

Grow, peak or plateau – the outlook for car travel

Report of a roundtable discussion held in London on 20 May 2014

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Summary

At the request of the New Zealand Ministry of Transport, a meeting of UK researchers and commentators was convened in London on 'peak car', a hypothesis that per capita car use is close to its maximum level, and *may* stabilise or turn down. In both countries car traffic forecasts have been overestimated, though current official thinking is that recent levelling off and decline in car use is a temporary result of poor economic conditions, and that a resumption of strong growth is expected in future. Research findings include features that may show evidence of structural changes in the influence of economic and other drivers of car travel, and/or demand reaching natural saturation levels where further growth gives little benefit to travellers. The discussion reflected diverse experience and judgements, not all in agreement, and mostly related to UK experience, though influenced by a growing international research literature, mostly empirical in focus, showing some important similarities in many other countries. Key features included:

- There have been strongly divergent trends in different locations (the main areas of decline being in cities, with growth continuing in many lower density areas) and among different groups (young men showing a decline, women an increase), with noticeable differences by journey purpose, length and mode (rail use has grown strongly at the same time as car use has fallen). As a result the trends in national aggregate totals have been damped, not fully revealing underlying causes, and disaggregate experience has varied not only in size but also in direction of change.
- At the aggregate level, evidence of shifts in demand predates recent economic difficulties, including decoupling of traffic growth and economic growth, reductions in propensity to learn to drive, changing land use and migration trends (which had previously been dominated by movements to areas encouraging higher car use, and in the 2000s reversed), growth of internet use, and decline in traffic levels in London and some other urban areas. These shifts have mostly been observed in the 1990s and early 2000s, including periods of strong economic growth.
- Over the same period, there have been changes in transport policy and travel conditions favouring public transport, walking and cycling in some places, changes in tax effects on prices (especially company car use), parking control, congestion levels, and fuel prices. It has often been the case that policy changes, though worthy, are deemed to have rather small effects on travel demand, but there is a view that the cumulative effects may have been larger than expected, the resulting car use levels representing a new equilibrium to the prevailing conditions.

Taken together, these features would imply that per capita car use is influenced by both economic *and* other structural factors, cannot be converted to total traffic levels simply by multiplying by population, and demands serious re-examination. Although all these features are researchable, there is not currently a professional consensus backing either the official forecasts or any specific alternative, and a strong implication is that methods of policy formulation and project design should test robustness to a much wider span of feasible futures than is reflected by traditional methods involving rather narrow bands of statistical uncertainty.

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Part 1 – setting the scene

Introduction

On 20 May 2014 a roundtable meeting was convened in London involving a number of key UK commentators on what is now increasingly known as ‘peak car’. The event was organised by Glenn Lyons for the New Zealand Ministry of Transport in conjunction with Phil Goodwin who agreed to chair the meeting. This report captures an account of key issues addressed by the roundtable discussion. It is important to note that some of the key issues and possibilities are not necessarily unanimously owned or endorsed by all those who were present; and points made are not all necessarily empirically verifiable. This reflects the very nature of this challenging and multi-faceted topic – especially in looking to the future as distinct from seeking to make sense of recent trends in car travel. The event took place under Chatham House Rule and hence no remarks are attributed to individuals who attended, though written ‘on-the-record’ comments by some of the participants are attached as an Appendix (with their permission).

Background

A number of countries, including the UK and New Zealand have observed a slowing down of growth or even a decline in per capita car travel that has pre-dated the global economic downturn while also continuing through it. This phenomenon has attracted the widely used label ‘peak car’. Not everyone approves of the label, but there is an agreed interest in trying to understand better why this ‘disruption’ to a long-run trend in car traffic growth has occurred and what this might mean for future levels of per capita and total car travel, which might either resume growth, have stabilised or see decline.

In the last two years some key sources of published material on the phenomenon have emerged, in which the roundtable participants have been active contributors: participants’ own contributions have included the following, which in turn refer to a large international research literature and growing evidence base.

- Goodwin, P. (2012). Peak travel, peak car and the future of mobility: Evidence, unresolved issues, policy implications, and a research agenda. International Transport Forum round table on “Long Run Trends in Travel Demand”, Paris, OECD. Available at: <http://www.internationaltransportforum.org/jtrc/DiscussionPapers/DP201213.pdf> (together with contributions by authors from several other countries)
- Le Vine, S. and Jones, P. (2012). On the Move: Making sense of car and train travel trends in Britain. RAC Foundation, London. Available at http://www.racfoundation.org/assets/rac_foundation/content/downloadables/on_the_move-le_vine_&_jones-dec2012.pdf

- Transport Reviews special issue on Peak Car (2013) edited by Phil Goodwin and Gordon Stokes. Available at <http://www.tandfonline.com/toc/ttrv20/33/3#.U4x0IPldWSo> (overview paper by Goodwin and Van Dender freely available – some other papers require journal subscription)
- Metz, D. (2014). Peak Car – the future of travel. Available at http://www.amazon.co.uk/Peak-Car-Future-David-Metz-ebook/dp/B00I8LM6TG/ref%3Dsr_1_3?s=books&ie=UTF8&qid=1391593211&sr=1-3 (eBook or paperback)
- Lyons, G. (2014). Transport's Digital Age Transition. Forthcoming in the *Journal of Transport and Land Use*. Available on request from Glenn.Lyons@uwe.ac.uk

In 2014 the New Zealand Ministry of Transport established four strategy director positions to help it address key issues for the future development of transport. Professor Glenn Lyons from UWE Bristol has been seconded to the Ministry and is responsible for supporting the Deputy Chief Executive, Andrew Jackson, in examining future demand.

While New Zealand has been observing a flattening of total vehicle kilometres travelled and an overall decrease in *per capita* car travel (revealed by its national travel data), it sits in a rather different position in terms of current policy. The country has ramped up substantially its level of expenditure on transport from less than 1% of GDP through the 1980s and 1990s to around 1.7% of GDP from 2010. This expenditure includes major construction projects to 'complete' the strategic road network. This could be considered to have parallels with the later stages of the 'predict and provide' era in the UK. Revenue is raised through a regime of hypothecation – funds for investment in transport are principally raised from road users. Predicting future revenue is therefore dependent on being able to predict future levels of road network use. A central question for New Zealand concerns the nature and extent of future demand for its transport system. Understanding future demand has increasing importance in light of New Zealand's move towards infrastructure financing based on loans, the paying back of which is based on revenue from use in future years. With a population of approximately 4.5 million, 1.4 million of this is concentrated in Auckland and a further 1 million in Wellington, Christchurch and Hamilton combined. In terms of passenger transport, the future development of these urban centres for the country is particularly key.

