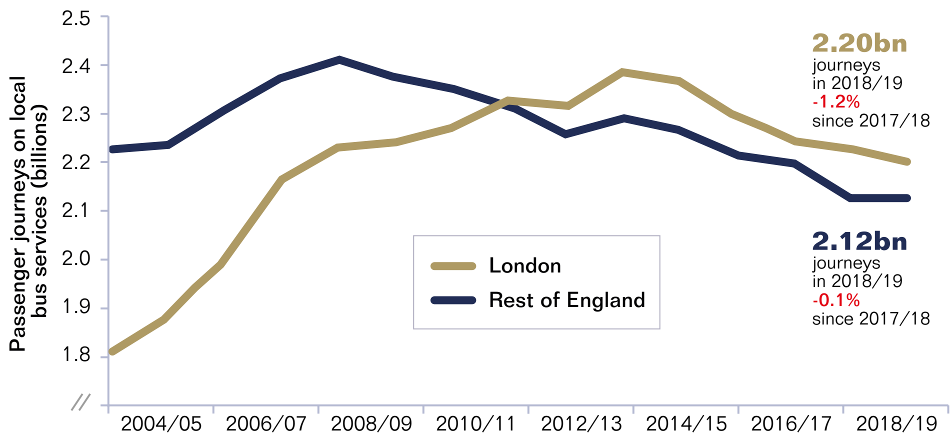
2.1 Bus use in England, measured by passenger journeys[3], has trended downwards since around 2008 outside London, and since around 2014 in the capital. These trends can be seen on the following page (Figure 1), with the number of bus journeys in England outside London falling by about 15% since the Great Recession of 2008. However, in London bus use saw substantial growth in the first decade of the century, and today patronage is still higher than in 2000. It is important to note though, that the bus market in London has different characteristics to the rest of England, with a much higher proportion of the population being regular bus users, and it operates under a differently regulatory framework. For the purposes of this report the analysis separates out London from the rest of England.

1 Peter Headicar and Gordon Stokes, On The Move 2: Making sense of Travel Trends in England 1994-2014 (Independent Transport Commission, 2016), available at: http://www.theitc.org.uk/wp-content/uploads/2016/11/OTM2-Technical-Report-FINAL.pdf

2 Department for Transport, Transport Statistics Great Britain (2019)

3 'Journeys' are defined by bus operators as commencing each time a passenger boards a bus (traditionally when a ticket was purchased), corresponding to 'boardings' in NTS data. In aggregate, these two indicators have matched quite closely for England outside London, but in the last three years there has been a marked difference in trends shown, with operator-reported data showing a gradual year-on-year decline, but NTS showing much greater fluctuation. This is discussed further in Appendix 4.

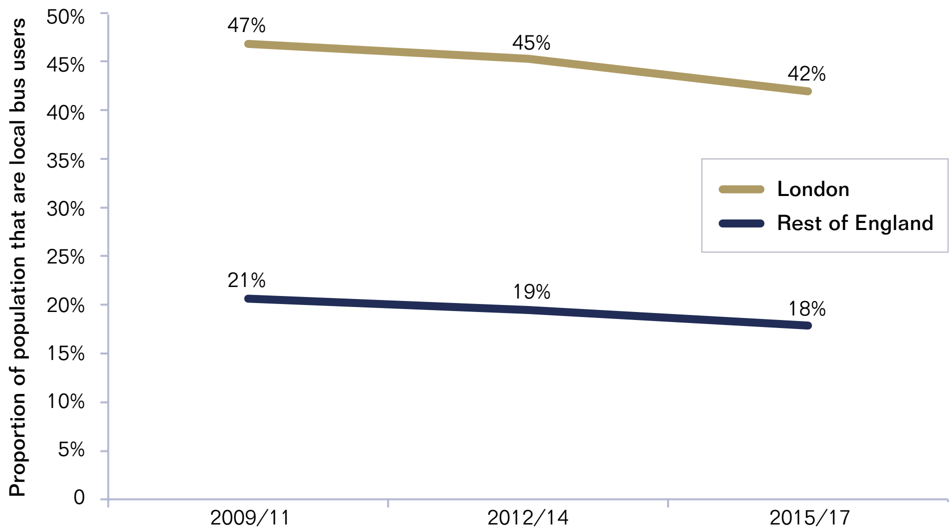
Figure 1: Local Bus Passenger Journeys in England, 2004/05 to 2018/19



(Source: DfT, Annual Bus Statistics England 2018/19)

2.2 The researchers have found that the decline in bus use in England over the past decade is largely due to a fall in the proportion of the population who are bus users, rather than existing bus users travelling less often. This shrinking market can be seen in Figures 2 and 3 below. Figure 2 shows that the proportion of the English population who are 'bus users' (defined as making at least one bus boarding in the NTS seven-day diary period) has declined since 2009 from 47% to 42% in London, and from 21% to 18% outside of London.

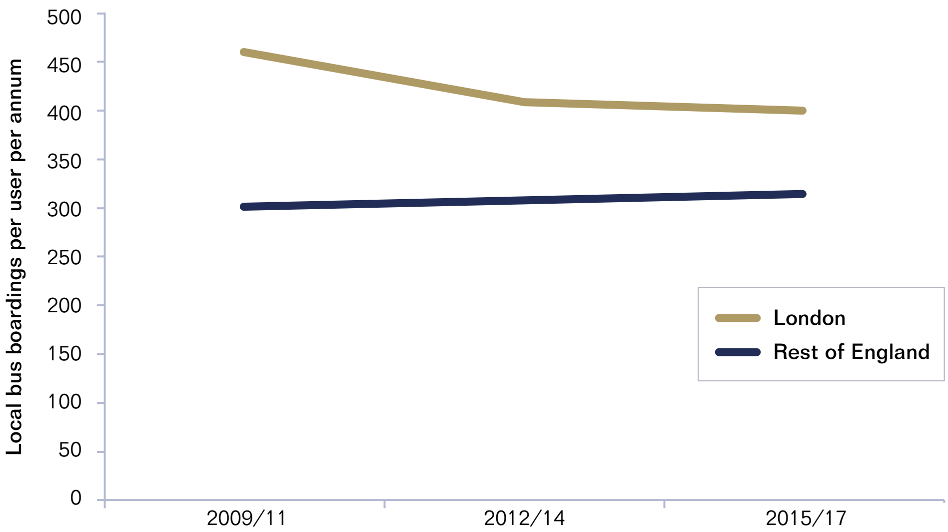
Figure 2: Percentage of the population who are local bus users in London and in the Rest of England, 2009/11 to 2015/17



(Source: NTS)

2.3 In Figure 3 we can see that, in contrast to this decline in the percentage of the population who are bus users, those people outside London who are still using buses are making about 5% more boardings per annum than in 2009. This increase in the intensity of bus use by bus users outside London suggests that the bus market is becoming focused on a smaller number of high-intensity users. Interestingly, this is the opposite trend to that the ITC has identified in the rail market, where demand growth has arisen from the rail market capturing a higher proportion of the population, rather than from pre-existing train users travelling more.

Figure 3: Annual bus journeys made per bus user in London and Rest of England, 2009/11 to 2015/17



(Source: NTS)

2.4 The researchers have explored some of the theories offered to explain this decline in the bus market. One theory is that bus service supply has declined since the turn of the century. Local bus mileage has indeed fallen in England outside London since 2000 by over 15%, coinciding with the declining bus ridership; however, by contrast bus service mileage has increased steadily in London over the same period, so does not satisfactorily explain the recent falls in ridership there.

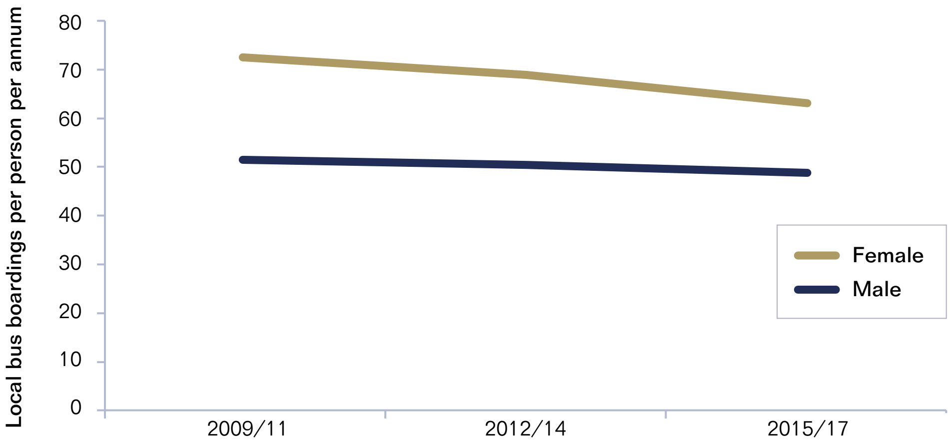
2.5 A further issue has been changes in ticket types and fares. The extension of free travel for pensioners after 2006 substantially boosted bus travel, but this has been in some respects a temporary phenomenon. After reaching a peak in 2010, such concessionary travel by bus has reduced from 753 million trips in 2010-11 to 611 million in 2017-18 as the age for eligibility has increased, and successive cohorts of pensioners are more likely to have cars and driving licences (a trend identified in the ITC's original 'On the Move' report). Outside London, the researchers found that bus usage has increased the most by those holding non-concessionary bus pass.

2.6 One of the most prevalent theories about bus use is that it has lost market share to private hire services (such as Uber) and taxis. These are often seen as potential competitors to local buses, notably in offering the convenience of door-to-door journeys over shorter distances. However, while private hire services have expanded in recent years, the NTS data does not show a corresponding increase in trip rates by this mode of travel. This suggests that, while there may be some very localised examples of a shift from bus travel to private hire/taxi use, it cannot explain the general decline in bus use to any noteworthy extent.

3. The shape of the bus market – demographic factors

3.1 To understand the changing shape of the bus market, the researchers have explored changing bus use by a variety of individual factors, including age, gender, income, journey purpose and car ownership. In terms of variations by gender, Figure 4 shows that women still make more journeys by bus than men, as they historically have done, but the gap is narrowing. While local bus travel by women outside London has fallen by about 15% since 2009, for men the decline has only been about 6%. In terms of age cohorts, the researchers found that the highest rates of bus journeys are amongst older teens aged between 17 and 20, particularly females, and it is this group which has seen a particularly strong fall in bus usage. Travel by bus is lowest amongst middle aged groups before rising again for the over-60s.

Figure 4: Annual bus journeys per person, categorised by gender, 2009/11 to 2015/17



(Source: NTS)

3.2 Table 1 below shows how bus usage has been changing relatively amongst different age and gender cohorts. The overall picture demonstrates that the bus market has been declining amongst all groups with a smaller proportion of the population in each group being bus users today than in 2009-11. However, the intensity of travel by existing bus users (measured by miles per tripmaker per year) has increased in all cohorts except for women over the age of 60. This could reflect the fact that the proportion of older women who own cars and are licence holders has increased (since bus use is inversely linked with car use). Interestingly, the intensity of bus use by existing users has increased the most amongst younger men aged from 17 to 39; this is also the category that has seen the least shrinkage in the proportion of people overall who are bus users.

Table 1: Trends by age/gender cohort in trip-making by local bus, change between 2009/11 and 2015/17

	% pop'n making trips		Trips per year per tripmaker		Miles per trip		Miles per trip maker per year		Miles per person per year	
	2015/17	Change from 2009/11	2015/17	Change from 2009/11	2015/17	Change from 2009/11	2015/17	Change from 2009/11	2015/17	Change from 2009/11
All Persons	18%	-14%	314	4%	4.6	4%	1,447	9%	258	-6%
Children (Under age 16)	16%	-13%	297	5%	4.4	8%	1,303	13%	211	-2%
Men 17-39	18%	-9%	355	14%	5.2	1%	1,835	15%	322	5%
Women 17-39	23%	-14%	336	5%	4.9	7%	1,631	12%	369	-4%
Men 40-59	9%	-16%	329	9%	4.6	1%	1,520	10%	140	-8%
Women 40-59	15%	-16%	306	-1%	4.2	8%	1,294	7%	188	-11%
Men 60+	19%	-12%	296	4%	4.5	7%	1,337	11%	256	-3%
Women 60+	27%	-16%	289	-2%	4.3	-3%	1,247	-5%	334	-20%

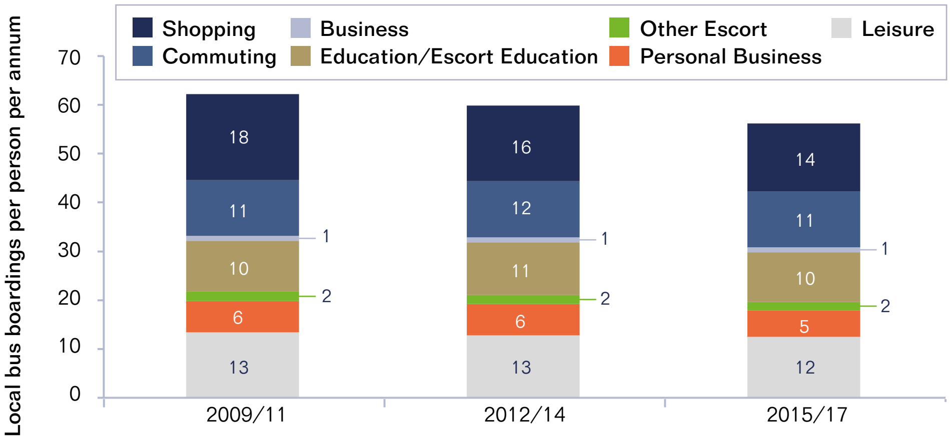
NB: White-to-blue shading indicates lowest-to-highest absolute level for each column; red-to-yellow-to-green shading indicates large decreases to large increases in percentage terms (between 2009/11 and 2015/17)

(Source: NTS); Technical Note[4]

3.3 In terms of journey purpose, shopping has traditionally been the most common reason for taking the bus, followed by travel for leisure, commuting and educational purposes. As indicated in Figure 5, of all journey purposes shopping has fallen the most as a reason for travelling by bus outside London and this has had a disproportionally large effect on reducing bus travel demand. An element of this will be related to the increased trend towards online shopping in recent years. However, the researchers have found that local bus shopping trips have declined more sharply (by 25% since 2009) than shopping trips by all modes (a 5% decline over the same period). This could be related to the increasing trend for shopping centres to be consolidated in out-of-town locations where bus usage is less frequent or more inconvenient.

4 The term 'tripmaker' used in Table 1 corresponds to the term 'bus user' as found elsewhere in this report (i.e. an NTS respondent using a bus at a least once in the seven-day diary period)

Figure 5: Bus boardings by journey purpose 2009/11 to 2015/17 England outside London

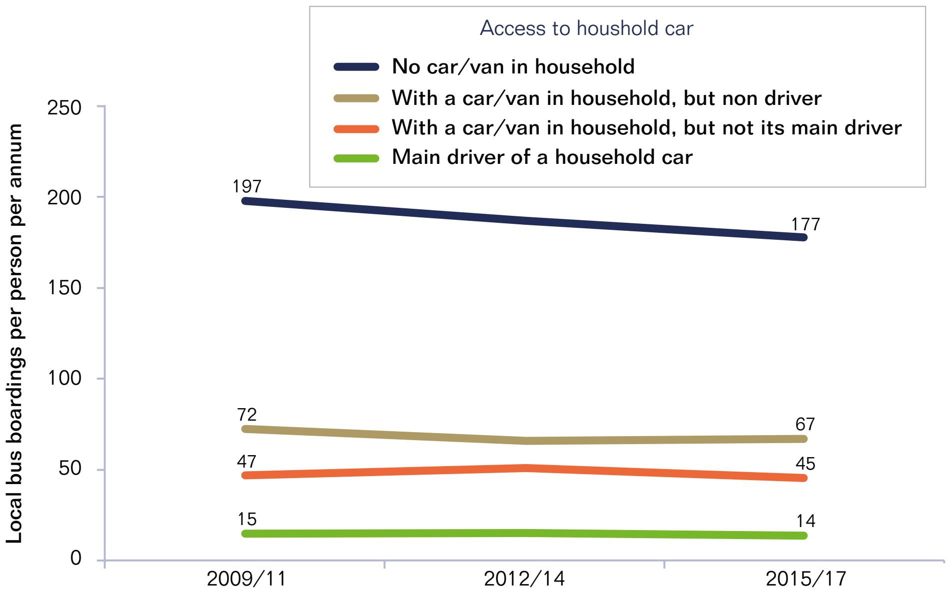


(Source: NTS)

3.4 The researchers also looked at bus usage by occupation. Students have the highest frequency of bus use, in keeping with the finding that 17-20 year olds use the bus more than any other age group. However this group has also seen the steepest decline in bus usage, with local bus boardings per annum by students falling by 15% since 2009. Bus travel by the unemployed is also relatively high, but this has also fallen by 10% over the same period. The lowest rate of bus users is amongst full-time workers, but bus travel amongst this group has remained stable over the same period. In summary, travel by bus is falling fastest amongst its traditional markets of students and the unemployed.

3.5 It is well-known that there is a strong inverse relationship between car ownership and bus usage. As can be seen in Figure 6, bus usage is far higher by people living in households that do not have a car. However, this is also the category that has seen the steepest fall in the rate of bus usage, with boardings amongst this group falling by over 10% since 2009, while bus usage by people in car-owning households has remained relatively stable. Again, this demonstrates that the decline in bus travel is principally due to falling usage within its traditional 'core' market.

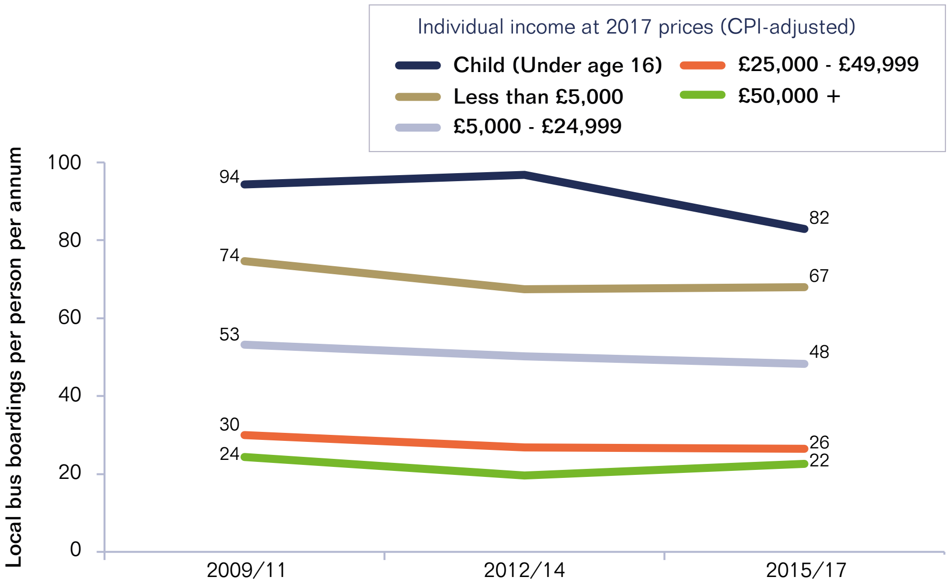
Figure 6: Bus boardings per annum by car access 2009/11 to 2015/17 England outside London



(Source: NTS)

3.6 There has also traditionally been a strong correlation between bus use and lower incomes. Generally, those with higher incomes can afford a car or have access to other modes which displace bus usage. In Figure 7 below the researchers demonstrate how bus travel has changed over the past decade amongst various income levels. We can see that, although bus use has declined amongst all the income categories, it has fallen most steeply amongst the lowest income groups, including by 13% amongst those individuals with an annual income of less than £5,000. One view is that when lower income families acquire a car (at an increasingly lower cost than public transport) they make maximum use of their investment. This finding reinforces the message that the decline in bus travel in England is principally due to losing patronage amongst those segments of the population which have traditionally travelled the most by bus.

Figure 7: Bus boardings per head by personal income category, 2009/11 to 2015/17 England outside London



(Source: NTS)

4. Local variations

4.1 The bus market across England is diverse, and the overall trends disguise significant local variations. In this study, the ITC asked the researchers to segment the NTS data in order to compare characteristics across local authority areas that had seen a strong decline, a weak decline and an increase in the rate of bus usage. The areas seeing the strongest decline in bus usage per head since 2009, with falls of over 20%, included low-density rural counties (such as Lincolnshire and North Yorkshire) but also older industrial areas traditionally associated with high bus usage, such as Stoke-on-Trent and Middlesbrough. Those areas bucking the trend and seeing an increase in bus use were almost entirely in southern England. Some of these areas are low-density locations where bus usage has been increasing from a low base (such as West Berkshire and Cornwall) but most are urban areas where bus usage was already high (such as Reading, Bristol and Brighton).

4.2 To explore some of the characteristics of these areas with different bus trends, the researchers looked at various comparative factors between these area groups. Some of these categories are given in Table 2. Unsurprisingly, the findings include the fact that the areas that have seen an increase in bus use over the past decade have also seen improvements in bus service supply (measured by bus network vehicle kms). The areas seeing an increase in bus usage are also wealthier than the English average (measured by personal incomes) and have a slightly higher population density than is the case for those areas outside London seeing a decline in bus use. Relationships of these areas with other factors, such as the proportion of adults employed, the proportion of pensioners, and car ownership patterns, were less clear-cut.

Table 2: Characteristics of areas in England with different bus usage trends

Year	Category of Local Authorities by change in per capita journeys (2009/10-2016/17)	Annual bus boardings per person per annum	Difference 2013/14 to 2016/17 in bus network vehicle-kms	Population density of Local Authority (persons / hectare)	Proportion of population that was born abroad	Average personal (not household) income
2009/11	More than 10% decline	67	-6.8	11.8	8%	£19,072
	Up to 10% decline	53	-9.3	11.7	9%	£21,386
	Increase	57	8.3	13.0	11%	£22,524
	London	215	-9.4	59.0	35%	£22,017
2015/17	More than 10% decline	60	No change	13.0	10%	£19,373
	Up to 10% decline	50	No change	14.7	11%	£21,116
	Increase	50	No change	12.7	12%	£22,799
	London	168	No change	65.8	35%	£23,336
Absolute change 2009/11 - 2015/17	More than 10% decline	-7	N/A	1.2	2%	£301
	Up to 10% decline	-3	N/A	3.0	2%	-£270
	Increase	-7	N/A	-0.3	1%	£275
	London	-47	N/A	6.8	1%	£1,319
Percentage change 2009/11 - 2015/17	More than 10% decline	-11%	N/A	10%	22%	2%
	Up to 10% decline	-5%	N/A	26%	22%	-1.3%
	Increase	-12%	N/A	-3%	9%	1.2%
	London	-22%	N/A	11%	2%	6%

NB. Boardings per head data in this table are derived from operator-reported data published by the DfT.

5. Comparisons with other recent studies on bus demand

5.1 The topic of bus demand in England has been receiving increasing attention in recent years and a number of studies have been published. In order to place the ITC findings in the context of wider research work, the authors examined a range of third party studies on bus usage. Studies by KPMG on bus patronage in England and Scotland have suggested that the growth in car ownership has been the greatest negative factor depressing bus usage, followed by worsening bus journey times. The problem of slower bus journey times was particularly problematic in London, where there exists a wide range of good public transport alternatives. Other negative factors for bus use identified included the increasing use of online retail (confirming the ITC finding that the fall in shopping trips has particularly depressed bus usage), increases in bus fares and the cheaper costs of car ownership and use (principally caused by the steep fall in fuel prices in 2014).

5.2 Research undertaken recently by KPMG and for the UTG appears to support the ITC's finding that the increase in private hire service supply has not had a major impact upon bus usage. These studies also confirm the ITC finding that there is a positive relationship between a high student population and bus usage, and that areas that have seen an increase in bus usage are mainly found in southern England. The ITC research complements these studies by providing a fuller picture of the overall trends and the extent to which the traditional bus market is changing.

6. Conclusion and Recommendations:

6.1 What can the findings from the ITC research tell us about the changing nature of bus travel in England? First, it is clear that the decline in bus travel outside London has been caused by a shrinkage in the percentage of the population who are bus users, rather than existing bus travellers using the bus less. Indeed, overall bus satisfaction by users has remained stable over this period, and there has been a trend towards intensification of bus use by some groups (such as non-concessionary bus pass holders).

6.2 The decline in bus travel in England outside London has been particularly influenced by a contraction in the traditional bus market (where the highest users were female, people on low-incomes, non-car owners, students and pensioners).

Findings of changes in the market include:

- Bus usage by women is falling more quickly than by men, and the gender gap in bus travel has therefore narrowed. Bus usage has also intensified amongst younger men with bus users in this group making 14% more trips than in 2009.
- There has been a particularly pronounced fall in bus use by students and those in their late teens (aged 17-20) – groups which have historically had high rates of bus use.
- Bus usage has fallen fastest amongst low-income groups and amongst those without access to a car – traditionally the largest markets for bus.
- Shopping trips by bus, which remain the largest journey purpose category, have seen a particularly pronounced decline.

6.3 At the same time, the research shows that bus demand is shifting towards new markets. Those areas of England which have bucked the trend and seen an increase in bus use over the past decade have tended to have higher incomes and have seen growth in bus service supply. Many of the areas where bus use has increased are located in economically flourishing cities in southern England. Bus usage has also intensified amongst younger men, perhaps related to the steep fall in car licence holding amongst this group. The growth of private hire services such as Uber does not appear to have yet contributed significantly to the overall decline in bus usage. These findings suggest that there will be an increasing opportunity for bus operators to focus on the quality of their services as a means of tapping into new growth markets.

6.4 The findings from this report have indicated some of the ways in which the bus market in England is changing. We recommend that further work be undertaken on the views of bus users to understand what they are seeking from high-quality bus services, and to understand how bus marketing should be updated. In addition, more work to understand the challenge to the bus market from disruptor modes (such as scooters and autonomous vehicles) would be welcome. Better data on usage of different types of bus service (such as park and ride, or bus rapid transit) would also be helpful in understanding trends.

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1. Introduction

1.0.1 The motivation for this study is to establish the factors contributing to the decline in bus patronage in England outside of London. To do so, the primary data utilised was obtained from the Department for Transport's (DfT) National Travel Survey (NTS), for the inclusive period of 2002-2017, with particular focus on 2009 onwards, (except as where noted otherwise in the text)[5] and excluding London bus journeys. The DfT also collects data from bus operators. These sources largely complemented each other, but NTS data in the last four years display some marked fluctuations compared with a steadier trend for operator-reported data as disused in Appendix 4. Table 3 shows the longer-term trends derived from operator-reported data.

