

RAC Foundation's Response to the Commission on Travel Demand's Call for Evidence: Understanding Travel Demand

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1. Introduction

1.1 The RAC Foundation¹ is an independent transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads and their users. The Foundation carries out independent and authoritative research with which it promotes informed debate and advocates policy in the interests of responsible road users.

1.2 The Foundation's interest in better understanding travel demand is its implications for future levels of mobility, road traffic conditions, road safety and the environmental impacts of roads and their traffic; and the consequent need for changes in regulation, pricing, technology and physical infrastructure needed to accommodate future demand levels. Whilst the motorist and road use are the focus of the Foundation's interest clearly a wider view of demand must be taken because many 'demand drivers' apply to a range of transport modes and there is some overlap between the different means of road transport and between road and rail.

1.3 Defining 'travel demand' is not easy as it is circumstantial varying in nature by time, location, user type, price and service levels². In using the term 'demand' therefore it is important to bear in mind that its manifestation is contingent on the prevailing travel conditions and particular circumstances of that sector of the travel market.

1.4 This response relies heavily on a series of studies carried out by or for the Foundation which are listed in the Sources section. Identification of which studies underpin which of the points made have not been systematically made, to save time and space, though a substantial source list is annexed.

1.5 Standing back from work specifically commissioned by the Foundation, it might be useful for the Commission to consider the following points:

- The relationship between the cost of travel and travel demand is evident, but far from linear. Making bus travel cheaper is not going to attract wealthy Londoners from their Range Rovers. In particular it is important to look at the cost of travel

¹ For further information about the Foundation see <http://www.racfoundation.org/>.

² See for example McNally 2016.

relative to other costs, specifically housing. This impacts most obviously on patterns of rail commuting in the South East;

- The only thing we can say with absolute confidence about the future is that it hasn't happened yet. There will be unexpected, unpredicted disruptors. The impact of the autonomous road vehicle on travel patterns thirty years hence is, today, unknowable, and we should not delude ourselves otherwise; and so
- Forecasts should always be presented as ranges, not point or average results, with some indication of probability. This is frantically difficult for politicians to manage – neither the media nor the parliamentary select committee wants to have to manage more than a single number, or, at most, two – what's it going to cost, and what's the benefit going to be? Academia has an important role to play in helping politicians, officials and officers navigate these choppy waters.

2. The estimation and forecasting of travel demand has changed over the last fifty years and will continue to do so.

2.1 Prior to the Second World War, and for some years thereafter, those who attempted to establish and forecast travel demand (typically infrastructure planners) relied largely on measuring existing usage and using trend projections to estimate future levels³. This started to change in the 1960s with work by individuals like John Tanner⁴ and the teams carrying out the new, computer aided, metropolitan transportation studies⁵. From this evolved fairly standard sets of procedures (both aggregate and disaggregated) for estimating future personal travel demand based on a range of external factors such as population, households, employment, income, car ownership etc. With these models new features such as benefit/cost analysis of alternative plans were also being incorporated.

2.2 The range in commercial and other factors that affected changes in van and lorry traffic have consistently confounded attempts to develop similar procedures and a mixture of trend, demand elasticity and wider industrial performance models have been used. Whilst these have worked quite well for true freight movements (mainly lorries) the diversity of purposes for which vans are used is such that there has been little success in reliably forecasting future van activities.

2.3 Of late these procedures appear to have been performing less well and there is perceived to be a need for new methods which take into account factors that we are learning about, but which are ignored by these traditional methods. Before dismissing these methods completely it is worth considering why they are no longer serving the transport planning community adequately.

2.4 When the forecasting regime typified by the four stage transport model developed in the 1960s⁶ and into the 1970s the raw effects of rising income and car ownership,

³ See for example Hall 1963.

⁴ Tanner 1961.

⁵ E.g. Freeman Fox & Associates 1968.

⁶ Martin Memmott & Bone 1961.

changing population and employment structure were so powerful that they dominated the expected growth in travel demand⁷. Whilst other factors were also playing their part, these powerful primary factors took centre stage in the forecasting procedures and outcomes. For example whilst the number of households with one or more cars increased from 38% in 1964 to 55% (45%) in 1974⁸, between 2000 and 2010 this grew and order of magnitude less from 72% to 75% (4%) where it remains today⁹. As a consequence what were second order factors forty years ago now become more significant; especially where they are varying to greater degrees than previously.