As part of its examination of future demand, the opportunity was taken to organise the roundtable meeting in London to coincide with Andrew Jackson's visit to the UK.

The aim in convening the meeting was to explore the future uncertainties in levels of road traffic – framed by the following four questions:

1. What are the most noteworthy factors likely to have been contributing to recent changes in per capita car travel?
2. What would be the assumed drivers of each of the three trajectories forward of grow, peak or plateau?
3. Are these the only trajectories and to what extent might different trajectories concurrently prevail below the aggregate?

4. How should policymaking respond to the pronounced uncertainty surrounding future travel demand; and what does this uncertainty mean for how we invest in land transport and how we might look to build flexibility into the system to cope with uncertainty?

This report has been produced as a public record of the roundtable in the hope that it further contributes to this significant area of policy consideration internationally.

Attendance

Event attendance was by invitation, and the following individuals participated:

Stephen Glaister, Director, RAC Foundation; and Emeritus Professor of Transport and Infrastructure, Centre for Transport Studies, Imperial College London

Phil Goodwin (Chair), Emeritus Professor of Transport Policy, UCL and UWE Bristol

Peter Headicar, formerly Reader in Transport Planning, Oxford Brookes University (current Associate)

Andrew Jackson, Deputy Chief Executive, New Zealand Ministry of Transport

Peter Jones, Professor of Transport and Sustainable Development, Centre for Transport Studies, UCL

Stephen Joseph, Chief Executive, Campaign for Better Transport

Charilaos Latinopoulos, PhD student, Centre for Transport Studies, Imperial College London

Glenn Lyons (organiser), Strategy Director, New Zealand Ministry of Transport (on secondment); and Professor of Transport and Society, UWE Bristol

David Metz, Visiting Professor, Centre for Transport Studies, UCL

Gordon Stokes, Honorary Visiting Research Associate, Transport Studies Unit, University of Oxford

Tracey Waltho, Director of Strategy and Analysis and Chief Economist, UK Department for Transport

Part 2 – record of roundtable discussions

In this main part of the report the key themes that arose during the discussion are summarised. Although there was a range of views on all issues, broadly the discussions in sections 1-6 below focus on more concrete issues and practical suggestions where considerable research has already been carried out, and sections 7-10 reflect a mixture of more speculative explanations, research which is less far advanced, and various ideas about the political implications.

1 Lost in translation

In the 1970s official forecasts of road traffic included allowance for an eventual saturation level of car ownership, car use and total car traffic (the expected point when this would occur being the first decade of the 21st century). While indicators of a turning point in the long run trend of car traffic growth can now be seen to date from the early 1990s, the phenomenon itself both in terms of its appearance in various countries' national statistics and its subsequent examination by commentators has been much more recent. It has quickly acquired the label 'peak car' which can present a problem of communication – to policymakers and other stakeholders. 'Peak car' suggests an interpretation that car travel has indeed peaked. This should not be taken as axiomatic - rather, the discussion took the label as a shorthand for confronting uncertainty over whether or not car travel has peaked and contemplating the available evidence base and plausibility of three future alternatives – growing car travel, saturated car travel or declining car travel.

Another matter that can be lost in translation is the distinction between car travel per capita and total car travel. It is the former that has been principally responsible for interest in the topic because of its implication that if car travel per capita is going down then something is changing in terms of the underlying drivers of demand relating to behaviour. However, it is possible that per capita car use could decline while total car use (and hence traffic volume) might still continue to increase as a result of population growth. From a policymaking perspective the latter can have as much if not more importance for certain areas of policy and investment. Therefore car travel per capita and total car travel should be explicitly distinguished. A key element of discussion is whether the resulting totals should be taken as proportional to population or some other conversion factor, depending on locations where population grows and the policy context in those places.

Many forecasting models identify economic drivers as principal determinants of travel demand including real incomes, oil prices, and other transport prices. Examination of recent data on car travel suggests that a wider set of drivers may be at play including social, behavioural and lifestyle factors. There is wide agreement that this does *not* mean that the economic drivers no longer operate. However, their impact may be modified in size or structure – in economic terms, there will still be demand elasticities with respect to price or economic growth, but these may be different sizes (and in some circumstances even different signs), and subject to different influence, than has traditionally been assumed. The 'peak car debate' should not take the form of a false distinction between 'economic and psychological' or 'quantitative and qualitative' influences.

There is a recognition that some rather entrenched positions may have got in the way of fostering collective engagement amongst policymakers, academics and practitioners. Perhaps the principal point that needs to be made is that any degree of professional consensus about the nature and extent of future demand is currently significantly diminished. There is little confidence that a single forecast, or narrow uncertainty band, represents a robust 'most likely' future, and there is a wider range of views and greater uncertainty of an unprecedented extent in recent times. If the fact of this greater range of views can be commonly recognised then a more collaborative approach can be adopted to address how this uncertainty might be reduced and how best to respond in policy and investment terms in the meantime.

2 Divergent trends

An important point already widely reported in the existing literature on recent developments in car travel is that of divergent trends that exist below aggregate national profiles of car travel per capita, i.e. that the trends for different areas, classes of travel or groups of the population are moving in different directions. Analysis of National Travel Survey data (for Great Britain) has revealed that car travel has gone down amongst men while up amongst women; it has gone down amongst young people and up amongst old people; it has gone down in London and some other cities and up in rural areas. The extent of divergent behaviours in different types of area for different types of people is significant in considering how total car travel will be affected by future population growth – the composition and spatial distribution of population matters hugely. Divergent behaviours are also not only related to cities versus smaller towns and rural areas but also to economically buoyant areas versus much less buoyant ones, not always in intuitively obvious directions.

One 'cartoon' is that there are two 'worlds': (i) London and certain other cities with 'metropolitan' characteristics with their trend towards less car use accompanied by rapid economic growth, increased population, increased densification, youth, immigration, and public transport growth; and (ii) 'the rest of the country' where trends still continue the previously dominant increases in car use, decline in public transport, and a tendency to suburbanisation. Similar divergence is seen in New Zealand with per capita car use recently decreasing in Wellington and Auckland and either being flat or growing elsewhere in the country (with growth largely being associated with remote rural areas). The discussion suggested that this is an oversimplification, and many of the trends seen in London are also seen, though in somewhat damped form, in some other areas – thus divergence is occurring, but 'London versus the rest' does not capture its characteristics. It is crucial to track and examine the diversity reflected by these two worlds. In turn that means that research on the behaviour of the aggregate total is important, but so is focus on those areas or groups whose behaviour shows departure from prevailing aggregate trends in both directions. Divergent trends matter.