Table 3: Aggregate trends from operator-reported data, 2002/3-2017/18

Area	Total Trips	Trips per head
English metropolitan areas	1182m to 907m (-23.3%)	108 to 76 (-29.6%)
English non-metropolitan areas	1255m to 1223m (-2.5%)	40 to 35 (-12.5%)
England outside London (sum)	2437m to 2131m (-12.6%)	58 to 46 (-24.1%)
London	1527m to 2225m (+45.7%)	207 to 252 (+21.7%)

(Derived from DfT Table BUS0103 'Passenger journeys on local bus services by metropolitan area status and country, per head of population')

1.1 Definitions

The following terms will be employed throughout the report.

1.1.1 **Local:** Services on which most passenger trips are less than 15 miles in length. Passengers are carried at separate fares (i.e. through payment in cash, or to an increasing extent, validation of a card or pass on entry to the vehicle). Almost all passengers board or alight at kerbside stops, apart from those in bus stations, or on segregated routes such as busways. Data are compiled by the DfT from operators for passenger trips, vehicle miles run, revenue received by operators, etc. These also include some tourist services (e.g. 'hop on, hop off' sightseeing), along with sections of longer-distance express services on which local passengers are carried. These will therefore be included in some of the 'local' service statistics, but the effect at national level is likely small. For return tickets, operators are asked to assume two single trips are made, but for seasons and travelcards variable assumptions might be made.

5 In many of the analyses that follow, the NTS data grouped into groups of three years (2009/11, 2012/14 and 2015/17) , to increase sample sizes and decrease noise in the time series.

1.1.2 **Other:** This encompasses all other service types, including private hire, school and works contracts, excursions, tours and scheduled express services. Only broad estimates of this market segment are available. In 2004/05, 69% of all bus and coach passenger revenue (including concessionary travel compensation) came from 'local' services, and 31% from 'other': in terms of vehicle-km run, 'other' represented a slightly higher share, at 35%.

Schoolchildren travelling in vehicles used solely for that purpose fall in the 'other' category (i.e. non-local operations). However, where children are carried on services registered as local services at separate fares (e.g. on season tickets issued by the LEA) these trips will appear in the 'local' category. The former service type, corresponding to 'other', is classified in the NTS as 'other private'.

1.1.3 **Trip:** Based on the custom of collecting a cash fare each time a passenger boards a bus, a 'trip' is defined in many bus operational datasets as the act of a boarding the vehicle. In the great majority of cases, only one bus is involved in a journey between two activities (e.g. home and work). However, in some cases a second bus service is required, and hence a second boarding is involved. The focus on NTS boardings data in this study provides a better alignment with operator-reported 'trips'.

1.1.4 **Stage:** That part of the trip on a single mode using the same ticket (e.g. for a specific bus operator) in which one or more boardings may be involved. A typical bus journey would thus comprise a bus stage, with a walk stage at each end, to and from bus stops. Most bus trips are 'main mode' trips, i.e. that for which bus forms the greater part of the total trip length, but in some cases, it is used as secondary mode (e.g. feeding to/from rail).

1.1.5 **Boardings:** The NTS data collected from respondents can also be sub-divided into boardings and is thus consistent with operator-reported data on the traditional 'trip' definition. Within this study, 'boardings' data from the NTS forms the base for analysis and is thus generally consistent with the operator-reported data. Analysis is confined to England outside London, except where London analyses are included for comparison (which is noted in the appropriate point in the text).

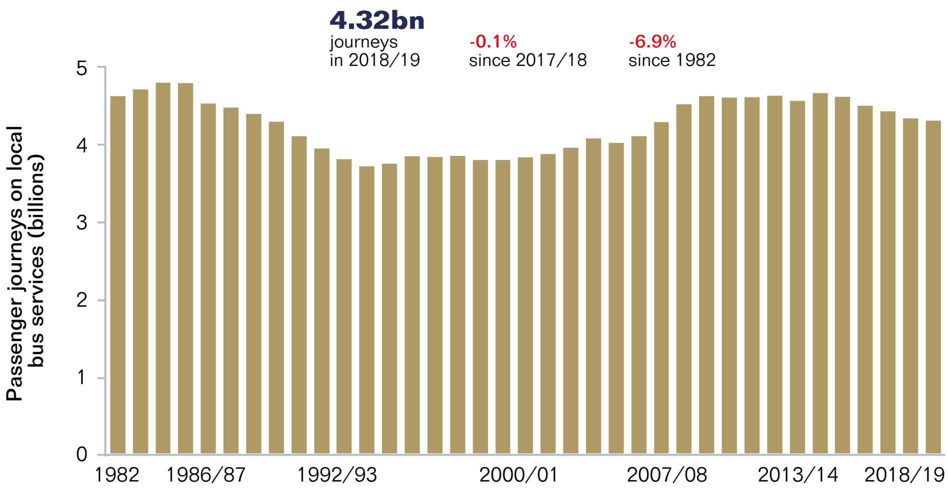
2. Overall trends

Key Findings

- The decline in bus use in England over the past decade is largely due to a fall in the proportion of the population who are bus users, rather than existing bus users travelling less often. The proportion of the English population who are bus users has declined since 2009 from 47% to 42% in London, and from 21% to 18% outside of London.
- Londoners use buses at more than triple the rate of the English population outside London.
- Bus service supply (measured by miles travelled by in-service buses) has fallen by more than 15% outside London since 2000, but has increased over the same period within London.
- The average speed of bus journeys as reported by NTS respondents has increased in London since 2009, but decreased elsewhere in England.
- Bus users do not appear to have transferred in significant numbers away to taxi and private hire services, but there is some evidence that light rail systems encourage modal shift away from the bus.

2.0.1 Local bus patronage in England has ebbed and flowed since the 1980s (see Figure 8), however the 21st century has brought an unusual confluence of trends. In addition to long-term factors (such a car ownership), a marked decline can be seen in the late 1980s, associated with sharp fare increases in some metropolitan areas and some of the effects of deregulation. Growth between 2006/7 and 2009/10 is associated with the introduction of compulsory free concessionary travel for pensioner and disabled passengers.

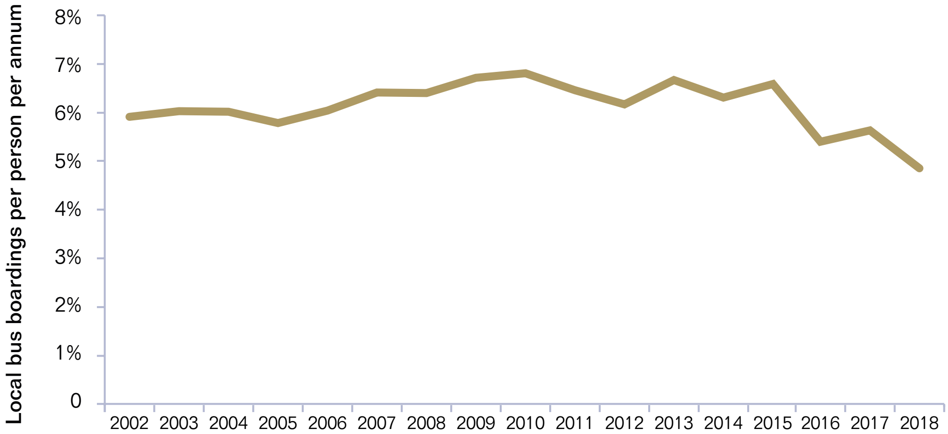
Figure 8: Operator-reported bus patronage in England, 2004/05 to 2017/18.



(Reproduced from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774565/annual-bus-statistics-year-ending-mar-2018.pdf)

2.0.2 These may also be expressed as a percentage share of NTS-reported trips by all modes, shown in Figure 9 below. Note, however, the discrepancy between operator-reported data and that from NTS from 2016 inclusive discussed in appendix 4, which may suggest understatement from 2016.

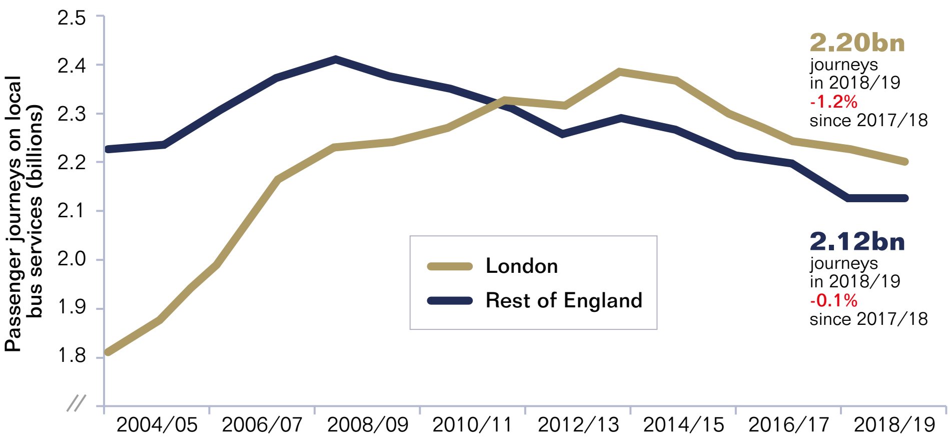
Figure 9: Local bus journeys (main mode definition) as a proportion of total journeys (encompassing all forms of transport), 2002 to 2018



(Source: Table NTS0303, available at: https://www.gov.uk/government/statistics/national-travel-survey-2018)

2.0.3 Though it has declined by 7% since 2013/14, bus patronage in Greater London on local bus services has increased robustly over a longer period of time (+32% in the 9 years from 2004/05[6]; see Figure 10). In contrast, ridership on local bus services in the rest of England (aside from London) has consistently trended downwards over this period, a total of -12% after reaching a high of just over 2.4 billion journeys per annum in 2008/09. In every year since 2011/12, ridership (as boardings) in London has exceeded ridership elsewhere in England, despite London's much smaller population. Average bus passenger journey lengths in London are also shorter than those in the rest of England, averaging 3.7 versus 4.8 miles in the period 2015-17.

Figure 10: Operator-reported Bus patronage in London and in England outside London, 2004/05 to 2017/18



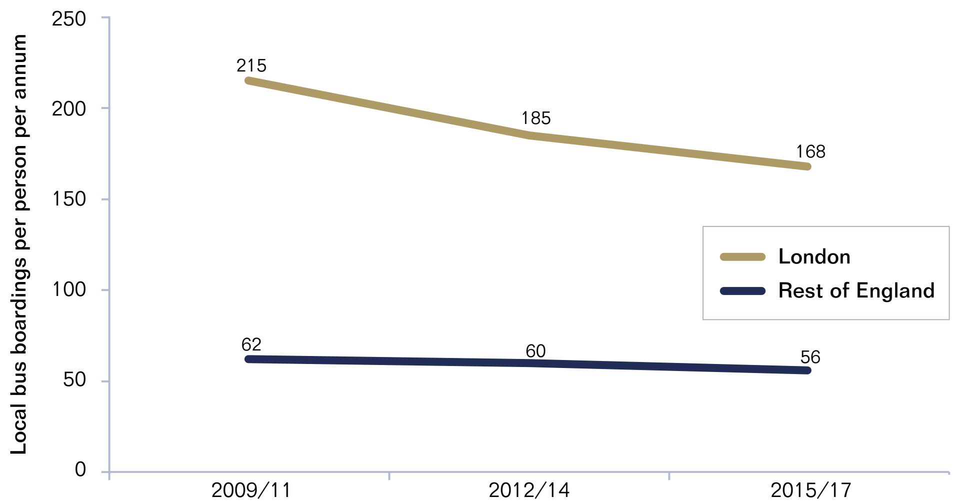
(Reproduced from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774565/annual-bus-statistics-year-ending-mar-2018.pdf)

6 For more information on London trends see TfL's latest 'Travel in London' publication.

2.0.4 Total bus usage began declining outside of London earlier, around 2008 versus around 2013 in London. However, drawing on National Travel Survey data, it can be seen that, in the years since 2009, the decline in bus journeys per person per annum (pppa.) has been more rapid within London, albeit from a higher base (see Figure 11). In the main focus of this study – England outside of London – the decline has been smaller, at 10% between 2009/11 and 2015/17, compared to 22% for Greater London.

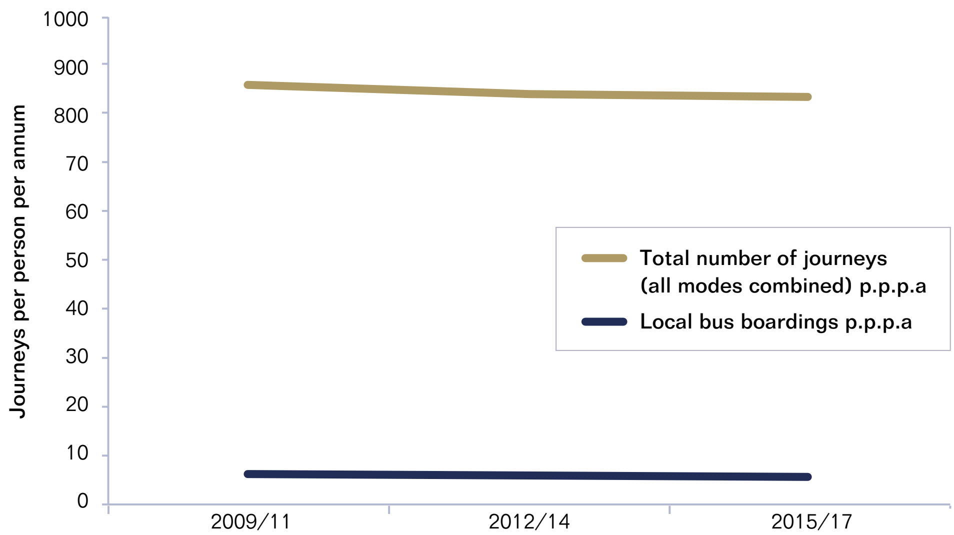
2.0.5 We note that both of these categories include much diversity of context. "England outside of London" includes both Greater Manchester and rural areas, whereas "London" encompasses great diversity in, for example, wealth, and land use patterns.

Figure 11: Time-trend in NTS-reported local bus boardings per person per annum, London and Rest of England, 2009/11 to 2015/17



2.0.6 Focusing on England outside of London, Figure 12 shows that the overall trip rate for all modes – the average number of trips made by a person over the course of a year – has trended downwards in the 2010s. However this decline was 3% whereas bus travel fell by 10%. Thus the overall decline in trip-making is equivalent to roughly one-third of the decrease in local bus travel.

Figure 12: NTS-reported bus journeys and all journeys, England excluding London, 2009/11 to 2015/17



2.1 The number of 'users' and usage-per-user

2.1.1 The concept of 'market gearing' may be applied to local bus travel towards the proportion of demand coming from users who travel at different frequencies. These may include:

1. High-frequency users, such as those travelling several days per week for education or work purposes. For example, someone travelling five days per week making a simple return trip by bus each day (without interchange) would generate 10 boardings (or about 380 per year for a typical school year, 450 for an adult working year of 45 weeks).
2. Moderate-frequency users, e.g. those making shopping and/or personal business trips on one or two days per week, generating 2 or 4 boardings. This may be typical of concessionary pass holders, for example.
3. Lower-frequency users, travelling less than once a week
4. Non-users.

Groups 1 and 2 would generate a much higher share of bus travel than the proportion of the entire population which they represent.

2.1.2 Published operator-derived data do not make such distinctions, although within a given operation data would be available on concessionary pass use, and travelcards/seasons/stored value cards on issue and trips attributed thereto. Smartcard technology enables identification of frequent users through analysis of anonymised samples, potentially covering longer periods than possible in travel diary work. For example, a period of up to 35 days was used in some earlier research (if a 'user' is defined as a card detected at least once in a such a period, the resulting average trip rate per card will drop as longer periods are sampled).

2.1.3 NTS data classify respondents by pass-holding, both for free concessionary travel (above), other forms of concession (such as disabled or scholar's pass), and types requiring payment (such as travelcards). In principle, trip rates for each pass type can then be calculated from travel diary data. Pass types can also be classified by duration of validity.

2.1.4 The NTS one-week diary also provides a means of estimating market gearing. The percentage of the population that use buses at least once a week has fallen gradually from 2002 to 2017. The trend in bus usage can be split into two parts:

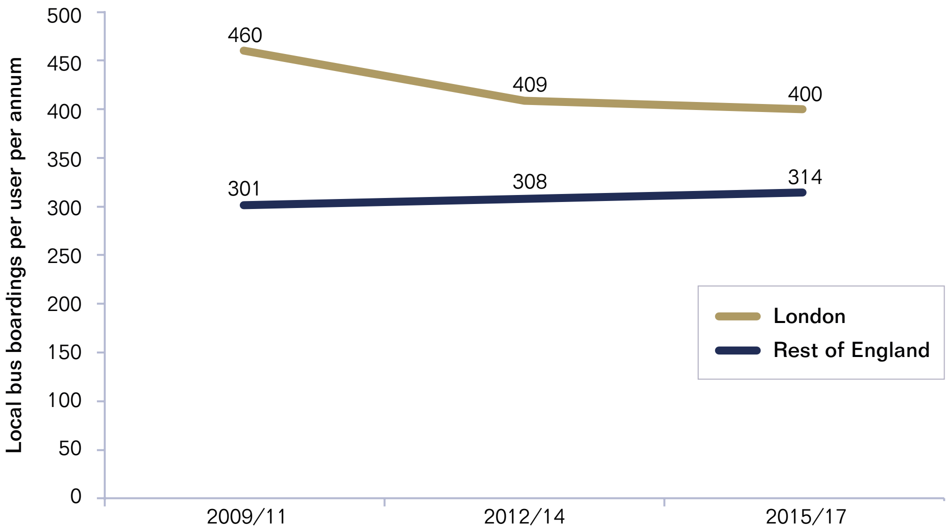
1. The fraction of people who use buses at all ('users'), and
2. The amount of bus usage per user.

2.1.5 The former relates to the extent of bus usage across the population, with the latter relating to intensity of use. We use the seven-day travel diary of the NTS to identify people as bus 'users' if they travelled by bus at least once during that period.

2.1.6 As would be expected, the fraction of London's population that uses buses is more than double the proportion in the rest of England. The trend outside of London (as well as in London) is downwards, a decrease from 21% of the population in 2009/11 to 18% in 2015/17.

2.1.7 Figure 13 looks at the intensity-of-usage measure. We see that the bus users living outside London make approximately 300 bus boardings annually, and that this has tended to increase since 2009/2011. One interpretation of this result is that more casual bus users may be opting out of bus use altogether, which leaves behind a group of bus users that perform more journeys per year. The opposite trend has happened in London, where intensity of bus usage per user has decreased in the 2010s.

Figure 13: Bus journeys per bus user per annum, London and Rest of England, 2009/11 to 2015/17



Bus Usage in Rural Areas

2.1.8 The Government Statistical Service (2015) categorises rural settlements, comprising approximately 17% of the 2011 population, within a threshold of 10,000, in contrast to the previous definition of all settlements under 3,000 as 'rural'. A distinction is drawn between 'rural town and fringe' (which will include substantial market towns, for example) and more scattered settlements. An overall picture of travel by residents of rural settlements in England is shown in Table 4, also showing comparisons with England as whole. As one would expect, car ownership is much higher in the rural settlements. Although trips per person per year (by all modes) are similar, the total distance travelled per person is substantially higher at approximately 9,000 miles (14,500 km) compared with approximately 6,500 miles (10,500 km) for England outside London as a whole – the 'rural town and fringe' distance is some 33% higher, and 'rural village, hamlet and isolated dwelling' some 49% higher. This is to be expected, given the greater distances from opportunities for employment, education and other activities.

Table 4: Major features of the rural transport market in England 2013-14, derived from the National Travel Survey[7]

Variable	England, excluding London	Rural town and fringe (8.8% of 2011 population)	Rural Village, Hamlet or Isolated dwelling (8.9% of 2011 population)
Car driving licence holders (a)	74	82	89
Households with at least one car or van (b)	75	85	94
Car and vans per house-hold (c)	1.16	1.37	1.74
Trips per year by main mode (d) and distance covered, miles, all modes [thus]	922 [6,536]	974[8,718]	946[9,732]
Walk	202 [184]	200 [161]	105 [95]
Car/van driver	382 [3,256]	456 [4,837]	540 [5,715]
Car/van passenger	208 [1,828]	239 [2,619]	241 [2,897]
Other private transport	26 [199}	25 [243]	26 [293]
Local bus	61 [279]	34 [253]	19 [143]
Other public transport	44 [790]	20 [605]	15 [590]
Trips to/from school (e), %'s by mode			
Walk	42	42	10
Bicycle	2	0	1
Car/van	35	32	44
'Private' bus	4	11	16
Local bus	14	13	25
Surface rail and other modes	3	3	4

7 This table has been compiled from tables in 'National Travel Survey: England 2014' published by the DfT in September 2015
It shows combined data from the NTS sample for two calendar years, 2013 and 2014
Values of under 0.5 are shown as 0.
(a) Percentage of all those aged 17 or over holding a licence (from NTS Table 9901)
(b) Percentage of households (from table NTS9902)
(c) Absolute number per household (from table NTS9902)
(d) 'Main mode' is that used for the greater part by distance of each trip. 'other private transport' comprises bicycle, motorcycle and private hire bus
'other public transport' includes 'non-local' bus, rail, taxi/private vehicle, and ferries
Data is taken from tables NTS9903 (trips), and NTS9904 (distance, shown in brackets)
(e) From table NTS9908. Note that 'private' bus includes dedicated school services
This table was first published in White, Peter 'Public Transport: Its Planning, Management and Operation' 6th edition, 2016, (Routledge, 2017)

2.1.9 The pattern for public transport is more complex than might at first appear. While the trip rates by local bus clearly differ with settlement size as shown in Table 4 - 61 for England outside London overall, 34 in rural town and fringe, 19 in rural villages, hamlets and isolated dwellings (levels below the national average of 44% and 69% respectively) - this effect is much less marked for differences in distance covered (9% and 49% respectively), reflecting the higher average trip lengths in rural areas. Hence, bus use by residents of rural towns and fringe areas is not as far below the national average as might be assumed.

2.1.10 The needs of populations in smaller urban areas are often also served by the 'rural' network, through providing interurban links to larger regional centres of employment, shopping, etc. In many cases, village-to-town and town-to-town movements are served by the same routes. Public transport services within small towns are often very limited, and facilities may be provided largely by longer rural routes picking up local traffic. Even in larger towns, rural and urban services are often inter-mixed, being provided by the same operator and forming part of the same cost centre.

2.2 Theories to Explain the Decline

2.2.1 A wide range of theories have been suggested to explain the sustained decline in bus patronage. Some of them are readily amenable to analysis using the available data resources on this study.

- **Cuts to local bus services:** This is measured by the number of vehicle-miles of bus services provided by bus operators.
- **Slowing of operating speeds on local buses due to congestion:** Evidence from operators indicates substantial increases in scheduled running time in recent years, making bus travel less competitive. However, it is not necessarily reflected in reported journeys time in NTS data.
- **Mode shifts from bus to rail:** National Rail usage has grown rapidly in recent years, and this theory suggests that some amount of bus trips could have shifted onto the rail network.
- **Bus fares:** Local bus fares have risen rapidly in real (inflation-adjusted) terms, as has been reported[8] by DfT (78% increase in the Local Bus Fares Index from 2005 to 2019, compared to 38% escalation in the All-Items CPI index).
- **Changes in car ownership:** Car ownership has trended up in recent years, and owning a car is strongly associated with lower levels of bus usage.
- **Changes in retail markets and commuting behaviour:** Shopping is traditionally a major segment of the local bus market, however the retail trade has undergone major changes, including consolidation of retail activity into a smaller number of larger out-of-town shops and the rise of e-commerce. Commuting patterns have also changed over time, and employment has dispersed away from traditional corridors.

8 Table BUS0405, available at: https://www.gov.uk/government/statistical-data-sets/bus04-costs-fares-and-revenue

- **Changes in mobility lifestyle amongst different demographic groups:** Older age groups and females have become more automobile-oriented over time, with the opposite observed for young adults.
- **Virtual activity participation:** This theory suggests that local bus journeys may be impacted by the emergence of smartphone and internet connectivity, creating the opportunity to participate in activities without physical travel to out-of-home destinations. This theory is difficult to evaluate using traditional data resources, however as noted above it is possible to investigate specific journey purposes such as shopping, which are known to be impacted by the shift towards online activity.

2.2.2 In the remainder of this report, we explore these various theories. We provide clear answers where the data can support them, and in other cases we identify possibilities that would require further study using different approaches to provide clarity. However, it is likely that the main long-run variable has been the growth in car ownership. NTS data can be used in cross-section form to compare trip rates at different levels of car availability in the household, as shown in the following Table 5.

Table 5: Public Transport use by car access, England 2017

Trips per person per year	Average for all persons with vehicle	Main driver	Other driver	Non-driver	Average for all persons in non-car households
As car driver	475	793	231	4	9
As car passenger	232	96	257	461	76
Buses	31	14	41	58	161
Taxi/Private Hire Vehicle	6	5	7	8	24
Other p.t. (a)	29	24	70	23	62
Distance per person per year (miles)					
As car driver	3982	6,681	1726	33	114
As car passenger	2076	1299	2528	3274	702
Buses	186	75	197	312	669
Taxi/Private Hire Vehicle	49	47	54	50	182
Other p.t (a)	686	745	1394	368	806

(Source: Table NTS0702 'Travel by personal car access, gender and main mode: England, 2017')

'Buses' corresponds to 'Bus in London' and 'other local bus', and 'car' to 'car/van' within NTS0702. Note (a) corresponds to 'Other public transport', comprising surface rail, London Underground, air, ferries, and light rail. Data in NTS0702 for walk and 'other private' is not shown above.

2.2.3 This is a cross-section relationship, averaged over the whole set of NTS respondent categories shown. It may be applied in a forecasting sense, as the net total of households with cars rises, an average negative impact on bus use is shown. However, this may not apply at the margin. For example, when broken down by age, zero-car households among the over-60s are being replaced by car-owning households as successive cohorts entering that group have higher car ownership than their predecessors, whilst car ownership is falling among younger adults. Some drop in car trip rates might be expected from the car-owning households who move into the over-60s age bracket, as they will reduce travel to/from work, and will have access to free concessionary travel, for example.

2.2.4 It can be seen that a very marked reduction in bus use is associated with car ownership, from an average of 161 bus trips per person per year for those in non-car-owning households to 31 in car-owning households. 'Non-drivers' in car-owning households make 58 bus trips per annum, but this dwarfed by 461 trips as car passengers.

2.2.5 Some of the strongest car ownership growth has taken place in regions in which it was previously at a low level. For example, between 2002/3 and 2016/17, the percentage of households with no car or van in England outside London fell from 24% to 20%, but this was particularly marked in the North East (from 37% to 29%) and Yorkshire & The Humber (30% to 24%)[9].