2.5 There is a logical progression from being aware of previously ignored forces to being able to specify and then measure them and finally incorporate them in formal estimation procedures; and recent work¹⁰ has revealed a range of forces at work but not all of which are able to be formally introduced into contemporary travel analyses. The DfT's recent road traffic forecasts have made¹¹ impressive efforts to expand the range of factors used in its forecasts, to give more disaggregated results and to cope with some uncertainties by analysing a range of scenarios. The fact that this does not go the whole way to representing some of the more recently evident factors means that they should be qualified, rather than dismissed.

3. Which aspects of travel demand have changed in ways which have not been anticipated by traditional forecasting approaches in the past twenty years?

3.1 Recent trends that were not anticipated, or for which the pace was significantly different from that expected, are listed below. Some of these are the result of weaknesses in the travel forecasting methods whilst others were caused by external 'surprises' such as the 2008+ recession and public policy changes.

- The slowing down of car traffic growth from 2%pa in the mid-1990s to a fall of 3% between 2007 and 2010. However, over the last two years growth has recovered to 1½%pa¹².
- The decline in urban car traffic by 2½% over the last twenty years¹³.
- The two thirds increase in van traffic over the last twenty years¹⁴.
- The doubling of national rail passenger traffic since the mid-1990s¹⁵.
- The strong growth of intermodal freight since the beginning of the 2000s¹⁶.

⁷ See for example Bayliss 2008.

⁸ DoE 1976, table 39.

⁹ ONS 2016a.

¹⁰ E.g. Le Vine & Jones 2012.

¹¹ DfT 2015.

¹² DfT 2017a.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ DfT 2016b.

¹⁶ Ibid.

- The continued strong growth in London Underground traffic since the beginning of the 2000s (although growth was expected – not by over 50%¹⁷).
- The continued decline of bus use outside London – a 4% fall compared with a 90% increase in London¹⁸.

3.2 Not all changes in travel demand are included in the traditional forecasting procedures but may also be noteworthy. Much was made in the 10 Year Plan of trebling cycling between 2000 and 2010, in practice however cycling has grown little (London again being an exception) and remains at around 1% of all personal travel. Changing economic and social patterns have increased travel outside the peak – especially in the late evening – with implications for public transport services. In future these elements of the travel demand scene may grow in importance and need to be reflected some way in the formal demand estimation procedures.

4. How do these changes relate to the way in which the activities that we participate in have changed? What other factors might explain change?

4.1 Research for the Foundation has identifies a range of factors that go some way to explaining why recent trends have not followed expectations and these are listed below. However first it is important to point out that traditional demand forecasting methods take little or no account of economic cycles. Whilst the effects of these have been evident (ex post) from recent cycles, predicting the timing and amplitude of these is very difficult. Some ‘trend failures’ have been a result of unexpected changes in economic circumstances and these are likely to continue to dog travel forecasting.

4.2 Some reasons for changes in travel demand derive from new social and economic behaviours. Others lie with the operation of the transport system itself. Whilst these are related in real life (e.g. increased demand for rail triggering better services which stimulate demand further) for the purposes of this paper they are identified separately.

4.3 It is not possible to be definitive about the phenomena that have not been adequately accounted for in ‘traditional forecasting’ for two reasons. Firstly some have been taken account of either implicitly in calibration, or explicitly in behavioural functions - but not necessarily accurately or to a sufficient degree. Secondly ‘traditional forecasting’ includes a wide range of techniques, some of which ignore the phenomena listed below but others do not. However from the Foundation’s work these identified in the following eight paragraphs appear to be worthy of consideration.

4.4 There have been some changes in land and overall population trends including:

- There was a substantial and higher than expected increase in Britain’s population from 56.4 in 1995 to 63.3m in 2015¹⁹ with a quadrupling of net international

¹⁷ DfT 2016c.

¹⁸ DfT 2016d.

¹⁹ ONS 2016b

migration since 1997. People born outside the United Kingdom tend to use cars less, an effect which is seen most in the 20–39 age group in which migrants are concentrated.

- There has been more development on previously developed land and often at higher densities than previously as a result of stricter and ‘sequential’ planning policies. The average density of new residential building in England was stable throughout the 1990s, then increased year-on-year from 25 units per hectare in 2001/2 to 43 in 2007/8, and has since plateaued at this higher level²⁰.
- An increased concentration of people and jobs in London and the South East. For example between mid-2014 and mid-2015, of the 470k increase in England’s population 57% was in London, the South east and the East of England – and 29% in London alone²¹.