Another divergent trend worthy of note is that of under and over projection of future demand. For future car travel, forecasts (since about 1989 in the UK) have been successively revised downwards underlining a tendency to over-predict. (Though it should also be noted that the accuracy of transport forecasts depends also on the accuracy of

forecasts of exogenous input variables, as discussed in section 6.) Meanwhile, the opposite has been true for rail in the UK – nearly all rail enhancements in recent years have substantially exceeded forecasts of use. Rail use nationally is also enjoying its highest ever levels. In the case of rail forecasts it is acknowledged that the forecasting models that are used are quite good at dealing with incremental change but not as good at dealing with step changes – whether internally or externally generated. Were both road and rail behaving in the same direction in relation to projections then this would have different avenues of possible explanation to those for the current situation. One might posit that there is some common oversight in both road and rail forecasts that is attributable to travel behaviour change determinants.

3 Economic cycle effects

It could be suggested that we have been provided with a tremendous international travel demand experiment with the global economic downturn in that we now have the emerging opportunity to discover whether indeed as employment and GDP recover so too does car travel per capita begin once again to increase (as there are some very early signs that it might be from the most recent data). However, the experiment may be problematic because there are two possibilities – firstly that the downturn has been a *temporary disruption* from which the long run trend in per capita car travel will recover (or will largely do so subject to any hysteresis effect); or secondly that the severity of this downturn (and indeed previous recessions) will itself have had a *lasting impact* on aspects of society and economic and social activity from which demand is derived. For example, there has been a marked increase seen in the most recent census (2011) of the proportion of the population which defines itself as part-time employed or self-employed. For these people it potentially moves beyond a matter of simply recording how much they earn at a particular survey point to the realities of the insecurity of agency work, zero hours contracts and the like. Fuelled by the global economic downturn, this may not only have altered the labour market for good but it may have changed the whole attitude towards taking on substantial financial commitment such as that associated with car ownership or home ownership. It will be a long time before we can establish definitely whether the economic crisis itself has had only temporary or more long-lasting structural effects.

In addition, there is an unresolved issue about the extent to which first levelling off and then recent downturns in car travel have been due to the state of the economy or due to other factors. The argument here has mainly been in terms of the timing of the changes in trend. Have they in fact been contemporaneous with, or subsequent to, changes in the economic factors and downturns in national economies from 2008 onwards? This begs the question – is enough attention being given to studying and understanding effects (including policy responses and their effects) from economic conditions before the current recession? It has been suggested in recent work that the start of some of the observed changes can be traced back to much earlier developments: the upswing of an earlier economic cycle – change in youth driving licence acquisition was already recognised by 2005 as having slowed down some ten years earlier; car mode share in London had peaked around 1990 (and is now down to around 37% - much of this change occurring pre- global economic downturn). Indeed, emerging from the last significant recession in the early 1990s, following an earlier period of considerable traffic growth in the late 1980s,

coincided with UK data showing a change from increasing traffic intensity of the economy to decreasing intensity. In other words decoupling of economic growth from traffic growth started to be observed in the period 1992-4. The same is true of shifts in land use and patterns of internal migration. The hypothesis that traffic growth and economic growth will both 'return to normal' depends on examination of how we expect traffic intensity of economic activity to change in future, which has so far been little considered yet this is surely key to matters (picked up below) of transport investment decisions.

4 Equilibrium not saturation

There is a long held hypothesis that car travel per capita should reach saturation over time as people are afforded the opportunity to reach their desired levels of consumption: Official forecasts of traffic in the UK made this assumption during the 1970s and early 1980s (suggesting at that time that saturation levels of car use would occur at around 2010). One hypothesis is that as technological advance has enabled us to travel faster and further to access people, goods, services and opportunities, we may be reaching a point where we have (at the average) all the access we require. An alternative hypothesis is that any flattening off in per capita demand may reflect a state of *equilibrium* being reached for the prevailing travel, economic and social conditions. In the UK, major road building has not been a feature of policy and investment for some 20 years and it may be that this limitation on capacity provision has resulted in a 'containment of demand' with the results in terms patterns of behaviour now emerging. In this case if strategic road capacity were to be substantially increased, and greater road traffic speeds permitted, it would be likely that more miles would be travelled as road users moved to establish a new equilibrium. (If this hypothesis is a significant contributing factor, it would imply that the feedback relationship of capacity changes on demand has rather large effects, with induced traffic being a substantial part of future traffic, as well as exogenous growth, and both needing to be taken account of in the forecasts.)

5 Policy developments affect car use

Alongside underlying economic drivers, key factors identified in the 'peak car' literature to date as also contributing to an explanation of changing car use include: (i) the behaviour of young people and a reduced commitment to learning to drive and own their first car (this has been influenced by changes in policy on driving tests, as well as wider public engagement in education on environmental issues, and changes in the insurance market reflecting age-related risk of accidents; it may also be influenced by changes in higher education – see later); and (ii) the locational distribution of a growing population (in terms of both per capita and in turn total car travel). There can be a tendency to view transport policy as something which must respond to such key factors, drivers and changing demand rather than itself influencing the drivers and factors which in turn influence demand. However it is suggested that past UK policies may, importantly, also be partly responsible for the dampening of car travel. This builds upon the equilibrium theory above.

There have been some big policy changes that were introduced in the 1990s onwards in the UK. In particular land use policy (with a recognised interaction with transport) focused upon urban containment, brownfield development, restriction of out-of-town shopping and

the introduction of maximum rather than minimum parking standards (i.e. restraint). Such policy effects would have taken a number of years to become fully manifest – compatible with noticeable consequences being seen in car travel data from the early 2000s onwards, when the long term tendency for migration from cities to smaller towns and rural areas was reversed, with the consequence of reducing pressures for car use rather than increasing them. Another policy change which has been shown to contribute to effects on car use has been that concerning company car tax in the UK which moved from having perverse incentives to drive more in some cases to making company cars relatively less attractive. Thus policy measures may have been more effective than they have been given credit for – largely because of the lag effects between policy formulation and implementation, and resulting influences on demand (with such lag effects straddling different political administrations).

Similarly in New Zealand, policy and investment may have been impacting on car travel rather than (only) responding to it. Lower (or under) investment in transport infrastructure capacity up to and at the point of change in the trend in car travel data in around 2004 (before the global economic downturn) may have contributed to this observed change in demand. The subsequent attention being given to higher investment now in New Zealand with road capacity expansion is conversely likely to itself bring about an upward influence on demand. Indeed based on assumptions of improved accessibility bringing about greater economic activity and as a consequence generating more traffic, this might be considered a not unreasonable political response to the challenge of driving economic recovery. However, this makes a presupposition of there being a (strong) coupling between economic activity and traffic – something not necessarily borne out in practice where urbanisation is drawing upon agglomeration, densification and improved alternatives to car use to bring about a reduction in car mode share while maintaining economic vitality – as is the case with London.