2.3 Attitudinal and Perception Data

2.3.1 In addition to quantified factors described above, subjective perceptions will also affect user behaviour. A distinction is sometimes drawn between 'hard' and 'soft' factors, the former typically being the readily-quantifiable aggregate data of the type discussed above (e.g. bus-km run, average fare paid). The latter may include design aspects such as accessibility, or features such as passenger information, vehicle comfort, etc. Methods such as Stated Preference may be used to estimate their likely effect on ridership[10].

2.3.2 Other studies have researched the travel planning decisions and demonstrated the complexity of the process including mode choice (DfT (2004) Transport Direct Market Research Validation Report). Rather than a simple hierarchy of influences, it seems that there is a more complex palette any one of which may represent a 'tipping point' for the final decision. Examples of bus use deterrents include the attitude of the driver, the behaviour of other passengers, perceptions of security, or seating arrangements, yet none of these would appear in a straightforward satisfaction survey measuring such as price, frequency, or reliability. Supporting evidence is the marked difference between areas in levels of bus use where easily measurable factors such as price, frequency or structure of ownership do not offer explanations. Difficult to quantify factors such as customer care, collaborative working with local authorities and community trust appear to be equally or often more influential.

9 NTS Table 9902 'Household car ownership by region and Rural-Urban Classification: England 2002/03 to 2015/17'

10 Department for Transport (2009) The Role of Soft Measures in Influencing Patronage Growth and Modal Split in the Bus Market in England (see summary elsewhere in this report)

2.3.3 It may be argued that the 'hard' and 'soft' distinction is somewhat artificial, reflecting past data availability. In reality, a user will perceive a change in service attributes, but not necessarily in the same manner as aggregate data suggest, e.g. a 10% increase in service frequency would be reflected in convenience of the timetable in matching the timing of activity changes, and/or waiting time, rather than directly. Some more subjective perceptions may also affect user behaviour - for example, in terms of personal security, or quality of the bus vis a vis other modes.

2.3.4 A limited amount of perception data is collected as part of the NTS, with the advantage of reporting perceptions of both users and non-users of bus services. A much more extensive range of data on bus user perceptions (covering numerous attributes of services offered) is collected by Transport Focus, through a large on-bus sample within England outside London, also with some surveys in Wales and Scotland[11]. Using a five-point scale ('Very satisfied' to 'very dissatisfied') an overall 'satisfaction' score is compiled (sum of 'satisfied' and 'very satisfied'). These data have also been treated as interval data in some research[12].

2.3.5 A further feature of such data is that comparisons may be made between user perceptions in different areas, and also by named operator groups. Transport Focus has also undertaken work on specific aspects of public transport services, such as demand-responsive operations, and of particular user groups, notably younger people.

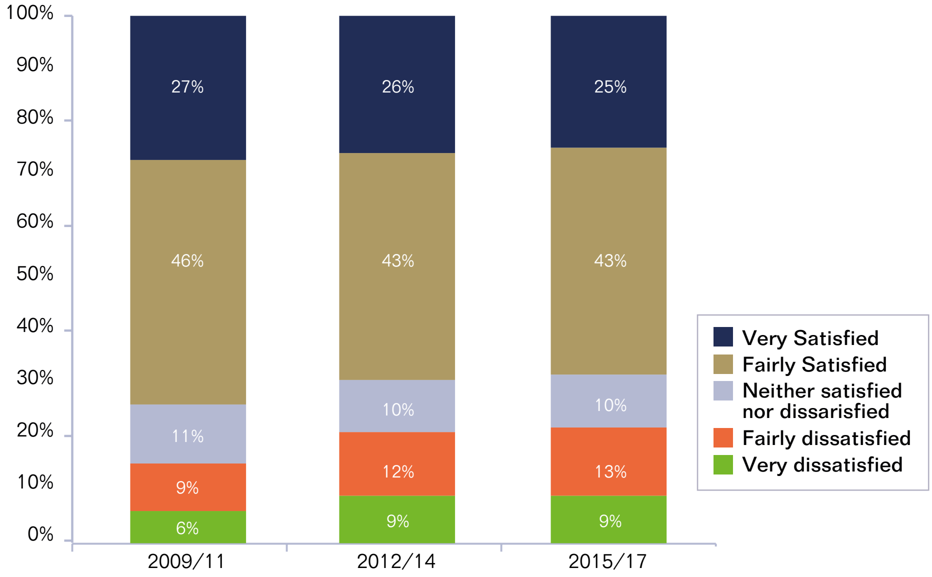
2.3.6 The NTS data (collected for 2002, 2004, then annually from 2008) indicate a 'satisfied' category (the sum of 'very satisfied', and 'fairly satisfied') of about 75%, but falling from 73% in 2009/11 to 68% in 2015/2017 (figure 8). These are lower than the corresponding Transport Focus figures for the five main operator groups, ranging from 83% to 92% in 2018[13], but these are for bus users only: non-users' views may be less favourable (such views may be based on little information or experience but will nonetheless influence behaviour). A further breakdown of the NTS data by area showed much higher satisfaction, with a growing share of 'very satisfied' in London (which is not covered by Transport Focus) than the rest of England, but no clear relationship between changes in bus-km run and satisfaction scores (even where a decline of over 20% had occurred) over the period 2013/14 to 2016/17. When non-bus-users were removed, there was some evidence of the 'very dissatisfied' share increasing to 2016/17. (See Figure 15).

11 Reports are available at www.transportfocus.org.uk. The most recent bus user survey, conducted in Autumn 2018, was published in March 2019.

12 Cowie, Jonathan 'Performance, profit and consumer sovereignty in the English deregulated bus market' Research in Transportation Economics Vol 48 (2014), pp255-262

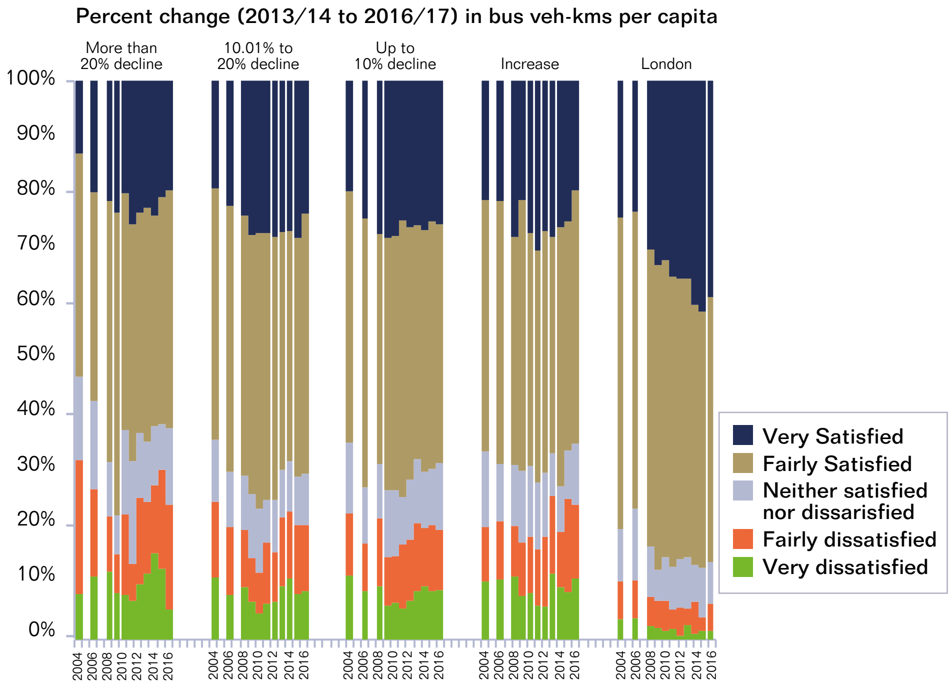
13 Transport Focus 'Bus Passenger Survey - Autumn 2018 report

Figure 14: Satisfaction with local bus services (NTS sample) 2009/11 to 2015/17



(Source: NTS)

Figure 15: Satisfaction with local bus services, minus non-users, 2002-2016



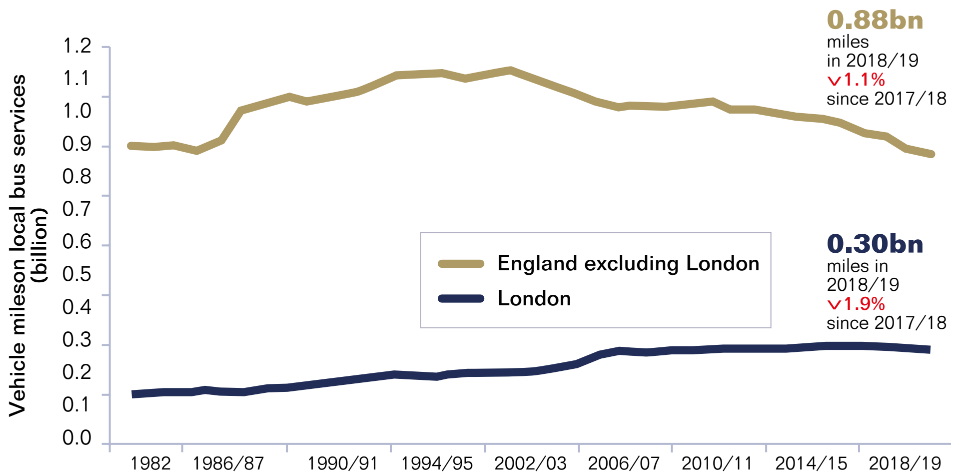
(Source: NTS)

2.4 Bus Service Supply

2.4.1 As noted in Section 2.2, one theory is that decreasing quality of service – manifested as a reduction in service mileage and/or a slowing of bus speeds over time – is linked with declining local bus patronage. This section draws on the available data to look at this issue.

2.4.2 First, DfT's survey of bus operators showed that bus-miles rose in the late 1980s following deregulation. Outside London, this peaked around 1999, a decline which accelerated more recently. In London, under a contracting system, growth was slower, but a more stable pattern can be seen in the longer term (see Figure 16).

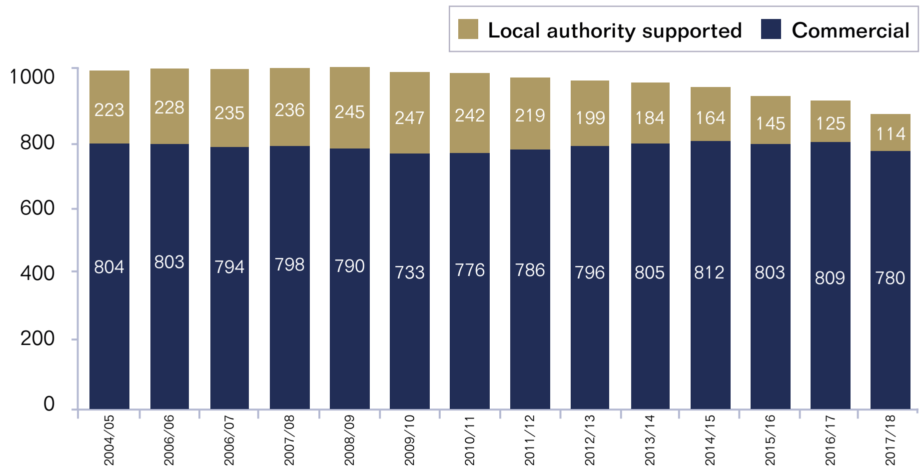
Figure 16: Local bus in-service mileage (in billions) by area type, 1982 to 2017/18



(Reproduced from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/852652/annual-bus-statistics-2019.pdf)

2.4.3 Most local bus service mileage is provided commercially (i.e. without direct local operating subsidy, although receiving Bus Service Operator Grant (BSOG) and compensation for concessionary travel), and this level has remained broadly constant in the 2010s. However, local authority supported bus service miles declined by 54% between 2009/10 (when the historic high was recorded) and 2017/18;
this is shown in Figure 17.

Figure 17: Local bus in-service miles (in thousands) by service type England outside London (commercial versus local authority supported), 2004/05 to 2017/18



(Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774565/annual-bus-statistics-year-ending-mar-2018.pdf)

Thus, while declining bus ridership outside of London has coincided with cuts to the bus network, the experience in London has been different.

2.5 Journey Time and Speed

2.5.1 From the passenger's viewpoint, journey time and speed has three components:

1. Walk or other mode access times to/from bus stops.
2. Waiting time for the bus. For high-frequency services, users may be assumed to arrive independently of the timetable. Hence, for a regular-headway service, average waiting time will be half the service headway. In practice, perfect regularity is not possible, and excess waiting time (EWT), derived from distribution of observed service headways, allows for this. For low-frequency services, users are likely to allow a margin for catching a timetabled journey, but again reliability will be important.
3. Riding time in the bus.

For a journey involving successive bus boardings, this cycle is repeated.

2.5.2 An omission in time-series data for bus services is any indication of average speed. In other public transport modelling work, this is often a major factor - for example, demand growth due to acceleration of intercity rail services from the 1960s stimulated early rail modelling work, such as 'MOIRA'. Whilst bus speeds are much lower, the absolute variation in journey time may be similar. For example, if a rail service over a distance of 150 km is accelerated from 100 kph to 120 kph, total station-to-station journey time falls from 1 hour 30 minutes to 1 hour 15 minutes. If an urban bus service over 12 km has an average speed which falls from 15 to 11.5 kph over a number of years, end-to-end journey time rises from by 15 minutes from 48 minutes to 63 minutes. Furthermore, the extra journey time will be experienced far more frequently by bus users than most intercity rail users.

2.5.3 Although time-series data are not available, examples of published operator timetables suggest very considerable increases in scheduled journey times in recent decades[14] approaching 1% per annum in the most congested urban areas. This has two effects:

1. To maintain the same frequency and service capacity, more buses and drivers are needed as round trip time rises (for example, on a 10 minute headway, round trip time in the above example would rise from 96 to 126 minutes, excluding layover. On a 10 minute headway, peak vehicle requirement would rise from 10 to 13 vehicles (30%), with pro rata increase in driver hours. About 80% of bus operating costs are associated with time-based costs (mainly drivers) and peak vehicle requirements, hence they would rise by about 24%. For a commercial bus service, a proportionate rise in revenue would be needed, i.e. a fare increase of 24%, before allowing for any elasticity effect. The latter would then cause a drop in ridership.
2. The average journey time experienced by a passenger would rise. Very few passenger trips cover the whole length of a route, hence the absolute increase will be less than in the case above. Door-to-door journey time will be affected by walk and wait time (and the latter by service frequency and/or reliability) as well as in-vehicle time. NTS data provide an indication of this, albeit self-reported.

2.5.4 From the 1960s, bus operators converted to one-person-operation to reduce costs, but this often substantially increased running times where cumbersome fare collection applied (in recent years this has been partly offset by a shift to non-cash methods). More generally, running times have increased as traffic congestion has grown, and also due to requirements on operators to run services more reliably, by inserting additional recovery time in schedules.

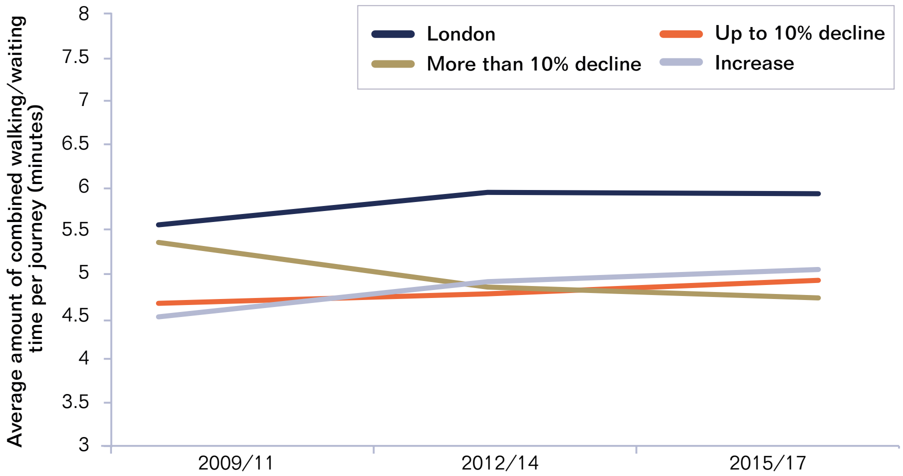
2.5.5 The omission of journey time from past time-series modelling may have led to overstatement of other effects, although the effect of fares increases on demand would have been incorporated.

2.5.6 Whilst there is strong evidence of increased scheduled bus journey times, NTS data do not indicate any marked change in average speed reported by passengers. This was estimated by summing passengers' distance travelled ["SD" variable] and number of minutes ["STTXSC" variable] of travel for all NTS stages using local bus services, and then dividing distance by time, expressing the result in mph. The NTS data on travel times by bus include walking and waiting times to and from the bus service. Figure 18 shows reported journey times and distances, and Figure 19 the inferred average speeds. The latter indicates a drop from about 10.4 to 9.9 mph for local buses outside London (this will be influenced by rural and interurban journeys as well as those within urban areas). Within London, the average was lower, as would be expected from traffic congestion, around 7 mph, improving from 6.7 to 7.3 mph. However, this is clearly inconsistent with evidence indicating a drop in in-vehicle speeds: TfL data indicate a drop in average bus speed over the whole network from 9.6 mph in 2013/14 to 9.2 mph in 2016/17, recovering to 9.3 mph in 2018/19 (the series does not show data for earlier years)[15]. This could lead to a drop in ridership, as examined in the KPMG study (see section 5.2.7).

14 'The Impact of Congestion on Bus Passengers' David Begg. Report published by Greener Journeys, 2 June 2016.

15 TfL Travel in London report no 12, 2019, Table 12.3

Figure 18: Reported walk and wait times for bus journeys in London, and areas of England defined by changes in bus use.



Source: (NTS)

2.5.7 Aggregate data from the NTS indicate relatively small changes in reported journey times by respondents. These are subject to self-reporting effects, and sample sizes which make it impracticable to apply existing known speed or journey time elasticities to estimate attributable demand changes. Operator data with speed and ridership for specific routes or areas are not generally in the public domain, since most services are operated commercially.

2.5.8 However, in the case of London route-by-route data are collected by TfL as the contracting authority, and extensive speed data is gathered by iBus system. Bus speed and service reliability in London has been affected by roadworks, cycle infrastructure, and a general policy to give more emphasis to pedestrian movement. This may have affected inner area services, especially on radial routes, to a greater degree than others. Over the period 2013-14 to 2017-18 there was a particularly marked speed drop in the inner area during the first three years, comprising most of the reduction over the whole period, during which there was a passenger drop of about 10%.

2.5.9 Over the whole period total bus passengers in London fell from 2384m to 2198m[16] (a drop of 7.8%), while aggregate bus-km operated were largely unchanged, falling from 487m to 486m[17]. TfL data indicate that, over the same period in the inner area passenger trips fell by about 15%, and in the outer by about 2%. In both cases, in-vehicle speeds fell by about 6%. This may have affected some inner area services, especially on radial routes, to a greater degree than others. David Begg[18] provides a London case study, indicating a drop of 7% in bus speeds in central London over the eight years to 2016.

16 From DfT Table Bus 0106a 'Passenger Journeys on Local Bus Services by metropolitan area status and country: Great Britain, from 2004/05'

17 DfT Table Bus 0203b 'Vehicle-kilometres on local bus services metropolitan area status and country: Great Britain, from 2004/05'

18 Begg, David 'The Impact of Congestion on Bus Passengers. Greener Journeys, 2016, pp 52-55.

19 Correspondence with TfL, Autumn 2019

20 Bus fare and journey time elasticities and diversion factors for all modes: A rapid evidence assessment. F.Dunkerley, M.Wardman, C.Rohr, and N.Fearnley (RAND Europe and SYSTRA) February 2018, for UK Department of Transport

21 TfL Central Budget Forecast as quoted in Local Transport Today 12 April 2019, p4

2.5.10 Work at TfL on the overall impact suggests a bus passenger trips/in-vehicle speed elasticity in the order of +0.6[19], i.e. roughly in line with the recommended value of -0.6 for bus passenger trips/in-vehicle journey time in the review of evidence by Dunkerley et al (in turn endorsing the DFPT) summarised elsewhere in this report[20]. However, such results should be treated with some caution, given the likely impact of other factors such as competing rail services, especially on inner radial corridors (causing a shift from bus to rail, especially where rail capacity has been increased and/or service quality improved). General factors such as economic changes and decline in shopping trips will also have had effects. For example, TfL have attributed the general decline in bus trips since 2015 to a drop by in bus travel by low-income households, with a greater drop during school holidays and weekends, together with changes in consumer behaviour[21]. Some of these may have affected inner London to a greater degree given its lower incomes.

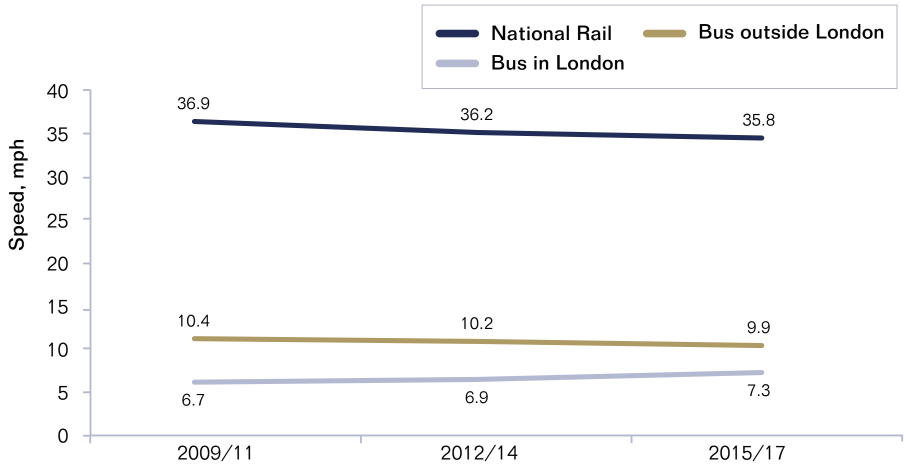
2.5.11 The component for walk and wait time can also be identified explicitly, giving a combined figure of about 5 minutes both in London and elsewhere. However, discussions with DfT noted concerns regarding the reliability of data for such self-reported elements and further analysis is likely to be of limited value. Analysis of this component by local authority areas classified by rate of change in bus use shows no clear pattern, nor is there one for changes in bus-km and the combined walk/wait time component.

2.5.12 A breakdown by local authority areas according to rates of changes in bus ridership by four categories (as for discussion of aggregate trends, above) was used to test for relationships with trends in average speeds. Very marked year-to-year fluctuations may obscure trends, but little overall pattern is evident: areas with growing ridership exhibit slightly lower speeds, which are falling. A recent UTG study[22] also finds this, noting that growing bus use is found in some areas which also record lower user satisfaction with punctuality, such as Reading and Bristol, possibly associated with local economic activity, as well as factors such as parking policy.

2.5.13 Figure 19 depicts slightly decreasing bus travel speeds for England outside from London since 2009, although bus speeds within London have risen over the same period. On the NTS data, bus journeys in London have experienced an opposing trend of increasing operating speeds in the 2010s. Interestingly, Figure 19 also shows that average speeds of National Rail journeys have been decreasing; this may be due to changes in the types of journeys that are being made via train, e.g. a shorter average trip length may be associated with use of lower speed services.

22 Urban Transport Group 'What's driving bus patronage decline? An Analysis of the Evidence Base' Jan 2019 [see para 3.39) [see summary elsewhere in this report]

Figure 19: Average reported speed of journeys on local buses (mph) 2009/11 to 2015/17



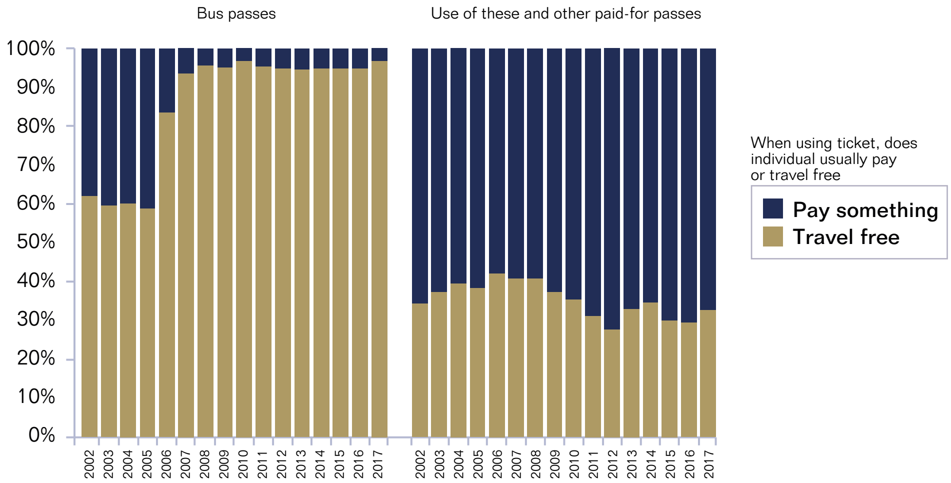
2.6 Trends in Ticket Types

2.6.1 Traditionally, most bus users paid in cash for each journey, but prior to the period analysed in this report, a shift had occurred, firstly with the introduction of travelcards from the 1970s, i.e. a card purchased by an individual user, permitting unlimited travel within defined zones for a specified period. The concessionary pass permitting free travel is used in a similar way. The population eligible for such a pass grew rapidly around 2006.

2.6.2 In the case of concessionary passes provided as a statutory obligation, a fairly consistent picture may be derived from NTS and operator-reported data. The great majority of these (8.5m from a total of 9.4m, i.e. about 90%)[23] are defined by age of eligibility, the remainder for disabled users. From 2001 a statutory obligation applied in England, such that this category of user was entitled to a pass entitling them to travel at half the applicable adult rate (except before 0930 Monday to Friday). In addition, some areas, mainly large conurbations (London, West Midlands, Merseyside) had offered free concessionary travel prior to this. From 2006, the half-fare obligation changed to free bus travel within the area of residence, and in 2008 to free bus travel in the whole of England. In 2004 about 40% of bus passes entitled the holder to free travel, after 2006 this rose to almost 100%, with little variation by area, except for the existing scheme in London. The NTS data also include as 'bus passes' those for which payment is required, such as season tickets and travelcard, but the majority are the free passes denoted by age. See Figure 20 below. The left-hand side of the figure shows concessionary pass travel, the right hand side shows use of these and other paid-for passes.