4.5 There have been a number of socio-demographic changes with important implications for travel demand including:

- There has been higher proportion of older people, who are better off, and drive more than their predecessors (especially women²²). The greater ease of driving modern well equipped vehicles has aided this significantly.
- The gap between the proportion of men and women who drive is closing (80% of adult males in both 1990 and 2015 but 50% increasing to 68% for adult females) with women’s share of car/car traffic increasing from 38% in the mid-1990s to 45% today.
- There has been reduction in the number of young people that are economically active.
- It has become increasing difficulties for young people in being able to move out of the family home and adopt radically new mobility patterns.
- More young adults have been migrating to Britain’s metropolitan areas where car ownership is less attractive and necessary.
- Fewer young people are learning to drive and buying a car, as a result mileage driven by young adults has trended consistently downwards (-30%), and their car passenger travel has also fallen. Higher learning and insurance costs are undoubtedly a factor in this.

4.6 Communication technology has improved enormously over the last two decades, especially with the expansion of the Internet and the availability of smartphones which have had implications for travel demand including:

- Fewer people making physical shopping journeys and more home deliveries and ‘click and collect’. The internet and improved ‘fulfilment’ schemes by retailers and their agents have been the driving force behind this trend. However more generally - after accounting for household income, socio-demographics and other baseline

²⁰ DCLG 2016a and 2016b.

²¹ Ibid

²² DfT 2016e.

effects, - use of the Internet was found to be associated with a higher probability of holding a driving licence.

- On average, using the Internet was associated with nearly 500 more driving miles per year than not being an Internet user. What is more, beyond 5 hours per week of online activity we found a strong negative relationship between Internet use and driving mileage (i.e. the association with driving weakened from 5 hours upwards, until by 20 hours a week there was no positive association any longer).
- Internet availability has also had implications for business practices expanding markets and supply chains as well as substituting some electronic transactions for physical journeys.
- High quality 'on the move' communication has had implications for travel and allowed some types of travel (especially longer train journeys) more productive.

4.7 Travel behaviours have also changed sometimes in unexpected ways over this period including:

- In general, very little of the observed aggregate change in car and rail travel is accounted for by the ongoing changes in the proportions of the population that fall in each age group, or that live in different types of area; most are due to changes in travel behaviour within groups, caused by external factors.
- Average car driving mileage per head of population has changed little in Britain over the ten-year study period, but this masks large differences in trends between men (whose driving mileage has decreased) and women (whose driving mileage has increased); the largest drop has been for men in their 20s, whose average car mileage fell by about 2,000 miles per year.
- Most of the reduction in mileage by men (except for those in their 20s) can be accounted for by a sharp fall in company car use; this seems to be linked to the large increases in taxation on fuel provided for private use. The reduction in company cars was from 1.6m in 1999/00 to 940k in 2015 – company cars travel about 2½ times the distance of their private counterparts²³.
- There has been a sharp increase in rail use which has grown most rapidly for business purposes – it has nearly tripled – and there is some evidence of a partial shift of business travel from company car to rail for men. The growth in the rail market seems to be fed by 'new entrants' rather than by increased use by established patrons.
- More people have travelled abroad for leisure and business which will have replaced some domestic journeys. Between 1995 and 2015 there was a 74% (24.1 million) increase in overseas visits by UK residents for holidays of visiting friends²⁴.

4.8 The structure of the economy has also been changing with more service jobs which do not need to be so place-based, and electronic communications allow the potential of the

²³ DfT 2015f

²⁴ ONS 2016c.

mobile office to be realised and increasing working from home which has now grown to over 10% (mainly, but not all the time) which has eased peak personal travel demand.

4.9 The transport system itself has changed and the effects of these changes has not always been incorporated in travel demand forecasting. These changes include:

- Increasing difficulties in finding a parking space in urban areas²⁵.
- The expansion of national rail service by 40% since 1997/98 and improvements such as the WCML modernisation and Thameslink.
- Improvements in London Underground services by a third since 1997/98²⁶ including the opening of the Jubilee Line Extension.
- New forms of car access have emerged – car clubs and car sharing. However so far these remain as niche markets with little impact on general car traffic.
- Aspirations to reduce road traffic congestion²⁷ have not materialised and of late concerns about congestion are become substantial²⁸. This must be having an impact on the propensity of some groups to drive and perhaps even where they live.
- Following escalation in the 1990s, the freezing of fuel duty in cash terms since March 2011²⁹ (Since 2000 motoring taxes payed per vehicle mile have fallen by 28%).

4.10 Other changes to the transport system which have not had the effect on travel demand that some expected has been the expansion of light rail outside London where despite a doubling in route mileage³⁰ patronage still amounts to a little over 2% of bus travel³¹. The continued fall in bus use outside London has also been an unexpected disappointment. In the twenty years to 2015/16 this grew by 90% in London but fell by a quarter in the rest of metropolitan England and a 15% reduction in the rest of the country. It would be surprising if deregulation had not been a major contributor to this difference and if half of London's bus traffic growth from the mid-1980s had been experienced in the Mets and a quarter in the rest of the country, there would now be a billion more local bus journeys a year outside the capital, and local bus per capita trip rates would be 65 journeys a year compared with the current 48.