The importance of the policy effects on, rather than responses to, changing car use raises the need to distinguish between factors which are external and outside of the control of public policy and investment (where market forces are at work) and those which are internal and within control. (There is also a distinction between transport authorities and agencies and other public policy areas across government.)

6 Robustness and risk

There has always been to a greater or lesser extent the approach by government of producing ‘high’ and ‘low’ forecasts rather than a single projection of future car travel. These different forecasts tend to be based upon the same underlying assumptions but with different input values. This results in some acknowledgement of uncertainty about the future with an apparent envelope of possibility. It is manifest that professional views on this envelope (and any central projection within it) now span a wider range than used to be the case.

With this in mind it is significant to note the dependence that other parts of government have on official road traffic forecasts – for example in relation to income from fuel tax for the Treasury or estimating transport’s future contribution to UK carbon emissions.

Meanwhile road traffic forecasts are dependent on GDP forecasts. Forecasting models and decision making that derives from them are subject to both internal assumptions as well as assumptions about input parameter values. Uncertainty can be at risk of being concealed in such forecasting which is why scenario planning (as a complement to, rather than substitute for, forecasting) has grown in appeal. This is especially important where 'game changing' developments in society are contemplated. Game changers might include changing energy supplies, driverless cars or localised goods production (3-D printing).

Given that 'peak car' debates are unlikely to be resolved with full consensus or confidence for some years, a review of policy appraisal approaches is needed which gives greater attention to policy and investment *robustness* in the face of outcomes which may be outside the narrow traditional envelope of statistical error bands. Thus estimates of benefit-cost ratios (and strategic fit and deliverability) need to be considered for a wider range of futures than is done at present. In commercial terms this would be described as a need to consider both upside and downside risks of policy measures in the face of different possible futures. In the current situation of an apparent tendency to overestimate traffic growth it is argued that upside and downside risks are not symmetrical, but there is a greater probability of forecasts being overestimated than underestimated (hence the progressive downward revisions in the last 25 years). This is especially true of major scheme investments.

Robustness needs also to be considered in terms of 'portfolios' of schemes and measures rather than considering individual schemes or measures in isolation, and tested against whether they only perform well under a narrow range of assumed futures, or under a wider range of conditions. It is recognised that addressing this would in turn require an appropriate means of explaining to policy makers that there is a wider range of possible futures than is implied by the envelope of 'upper and lower' assumptions which may be included in traffic forecasts. There is a range of views about the practical aspects of handling this matter.

7 Opportunity beckons

Taking forward the equilibrium theory above, allied to policy consequences, then raises an interesting question: if public policy is contributing to the system state that then dictates a corresponding equilibrium state for system use, what would be the right equilibrium to aim for? The question suggests that many of the issues considered to be related to forecasting matters could in fact be related to *decision making* matters. Rather than public policy trying to establish where it thinks future society and travel demand will be and respond to it, it is faced with the prospect of making decisions regarding where we *want* to be in future.

The greater uncertainty which is now surrounding future demand (notwithstanding that public policy alone is not responsible for shaping that demand) might be seen as problematic to policymaking. However, the reasoning above suggests that uncertainty represents an *opportunity*. Faced with diminished confidence in predicting in order to provide, one has to move to a different question of choice in terms of what should be provided in order to try and influence a desirable equilibrium for society. This may appear to represent a significant change of mind set for policymakers and indeed it may be so for

certain countries (or many – especially in the face of pursuing economic recovery). However, from an economics perspective this is not radically new thinking and formed a basis for the work of the Eddington Study in the UK (2006). Predicting demand is seen to represent something which has a ‘price’ variable in a generalised cost sense (i.e. not simply monetary cost). This being the case, economic modelling can consider how the demand can be influenced by price and level of congestion to achieve a ‘desirable equilibrium’. The Eddington Study did this with two scenarios – one involving road investment without road pricing and one involving less road investment but with road pricing. Although the difference in total vehicle miles of traffic between the scenarios was small, the consequences for infrastructure strategy and congestion were very substantial, there being some 80% less expanded road capacity warranted under CBA assumptions with the reduced traffic volume, and less congestion, resulting from optimal road pricing. Opportunity itself can of course become problematic because it suggests scope for choice both about the future state we wish to reach and also the policies and measures that may enable us to get there. Future generations may not necessarily agree with the choices made today and the consequences of related policies and measures. It is also recognised that there are controversial differences of opinion today about the right balance between the pursuit of economic growth as an imperative in a globalising economy and the pursuit of environmental, social and health goals. However, in this case it is argued that the chosen balance does not of itself solve the question about whether or not car travel increase is an inevitable accompaniment, result of, condition for or barrier to economic success. Thus the selection of infrastructure for capacity increases does not follow simply from the choice of goals, but from an evidence-based assessment of its effects. Choice politically will also invariably be driven by the perceived imperatives of the time – the relative emphasis on economic, social and environmental considerations is likely to alter at different stages of the economic cycle.

One manifestation of policy choice might be labelled the ‘green metropolis’ – epitomised by London but potentially replicable elsewhere globally. This is a mega city in which population is growing but without additional road capacity for car traffic, meanwhile allied to densification and investment in rail-based public transport. It is fascinating that so much new housing stock as part of densification is focused on where planners would wish it to be and also that quite expensive, high-rise accommodation is acceptable and perhaps desirable to younger, richer, lower car ownership individuals – accommodation that described loosely 50 years ago would have been seen as a ‘council flat’. With low mode share for car in the face of these conditions and the speed and reliability of rail (compared to bus) it is possible to deliver a city that is economically and socially vibrant (and which has lower per capita carbon emissions). However, for other cities to realise this policy goal is a potentially complex proposition and it is unclear whether or not the logic would hold true for smaller scale urban areas. In terms of such policy choices this is also in the context of questions over equity of investment choices that may disproportionately favour one geographic area over another.

8 Winds of digital change

Interest in the ‘peak car’ phenomenon has been driven by data suggesting that something different and important is happening – in a number of countries (albeit not all for exactly

the same reasons). Examination of the phenomenon has, understandably and helpfully, been focused upon empirical evidence. The UK is world leading in its longitudinal capture and reporting of transport statistics, accompanied by other national surveys which help paint a 'measured' picture of UK society. However, certain forms of data are more commonplace than others across a number of countries. Less data exists to allow comparison across locations and over time regarding the impacts of the digital age on society and in turn transport. The 'peak car' literature does acknowledge the possible contribution of the digital age to changing demand for car use but in the face of limited suitable empirical evidence this appears to be given less prominence than other potential factors. Much research has been undertaken on seeking to understand the relationships between information and communication technologies (ICTs) and travel. However, this has tended to focus upon particular activities or technologies and look for isolated cause-effect relationships; and much of the research has concerned the period before mobile online technologies became ubiquitous.