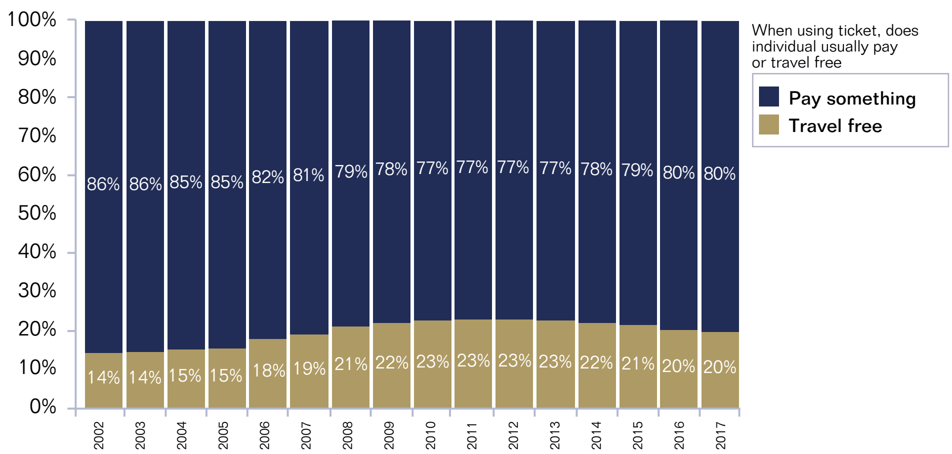
23 DfT Concessionary Travel Statistics England 2017-18, page 1

Figure 20: Percentage of paid and free bus travel, 2002-2016[24]



2.6.3 The extension of free travel from 2006 and 2008 caused an increase in such trips, both as a result of those users travelling at half-fare being entitled to free travel, and an increase in the take-up of passes by those already entitled by age to do so, but who had not taken the opportunity before. Of the NTS respondents, the percentage holding a bus pass rose from around 20% in the period 2002-05, to about 27% in 2011, falling back to about 23% in 2017, as illustrated in Figure 21. This produced an increase in total concessionary trips, but a drop in the trip rate per card holder. The NTS sample shows a marked drop from 2006 to 2012 (from about 230 to about 175 per year, remaining broadly stable since then).

Figure 21: Percentage of bus pass holders, 2002-2017



24 The left hand side of the figure reflects the fact that half-fare concessionary passes were converted to free travel passes from 2006, hence the percentage of free travel rising to almost 100% as a result (a small amount of paid travel might still have been made by concession pass holders after 2006, when travelling outside their regions of residence between 2006 and 2008, or at times of day when the free concession did not apply).

2.6.4 For example, in the Salisbury area, total trips and passes on issue both rose by about 70% between 2005/06 and 2006/07, hence average trip rate remained largely unchanged. However, trips by those previously holding passes for half-fare travel rose substantially, whilst the trip rate of the 'new' passholders was much lower, a survey indicating that they were more likely to have access to cars, and display other differences in characteristics[25].

2.6.5 The effect of the free concession from 2006 was thus to substantially boost bus travel. However, some areas, such as the West Midlands and Merseyside metropolitan areas, already offered free travel, so less change took place in this category. Conversely, more dramatic effects were found in rural areas where the half-fare concession had previously applied.

2.6.6 From the initial surge in demand, a peak in England outside London was reached in 2010-11[26], after which statutory concessionary travel has reduced from 753m trips to 611m in 2017-18, as successive cohorts of those who become eligible by age are more likely to have cars and driving licences. Additionally, the age for eligibility has been successively increased (in line with the female retirement age), resulting in smaller new cohorts in each successive year. In some areas, local authorities support more generous schemes, like retaining lower eligibility ages and/or not applying the morning peak restriction (or covering additional modes such as tram), which will affect trip rates.

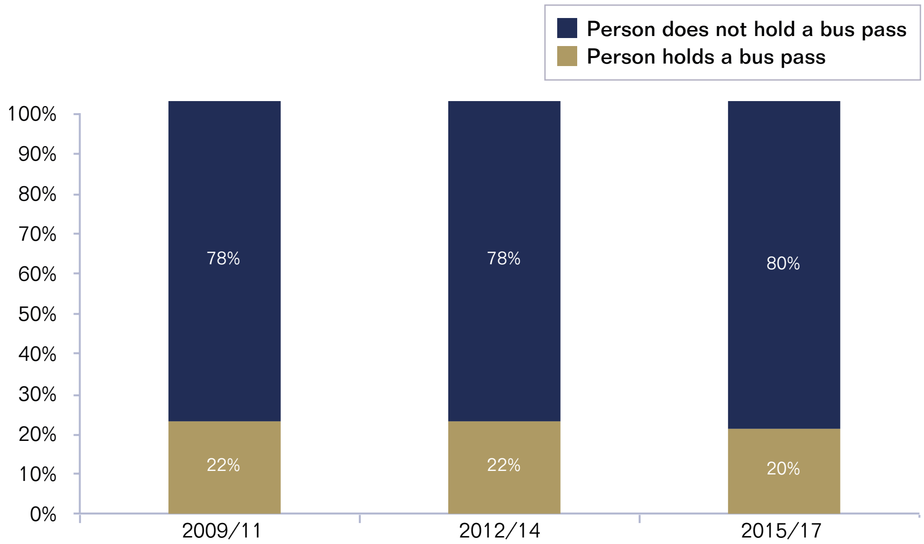
2.6.7 In the case of younger people, there are discretionary powers for local authorities to fund explicit concessions (i.e. travel at lower prices than the operator would charge commercially), but outside London and some metropolitan areas, these apply to only a very small proportion of users. The child/adult fare boundary is determined by bus operator commercial policies, and may thus differ substantially from one area to another. In many areas, an intermediate fare level is now charged for those aged up to about 19. However, these groups are not distinguished separately in the DfT operator-reported data, and the NTS will provide a more reliable guide to travel by these age groups.

25 Baker, S. and White, P. (2010) 'Impacts of free concessionary travel: case study of an English rural region' Transport Policy, Vol 17 (issue 1), pp 20-26

26 DfT Table Bus 0821 Number of older/disabled concessionary travel passes and bus concessionary journeys per pass by metropolitan areas status: England, annual from 2010/11

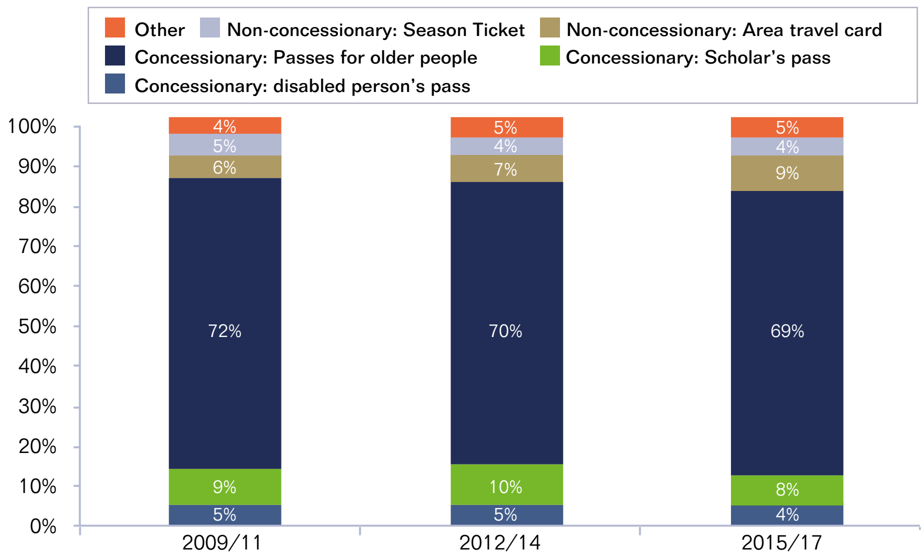
2.6.8 Figure 22 shows a small decrease in the share of NTS respondents that held a bus pass of any type between 2009/11 and 2015/17, which is probably attributable to the peak in concessionary pass holding mentioned above.

Figure 22: Proportion of NTS respondents who held a Bus Pass, 2009/11 to 2015/17



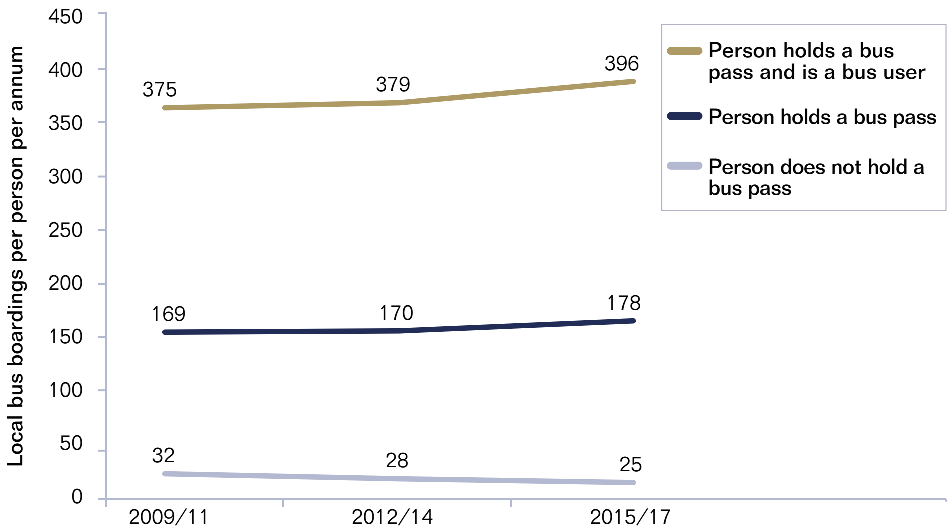
2.6.9 Figure 23 looks in more detail at the types of passes that respondents hold, the vast majority (around 70%) being the concession for older people and disabled users. 'Scholars pass' relates to the obligation to provide free travel by local education authorities where children live above a specified distance from the nearest appropriate school. The most rapid growth has been in non-concessionary area travel cards (from 6% to 9%).

Figure 23: Composition of types of bus passes held, 2009/11 to 2015/17



2.6.10 Figure 24 shows how local bus usage outside of London differs by whether or not a person owns a bus pass (of any type). Holding a bus pass is unsurprisingly linked very strongly with the number of bus journeys that are made. In the 2010s, bus pass holders have increased the intensity of their bus usage (by 5%, from 169 to 178 journeys per year), while people without a bus pass have decreased their average number of bus journeys by 22%, starting from their already much lower level in 2009/11. Figure 24 also shows that bus usage has increased most quickly amongst bus pass holders that are bus users (defined by using local bus services at least once during their travel diary week), by 6%. This intensification in bus use by bus pass holders may be due to the growth in non-concessionary bus passes, which logically would be most attractive to people that are heavy bus users.

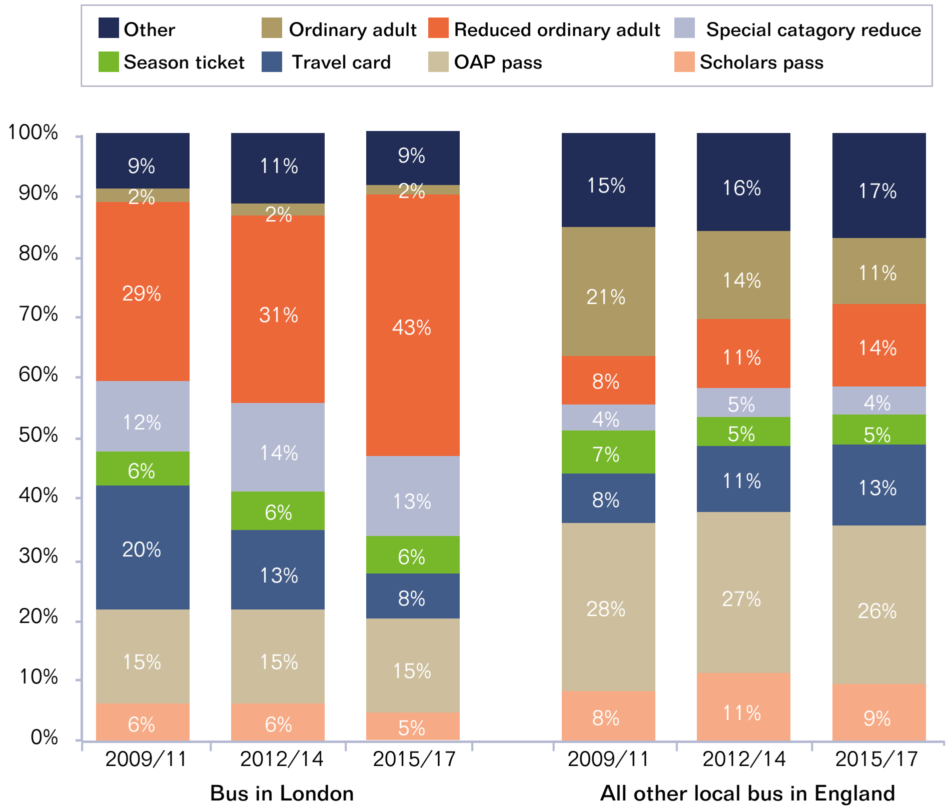
Figure 24: Bus usage by whether a bus pass is held and whether a person is a bus user, 2009/11 to 2015/17



2.6.11 Finally, we look at the types of ticket products that bus users are using to access local bus services. Figure 25 shows this for local bus services outside of London as well as for buses in London. Both markets show distinctive patterns and trends. For local buses outside of London, the single most frequently used ticket for bus journeys is the Senior Citizen Concessionary Bus Pass (identified in the legend by the NTS' legacy term "OAP Pass"). For buses in London, however, it is the "reduced ordinary adult" ticket type.

2.6.12 Outside of London, the trend is a sharp decrease (a halving between 2009/11 and 2015/17) in trips made by "ordinary adult" fare products, and corresponding increases in the "reduced ordinary adult" and "travelcard" types of tickets. Note that in London, the dependence on the OAP pass is much lower than elsewhere (around 16% and 27% respectively). This may reflect the younger population in London and greater success in attracting working-age users. However, London has a much higher share of 'special category reduced' (about 13%). This may reflect the 'zip' card, giving free travel for all journeys by school-age children. Relatively few children live above the statutory distance for free school travel in London, but many shorter trips are made using this card. The NTS does not explicitly categorise journeys made on stored value cards (such as 'Oyster' in London), contactless bank cards or mobile phones: it is likely that these account for most of the 'reduced ordinary adult' category in figure 25, which also reflects a shift from travelcards to Oyster stored value in London.

Figure 25: Distribution of bus ticket products used, London and rest of England, 2009/11 to 2015/17

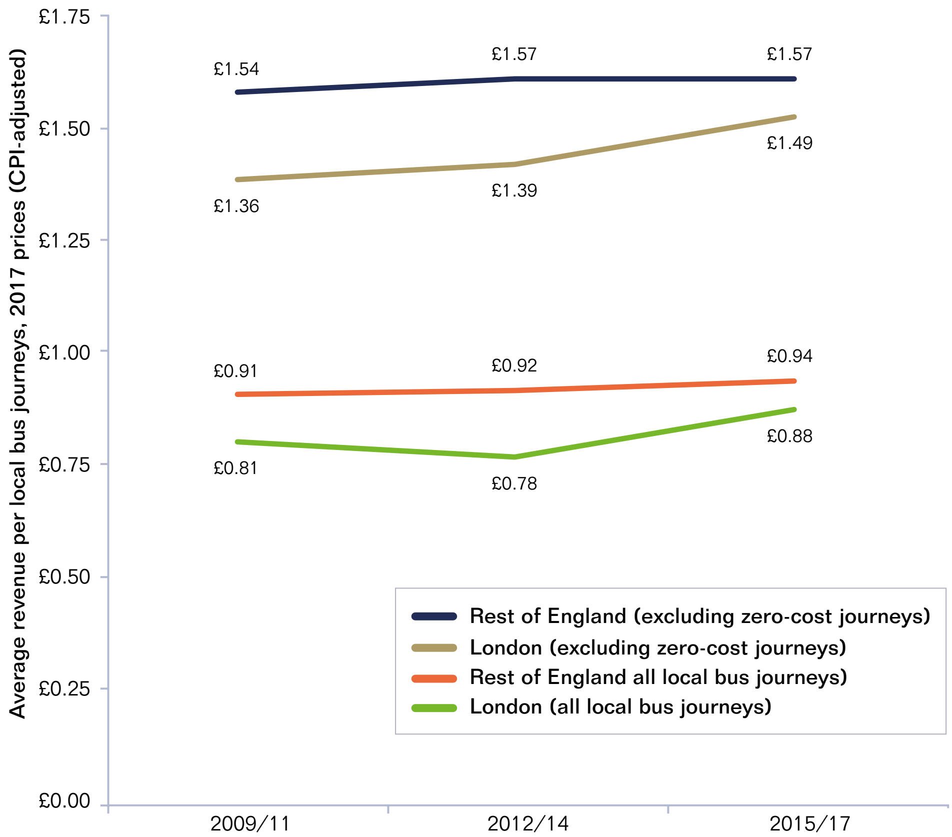


2.7 Fares Paid

2.7.1 Here we look at fare amount actually paid per journey (as opposed to headline published fare price) on local buses. We see that fares paid have tended to increase more rapidly in London than elsewhere in England, as seen in Figure 26. This applies whether journeys for which no fare (either a per-journey ticket cost or a pro-rata share of an unlimited ticket) was applicable, as well as all journeys combined. This is a slower rate of growth than the headline bus fare inflation numbers published by the Department for Transport, which is likely due to differences in methodology. However, it is notable that fares actually paid seems to be increasing more slowly than headline fares. Given the shorter average trip length in London, a higher payment per km travelled is implied.

2.7.2 The Demand for Public Transport study[27] indicates a short-run (one year) elasticity of -0.4 (percentage change in bus trips with respect to changes in real fares). A subsequent analysis of NTS data by Molnar and Nesheim suggests a similar figure[28]. However, elasticities of much greater magnitude are found in the medium to long-term.

Figure 26: Average revenue per journey at 2017 prices for local bus journeys, 2009/11 to 2015/17



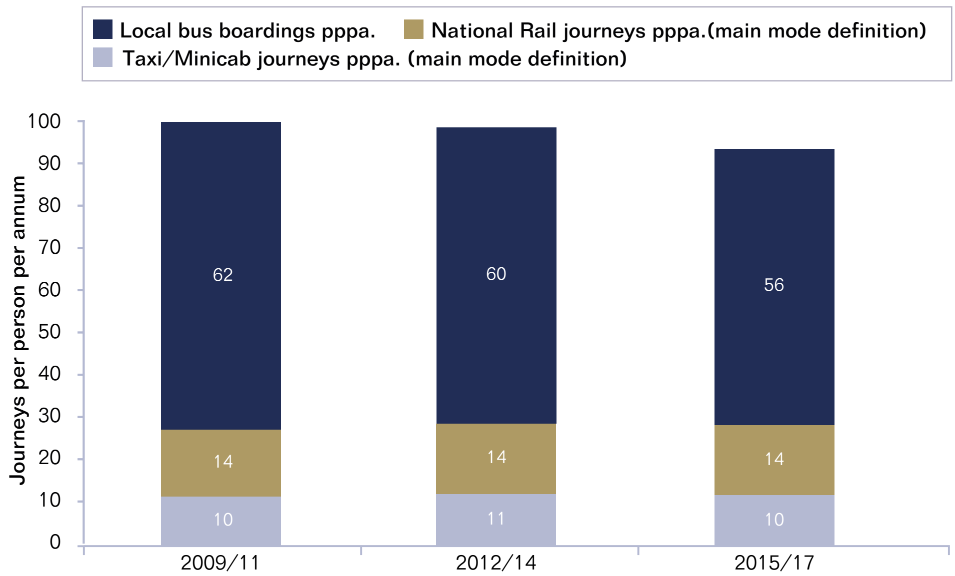
27 Balcombe, R. et al. (2004) The Demand for Public Transport: A Practical Guide. Transport Research Laboratory report TRL593

28 Molnar, J. and Nesheim, L. A Disaggregate Analysis of Demand for Local Bus Services in Great Britain (excluding London) using the National Travel Survey, December 2010 (report forming an input to Competition Commission study)

2.8 Trends in Competing Modes

2.8.1 Figure 27 shows trips per person per annum by local bus, national rail, and taxi/PHV. It shows no evidence at the aggregate level of the decreasing bus journeys outside of London shifting onto either National Rail or taxi/minicabs; both of these categories had stable numbers of journeys per person per year since 2009, when local bus usage pppa. declined.

Figure 27: Journeys per person per annum (England excluding London) by local bus, National Rail, and taxi/minicab, 2009/11 to 2015/17



Taxi and Private Hire Vehicle (PHV) usage

2.8.2 The NTS collects travel diary data on use of this mode, comprising taxis (vehicles with a metered fare scale, able to 'ply for hire') and PHVs (where fares are not fixed, and all trips are pre-booked). The latter are also known as 'minicabs'. In London, they are generally perceived quite differently from taxis. Outside London, however, the distinction is far less clear, and the survey now sensibly combines the two as a single mode (until 2012 inclusive, separate data were produced, showing the majority of such trips to be 'taxi', but this distinction may not be reliable).

2.8.3 They can be seen as potential competitors to buses, notably in convenience of door-to-door journeys. However, their role may also be complementary, for example providing services late at night when buses are very limited. There has been a marked expansion of total numbers iin recent years, but at the same time a slight decline in trips per person per year (see Table 6).

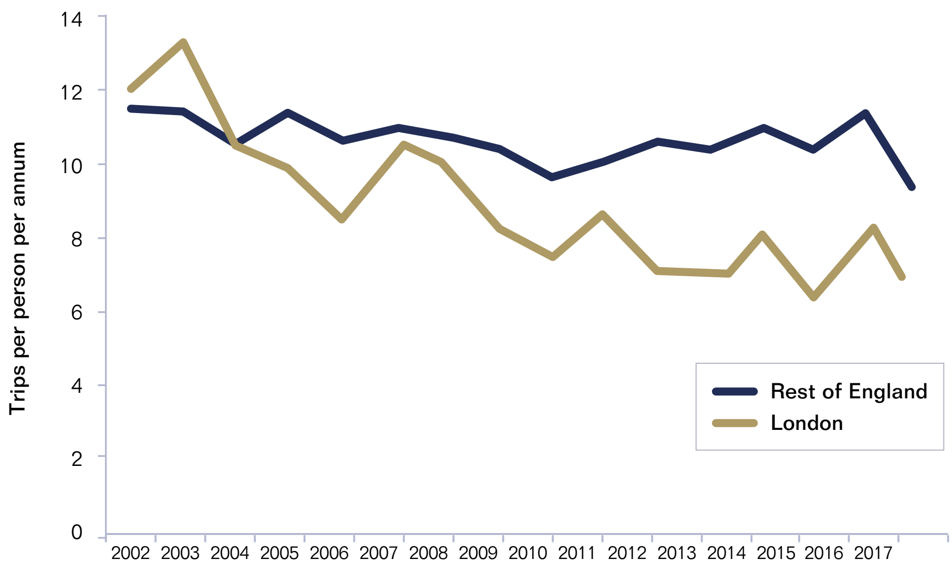
Table 6: Trips per person by taxi and PHV, and total number of vehicles licensed in England, 2005 – 2017

Year	2005	2007	2009	2011	2013	2015	2017
Trips per person per year	11	10	10	10	10	10	9
Total taxis and PHVs (thousands)	188.47	198.18	217.3	227.97	221.66	242.36	280.54

Sources: Trips per person per year from the National Travel Survey: England, (Table NTS0303 'Average number of trips (trip rates) by mode, England 2002 to 2017' [data are published to the nearest whole number]. Total taxis and PHVs from DfT Table TAXI0101a 'Licensed taxis and licensed PHVs: England and Wales from 1965')

2.8.4 NTS data show a drop in trips per person per annum between 2002 and 2017 – in London, from about 15 to 8, and elsewhere in England from about 14 to 11 (See Figure 28). Taxi/PHV users make more bus trips than the population as a whole outside London, and tend to come from the same population group as bus users. A marked disparity exists between the rapid growth in taxis and PHVs, and a reduction in trip rate per head. It should be noted that a growth in numbers of drivers and vehicles does not necessarily indicate a pro rata increase in service supply if additional drivers are mainly part-timers, undertaking supplementary work. It is also worth noting the London Travel Demand Survey (generally similar to NTS in methodology, but with a much larger local sample) shows some recent growth for taxi/PHV trips per respondent in the combined demand, of 9.8% in 2016, and 2.7% in 2017, but nonetheless below the rapid growth in PHVs at this time[29].

Figure 28: Taxi and minicab usage, 2002-2017



2.8.5 A striking paradox can be seen between the stability or slight decline in trip rate per person, and the large growth in supply of vehicles. This suggests that, while some individual examples exist of a shift from bus to taxi/PHV use, this does not explain general decline in bus use to any noteworthy extent. For example, in areas with a bus use decline of over 20%, taxi/PHV trips per head were broadly the same in 2010 and 2017 (about 14 per year).

29 Transport for London (2018) Travel in London: report no 11, section 7.4 (pp140-141).

Rail services

2.8.6 In contrast to buses, rail use does not follow as predictable a pattern of decrease with car ownership, and has experienced a strong increase in Britain in the last two decades. In respect of 'heavy rail' systems, there has been little change in network size. For light rail - which more closely matches bus services in terms of stop spacing and speed – there has been substantial network expansion in the period analysed in this report, notably in Manchester and Nottingham. In the metropolitan areas outside London, growth in rail use offset a substantial part of the decline in bus use in the period 1999/2000 to 2006/07, bus use falling by in 104 million trips, whilst heavy and light rail use grew by 40 million[30]. It does not follow, however, that a direct shift of the same individual passenger journeys took place. In some cases, growing congestion affecting speed and reliability of bus service may have led to diversion of trips directly to rail- the West Midlands is a relevant example, as bus speeds have worsened substantially – by an average of about 1% per annum, with worsening reliability also increasing the journey time which users will have to allow[31]. Although the rail network in that conurbation is limited to a few corridors, usage has grown rapidly in recent years, and it now accounts for more commuting into central Birmingham at peaks than does the bus network.

2.8.7 Studies of light rail systems also indicate a large element of trips diverting from bus when they opened - for example about 20% in the case of Manchester Metrolink[32], and 55% for Sheffield Supertram[33].

Walking and Cycling

2.8.8 One possible explanation for the decline in bus trips is that people are walking and cycling instead. The Government and local authorities have actively been encouraging these modes, including publishing an investment strategy in 2017 which set targets for walking and cycling in England (Department for Transport, Cycling and Walking Investment Strategy, April 2017). Over the past three years, people walked more often and further, but cycling trips have remained flat although for longer distances. Explanations for the increase in walking tend to emphasise the health benefits of active travel and the push factor of time savings especially in the light of the total door to door time when there is congestion during the bus section of the journey. It is also suggested that the use of real time travel planning apps has highlighted the similarity of walk/bus whole journey times in congested road conditions. Certainly, in many cases walk trips under a mile (where the biggest increases have been seen) would be competitive with bus. However, in the absence of detailed individual travel change surveys, there is no hard evidence to show that this rise in walking is due to less bus use.