4.11 Understanding the underlying reasons for van use and how these have changed remains one of the most difficult areas for transport analysts. Factors contributing to the strong growth in van ownership and use over the last two decades probably include:

- A growth in home and office services such as such as cleaning, gardening, equipment repairs and maintenance; promoted by higher incomes, more sophisticated domestic and work equipment and a reduction in 'self-service' activity.

²⁵ Daily Telegraph 2017.

²⁶ LT 1999 and DfT 2016c.

²⁷ E.g. in the 10 Year Plan –congestion reduced below current levels particularly in large urban areas and 3% on the strategic road network

²⁸ DfT 2017b; motorways up from 22% to 37% between 2011 and 2015 and 39% up to 55% in towns and cities.

²⁹ ONS 2017.

³⁰ DfT 2016g

³¹ DfT2016d and DfT 2016h.

- An increase in mobile sole traders, aided by much improved roving telecommunications, for whom a van is essentially their mobile workshop/store.
- An increased need for tradesmen to carry heavy and specialised equipment for which other forms of transport are not suitable.
- An increase in home and office deliveries as a result of the expansion of internet trading – although perhaps not as much from Internet shopping as commonly supposed³².
- A growth of ‘just in time’ transactions from replenishing a restaurant’s wine stocks during trading hours to sourcing building materials as needs arise.
- Lower costs of van ownership and use

Whether it will be possible to develop formal demand models which allow for all these factors is a moot point but it should be worth at least trying to get a better qualitative feeling for their relevance.

5. How do these vary spatially? Are there distinctions between central, suburban and rural areas and are there differences between cities?

5.1 The work carried out for the Foundation has included little that differentiates between different regions and types of area/settlements, timing of trends and travel patterns. What can be said in response to this and the next question is therefore limited.

5.2 The most obvious spatial distinction is between London and the rest of the country – especially the smaller towns and rural areas. London has always been different but has become more so in terms of its transport landscape. The high housing costs in London and to a lesser extent in cities like Leeds, Birmingham and Manchester have meant that the phenomena referred to in paragraph 4.5 are, almost certainly more evident elsewhere there than in the rest of the country.

6. How do they vary over time? Are there particular times in the week where demand has changed or seasonal variations which have emerged?

6.1 There is anecdotal evidence of evening visits to pubs and clubs lengthening with the relaxation of licensing hours – most recently in 2005 resulting in increased late night/early morning travel. The proportion of goods vehicle traffic has increased at the weekends on motorways and in urban areas³³. During the day there has been a small increase in the proportion of early morning (03.00 – 07.00hrs) traffic and a slight lengthening of the evening peak³⁴. These changes are presumably a result of trading practices (including increased Sunday trading), moves by HGV operators to avoid weekday congestion and

³² Braithwaite 2017.

³³ DfT 2016i and DfTj.

³⁴ DfT 2016k.

possibly the increase in foreign HGVs using Britain's roads (a more the fourfold increase over the last twenty years³⁵).

7. What methods can be used to incorporate greater uncertainty³⁶ in demand? Have they been deployed and to what effect?

7.1 The first step in dealing with uncertainty in estimating demand is to reduce unnecessary errors in the forecasting procedure by stringent control of data quality, thorough calibration and validation of the demand models and ensuring that as many quantified variables are incorporated in the estimation procedures are practicable.

7.2 Secondly there should be a qualitative assessment of the nature and scale of the key uncertainties and their ranges incorporated into alternative set of scenarios for formal evaluation. This will allow combinations of uncertainties to be tested and probabilities assigned to variations from the central forecasts.

7.3 Thirdly, no matter how refined the formal estimation process is made, there will remain factors which it is unable to include: these should not be ignored but identified in a parallel narrative to enable the decision maker to make appropriate allowances for these. It may be possible for some of these factors to carry simple 'what if' calculations to get a feel for the orders of magnitude involved.

7.4 Finally demand estimates need to be updated at regular intervals to take into account both changed circumstance and the opportunities to develop and refine the estimation procedures.

7.5 The best example of which the Foundation is aware of recognising and treating uncertainty in demand estimation is the recent work in the Department for Transport in its National Road Traffic Forecasts³⁷.

³⁵ DfT 2016l.

³⁶ It is assumed that this does not include 'risks' which different in nature and should be dealt with separately.

³⁷ E.g. DfT 2015.

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