It can be hypothesised that in practice the effects of the digital age are permeating society in a complex, subtle and cumulative way such that the consequences for car travel are becoming significant but are challenging empirically to substantiate. 2014 marks the 25th birthday of the world wide web. For many of the years over the period of its existence, major new digital innovations have emerged and been absorbed into (parts of) society – search engines, e-shopping, social media, smartphones and so on. One hypothesis is that society is in the midst of a transition from the regime of the motor age into something different – and strongly shaped by the digital age. Major transitions have, historically, taken several decades to become fully apparent. For New Zealand it took some 60 years to transition fully from sailing ships to steam ships. A similar period of time elapsed in transitioning from horse-drawn transport to motorised transport. The transition potentially now surrounding us is one from a society in which accessibility is dominated by physical mobility and especially by the car to a future regime where accessibility will be more strongly shaped and represented (alongside the car) by digital age interaction. The car, it can be suggested, is gradually or not so gradually being overcast by digital connectivity such that it will no longer be the dominant defining force of our culture and social and economic activity.

Such a hypothesis inevitably provokes a question of whether any evidence exists that such a transition has really started to happen. This is difficult to address for reasons stated above – relationships between ICTs and travel are multifaceted, interactive and changing over time. A longstanding area of interest has been that of teleworking with presumptions of growing substitution effects. Evidence can suggest that there has been little change in levels of teleworking over time. Yet such evidence can be hampered by problems of definition and measurement in the face of an increasing diversity of flexible working practices. For instance, previous national survey data in the US was based on a question asking 'where is your normal place of work?' – such a question would not capture those working at or from home for only part of their time (which is known from UK data to have been a growing form of flexible working). There is some recent work using Scottish data examining the relationship between internet use and car driving mileage. People with low internet use and very high internet use tended to have lower car use and people with

intermediate internet use had higher car use. Reasons for lower car use may be associated with lack of access to a car for one group and substitution effects from high internet use for another group.

The hypothesis above might appear to be in conflict with observed (re)urbanisation and associated lower car use because it had previously been assumed that ICTs would bring about a 'death of distance' such that people could locate more remotely and still participate economically (a contributor to urban sprawl). However, while this may be the case for some (perhaps those moving into (semi) retirement), urban living can be a natural accompaniment to digital age engagement where people can take advantage of public transport use to remain digitally engaged on the move. It may also be the case that being proximate some of the time is a feature of a service economy. Alternatively or as a complement, travel time use with the support of digital technologies may have contributed significantly to rail use attractiveness for business and commuting thus connecting people from outside urban centres without recourse to (as much) car travel. It must be noted, nevertheless, that public transport use remains a small part of the overall travel market. There may also be significant consequences for future travel time use and its influence on modal preferences according to whether *or not* self-driving cars become a mainstream feature of future transport (and whether or not public policy chooses to encourage this).

9 Changing norms

Higher education policy in the UK may have had a major effect on promoting young people's appetite for urban living and diminishing their appetite or need for car use through changing social norms. There has been a national policy for some years of increasing the proportion of young people going to university allied, more recently, to higher education becoming more expensive. This has resulted in large proportions of young people spending a significant period of their early adult lives in university towns and cities where they are amongst others who for various reasons also do not have a car. They spend 3-5 years in a less car dependent existence where social norms and pressures to be a car user (or certainly a driver) are much diminished. This is allied to an ability to stay connected and co-ordinate their social networking through digital technology. They can also more easily take advantage of public transport services through the availability of travel information services. Affordance of a car, influenced by disposable income levels, may still remain a significant and ultimate determinant of eventual car use – and yet changes to social norms may create more inertia to remain car 'independent'.

There remains much more to be learnt about factors influencing young people's car use. It was reported that recent work yet to be published suggests that young people's lifestyles and car use are affected by whether or not they are in full time work, part time or not employed, and also by housing costs and remaining living longer with parents.

10 Political perspectives

An issue that is not new but which now perhaps has even greater importance is the need to bridge between technical insights and expert advice and political realities. The approach to making decisions in times of uncertainty is key. There is a major challenge in moving policymakers away from orthodox thinking associated with long-run trends (in the face of

some uncertainty) to a space where plausible yet divergent possible futures should be contemplated which may present radically different possibilities in terms of policy and investment choices and associated risks (and returns).

This returns us to the issue of communication and engagement associated with the 'peak car' debates. A politician's role is to lead the electorate and create a sense of confidence and assurance – acknowledging uncertainty is not a comfortable place to be and to engage with. Thus it would seem that attention needs to be focused upon the possible virtues of *opportunity* that uncertainty can present. In this regard there remains much to be gained from better understanding how demand for car travel has responded to past events, especially in relation to policy initiatives, in order that greater confidence can be taken from being able to maintain or resurrect such policies (or to introduce new ones) in order to effect change that may be desirable – whether viewed from an economic, social or environmental point of view. In this light, it is of some concern that in the UK (outside of London) we are currently sorely lacking a robust planning framework.

Closing remarks

Participants at the workshop agreed that the roundtable discussion had been a worthwhile undertaking and that a forum for some form of continuation of knowledge sharing and discussion on this important topic would be appropriate. The event on this occasion has benefitted from the initiative and support of the New Zealand Ministry of Transport and the generosity of time given free of charge by the participants. Future undertakings, reminiscent of the OECD's International Transport Forum work referred to on page 2, would be welcome, with resources to support the activity. Given the ultimate significance for policymakers of the topic it would also be welcome to see more national governments wishing to act as (joint) convenors.

Appendix

Written submissions by participants in advance of or immediately following the roundtable discussion

Individual submissions are included with the permission of their authors. Each submission reflects the view of the individual concerned and has not been reviewed for factual accuracy and does not necessarily reflect wider endorsement by those participating in the roundtable discussion.

What are the most noteworthy factors likely to have been contributing to recent changes in per capita car travel?

- **Cumulative effects of society moving deeper into the digital age:** changing where and when activities are undertaken, enriching and reshaping interactions with others, influencing location decisions and diminishing, at least to some extent, the primacy of the low occupancy car for accessing people, goods, services and opportunities.
- The assertion above is **difficult if not impossible to unpack and conclusively support empirically**. There is evidence at more specific levels. For example, between 2007 and 2013 internet use for a range of activities increased substantially (e.g. internet banking, selling goods or services, internet phone/video calls). In 2010, 15% of people in paid employment worked a least one full day a week from home – up by 35% from 1997. However, **one may not necessarily observe cause and effect in such specific data since the cumulative effect of our move into the digital age is more profound**. It embodies or at least overlaps with some of the more specific considerations of factors such as, notably, urbanisation and younger people acquiring driving licences alongside their attitudes towards travel.