30 White, Peter 'Factors affecting the decline of bus use in the Metropolitan areas' Report for the Passenger Transport Executive Group, April 2008

31 Forth, T., McClure, N., Evans, P and Pass, D. 'Real Journey Time: A new understanding of bus passenger experience; measurement and applications' Paper at Transport Practitioners' Meeting, Oxford, July 2018

32 R.D.Knowles 'Transport impacts of Greater Manchester's Metrolink light rail system' Journal of Transport Geography, Vol 4, no 1, 1996, pp 1-14

33 TRL593 The Demand for Public Transport, 1993, table 12.15

3. Variations by Socio-demographic Characteristics and Journey Purpose

Key Findings

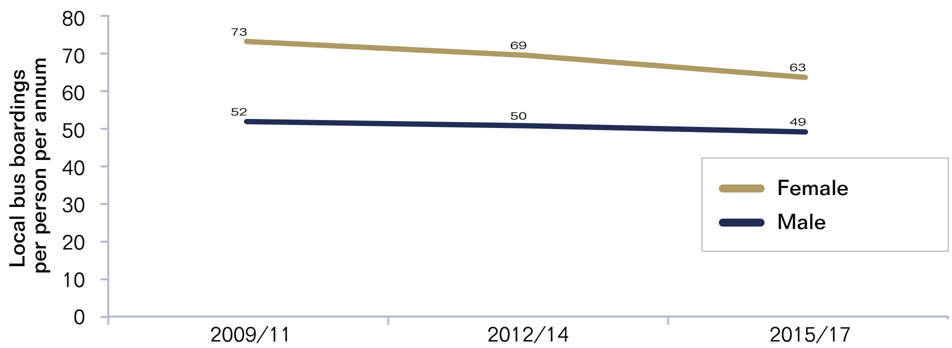
- A higher proportion of women are bus users than men, but bus usage by women has fallen more steeply since 2009, narrowing the gender gap.
- Bus usage has intensified amongst younger men, perhaps related to the steep fall in car licence holding amongst this group. This group also takes the longest bus journeys.
- There has been a particularly pronounced fall in bus use by students and those in their late teens (aged 17-20) – groups which have historically had high rates of bus use.
- Pensioners use the bus more than people in their 30s, 40s and 50s, but bus travel by pensioner women is steeply declining, perhaps related to greater car ownership amongst this group.
- Bus usage has fallen fastest amongst low-income groups such as students, the unemployed and the economically inactive, as well as amongst those without access to a car – traditionally the largest markets for bus.
- Shopping trips by bus, which remain the largest journey purpose category, have seen a particularly pronounced decline.

3.0.1 The previous section investigated trends in the overall bus market in England outside of London. This section now turns first to how bus usage varies by socio-demographic characteristics and then why people are using local buses (the journey purposes). It then takes an in-depth look at declining bus use amongst OAPs (Old Age Pensioners).

3.1 Variations by gender and age

3.1.1 We begin by looking at trends in bus usage separately for males and females in Figure 29. What can be seen is that the decrease in bus journeys is much sharper for females, a decline of 14% versus 6% for males, albeit from a higher base.

Figure 29: Bus journeys by gender, 2009/11 to 2015/17

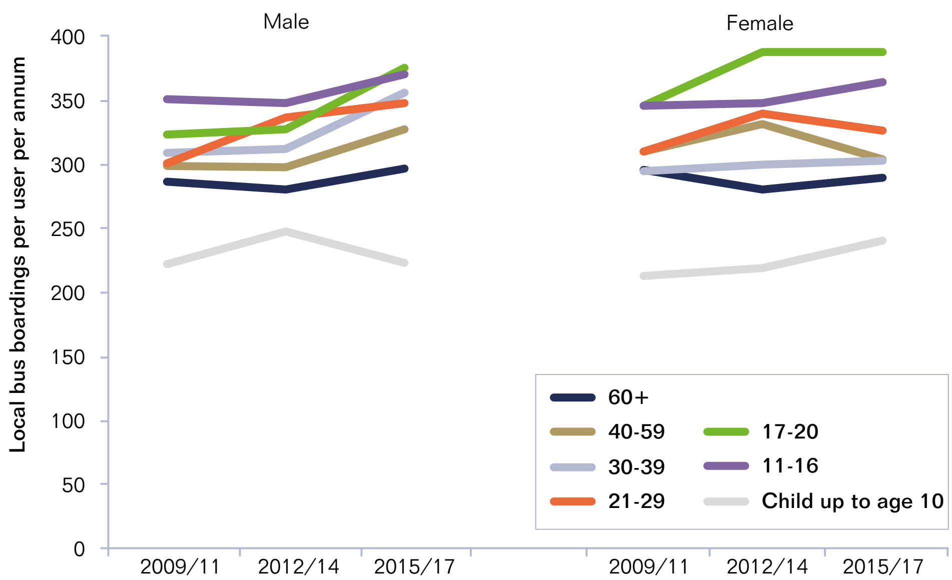


3.1.2 The highest rates of bus journeys per group member per year are teens aged 17-20, particularly females. However this group shows a relatively strong decline in bus usage.

3.1.3 Bus usage is low amongst children age 10 and under and in middle age between age 30 and 59. In contrast, it is relatively high for teens, for ages 21-29, and for over-60s. For young adults, driving licence acquisition has decreased, along with metrics of car usage. Licence-holding and car use amongst older females has risen over time due mainly to a cohort effect; this appears to be linked to this group's decreasing bus usage. Note that some year-to-year fluctuations may be associated with sampling issues, and the possible understatement of bus use as whole toward the end of this period in the NTS.

3.1.4 Figure 30 presents bus usage per user by age and gender. The main finding is that the variation between the age/gender groups is much less than in the two previous charts. The range in proportion-of-users is between approximately 10% and 50%, whereas the range in usage-per-user in Figure 24 is much narrower, between only about 200 and 400 journeys per year (and between ~300 and ~400 if children age 10 and under are excluded). Finally, it can be seen that trip rates for OAP bus users are relatively light, compared with younger and middle-aged adult users (as one might expect from work and education travel).

Figure 30: Bus use (boardings per annum) per user, by gender and age categories, 2009/11 to 2015/17



34 This table is in a comparable format to Figures 4.2 (for automobile travel) and 4.4 (for National Rail travel) in the 2016 Independent Transport Commission report titled Recent trends in road and rail travel: What do they tell us?, available at: www.theitc.org.uk/wp-content/uploads/2016/12/OTM2-Policy-Analysis.pdf

3.1.5 Table 7 summarises bus travel by age and gender, and also considers journey length (in miles) and total bus mileage per annum[34]. Groups having the largest proportion of bus users are both younger (age 17 – 39), women and older women (age 60+). However, the group showing the highest average distance of bus journeys are younger men (also age 17 – 39). While there is not a particularly large proportion of this group that are local bus users, the bus users amongst this group have the longest-distance bus trips, the largest number of bus trips per user, and also the largest number of bus miles travelled per user. In contrast, women in middle age (40 to 59) make the shortest-distance bus journeys.

Table 7: Age/Gender summary of trip-making by local bus, 2015/17 and change from 2009/11

	% pop'n making trips		Trips per year per tripmaker		Miles per trip		Miles per trip maker per year		Miles per person per year	
	2015/17	Change from 2009/11	2015/17	Change from 2009/11	2015/17	Change from 2009/11	2015/17	Change from 2009/11	2015/17	Change from 2009/11
All Persons	18%	-14%	314	4%	4.6	4%	1,447	9%	258	-6%
Children (Under age 16)	16%	-13%	297	5%	4.4	8%	1,303	13%	211	-2%
Men 17-39	18%	-9%	355	14%	5.2	1%	1,835	15%	322	5%
Women 17-39	23%	-14%	336	5%	4.9	7%	1,631	12%	369	-4%
Men 40-59	9%	-16%	329	9%	4.6	1%	1,520	10%	140	-8%
Women 40-59	15%	-16%	306	-1%	4.2	8%	1,294	7%	188	-11%
Men 60+	19%	-12%	296	4%	4.5	7%	1,337	11%	256	-3%
Women 60+	27%	-16%	289 -	-2%	4.3	-3%	1,247	-5%	334	-20%

Percentage changes in the percentage of the population making bus trips should be read as change expressed in percentage points.

NB: White-to-blue shading indicates lowest-to-highest absolute level for each column; red-to-yellow-to-green shading indicates large decreases to large increases in percentage terms (between 2009/11 and 2015/17)

3.2 Journey Purpose Categories

3.2.1 Table 8 shows composition of the bus and rail markets by journey purpose in 2018, and each mode's share of all travel. It can be seen that the most important trip purpose for travel by bus is shopping. Figure 33 provides more details on changes in journey purpose since 2009/11, and shows that shopping trips have declined particularly sharply.

Table 8: Composition of bus and rail journeys by purpose, England 2018

Trip purpose	Percentage of all bus trips	Bus market share of all modes' trips	Percentage of all rail trips	Rail market share of all modes' trips
Commuting	18.75	6.3	47.06	11.1
Business	2.08	2.0	8.82	10.0
Education	18.75	7.1	5.88	1.6
Shopping	25.00	6.4	5.88	1.1
Personal business	10.42	5.4	5.88	2.2
Leisure	20.83	3.9	26.43	3.5
Other purposes	4.17	1.3	0	0
All purposes	n/a	4.9	n/a	3.3

Source: see note below[35]

3.2.2 The very different composition of the bus market compared with that for rail may be noted, bus being far less dependent on commuting journeys, and thus less 'peaked' by time of day.

3.2.3 A fuller analysis, using a more detailed breakdown of trip purposes for bus boardings for the whole of England including London shows trends from 2002 to 2017 and is depicted in Figure 31. A year-by-year picture for bus modal shares for selected trip purposes (again, on the 'main mode' definition) shows that 'visiting friends' is also a noteworthy category, as seen in Figure 32. However, it is characterised by higher car occupancy than shopping, for example (the ratio of driver to car passenger trips suggests around 2) and for visiting friends at places other than a private home. For 'shopping' car occupancy is around 1.4 (declining in recent years) and similar for 'all other purposes', although stable. Car occupancy may be an important factor in mode choice between car and bus, since bus users are charged individually (except where on a free pass) whereas car total variable costs (fuel, parking, etc.) vary little with occupancy, reducing cost per person as occupancy rises. Taxi/PHV fares increase with occupancy, but not pro rata.

35 Derived from National Travel Survey table 0409 'Average number of trips (trip rates) by purpose and mode'. Note that data in that table are shown with trips per person rounded to a whole number, from which above percentages are derived. In the case of rail, the published grand total is 33, but adding separate purposes together gives 34, which is used as the base for percentages within the rail market, from which the above percentages are derived. 'Bus' comprises 'Bus in London' plus 'Other local bus' (and thus excludes school services not open to the public). 'Rail' comprises 'London Underground' plus 'Surface rail'. Note that recent NTS data for bus use show substantial fluctuations on a year-to-year basis (giving a greater rate of decline than in operator-reported data: see appendix 4), so that the bus share of the overall market appears considerably lower than in the previous year.

Figure 31: Journey purpose by finest-available classification, 2002-2017

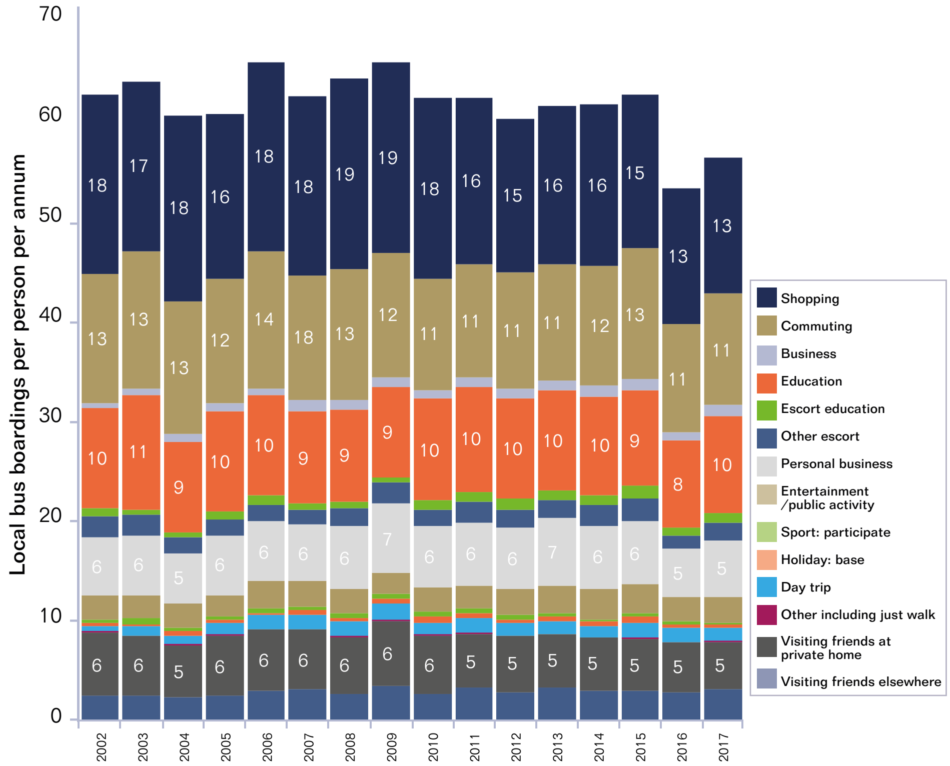
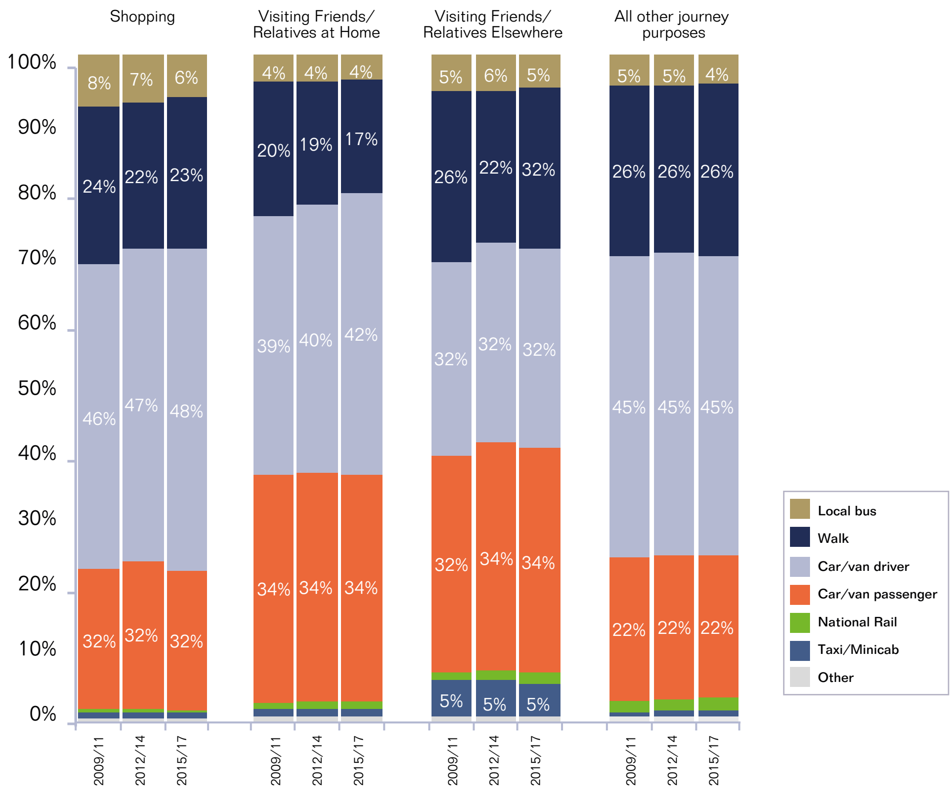
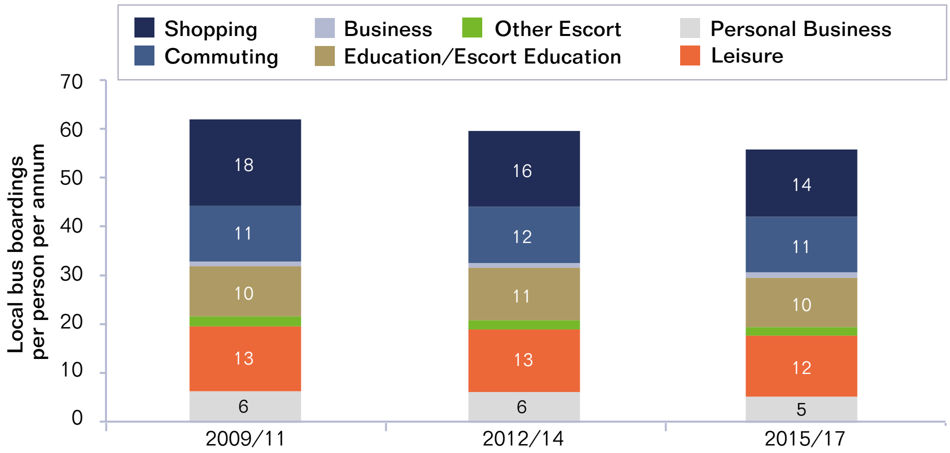


Figure 32: Mode shares by selected journey purposes, 2002-2017



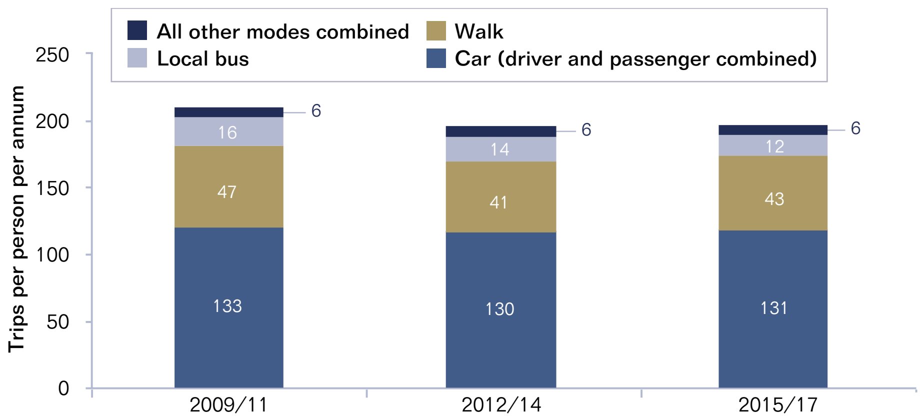
3.2.4 Figure 33 shows trends in the breakdown of bus usage outside of London by journey purpose. Shopping trips by bus declined sharply between 2009/11 and 2015/17 (by 22%), although remaining the most important single trip purpose, whereas all other purposes have much weaker time trends (whether other purposes are considered individually or combined into a single “all-except-shopping” category).

Figure 33: Bus boardings by journey purpose 2009/11 to 2015/17



3.2.5 We see in Figure 34 that shopping trips (all modes of travel combined) have trended modestly downwards since 2009. However, local bus shopping journeys declined much more sharply. There are a number of theories for the decline in shopping trips, ranging from the effect of online retail (in which the UK is an international leader) to the consolidation of retail into larger shops located out-of-town, where more shopping can be performed during a single shopping journey. The decline in overall shopping journeys can only be a small part of the explanation for the decline in bus travel outside of London. Note that the NTS defines trips by their main purpose, and it is possible that more shopping activity is now carried out as a secondary trip purpose (for example, purchases on the way home from work).

Figure 34: Trends in shopping journeys, by all modes of travel, 2009/11 to 2015/17

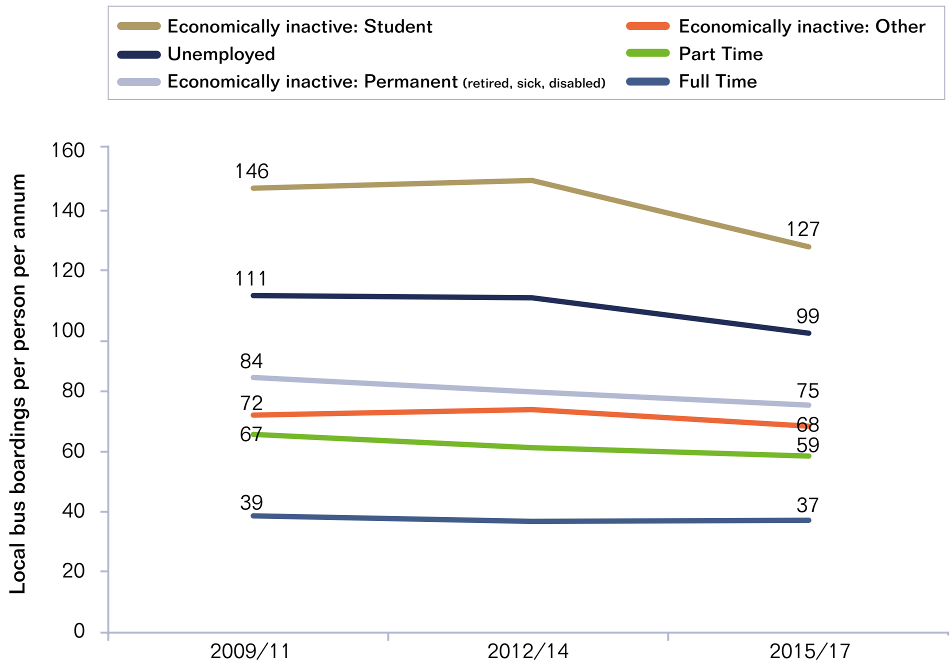


Note that mode use is defined by each journey’s “main mode”, thus is not identical to the bus boardings statistic.

3.3 Occupation Type and Personal Status

3.3.1 The next set of charts looks at how bus usage varies by occupation status. Figure 35 shows that students (age 16 and above; under-16s not shown in this chart) exhibit the highest bus use, but their usage appears to have trended downwards rather quickly since 2009. After students, unemployed and other economically inactive adults make high numbers of bus journeys, followed by part-time workers and finally full-time workers with the lowest rate of bus usage.

Figure 35: Bus journeys per person per annum by working status, 2009/11 to 2015/17



Source: NTS

3.3.2 Figures 36 and 37 look at the proportion of bus users and use-per-user, for the six categories of working status. There are much larger differences in the proportions-of-users than in use-per-user. The proportion of users ranges from the low teens to the low forties in percentage terms, but the use-per-user values are all clustered in a narrow band of approximately 300-350 boardings per user per annum.

Figure 36: Percentage of bus users within working status categories, 2009/11 to 2015/17

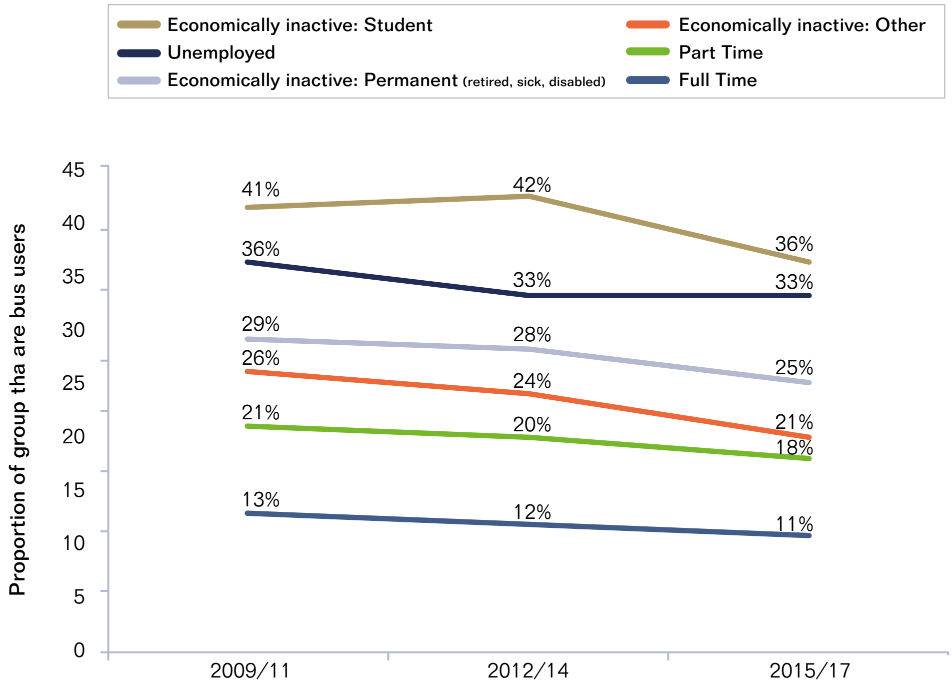
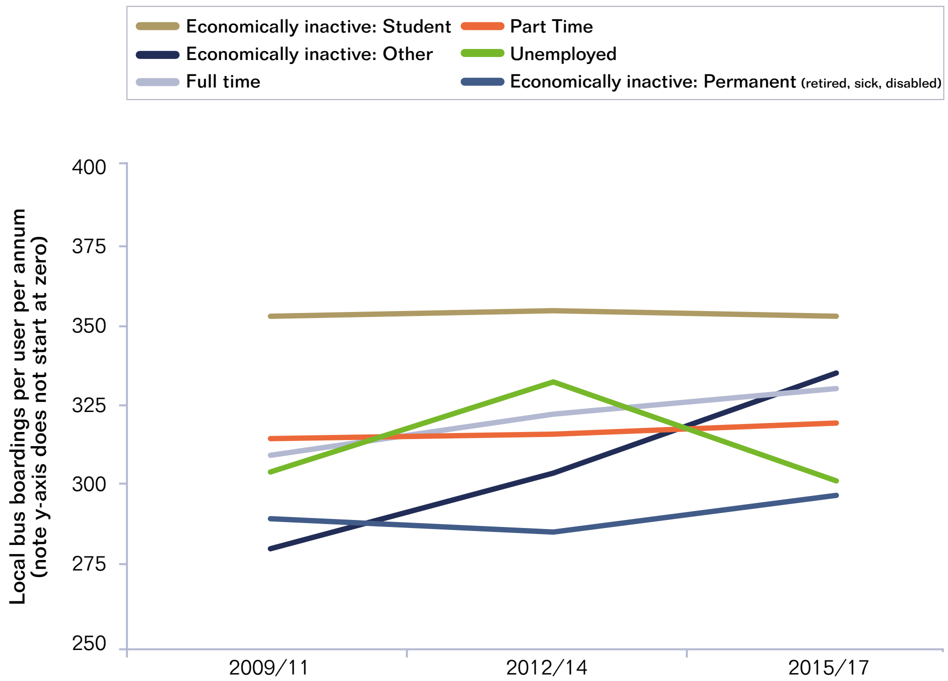
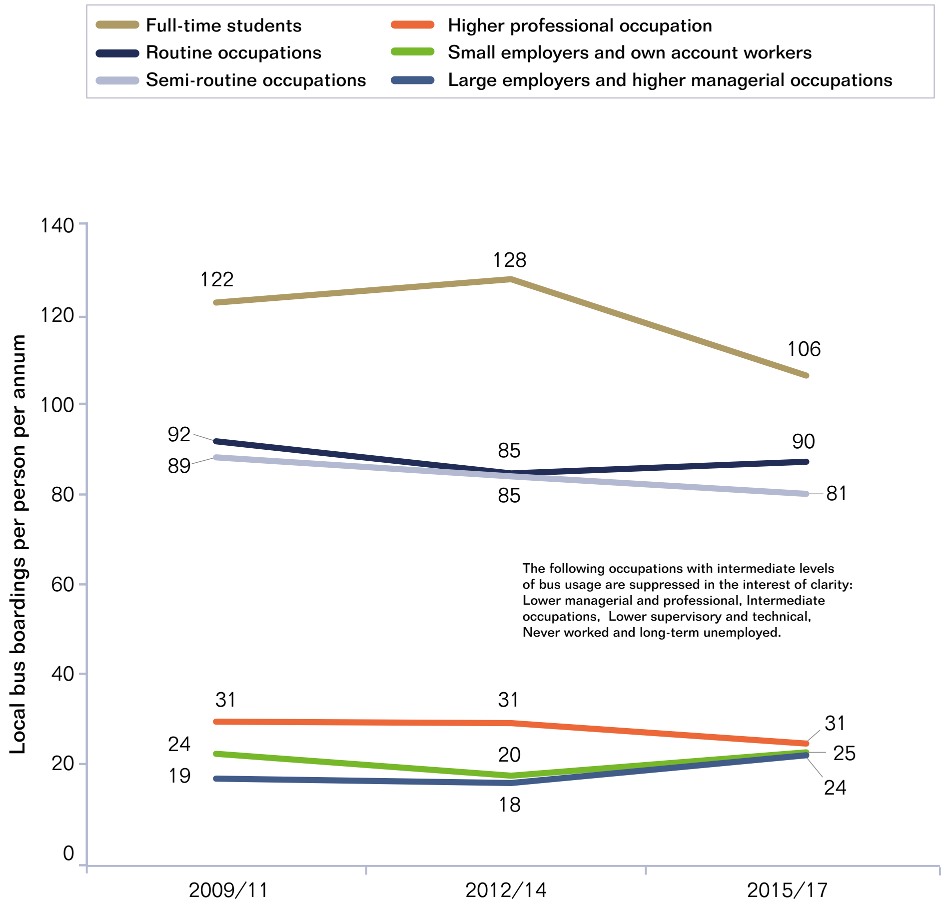


Figure 37: Bus use per 'user' per annum, by working status, 2009/11 to 2015/17



3.3.3 Figure 38 investigates relationship between socio-economic status and bus usage further, by looking at occupation type. The general pattern is that occupations that are low on the socio-economic scale have high rates of bus usage, and vice versa. Students have higher rates of bus use than all categories of workers.