What would be the assumed drivers of each of the three trajectories forward of grow, peak or plateau?

- **Affordability** of personal motorised mobility
- Extent of **coupling** between economic activity and traffic levels (and the extent to which internet bandwidth can keep pace with demand for use)
- Extent of **co-operative behaviour** affecting vehicle occupancy levels
- Relative experiences of and perceptions of **travel time use** across different modes
- Likelihood of **autonomous driving** becoming a mainstream reality
- **Political appetite** to espouse regime transition or preserve the incumbent automobility regime

Are these the only trajectories and to what extent might different trajectories concurrently prevail below the aggregate?

- Just as the digital age is affecting some people more profoundly than others across society, so too will per capita car travel as has been evidenced already in recent analysis. It seems likely that concurrent trajectories will continue to prevail and that since these trajectories may well themselves not be linear, **the aggregate trajectory itself may be 'unstable' for the period of years ahead suggesting a persistence of a rather inconclusive position on 'peak car'**.

How should policymaking respond to the pronounced uncertainty surrounding future travel demand; and what does this uncertainty mean for how we invest in land transport and how we might look to build flexibility into the system to cope with uncertainty?

- A fundamental consideration is the **extent to which policymaking is reactive to an uncertain future or proactive in shaping that future**. Providing capacity for projected growing demand may either prove to be a self-fulfilling prophecy or a underutilised asset. Infrastructure **investment should be considered in terms of supporting access demand** and not travel demand.
- There may be a widening of difference between the trajectories of per capital car travel and total car travel such that policymaking in the medium term is inclined towards total travel increasing due to population growth and unwilling to relinquish the lasting vestiges of 'predict and provide'.

NZ Round Table Meeting 20 May 2014 – David Metz

Key changes in trend occurring in 1990s:

- Cessation of growth of car-km per capita in most developed economies
- Cessation of growth of average distance travelled by all surface modes (UK National Travel Survey)
- Marked upturn in demand for rail travel (UK passenger numbers doubled)
- Car mode share in London peaked around 1990 at 50%, and now in decline (currently 37%), with public transport use growing.

However, average travel time (an hour a day) and trip rate (1000 pa) are long-term invariants.

Types of explanation for changed trends (not mutually exclusive)

- Applicable to driving in all countries (eg young men driving less)
- Applicable to particular countries (eg changes in UK company car taxation)
- Applicable to travel demand generally (eg demand saturation arising from high levels of access and choice)
- Applicable to urban locations (eg marked shift away from car use in London as population density grows)
- Result of changes in technology (eg no longer practicable to travel faster; impact of IT)

New trends unlikely to reverse (?)

'Peak Car' marks transition between two eras:

- Harnessing fossil fuel energy and rising incomes, to travel faster and hence further (1830-2000)
- A new era in which demographic factors, rather than income and technological advance, drive growth and pattern of travel demand

Demographic factors

- Population growth
- Spatial distribution (greenfield for new housing implies car-based travel; brownfield prompts public transport investment)
- Increasing longevity (younger people adopting prolonged urban lifestyles without a car, before settling in suburbs)
- Ageing population (more older people driving, more ceasing to drive)

Policy implications

- Central forecast should be on basis of unchanged average per capita travel distance, travel time and trip rate (historic elasticities no longer applicable)
- Scenarios to reflect options for accommodating population growth, as between high density urban and lower density suburban/rural
- Understand the case for higher urban densities: agglomeration economics and sustainability
- Consider packages of transport investment and property development as means for accommodating growing population and fostering economic growth

Fuller discussion in 'Peak Car: the Future of Travel', David Metz, Landor, 2014

Initial thinking for 20 May Roundtable – Gordon Stokes

What are the most noteworthy factors likely to have been contributing to recent changes in per capita car travel?

- Young people, especially men - changes in perceived utility of cars; related to higher rates of university education in cities where alternatives to car travel exist, the growth of electronic communications, more difficult and costly driving tests, more expensive insurance for younger people – older people still behaving as they did
- Policy may have been more effective than generally given credit for – better public transport, and encouragement of cycling and walk
- Economic growth in western developed countries has become ‘illusory’ being based on service and quaternary sectors and consumption rather than adding value to goods. This is likely to continue. (This is probably a controversial and maybe incorrect view, but supports the ‘saturation having been reached’ idea).

What would be the assumed drivers of each of the three trajectories forward of grow, peak or plateau?

- The ‘default’ with no strong drivers is probably equal car mileage per head of population.
- Growth (on a large scale) probably requires conscious policy to encourage car use over other modes (land use planning, or lack of it; weakening of public transport, and discouragement of cycling – corporate trends towards globalisation and ‘economic growth’ in terms of complexifying the economy and requiring more consumption to sustain that ‘growth’.
- Reduction probably requires policy to divert travel away from car, and shift to environmental economics.
- *Possibly* technology, though current ideas of universal driverless cars are probably equivalent to predictions on electric and hydrogen cars 15 years ago. (But the model of private vehicles designed for about 4 people has been fairly constant so could lead to little mileage per person change).
- Spatial planning (in the long term) can encourage less travel or more.

Are these the only trajectories and to what extent might different trajectories concurrently prevail below the aggregate?

- Polarisation – Urban rural differences could polarise; could be a polarisation between those able to use other modes and those who have no alternative to car.
- Likely changing trends over time – periods of growth, reduction and stability - could come about by swift changes in policy in response to resource, technology, environmental crises, or price fluctuations.

How should policymaking respond to the pronounced uncertainty surrounding future travel demand; and what does this uncertainty mean for how we invest in land transport and how we might look to build flexibility into the system to cope with uncertainty?

- It has to be robust to different scenarios until such time as we can predict a stable trend again (which is always a dangerous assumption to fall into)
- Need to provide for all realistic modes of transport, but not rely on one

Initial thoughts for 20 May roundtable on 'peak car' from Peter Headicar

- In seeking to unpack the myriad factors influencing per capita car travel I think it's helpful if we separate changes in attitudes and behaviour amongst particular types of people living in particular types of places ('area-types') from the changing proportion of such people within the total population (itself a function of changes in socio-economic composition and spatial distribution). My contribution focuses on this 'changing mix' dimension within England.

What are the most noteworthy factors likely to have been contributing to recent changes in per capita car travel?

- I have estimated that change in **spatial distribution** over the period 1971-2011 contributed about 3% to per capita car mileage, equivalent to about 5bn vehicle miles a year currently in England. But for the stemming in overall counter-urbanisation which has occurred over the last 15 -20 years these numbers would be roughly double.
- In principle it would be possible to identify the effect that changing **composition** has had over the same period. I don't know the figures on this but for example
 - The proportion of some higher car mileage groups has gone down (econ active males, full-time workers) whilst others have gone up (EA women amongst women of working age)
 - The proportion of some lower car mileage groups has gone up (students, over 65s, people not born in UK) whilst other have gone down (children until recently)
- Within these overall changes there are important trends in the spatial distribution of individual groups. Students and young adults are increasingly concentrated in University /econ buoyant cities; over 65s and 'early retired' professionals in small towns/ rural areas.

What would be the assumed drivers of each of the three trajectories forward of grow, peak or plateau?

- The pattern of change in the most recent decade ('mix' factors alone) suggests overall stability or slight decline in per capita car travel. In itself this is remarkable since historically one would have expected the large increase in total population to have been accompanied by development – hence population shift – outside cities with consequent increase in per capita car use.
- For conurbations and cities to retain/add to their current population share and composition characteristics in future depends on them maintaining their socio-economic/cultural attractiveness to younger people and for international immigration not to be significantly curtailed. It also depends on planning policy continuing to promote urban renaissance and successfully addressing housing/transport/social issues implied by increased densification.

Are these the only trajectories and to what extent might different trajectories concurrently prevail below the aggregate?

- The evident trend of socio-economic polarisation between London/Greater SE/ regional centres and the remaining area types (shires, coastal and older industrial areas) is currently accompanied by increasing divergence in travel behaviour (reversal of traditional trends in the former, 'business as usual' in the latter.
- The attractiveness of city regions could be enhanced (London style) through better place-making, a successful multi-modal travel regime, car sharing opportunities and greater adaptability to the electric vehicle/peak oil era. Will less urbanised areas be able to sustain/adapt the car-dependent lifestyles which have been a pre-requisite of their attractiveness to in-migrants in the past?

Initial thoughts for the 20 May roundtable on “peak car” from Stephen Joseph

Noteworthy factors contributing to recent changes in per capita car travel

I think what others may have missed are the trends in public transport use in the UK. Rail use in particular has more or less doubled in the last 15-20 years. There is a large debate about the impact of rail privatisation (1993-7) on this, but certainly a programme of investment in the last ten years, which is accelerating, has helped. However, even in networks with limited investment – notably the local rail services in the northern cities and even some rural branch lines – there has been huge growth in patronage. Similarly, as David Metz points out, growth in public transport use in London has been huge.

I think the urbanisation identified by Peter Headicar is an explanation for this – for example, the economic structure of the north of England changed, so that employment moved from industry – based in northern “mill towns” to services, which ended up (partly through planning policy) being based in the city centres. This created “rail friendly” growth.

I know we’re discussing cars, but it should be noted that GB rail freight has also grown significantly (although from a low base), and now accounts for (for example) around a third of tonnage from the ports of Southampton and Felixstowe. Here there is some evidence that privatisation has helped, giving rail freight operators guaranteed “slots” on the network and hence enabling them to match or exceed road’s performance.

Other public transport has been much more mixed – overall, bus use has declined outside London, but there are pockets of high bus use depending on local operators and councils.

Assumed drivers of the three trajectories

- Urbanisation: as Peter Headicar says, land use patterns and policies are key. A loosened planning system may lead to increased traffic, but denser development may counter this
- Investment in roads vs non-car alternatives: significant investment planned on the railways will drive change, especially if a new high speed rail network is built. At local level, investment in cycling in various forms may be a driver of change too, alongside other “pull” measures (car clubs, public realm improvements etc). On the other hand, big road investment allied to ex-urban development may counter this.
- New technologies – both transport (real time information, smartcards etc) and non-transport (continued growth of digital technology where cities/ public transport have advantages over ex-urban/ cars) will influence travel patterns

Different trajectories?

Definitely we can see this. City regions may follow London and car use will plateau and may reduce, while we may see growth in inter-urban traffic and in rural areas, especially if planning policy allows more car-based ex-urban development

Responses of policy-makers

- Scenarios rather than forecasts
- Multi-modal rather than single-mode plans
- Linking transport and land use planning

And an interesting question – maybe devolved city-region authorities, like London, will manage all this better if sufficiently resourced and with the right capacity and capabilities

Comment after the seminar by Phil Goodwin

1. Aggregate test of NTM ability to track recent years' traffic volume

The DfT has published suggestions that the forecasting errors made using NTM in recent years have mainly been due to wrong input values of population, income growth and fuel prices, and reported briefly that if the input values had been correct, the model's forecast would have tracked reasonably well the actual outcome. However, there are some features which make it seem that the test is not quite as persuasive as has been reported. These are:

- The tests have been done by a combination of retrospective runs of the model with corrected input data, and application of a reduced form of the model, at aggregate level, excluding certain important elements, for example, the feedback effect of congestion. This would appear to be a very interesting and important argument but has been difficult for outside commentators to assess because the detailed method, spread-sheets, calculations and results have not been published; only a graph and a few paragraphs of explanation are available. It would be very helpful if the test could be reported in sufficient detail to enable others to reproduce the results, or otherwise.
- The reduced form tests have used aggregate demand elasticities intended to be consistent with those derived from the complex pattern of parameters in the model. However, the model uses relationships implying long term equilibrium elasticities, on the argument that its main use is to predict traffic volumes many years in the future. It is empirically well established (and accepted by DfT) that long term elasticities, which take of the order of 5-10 years to settle down, are substantially bigger, by a factor of around 2, than the elasticities which apply within a year of changes in the cost, income etc. (There is also a smaller amount of evidence that at least some elasticities are not symmetrical in the short run, notably that the effects of income reductions on car use have been less than the effect of equal and opposite increases). In this case however the revised forecasts relate to a year-by-year tracking of short term effects. Prima facie the performance test of the model is based on the assumption that the short term elasticities are as big as the previously assumed long term equilibrium effects. If that is valid, it would imply that the true long term effects could be bigger than has been assumed. It is difficult to conclude that the same explicit or implied elasticities are valid for the short and long term at the same time as accepting the empirical evidence (and theoretical expectation) that they are different.
- The third issue is that even if the model's parameters are capable of accurately producing an aggregate trajectory of demand, for national totals, that is rarely the main use to which it is put: rather, it is used as a guide for regional or sectoral forecasts relevant to specific projects. It is known, for example, that its forecasts for London are substantially wrong, and there is much interest in whether there are corresponding errors for specific other areas, especially cities, even after allowing for corrected input variables. This would be a more testing test, and give insights into whether (for example) there are some areas of systematic overestimate and others of systematic underestimate.