Figure 38: Bus boardings per annum by type of occupation, 2009/11 to 2015/17



3.3.4 Figures 39 and 40 show proportions of category members that are bus users, and average use per user. In Figure 39, there appears to be a trend of convergence, in which the socio-economic categories that have high proportions of bus users have seen that percentage fall more than categories with lower proportions of bus users. As with the previous set of charts that considered Working Status, Figure 40 shows that use-per-user has smaller between-group differences than proportion-of-users.

Figure 39: Proportion of occupation categories who are bus users, 2009/11 to 2015/17

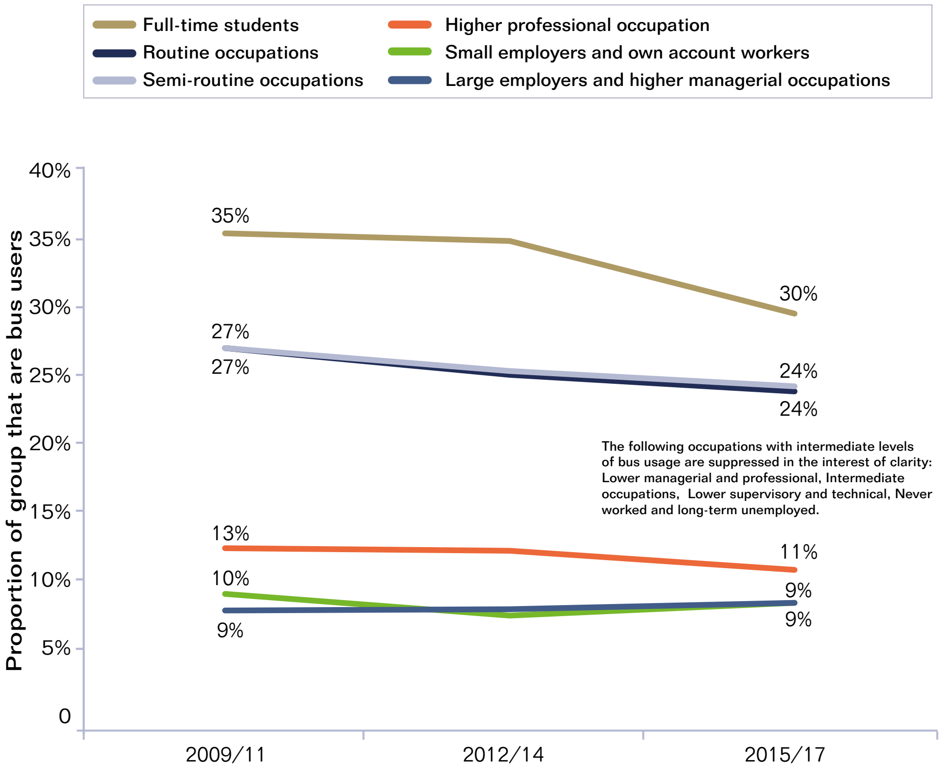
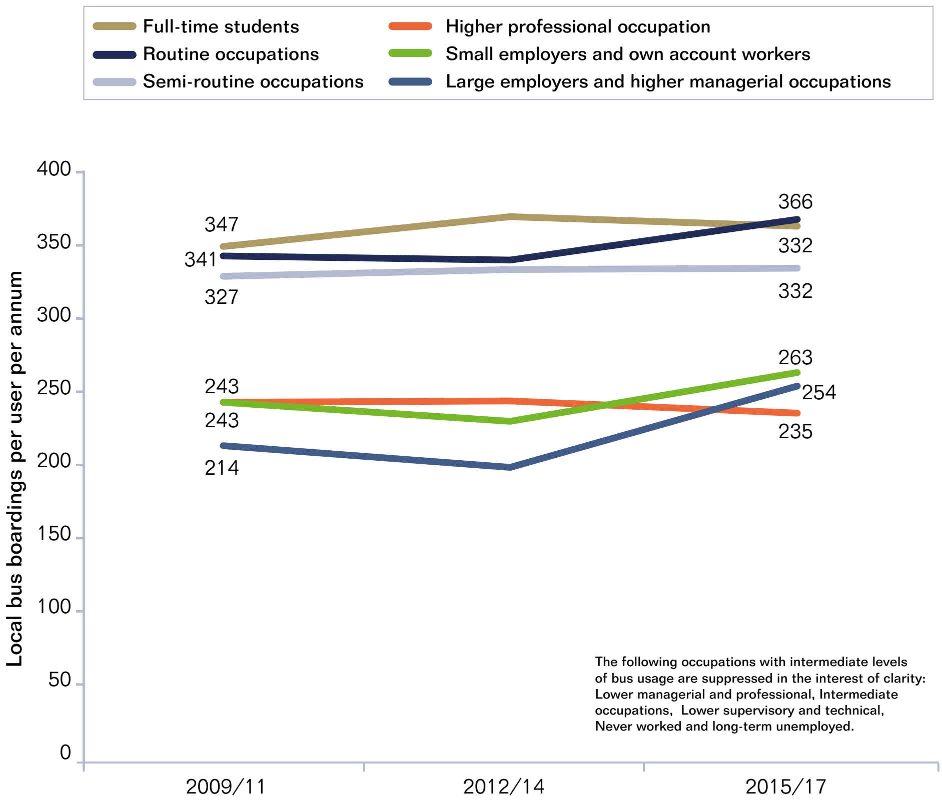


Figure 40: Bus boardings per annum by type of occupation, 2009/11 to 2015/17

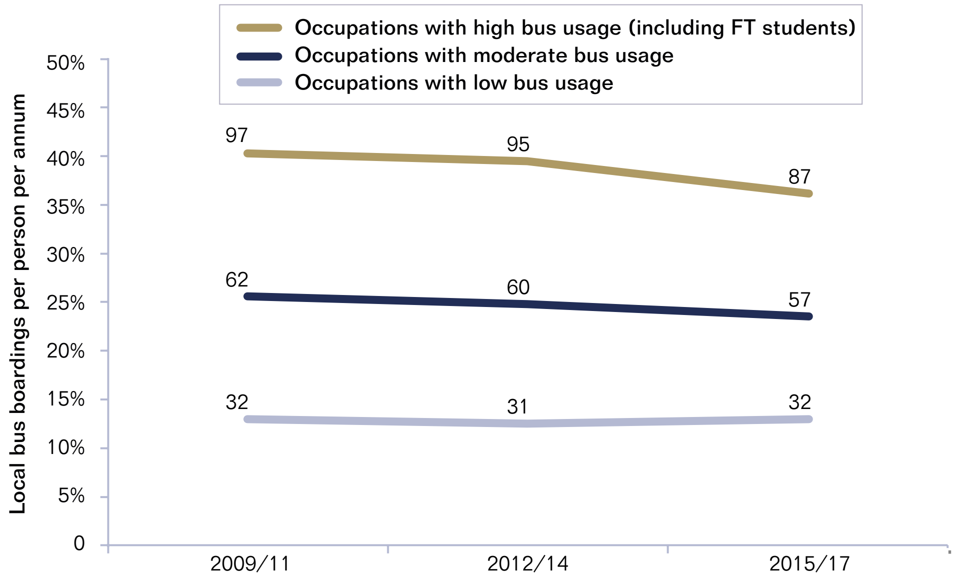


3.3.5 Figure 41 shows the same data as Figure 38, with the occupation types collapsed into a set of three categories defined by level of bus usage:

- High bus usage: Students, Never worked and long-term unemployed, Routine, and Semi-routine occupations
- Moderate bus usage: Intermediate occupations and lower supervisory and technical occupations
- Low bus usage: Lower managerial and professional occupations, higher professional occupations, small employers and own account workers, and large employers and higher managerial occupations.

3.3.6 Figure 41 shows an interesting pattern: there is a fast rate of decline in bus usage amongst the "high bus usage" category, and there is stability amongst the "low bus usage" class. Usage by traditional bus users is on the decline, while usage by non-traditional bus users is remaining more nearly steady. Note, however, the possible understatement of bus use in general in 2015/17 in NTS data as discussed earlier.

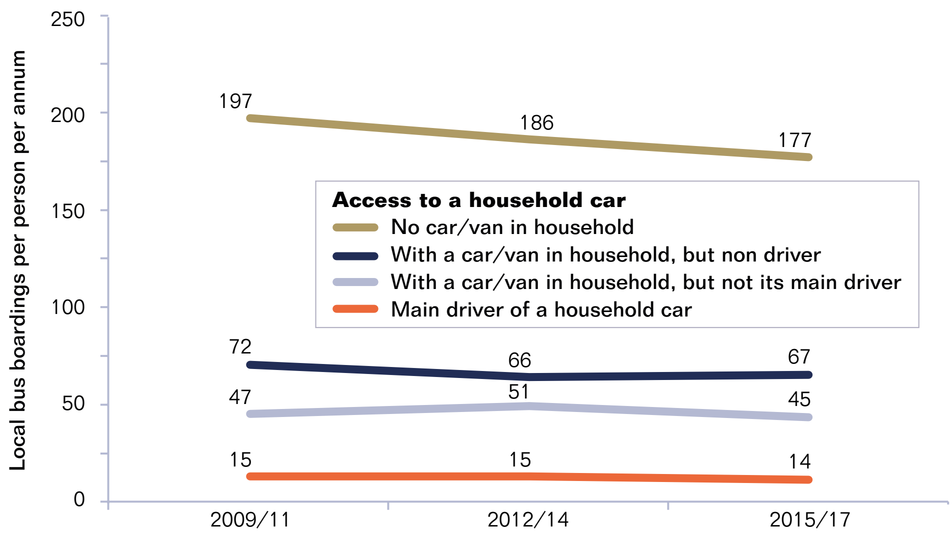
Figure 41: Bus boardings per annum, by aggregated type of occupation, 2009/11 to 2015/17



3.4 Car Ownership Effects

3.4.1 There is a strong cross-sectional relationship between car ownership and bus use, as indicated in table 5. Figure 42 shows how bus use varies by car access. Usage is much higher for people living in households that do not have a car than households that own a car, even for people that do not drive. But the clearest decline is in zero-car households, which also suggests that bus use is declining more in the traditionally "core" market segments. This decline in bus use by residents living in non-car-owning household could indicate that shifts of households between these categories will explain a substantial proportion of aggregate bus use decline.

Figure 42: Bus boardings per annum by car access 2009/11 to 2015/17



3.4.2 Car ownership may be expressed in three ways:

1. Cars per 1,000 population or per head of population, typically used in international comparisons
2. Cars per household. This will also be affected by average household size. The average in England rose from 0.82 in 1985/86 to 1.09 in 2002 and 1.22 in 2017[36]
3. Percentage distribution of car ownership by household, typically categorised as zero, one, two, and three or more. Multiple car ownership has further effects on bus ridership, especially where more than one driving licence holder is found in one-car households, who can shift more trips to car when a second car is acquired.

NTS data give both a vehicles per household and percentage distribution. In addition to cars as such, vans and jeeps for private use are also included.

3.4.3 London has for many years displayed a sharply lower car ownership rate, now only 305 per 1,000 population, which has declined slightly since the mid-1990s, compared with an average of 494 in other regions, the lowest (outside London) being the North East at 428[37]. In terms of cars etc. per household, the average was 1.00 in 2016/17. The share of households in London with no car was 41% in both 2002/03 and 2017/17, and multiple car ownership is also much lower than elsewhere.

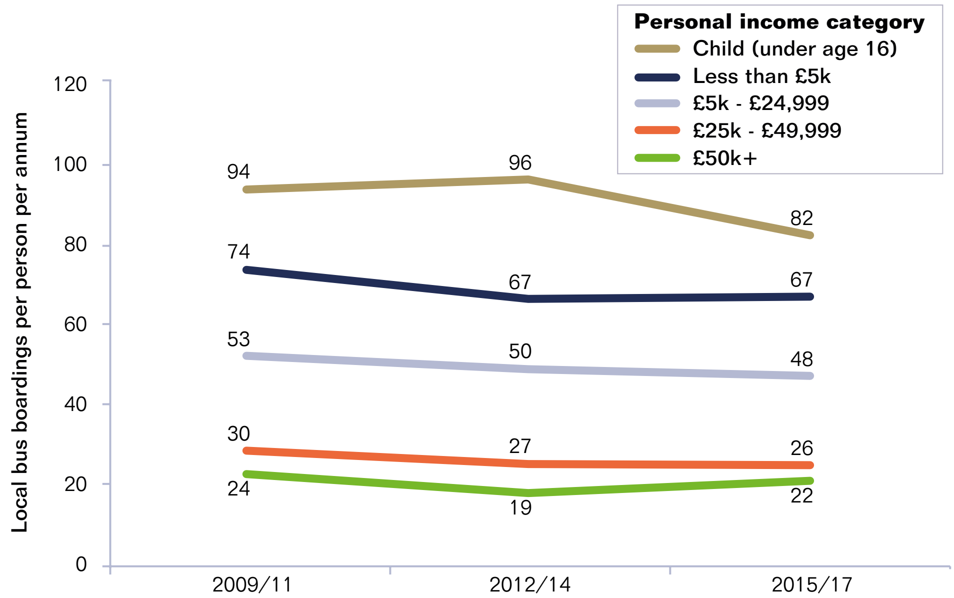
36 NTS Table 0205 Household car availability: England 1951 to 2017.

37 Table TSGB 0906 Cars per 1,000 head of population: Great Britain 2017.

3.5 Variation by Income Groups

3.5.1 When we look at income groups, Figure 43 shows that once again bus use has decreased more in segments that are traditionally strong for bus travel. Bus journeys decreased by 13% among people with the lowest incomes (annual income under £5K), compared to 8% for people with the highest incomes (£50K+). Lower-income people continue to make more bus journeys than higher-income people, however this relationship appears to be weakening.

Figure 43: Bus boardings per head by personal income category, 2009/11 to 2015/17



3.6 Pensioner travel

3.6.1 This section looks at changes in OAPs' lives, and relates these changes to their bus use. OAPs are of particular interest both because they have a high rate of bus use, and also because their bus use is a policy-relevant question given the provision of the Senior Citizen Concessionary Bus Pass. The minimum functionality of these passes is set by statute, however DfT statistics[38] show that the majority of the 89 Travel Concession Authority areas offer discretion beyond the statutory minimums:

- 70 offer extensions to travel times (beyond the 0930 to 2300 minimum on weekdays plus all-day on weekends)
- 53 allow older people's companions to travel
- 44 allow use of Community Transport or Dial-a-Ride
- 29 allow use of Park and Ride

38 Department for Transport, 'Concessionary Travel Statistics, England 2017/18'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774523/concessionary-travel-statistics-2018.pdf

3.6.2 One theory for OAPs' declining bus use is their increased rate of car access, which is shown as the slowly increasing rate of being a "main driver" of a car (i.e. they drive a car more than anyone else drives that car). The converse of this is the decrease in OAPs living in zero-car households (27% to 24%). From 2009-2017, the percentage of pensioners with access to a vehicle as the main driver increased from 50% to 54%. In the same time, the percentage of pensioners without a car decreased from 25% to 23%.

3.6.3 However, even amongst OAPs living in car-less households, there has been a 9% decrease in bus usage. Therefore, increasing car ownership amongst OAPs' households is not convincing as a full explanation of why their bus travel has decreased.

3.6.4 The trend amongst OAPs has been rising incomes, which might be expected to lead to less bus usage. OAPs' bus use has trended down within all income groups. The relationship with income is broken down by number of users and use-per-user in Figures 44 and 45. As with a number of the previous analyses, there are much greater differences in the proportion of users than in use-per-user amongst the different income classes. It is noteworthy that there is a rather sharp divide in proportion of bus users between the income groups below and above the £25K/year level.

Figure 44: Percentages of pensioners that are bus users, by income categories, 2009/11 to 2015/17

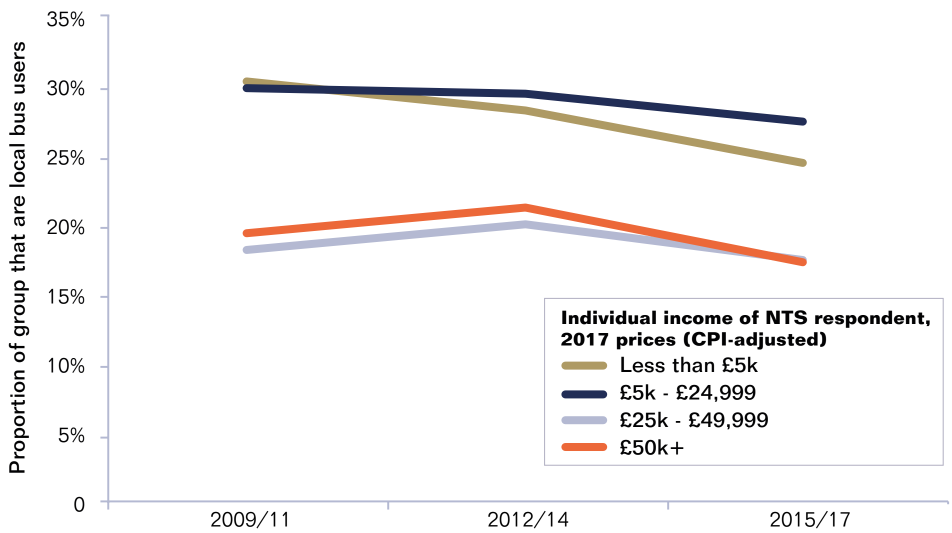
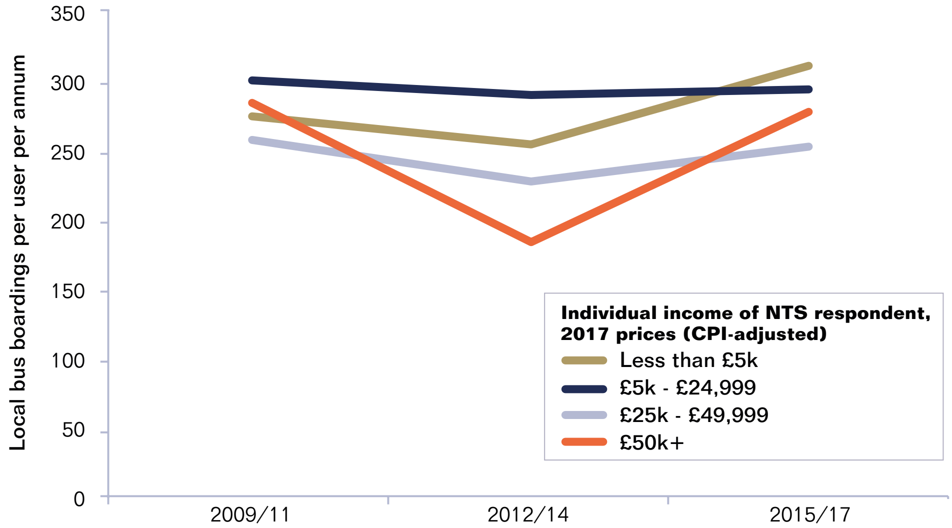


Figure 45: Changes in pensioner bus boardings by real income, 2009/11 to 2015/17



3.6.5 The final analysis relating to pensioners is by the types of place in which they are living. Figure 46 shows a slow trend towards living in the smallest settlement sizes, and away from larger metropolitan/urban areas, this is notable because local bus services are typically strongest in the largest urban areas and progressively less convenient in smaller cities and rural areas.

3.6.6 In Figure 47 it can be seen that pensioners' bus travel is declining in medium-sized and larger urban areas. Figure 48 next looks at bus users as a proportion of pensioners living in each settlement size band, with Figure 49 depicting use-per-user. The proportion of users and use-per-user are both highest in metropolitan areas, with a smooth decrease through to rural areas. Use-per-pensioner-user has increased in both metropolitan areas and rural areas, but has been stable for the small and mid-sized urban areas between these two extremes.

Figure 46: Trends in settlement size categories in which pensioners live, 2009/11 to 2015/17

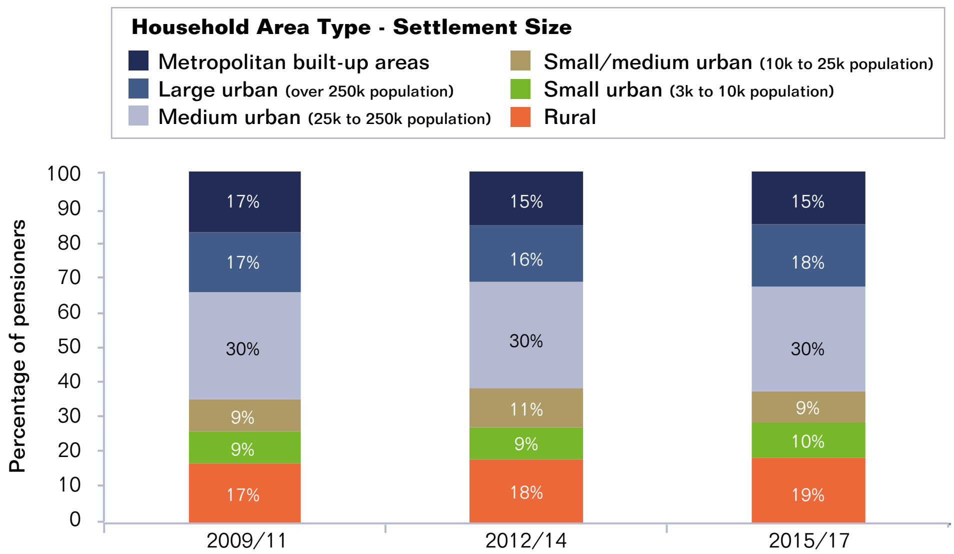


Figure 47: Pensioner bus boardings per annum by settlement size, 2009/11 to 2015/17

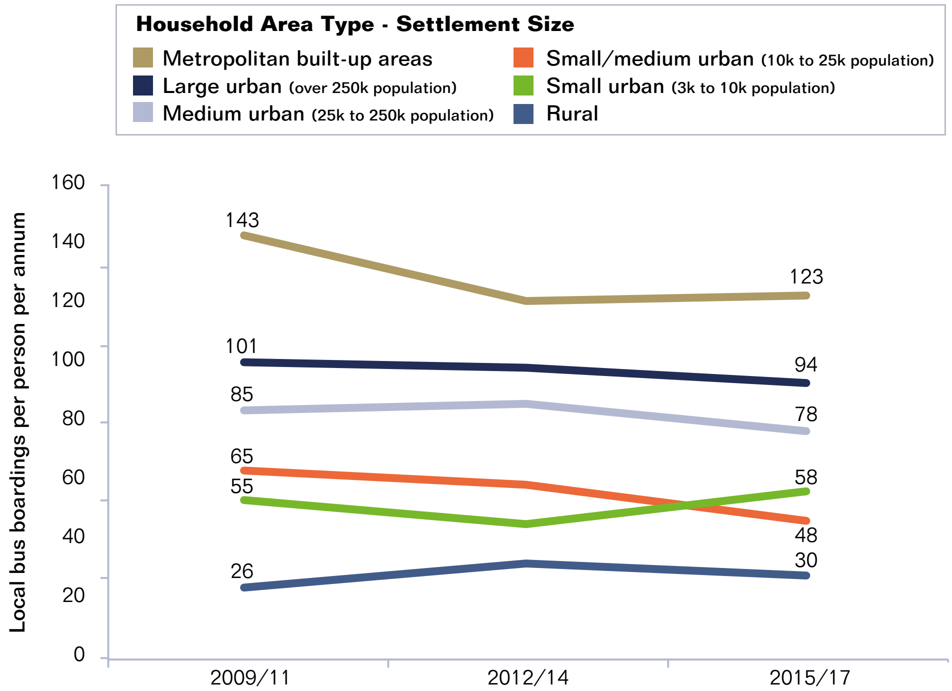


Figure 48: Percentage of pensioner category that are bus 'users', by settlement size, 2009/11 to 2015/17