For these reasons I do think that tests of the model's performance under different assumptions of the input data would be extremely useful and full of insights, but it needs to be done with the full version of the model, careful thought about the implications of short and long term elasticities, break-downs into the classes of area or population which are material to the current debate, and full publication or access to the detailed technical results. Ideally the method of carrying out the analysis would be collaborative¹ involving both in-house and external analysts.

¹ There is a long unresolved issue about people outside the DfT having access to the model, so that they can run it independently, varying assumptions or input values, and trying their own preferred policy tests. It would be good if progress could be made on this – I understand that the barrier of some parts of the model using a proprietary code is now easily solvable.

2. Policy implications of different forecasts

It is often assumed that if traffic forecasts are lower this will reduce the case for road capacity increases, and if they are higher this will strengthen the case. For that reason there is sometimes a tendency for people or institutions to be more or less receptive to the evidence according to whether they feel more or less comfortable about these policy implications.

Quite apart from the need for all policy appraisal to be based on the best possible evidence about the effects, without the sort of double-guessing that could lead to bias, I don't think the assumption is actually true; the effect of different forecasts on the choice of best-fitting policies is actually more complex and in some cases runs in the opposite direction. To take the case of expanding road infrastructure, policy approval will be influenced by a range of different factors, of which two (among many) are (a) the estimated size of the BCR as a measure of value for money, and (b) an assessment of whether people will experience an improvement in travelling conditions as a result. These are not equivalent: the BCR will be calculated against a counterfactual do-minimum or do-nothing future, whereas 'improvement' is experienced against a factual present situation.

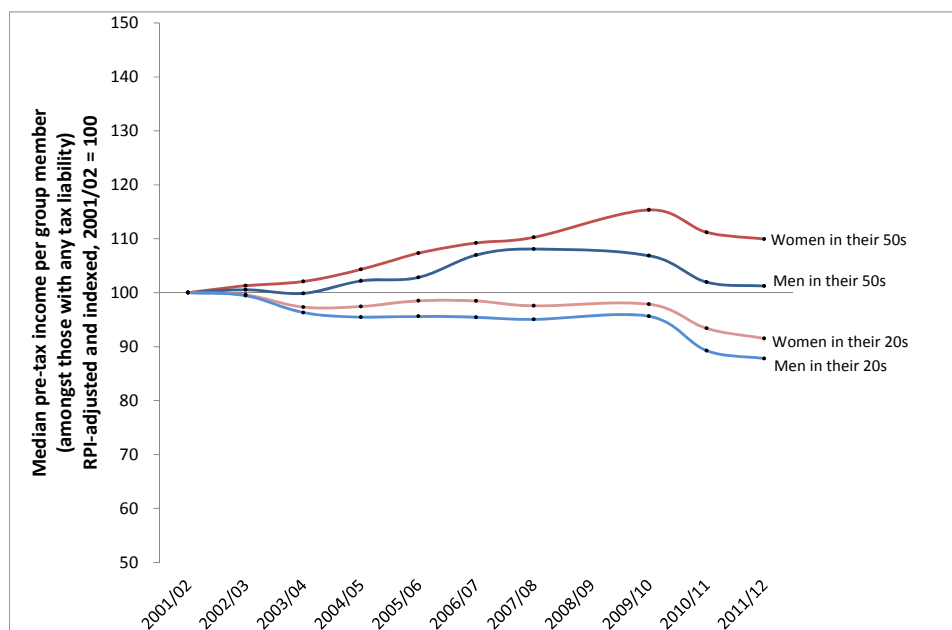
If the forecasts are very high, the estimated BCR will be high, but the possibility of experiencing improvement will be small: the outcome will be 'making things worse more slowly'. If the forecasts are low, then the BCRs will be lower but the effects of expanding infrastructure is more likely to result in reduced congestion which will be experienced by road users. Multiplying these two probabilities together, my hypothesis is that there is likely to be a curve whose maximum – where support for specific schemes will be highest – is at a level substantially below the current forecasts, maybe of the order of about 10% growth over the forecasting period.

Note that the experience of the period from 1992-1998, under both Conservative and Labour governments, showed exactly this feature. The traffic forecasts were so high that no road building strategy could actually make traffic conditions better, in spite of the claimed high benefit-cost ratios. This was one of the driving forces for all parties to undertake policy reappraisal in the period, and why the Eddington report favoured road pricing.

We are likely to see another aspect of the same problem in the near future, when considering the performance targets which are set for the new Highways Company. It is most unlikely that successful performance would be judged by their ability to argue that conditions, though getting worse, are doing so more slowly than would otherwise be the case: there will be a natural desire to have performance measures which show what improvements are being made. But setting ex post performance measures which are different from ex ante appraisal criteria would produce considerable tension, and probably disappointment.

Peak Car, Young Adults, and Economic Performance

A line of research is needed to better distinguish between effects due to the downward trend in young adults' economic activity and other hypotheses that involve less well-understood mechanisms (e.g. online-connectivity, changing attitudes towards cars, effects of migration). The chart below shows that even among just tax-paying young adults personal incomes trended down in the 2000s, while the opposite occurred for older adults. People on zero or very low incomes are excluded from this analysis; it therefore is distinct from other trends such as the increase in young adults' participation in higher education.



Authors' analysis of HMRC Survey of Personal Incomes

It may well be that some or all of the less-well-understood hypotheses turn out to be significant contributors to 'Peak Car'. The first order of business, however, is to identify how much of young adults' falling auto-mobility can be explained, in a statistical sense, by trends in their economic activity. A better understanding of what has caused the diverging economic performance between younger and older adults is also required, in order to sensibly make predictions for future years.

Research is also needed to quantify the degree to which the observed concentration of young adults in Britain's cities is due to changing *preferences* (e.g. evolving social norms, delayed household formation, increased desire for urban amenities) versus changing *constraints* (e.g. the mis-alignment between rising home prices in the early 2000s and decreasing young adults' incomes).

Implications

The notion of providing open access to the *National Transport Model* has been raised (by Phil Goodwin, writing in *Local Transport Today*). Whilst we recognise that there are practical challenges (e.g. confidentiality agreements), we believe there is an overriding public interest in making it available for interested parties to use and alter (subject to suitable agreement). The 'Peak Car' phenomenon – and its future trajectory – has very large implications indeed. The question is too important for anything other than open public discourse that is as well-informed as possible.

A shift towards scenario-based forecasting is most welcome. DfT are currently studying techniques to better represent uncertainties in the NTM, both statistical uncertainty and others such as model specification, future technologies, and socio-economic trends. This is to be applauded.