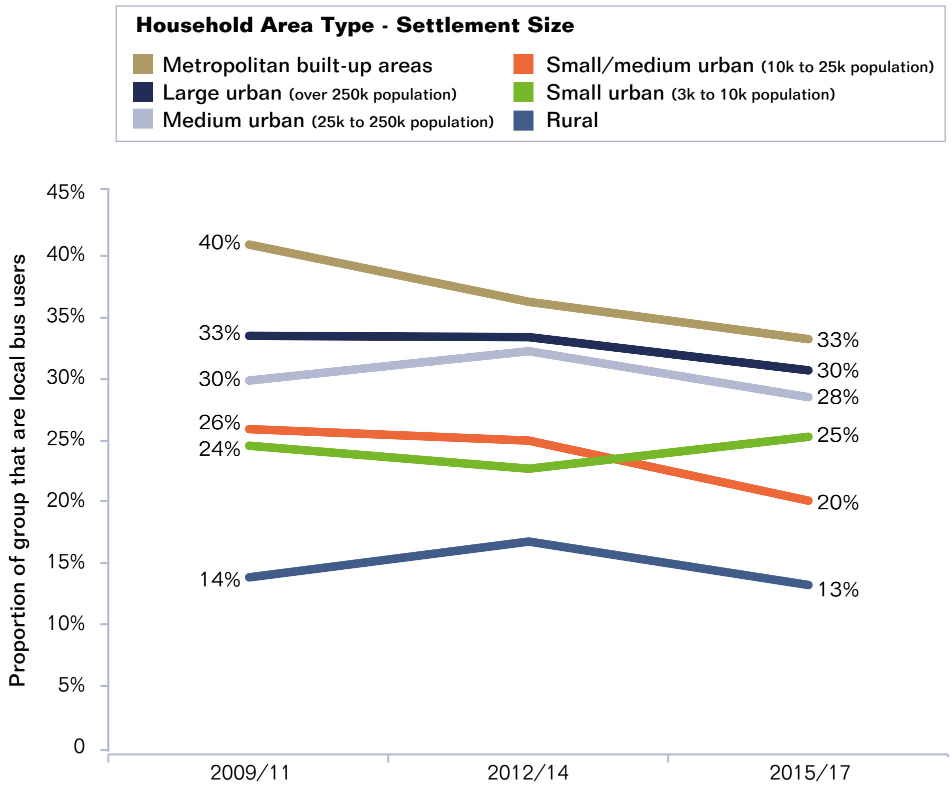
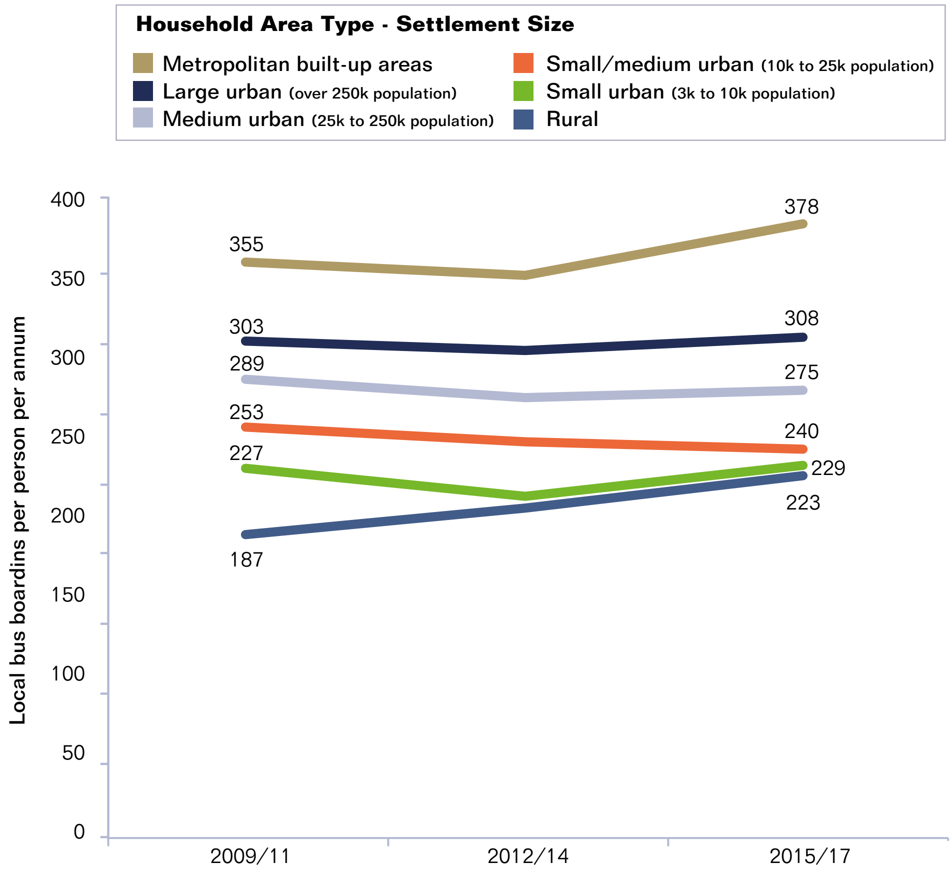


Figure 49: OAPs' bus boardings per user, by settlement size, 2009/11 to 2015/17



4. Trends by Local Authority Area

Key Findings

- Local Authority areas with the steepest declines in bus usage since 2009 tend to be found in Northern England and the Midlands, while those areas with increasing bus use tend to be found in Southern England.
- The areas that have seen the steepest declines in bus usage since 2009 have on average lower incomes and lower car ownership rates than those areas where bus ridership is increasing.
- Local authorities with recent strong declines in bus usage tend to have more frequent bus services. This is consistent with the above findings, that bus use is declining fastest in those market segments that have traditionally seen the highest levels of bus patronage.

4.1 Table 9 below shows how bus usage varies (as a cross-section, showing years 2015/17) by occupation type and the category of Local Authority that each NTS respondent lives in. They denote whether bus ticket sales data (as reported to DfT by bus operators) show a 'strong' decline (i.e. of over 10%) in bus usage per capita, a weaker decline, or an increase.

4.2 From Table 9, we can see that for most of the occupation-type categories bus usage is higher in the "More than 10% decline" category of Local Authority. This implies that the places where bus use is declining the most are where bus use was highest to begin with, i.e. core markets.

Table 9: Bus journeys per head per annum in 2015/17 by local authority area category and occupation type.

Category of Local Authorities by change in per capita journeys (2009/10-2016/17)	Large employers and higher managerial occupations	Higher professional occupation	Lower managerial and professional occupations	Intermediate occupations	Small employers and own account workers	Lower supervisory and technical occupations	Semi-routine occupations	Routine occupations	Full-time students	Non-working adults	Children (age 15 and under)
More than 10% decline	26	21	36	60	23	65	83	96	112	71	54
Up to 10% decline	27	28	36	57	27	41	81	62	97	72	39
Increase	11	42	42	41	25	46	75	90	98	56	36
London	79	133	141	204	125	204	219	239	249	143	138

NB Red-to-yellow-to-green sharing indicates low-to-high values within each row.

4.3 DfT operator-reported data for bus trips per person per year are classified by local authority areas (DfT Table 0110a). However, these areas are defined by administrative function, either as counties (the upper tier of two-tier areas) or unitaries. The latter are generally quite small, compact areas, which may often correspond to a specific built-up urban area. In some cases, this can also match quite well the operating area of a named operator, associated with particular service quality and pricing initiatives. However, county-level data may encompass very wide variations - for example, Oxfordshire includes the high-density city of Oxford and a surrounding low-density rural region. Hence the finer breakdowns that might be desirable, using census data for example, are not feasible.

4.4 Subject to these qualifications, three groupings were defined:

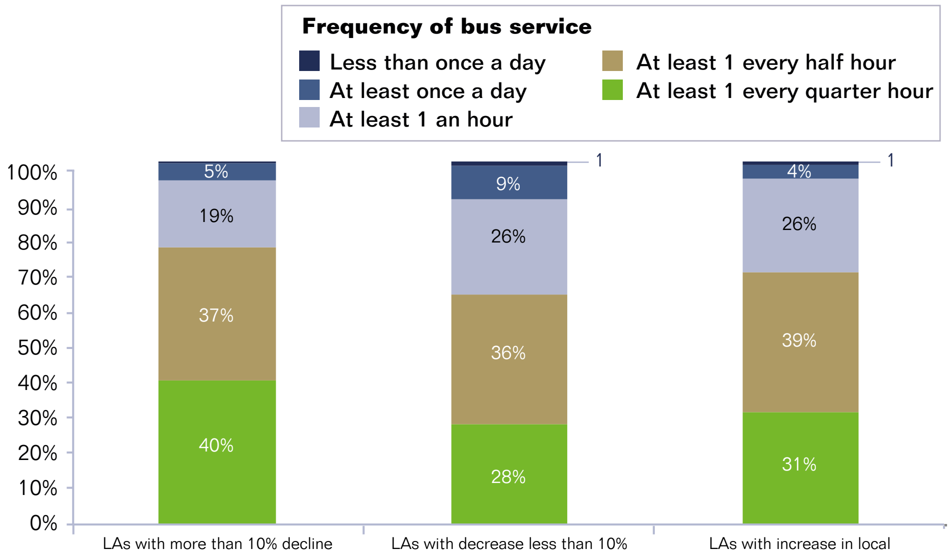
1. Areas with a 'strong' decline, of over to 10%, between 2009/10 and 2016/17. A total of 47 areas, including lower-density rural counties (such as Lincolnshire and North Yorkshire), but also many older industrial areas traditionally associated with high bus use, such as Stoke-on-Trent and Middlesbrough.
2. Areas with a 'weak' decline, of between 0% and 10%. A total of 23 areas.
3. Areas with an increase, a total of 18, comprising Torbay, Cornwall, Southampton, West Sussex, Oxfordshire, Milton Keynes, Thurrock, Wokingham, Brighton & Hove, Hertfordshire, North Somerset, Central Bedfordshire, Bath & North East Somerset, Reading, South Gloucester, Poole, City of Bristol, and West Berkshire. All are in the south of England or south Midlands. Some are low density areas where usage has increased from a low base (such as West Berkshire or Cornwall, rising to 21.0 and 20.3 respectively) but others include urban areas where use was already high, and has grown further (notably Brighton & Hove, from 154.0 to 171.8; and Reading, from 108.3 to 131.3).

4.5 The final set of analyses presented in this report are aimed at understanding what is different about places that have been experiencing strong declines in bus journeys per capita versus places that have experienced weaker decreases in bus usage or outright increases.

4.6 The aggregated data indicates all LAs experiencing increasing bus use per capita are located in the South (East of England, South East, and South West Regions). Also, population has grown a bit more quickly (+7% 2009-2017) in LAs in the "growth" category (versus 5% for LAs in the "strong decline" and "weak decline" categories).

4.7 We begin with Figure 50, which looks at what respondents within each LA area report as the frequency of the nearest local bus service to them. What can be seen is that LAs in the "strong decline" category tend to have more frequent bus service, and LAs with weaker declines or growth have less frequent bus service. This is consistent with findings reported previously in this report, of the decline in bus travel being concentrated among market segments that are traditionally quite productive in terms of bus usage.

Figure 50: Local Authorities by frequency of bus service reported by residents, 2012



4.8 The next three charts (Figures 51, 52, and 53 show bus journeys, proportion of population that are bus users, and "use-per-user" in the "strong decline" and "weak decline or growth" categories.

4.9 Figure 51 shows declining numbers of journeys in both categories, with higher usage in the "strong decline" category, and Figure 52 shows that the number of bus users decreased more quickly in local Authorities in the "strong decline" category. Figure 53 shows increasing usage-per-use in both categories.

Figure 51: Bus boardings per annum by "strong decline", "weak decline" and "increase" categories of local authorities, 2009/11 to 2015/17

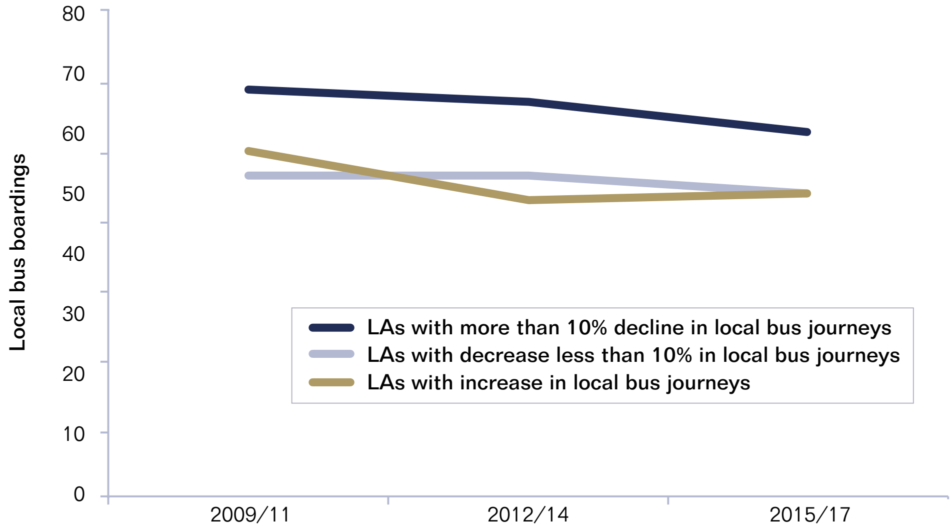


Figure 52: Proportion of population that are bus users, by "strong decline", "weak decline", and "increase" categories of local authorities

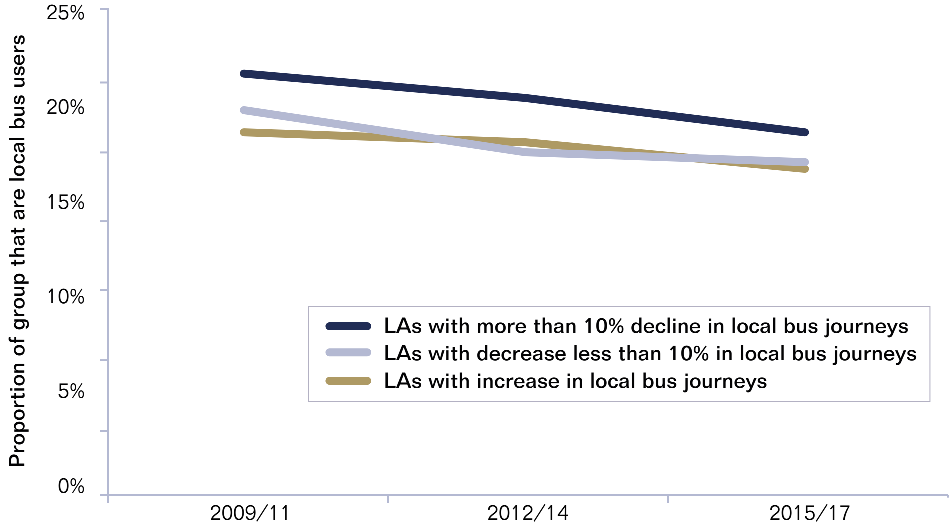
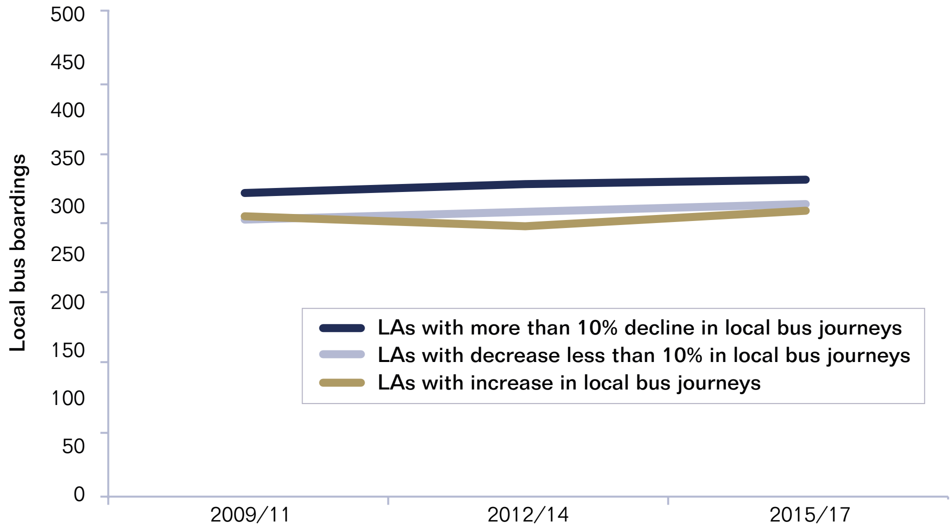


Figure 53: Bus journeys per user per annum, by "strong decline" and "weak decline or increase" categories of local authorities, 2009/11 to 2015/17



4.10 Tables 10 and 11 show summary profiles of socio-economic and bus network characteristics for both of the categories of local authorities. Notable findings include the "strong decline" category being the types of places that might be expected to be supportive of bus travel: the car ownership rate is lower (1.38 cars/household v. 1.49) and average personal incomes are lower (£19,000 v. £21,800). Other relationships with bus usage (population density, percentage born abroad, etc.) shown in Tables 10 and 11 are less clear.

Table 10: Summary population characteristics of Local Authorities in the "strong decline", "weak decline", and "growth" categories, along with London for comparison.

Year	Category of Local Authorities by change in per capita journeys (2009/10-2016/17)*	Annual bus boardings per person per annum.**	Proportion of population that are of pension age	Proportion of adults that are employed	Proportion of population that was born abroad
2009/11	More than 10% decline	67	19%	58%	8%
	Up to 10% decline	53	20%	61%	9%
	Increase	57	18%	61%	11%
	London	215	14%	59%	35%
2015/17	More than 10% decline	60	20%	59%	10%
	Up to 10% decline	50	20%	60%	11%
	Increase	50	19%	63%	12%
	London	168	12%	66%	35%
Absolute change 2009/11 - 2015/17	More than 10% decline	-7	0%	1%	2%
	Up to 10% decline	-3	0%	-1%	2%
	Increase	-7	1%	2%	1%
	London	-47	-2%	7%	1%
Percentage change 2009/11 - 2015/17	More than 10% decline	-11%	1%	1%	22%
	Up to 10% decline	-5%	0%	-2%	22%
	Increase	-12%	6%	3%	9%
	London	-22%	-14%	12%	2%

* Boardings per head data in this column of Table 10 was derived from operator-reported data published by DfT.

** Boardings per head data in this column was derived from the National Travel Survey

Table 11: Summary profiles of bus network, spatial and socio-economic characteristics of Local Authorities in the "strong decline", "weak decline", and "growth" categories, along with London for comparison

Year	Category of Local Authorities by change in per capita journeys (2009/10-2016/17)*	Annual bus boardings per person per annum**	Difference 2013/14 to 2016/17 in bus network vehicle-kms	Average number of cars/ light vans/ jeeps per household	Population density of Local Authority (persons / hectare)	Average personal (not household) income
2009/11	More than 10% decline	67	-6.8	1.38	11.8	£19,072
	Up to 10% decline	53	-9.3	1.50	11.7	£21,386
	Increase	57	8.3	1.38	13.0	£22,524
	London	215	-9.4	0.90	59.0	£22,017
2015/17	More than 10% decline	60	No change	1.41	13.0	£19,373
	Up to 10% decline	50	No change	1.51	14.7	£21,116
	Increase	50	No change	1.56	12.7	£22,799
	London	168	No change	1.00	65.8	£23,336
Absolute change 2009/11 - 2015/17	More than 10% decline	-7	N/A	0.03	1.2	£301
	Up to 10% decline	-3	N/A	0.01	3.0	-£270
	Increase	-7	N/A	0.18	-0.3	£275
	London	-47	N/A	0.10	6.8	£1,319
Percentage change 2009/11 - 2015/17	More than 10% decline	-11%	N/A	2%	10%	2%
	Up to 10% decline	-5%	N/A	1%	26%	-1.3%
	Increase	-12%	N/A	13%	-3%	1.2%
	London	-22%	N/A	11%	11%	6%

* Boardings per head data in this column of Table 11 was derived from operator-reported data published by DfT.

** Boardings per head data in this column was derived from the National Travel Survey

5. Recent Research on Bus Travel Demand

Key Findings

- Third party research shows that factors such as bus service supply are positively correlated with bus demand, but increasing incomes, higher car ownership, and higher fares are negatively correlated with bus usage.
- Regional studies indicate that the growth in car ownership has been the greatest negative factor depressing bus usage, followed by worsening bus travel times. Slower journey times is particularly a problem in London where there exist a wide range of good public transport alternatives.
- Other negative factors for bus use identified included the increasing use of online retail (confirming the ITC finding that the fall in shopping trips has particularly depressed bus usage), increases in bus fares and the lower costs of car ownership and use (principally caused by the steep fall in fuel prices in 2014).
- These studies confirm the ITC's finding that the recent increase in the supply of private hire services has not had a major impact upon bus usage.
- Further research is needed on the impact of Bus Rapid Transit and Park and Ride services in England.

5.0.1 A number of other studies have been published which analyse composition of the demand for bus travel, and factors affecting both the total and its components over time. These in turn may be sub-divided into studies looking broader, long-term factors, including international evidence, and recent studies examining the British bus market (in some cases split by nations and/or regions) and factors explaining components of change. The great majority of studies consider all types of local bus service taken together (from operator, and/or NTS, data) without differentiation by type of service provision within the local market (e.g. park & ride, or interurban) - comment is made on this aspect at the end of this text.

5.1 General studies of factors affecting demand

5.1.1 The studies in this section reflect a notable gap in the literature on fares elasticity is a value for children and younger adults, although recent operator experience where reduced fares have been offered up to ages of about 19, suggests a fairly high elasticity for this to be commercially worthwhile.

5.1.2 **The Demand for Public Transport: A Practical Guide.** R.Balcombe, R. Mackett, N.Paulley, J.Preston, J.Shires, H.Titheridge, M.Wardman, P.White. Transport Research Laboratory report TRL 593, 2004[39].

5.1.2.1 This comprehensive study (updating the previous 'Black Book' of 1980, and sometimes described as 'DFPT' or the 'White Book') examined a wide range of factors affecting bus and rail systems demand at the urban and regional level, drawing evidence from Britain and countries of broadly similar real per capita income and car ownership (western Europe, Australia, USA etc.). External factors affecting demand are identified (in particular, the impact of car ownership on bus use). In terms of endogenous factors, the importance of real fare levels, and service levels (expressed in terms of headway, or bus-km run) emerges strongly. For fares, a short-run (one year) elasticity of -0.4 (percentage change in bus trips with respect to changes in real fares) is indicated as an average, with variations associated with car availability, journey purpose and trip length. In terms of service level, a short-run elasticity of +0.4 (change in bus passenger trips with respect to bus-km run) was derived from aggregate analysis, which is also consistent with evidence from the introduction of high-frequency minibuses in the 1980s. Thus, we can see that the elasticities are of similar magnitude but opposite sign. Hence an increase in real fares of 20% and an increase in bus-km run of 20% would simply offset each other to produce approximately the same aggregate ridership (this was broadly the change observed in the early years of local bus deregulation in Britain from 1986 – NTS data confirmed a stable trip level in bus trips per head for members of non-car-owning households). However, elasticities of much greater magnitude are found in the medium to long-term. Although undertaken almost twenty years ago, the elasticity values in this study probably remain broadly valid, in the absence of a comprehensive updating of the whole study, but some specific aspects have been updated (see below). The study was also undertaken largely on aggregate 'hard' data, i.e. that readily quantified in existing studies.

39 Principal findings are summarised in Neil Paulley et al 'The demand for public transport: The effects of fares, quality of service, income and car ownership' Transport Policy Vol 13 (2006) pp 295-306.

5.1.3 **The Role of Soft Measures in Influencing Patronage Growth and Modal Split in the Bus Market in England** (Department for Transport, 2009).

5.1.3.1 In addition to quantified factors described above, subjective perceptions will also affect user behaviour. A distinction is sometimes drawn between 'hard' and 'soft' factors, the former typically being the readily-quantifiable aggregate data of the type discussed above (e.g. bus-km run, average fare paid). The latter may include design aspects such as accessibility, or features such as passenger information, vehicle comfort, etc. This report assessed the 'soft' factors through a series of case studies, and stated preference modelling. Benefits are expressed in terms of equivalent reductions in in-vehicle travel time, in minutes.

5.1.3.2 It may be argued that the 'hard' and 'soft' distinction is somewhat artificial, reflecting past data availability. In reality, a user will perceive a change in service attributes, but not necessarily in the same manner as aggregate data suggest, e.g. a 10% increase in service frequency would be reflected in convenience of the timetable in matching the timing of activity changes, and/or waiting time, rather than directly. Some more subjective perceptions may also affect user behaviour - for example, in terms of personal security, or quality of the bus vis a vis other modes.

5.1.4 **A Disaggregate Analysis of Demand for Local Bus Services in Great Britain (excluding London) using the National Travel Survey** (December 2010). J.Molnar and L.Nesheim. Centre for Microdata Methods and Practice (CeMMAP), UCL and IFS. (report forming an input to Competition Commission Bus Industry study, published Dec 2011).

5.1.4.1 An analysis of NTS data for 2008, indicating aggregate outcomes and also variations at the individual level. A discrete choice modelling approach was adopted. A short-run aggregate price elasticity of -0.36 was estimated, including effects of modal substitution and choosing not to travel, based on the average single fare, i.e. similar to that in the Demand for Public Transport study (above). A dataset for Great Britain (as then covered in the NTS), excluding London, and those eligible for concessionary fares, was used. However, variations by time period (peak and off-peak) for own price elasticity of demand did not support the concept of off-peak demand being more elastic, and little variation by age group was found. A weighted mean price elasticity (conditional of a trip of that purpose being made by any mode) of -0.58 was estimated for commuting, compared with -0.54 for shopping, and -0.29 for other purposes. At the individual level, much greater magnitudes for elasticities were estimated for a substantial share of respondents. Relationships between bus use and income show a lower price elasticity for higher-income users. Car ownership, bus frequency, and walk time to the bus stop, are also shown to be important determinants of bus demand. A much higher probability of bus use was found where respondents were within 6 minutes of a bus stop.

5.1.5 **Bus fare and journey time elasticities and diversion factors for all modes: A rapid evidence assessment.** (Department of Transport, February 2018) F.Dunkerley, M.Wardman, C.Rohr, and N.Fearnley (RAND Europe and SYSTRA).

5.1.5.1 A review of more recent evidence from a wide range of studies, updating the Demand for Public Transport Study, and drawn from a similar range of countries. Little new evidence for fares' elasticities was found, recommended values being urban short-run 'commute' at –0.30, and 'leisure' at -0.4, with an overall long-run value of -0.7 to -0.9. However, it notes that little is known on elasticities for concessionary travel. For in-vehicle time elasticity there was again little new evidence, the -0.6 value in DFPT being retained. An overall bus user generalised journey time elasticity (including walk and wait time components) of -1.1 is suggested, with very little difference between 'commute' and 'leisure' trips. A more substantial range of new evidence was found for 'diversion factors', i.e. where trips are gained by a specific mode, the sources from which they come. For bus, an intervention attracting trips to that mode was found, on average, to attract 24% of the growth in trips from car, 11% from rail, 16% light rail, 4% cycle, 14% walk, 12% taxi and 19% newly generated. This will, of course, depend on local circumstances (e.g. the presence of rail alternatives). For trips attracted to an urban light rail or metro service, between 5% and 35% might be expected to come from bus.

5.2 Studies of particular areas or regions

5.2.1 These studies do not suggest any radical differences in findings with this study. The limited impact attributed to taxi/PHV growth is noticeable. The main difference is that this study enables more analysis based on NTS data to examine variations in observed outcomes.

5.2.2 **Trends in Scottish Bus Patronage: report to the Confederation of Passenger Transport (Scotland), KPMG,** (November 2017)

5.2.2.1 An analysis of decline in bus use within Scotland 2011/12 to 2015/16 (6.2%), of 27 million trips, by contribution of different factors. The main absolute components, in millions of bus trips, are

Factor	Millions of bus trips
Growth in car ownership	-12.0
Demographic structure changes	- 1.9
Population growth	+ 8.9
Changes in the economy, employment & flexible working	- 3.2
Online services (including home delivery)	- 7.3
Bus fare changes	- 0.4
Bus journey time	- 5.9
Bus service quality	+ 2.0
Changes in the price and quality of other modes:	
Rail	- 0.1
Car (mainly lower real costs of travel)	- 2.6
Taxi	- 0.2
Cycling	- 0.8

5.2.2.2 Higher car ownership is shown to be the largest negative factor, with worsening bus journey time as the second most important. A very small component was due to growth in taxi/PHV use. Other longer-run issues (both positive and negative) are identified. A much fuller description of the components is provided in the main text of the report. The 'bus journey time' component reflects both in-vehicle and access time, including effects of bus mileage reductions. Some commentary is given on regional breakdown within Scotland. 'Population growth' reflects the positive effect on bus ridership that might have been expected at existing trip rates, before other factors.

5.2.2.3 Quantification of factors driving demand was attained by use of existing elasticities to estimate net impact on ridership (e.g. fares). Trip rate models were based on an aggregate NTS sample of 220,442 trips for 2002-2016 (i.e. from England and Wales as well as Scotland). A 'Tobit' modelling framework was adopted to identify components of change. A list of parameter coefficients and their significance is given. Ridership data is based on DfT operator-derived stats. Note that the rail shift relates to 'heavy' rail, and does not allow for opening of the Edinburgh tram in 2014. Implications for future development and policy are reviewed.

5.2.3 Trends in English bus patronage: report to the Confederation of Passenger Transport, KPMG (September 2018)

5.2.3.1 This report for CPT in England adopts a similar methodology to KPMG's study for CPT Scotland, covering 2011/12 to 2016/17 inclusive. A net passenger trip drop of 202 million, i.e. 4.4% (but 6% for concessionary travel), is attributed to the following components:

Factor	Millions of bus trips
Growth in car ownership	-141.8
Demographic structure changes	- 6.6
Population growth	+180.4
Changes in the economy, employment & flexible working	- 20.1
Online services (including home delivery)	- 54.5
Bus fare changes	- 78.4
Bus journey time	- 163.2
Bus service quality	+ 25.5
Changes in the price and quality of other modes:	
Rail	- 3.0
Car (mainly lower real costs of travel)	+ 90.9
Taxi	- 19.1
Light rail	- 24.7
Residual component	- 0.4

5.2.3.2 Allowing for the greater absolute values, the relative importance is similar to that in Scotland, with the notable exception of car price and quality, which in this case has a positive effect. Despite falling real fuel costs, growing congestion affects attraction of car as a modal alternative. Light rail is also included explicitly: across the eight LRT systems in England as a whole about 40% of their journeys are attributed to diversion from bus.

5.2.3.3 It covers separately the metropolitan areas (the largest drop), rest of England, and London. A drop in shopping trips is attributed largely to on-line shopping. Substantial diversion to light rail is observed, with 50% of users of Manchester Metrolink extensions being ex-bus. A fairly small effect is found for taxi/PHV growth. All ridership change analysis is based on DfT trip definitions. Marked effects of employment status on bus use were found. Separate component assessments indicate that for London, a negative trend was attributable almost wholly to worsening bus journey times and the presence of alternative rail services, whilst a large positive effect was attributed to socio-demographic change. In the metropolitan areas car ownership growth was found to be the main negative factor (46m trips), followed by worsening bus journey times (31m trips), partly offset by population growth (36m trips). In the rest of England, increased car ownership was the main negative factor (91m trips) followed by bus fares (-34m trips), and a relatively large effect for on-line services (-21m trips). However, shifts to other modes (rail, taxi, light rail) had little effect. Other regional variations are also considered (in figure 6 of the report), showing the most positive outcomes in the Eastern, South East and South Western regions.

5.2.4 **'Agent Based Modelling'** Helen Bowkett. Lecture to the Transport Economists' Group, London, 28 February 2018, as reported in its journal The Transport Economist, Vol 45, no 1, (Spring 2018), pp7-18.

5.2.4.1 'Agent based modelling' (ABM) is a form of micro-simulation in which each individual's behaviour is modelled, rather than aggregate behaviour. A dataset of 626 interviews was used to derive an SP model for the journey to work by bus over a period of ten years, during which individuals' behaviour would be affected by changes such as car ownership or moving house. Applied to a case study route, a substantial decline in bus use was estimated, which could be reversed by free concessionary travel. Estimated commuting fare elasticities are consistent with evidence from aggregate data models for all trip purposes in that they are of greater magnitude over a longer period: -0.24 after one year, -0.41 after two years, and -0.91 after seven years. A fuller account may be found in the paper Bowkett, H.; Chatterjee, K.; and Parkhurst, G. 'Incorporating habits into an agent based model of commuting mode choice', hEART (European Association in Research in Transportation) conference, 2015.

5.2.5 **The Bus Demand Jigsaw** A Bus Industry Monitor report, 2017.

5.2.5.1 A detailed study by Chris Cheek examining trends in Great Britain, split between London, the rest of England, Scotland and Wales, from operator and NTS data. It suggests that ridership changes are largely explained by existing known factors, applying elasticities from the Demand for Public Transport report. A section on taxis suggests a relatively small impact. There is separate discussion of the greater declines in Scotland, and Wales.

5.2.6 **What's driving bus patronage decline? An Analysis of the Evidence Base**
(Urban Transport Group, January 2019)

5.2.6.1 A comprehensive review of GB data, including per capita trends, issue in areas with high/growing usage, effects of car ownership, population changes, etc. It indicates that generally negative factors apply, with some exceptions, and a need for future research on 'emotive' factors. Impacts of taxi/PHV growth are suggested. The shift of population back to higher-density urban areas, which emerged as an important factor in the recent ITC rail study, does not appear to have had the same positive effects in the case of buses, partly due to use of more 'active' modes, and effect of congestion on bus service quality.

5.2.7 **'How People respond to the experience of bus travel and the implications for the future of bus services'. Phase 1, Literature Review**
Report by Systra for Urban Transport Group (May 2019)

5.2.7.1 A qualitative study, reviewing literature on how 'socio-emotional' attributes may inform bus choice. Ajzen's 'Theory of planned behaviour' provides a starting point for the review. Non-users' responses to bus services may highlight more subjective and negative aspects than those of users. Differences also apply to users classified by categories such as journey purpose, gender, and age. Aspects such as service information, waiting experience, and 'perceived lack of behavioural control' are important. An experiment conducted by Systra in the West Midlands in 2018 showed that some perceived barriers to non-use could be reduced by accompanying non-users on a real-life bus journey. Particular factors may apply to young people. Experience of rail and car travel is compared with that of bus. A wide range of references to previous studies is provided.

5.2.8 **What scope for boosting bus use? An Analysis of Intrinsic Bus Potential of local authority areas in England.** Study by Transport for Quality of Life for the Urban Transport Group (October 2019). Authors: Lynn Sloman and Sally Cairns.

5.2.8.1 An 'Intrinsic Bus Potential' (IBP) for commuting by bus within local authority areas is defined. Six factors can be combined to predict nearly 85% of the variability in this term. Adding measures of public transport availability increases this to about 88%. Some 25 local authority areas (including parts of London) were found to have significantly higher levels of bus use than predicted from their IBP values (ones in which bus use exceeded prediction by 3 or more percentage points, or was highest in its IBP decile group). Factors that might explain these differences include high levels of bus provision, a 'culture of bus use', supporting local government policies, bus regulation (in London) and specific local factors. Examples include areas well-known for high bus use such as Nottingham, Brighton, and Reading. The greatest potential is found in 'city regions'.

5.2.8.2 Use is made of the DfT area bus passenger statistics (with the limitation that they are based on administrative areas) and census data from 2011 which indicates the bus market share for the journey to work (excluding London and the Mets). Where comparable area data were available a good correlation was found, and hence it is assumed that the journey to work is a good proxy for bus market share as a whole. Detailed tabulations are provided of variables examined and correlations found. Regression analysis was used to identify the most important variables, avoiding those subject to substantial correlations. Indicators of public transport provision were found to add some explanatory power (notably service frequency, through a range of proxies - bus departures per hectare was found to give the best fit). Detailed commentary on specific cases is given.

5.2.8.3 Bus commuting shares are found to have fallen sharply in most areas since 1981, especially those where it was highest initially, but increases between 2001 and 2011 are found in some areas, and most parts of London. Four case study areas are examined in detail to identify factors behind high bus use (Nottingham and surroundings; Newcastle and Gateshead; Brighton & Hove and Lewes; five London boroughs).

5.2.8.4 A number of findings in this very thorough report parallel the ITC study, such as the positive relationship between a high student population and bus use. However, the use of work journey mode share as the main indicator (even though correlating with bus use overall) imposes a limitation (commuting trips being under 20% of all bus journeys in the NTS), and the ITC study therefore complements it through analysis of these other purposes and factors affecting them.

5.2.9 **Confederation of Passenger Transport (CPT) 'Moving Forward Together' document,** (September 2019).

5.2.9.1 This provides a general strategy for the future development of the local bus industry, with detailed statistics and proposals for England only. Evidence of passenger growth on bus rapid transit systems, and where partnerships exist between operators and local authorities, is cited. Suggested commitments from operators and from central government are set out. An 'ambition' of getting 1,000m more bus trips per annum by 2030 is set out, but with no explicit components for this growth. Such an ambition would imply a percentage growth of about 25% on a base of all bus trips in England, or about 50% if that growth were concentrated largely outside London.

5.3 Variations by types of service within the 'local' category

5.3.1 A wide range of service types exists, from very high frequency urban corridors, to very low frequency rural services. Within rural regions, some major interurban services have been substantially upgraded in terms of speed, frequency and vehicle quality, resulting in large growth in ridership. Expansion has also occurred where Bus Rapid Transit (BRT) services have been introduced (running at least in part on segregated busways), and in bus-based Park and Ride (P&R) operations. The last typically feature car parks on the fringe of built-up urban areas, providing high-frequency services into congested urban centres. In the larger conurbations, P&R provision is mostly rail-based, the bus-based form being found mainly in free-standing medium-sized towns and cities within rural regions (such as York, Oxford and Guildford). Their growth has been such that they now account for a substantial proportion of local bus travel in the areas concerned: for example, in the case of York, over 4m P&R passengers per year are carried, comprising about 25% of all bus trips within the unitary authority area[40] (note that, as described in Appendix 3, trips are attributed to the area in which the bus passenger journey commences, whereas in this case the car portion of the trips may originate in widely-dispersed rural catchment areas).

5.3.2 Unfortunately, no data series are published on these aspects, unlike the comprehensive data on light rail systems published by the DfT and Transport Scotland, even for systems which comprise just a single line. The only ridership data by service type distinguished in published DfT statistics is an estimate for community transport and demand-responsive services, of about 5 million trips per year over the whole of England[41], i.e. very marginal (equal to about 0.4% of all local bus trips outside London and Met areas), and unlikely to influence aggregate trends at a specific local level.

40 P&R passenger trips from 'Passenger Transport' 5 April 2019 page 13, and a total of all local bus trips within York unitary authority of 15.9m from DfT table BUS0109a

41 See 'Annual bus statistics: England 2017/18' (DfT, March 2019), page 8

5.3.3 The gaps relating to data on P&R, and BRT, services were identified in a report last year[42] but this appears to have had no effect. In the case of BRT services within Britain, an inventory has been compiled, with case studies of the Cambridgeshire, 'Fastway' (Gatwick/Crawley) and 'Eclipse' (South Hampshire) schemes, indicating ridership growth above initial forecasts, and in the last two cases, very favourable benefit:cost ratios. A large diversion from car can be identified in the Cambridge case, with substantial benefits in reduced energy consumption[43].

5.3.4 In the case of interurban services, operators have often identified commercial opportunities for improving speed, vehicle quality and frequency, with resultant large growth in ridership. A set of case studies includes examples such as First's Peterborough – Kings Lynn- Dereham - Norwich service, the 'Express City Connect' services between Fife and Edinburgh, and the 'InterConnect' services in Lincolnshire[44]. In Wales, the TrawsCymru network fills many gaps in the rail system, with modest public subsidy. Unfortunately, due to commercial confidentiality, little data is available on the composition of ridership, or modal diversion.

5.3.5 P&R services, usually operating from purpose-built car parks on the fringe of urban areas, are by definition, attracting car users to bus services. The more intensively-used examples, with a good mix of peak and inter-peak ridership, can be commercially viable (for example, Oxford, Cambridge and York) with public funding confined to infrastructure provision. A criticism has been made that such services may result in a net increase in pcu-km operated (due to additional car feeder trips from rural areas, especially where a through bus was previously used). However, the additional pcu-km are often on thinly-used rural roads, whereas traffic is diverted from congested radial urban routes. By applying the standard external social costs per pcu-km from 'TAG' a net benefit can be shown in cases such as Chelmsford.[45]

5.3.6 A problem with P&R usage statistics is that they tend to fall between definitions used at present. For example, suppose a P&R site is located just outside an urban unitary authority area. Car trips from the rural area are diverted to bus to reach the urban central area. However, the return leg will be attributed to the population of the urban area, not the rural catchment. In many cases, the urban area and surrounding rural area fall within the same county, removing this problem, but obscuring P&R use within a wider mix of services. Census data also has problems, in that the car stage of the journey to work may be much shorter than that by bus. If the 'main mode' for the journey to work is defined by length, then 'car' could still appear as the mode used. A possible solution may be to use NTS data to examine the extent of journeys which comprise car and bus stages within the same trip.

42 White, Peter. Rapid Evidence Review 'The UK Public Road Transport System: how and why is it changing?' for the Government Office for Science 'Future of Mobility' study, available on 'gov.uk' website since January 2019

43 Whelan, G. and White, P. Chapter 9 'Assessing Bus Rapid Transit Outcomes in Great Britain' in Ferbrache , F (ed) Developing Bus Rapid Transit. Edward Elgar, January 2019

44 Luke, D., Steer, J. and White, P. Interurban Bus: Time to raise the profile'. Greengauge21, 2018

45 Mills, G and White, P. 'Evaluating the long-term impacts of bus-based park and ride; Research in Transportation Economics, Vol 69 (2018) pp. 536-543.

6. Conclusions

6.1 What can the findings from the ITC research tell us about the changing nature of bus travel in England? First, it is clear that the decline in bus travel outside London has been caused by a shrinkage in the percentage of the population who are bus users, rather than existing bus travellers using the bus less often. Indeed, overall bus satisfaction by users has remained stable over this period, and there has been a trend towards intensification of bus use by some groups (such as non-concessionary bus pass holders).

6.2 The decline in bus travel in England outside London has been particularly affected by a contraction in the traditional bus market (where the highest users were female, people on low-incomes, non-car owners, students and pensioners).

Findings of changes in the market include:

- Bus usage by women is falling more quickly than by men, and the gender gap in bus travel has therefore narrowed. Bus usage has also intensified amongst younger men.
- There has been a particularly pronounced fall in bus use by students and those in their late teens (aged 17-20) – groups which have historically had high rates of bus use.
- Bus usage has fallen fastest amongst low-income groups and amongst those without access to a car – traditionally the largest markets for bus.
- Shopping trips by bus, which remain the largest journey purpose category, have seen a particularly pronounced decline.

6.3 At the same time, the research shows that bus demand is shifting towards new markets. Those areas of England which have bucked the trend and seen an increase in bus use over the past decade have tended to have higher incomes and have seen growth in bus service supply. Many of the areas where bus use has increased are located in economically flourishing cities in southern England. Bus usage has also intensified amongst younger men, perhaps related to the steep fall in car licence holding amongst this group. The growth of private hire services such as Uber does not appear to have yet contributed significantly to the overall decline in bus usage. These findings suggest that there will be an increasing opportunity for bus operators to focus on the quality of their services as a means of tapping into new growth markets.

6.4 The findings from this report have indicated some of the ways in which the bus market in England is changing. We recommend that further work be undertaken on the views of bus users to understand what they are seeking from high-quality bus services, and to understand how bus marketing should be updated. In addition, more work to understand the challenge to the bus market from disruptor modes (such as scooters and autonomous vehicles) would be welcome. Better data on usage of different types of bus service (such as park and ride, and bus rapid transit) would also be helpful in understanding trends.

Appendices

Two main data types were considered for this report. Firstly, statistics reported by bus operators to the Department for Transport (DfT) which are published in aggregated form, but not identifying named operators as such. Secondly, the National Travel Survey (NTS), which is confined to England. Reference is also made to other data sources where appropriate. Except where stated otherwise, NTS data is for residents of England, excluding 'London bus' journeys, for the period 2002 to 2017 inclusive.

Appendix 1 The National Travel Survey

Since the late 1980s the NTS has been undertaken on a continuous basis. Respondents complete travel diaries for trips by all modes for a seven-day period, with a sample of approximately 15,000 residents annually. Travel survey data is subject to sampling and reporting errors, however, which introduce year-to-year variation, particularly when studying forms of travel that have small mode shares (NB: In 2018, about 5% of trips in England took place on a local bus). The use of 'cluster' sampling' (i.e. sampling from clusters of households within defined areas, rather than randomly from the whole population) also affects the application of significance tests.

The area primarily analysed is that of England outside London, although London and other areas are referenced where appropriate. It should be noted that the NTS formerly covered the whole of mainland Britain, but has been limited to England only in recent years. Aggregate data for buses in Wales and in Scotland buses are also available - the latter being used in one of the reports discussed in section 5.2 above - but without any regional breakdown in the case of Wales and only a broad regional breakdown for Scotland.

Appendix 2 Service Category Sectors

Since the early 1980s the bus and coach operations in mainland Britain have been divided into two broad types for purposes of data on ridership, revenue etc.

Each bus or coach operator is required to hold an Operator Licence, in which the maximum number of vehicles that may be operated at any one time is determined by the number of discs issued. The skewed nature of the industry running local services was indicated by the distribution of O-licence discs in 2005-06. Operators with 1 to 6 discs accounted for only 0.2% of local bus passenger journeys, but 29% of all 'other' vehicle-km run, whereas those with 31 or more discs each accounted for 97.6% of local passengers. The DfT's Public Service Vehicle Operator survey takes a 100% sample of larger operators when collecting data on passengers carried etc., but samples lower percentages of the operators with small numbers of discs. This is unlikely to have any effect at the aggregate level, but might affect reliability of year-by-year trends in smaller areas where such operators are important.

Appendix 3 Bus trips by area and user type

Trips may be disaggregated by area. In the case of operator-reported data, this is by named administrative area, at the level of counties or unitary authorities within England, e.g. Oxfordshire County, or Brighton & Hove Unitary. The latter may correspond quite closely to self-contained built-up areas, but the former may encompass areas with very different conditions (e.g. the high-density city of Oxford, and low-density surrounding rural area) in which bus use may differ very sharply. In some small areas sampling of smaller operators, together with rounding of published totals, may affect realism of year-on-year changes (for example, Rutland). It may therefore be desirable to exclude such cases from further analysis.

Operator-reported data are also based on the area in which a trip originates (notably for concessionary travel compensation). This may result in some overstatement of trip rates in urban areas surrounded by fairly high-density areas, from which return trips originate (i.e. the return leg would be attributed to the area from which it commenced).

In the case of passengers holding a season ticket, pass or smartcard, the NTS household interview records the holding of such cards, and hence trip rates can be calculated for their holders. The published operator data records trips which are explicitly compensated, but not other card or pass types.

Local bus operators report patronage directly via the Public Service Vehicle Survey. This type of information is sometimes referred to colloquially as “ticket sales” data, however this description is not fully accurate, because a variety of unverifiable assumptions are required, such as average usage rates of season-ticket holders. Data from the Public Service Vehicle Survey is employed in Figure 1. This type of data is also subject to other reporting errors as well as sampling errors as different local bus operators are surveyed at different times. This type of data is also limited in that it contains no information about the demographics of bus users or their journey purposes when travelling on local buses

Appendix 4 Comparing Operator and NTS based data

Since use is made in this report of both NTS and operator-reported data, it is desirable to check the degree of consistency between them. In principle, as discussed earlier, use of 'boardings' data in NTS and 'trips' data from operators should provide consistent outcomes. However, operator data are derived from total ticket sales, whereas NTS data are from a sample survey. NTS respondent categories may exclude certain people (such as students in halls for residence, or overseas visitors).

In operator-reported data 'Metropolitan areas' (or 'Mets') comprise the six major conurbations outside London (West Midlands, Greater Manchester, Merseyside, South Yorkshire, West Yorkshire, Tyne & Wear). 'Non-metropolitan areas' comprise the rest of England outside London and the Mets. Note that in addition to low-density areas, these also include substantial cities such as Nottingham and Bristol.

As shown in table 3, operator-reported trends from 2002/03 to 2017/18 indicate a general decline outside London of 12.6% in total trips, and per capita decline of 24.1% after allowing for population growth. Bus trips in London rose by 45.7% and the per capita rate by 21.7% over the same period. Within this period, the London trips per head figure peaked at 285 in 2008/09, but then declined.

Published NTS data over the whole period indicate similar trends, trips per head for 'other local bus' (i.e. England outside London) falling from 49 in 2002 to 37 in 2017 (a drop of 24.5%). Note that this trip rate is averaged over the whole population of England. Deducting London (8.8m) from the total population for England in 2017 of 55.6m gives an adjustment factor of (55.6/47.2 = 1.18) bringing the trip rate to about 44, i.e. similar to the DfT average of 46.

Note that operator data reported to DfT is based on financial years (from 1 April), and NTS data on calendar years, hence financial year 2017-18 overlaps by nine months with calendar year 2017.

However, the last four years show marked discrepancies:

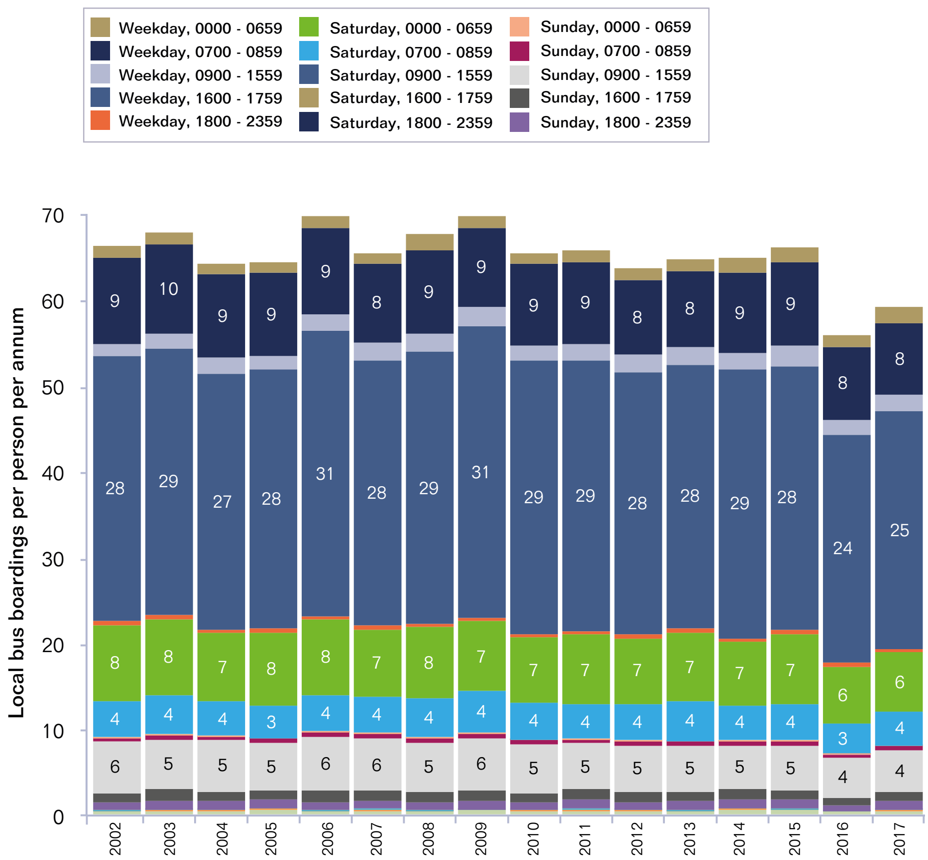
Year	2015	2016	2017	2018	% drop
NTS Table 0303 Trip rate per person by main mode, 'other local bus' (i.e. bus outside London)	41	35	37	33	19.5%

Year	2015/16	2016/17	2017/18	2018/19	% drop
DfT Table Bus 0103 Bus trips per head, England outside London	48	47	45	45	6.3%

Assuming no substantial change in the boardings/trips ratio (which explains the lower trip rate in NTS generally), or that of main mode to stages, over this short period, a very marked disparity in trends over time between NTS and operator data can be seen, both in overall decline, and year-to-year fluctuations. This suggests some caution in drawing conclusions from fluctuations in NTS data in 2016 and 2017 (or averages for 2015-17) in analysis. The 2018 figure is also the basis of modal share for buses in table 0409 as quoted above. It thus gives markedly lower bus market shares than in 2017 NTS data.

NTS data also enable analysis of bus demand by day of week. A very stable pattern is found, with very little change in share of bus travel since 2002 (about 10% on Sundays, 15% on Saturdays, and 75% on weekdays, i.e. an average of about 15% per weekday). By time of day, the percentage between 0900 and 1559 is the largest (about 45% on weekdays, about 60% on Saturdays and Sundays), and has grown slightly (see Figure 54). These patterns are consistent with the typical service patterns offered by operators – a similar level of service throughout the period 0800-1800 on Mondays to Saturdays and lower during evenings and Sundays. Note that if 45% of all trips take place in the seven hours between 0900-1559 on weekdays, and about 30% in the four peak hours (0700-0959, 1600-1759), the average percentage of trips within each hour over the whole period 0700-1800 is fairly similar.

Figure 54: Trips per person per annum by day of week and time of day, 2002-2017



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Peter White is an Emeritus Professor at the University of Westminster, having retired from regular teaching work in 2015. He is a specialist in public transport systems, and author of the textbook Public Transport: Its Planning, Management and Operation (first edition 1976, sixth 2017) and numerous published papers. He has acted as a specialist advisor to Select Committees of the House of Commons in respect of five transport-related enquiries. He received the PTRC Lifetime Achievement Award in 2016.

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