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# ITC Call for Evidence : Road to Rail - Factors Affecting Trends in GB Car Traffic and Rail Patronage

**What are the reasons behind the recent levelling off in car travel?**

**Why are we seeing such a strong rise in UK rail travel demand?**

**Are the increase in rail travel demand and the stagnation of car travel connected?**

**Are these recent trends in car and rail travel likely to continue in the future?**

# Key Questions to answer about Car travel

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## What are the reasons behind the recent levelling off in car travel?

- What has happened historically and recently to total GB car traffic?
- What has happened historically and recently to NTS travel behaviour?
- Are Total GB Car Traffic and NTS Travel Behaviour Statistics comparable?
- What are the key drivers of demand for car transport?
- What has happened to these key drivers historically and recently?
- Can we explain both the recent trends in car traffic using these key drivers?

## Are these recent trends in car travel likely to continue in the future?

- How do we model future car travel?
- What do we expect to happen to these key drivers in the future?
- What impact will these key drivers have?
- What do we expect to happen to car travel based on these key drivers?
- What sensitivity analysis have we done or could do?
- Why might our expectations for car travel in the future be wrong?

# What has been happened historically and recently to car travel?

# Historically Car travel has been on an upward trend with fluctuations attributable to economic reasons

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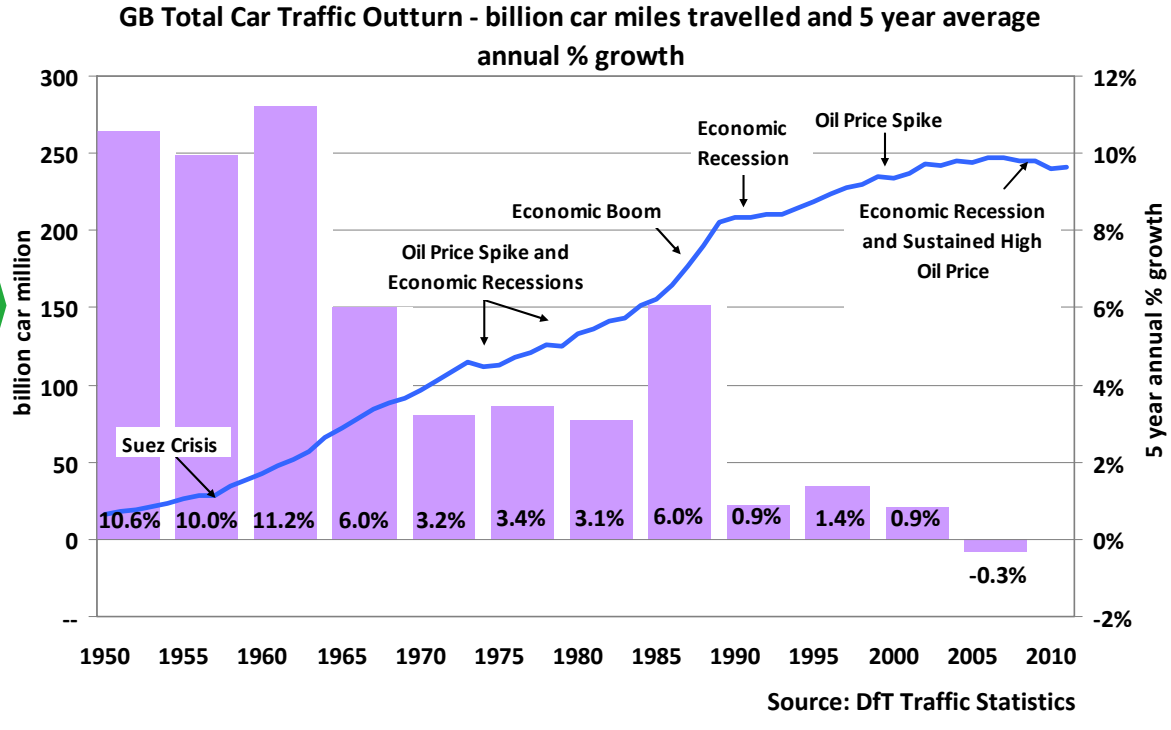
## Historic Trend

- Road traffic has grown for many decades. Between 1950-1965 the average annual growth rate in total car traffic was 10.6%.
- The plateau and fall in traffic over the last few years is not new.
- Plateaus or falls have historically occurred in times of recession or high oil prices.
- The late 1980's shows a much higher growth in car traffic at a time of economic boom.
- However the growth rate in traffic has generally trended down




Source: DfT Traffic Statistics

## Recent Trend

- The early 1990's saw the lowest growth in car traffic on record at a time of economic recession.
- There was higher growth in the late 1990's.
- Traffic grew 10% from 2000-07, then fell 3% from 07-10… but has now risen 0.5% in 2011*
- The 2000-05 annual average growth rate was as low as during the early 1990's recession

## Conclusions and Questions

- Car traffic in general has grown over the last 60 years but there is a long term downward trend in its rate of growth.
- Periods of high growth or plateaus/falls occur during economic booms/busts and when the oil prices are high.
- Does the same occur in individual travel behaviour?
- Can these economic drivers explain why traffic growth has been low over the last 20 years and plateau/declined over the last few?

*Provisional estimate for 2011; 2007-10 and 2010-11 figures affected by snowfall in 2010*

# The National Travel Survey

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## The National Travel Survey

- The National Travel Survey (NTS) is the primary source of data on personal travel patterns in Great Britain.
- The NTS is an established household survey which has been running continuously since 1988.
- It is designed to monitor long-term trends in personal travel and to inform the development of policy.
- Data collection consists of a face-to-face interview and a one week self-completed written travel diary.
- Approximately 20,000 individuals, in 8,000 households, participate in the NTS each year.

## The NTS and Travel Patterns

- We use the NTS to look at how general patterns and trends of travel have changed over time.
- Looks at how, when, where and why people travel.
- Also looks at factors which affect personal travel such as car availability, driving licence holding and access to key services.

## NTS and the National Transport Model (NTM)

- NTS data is the basis behind the NTM's Demand Model.
- The NTS provides a rich and detailed source of information on multi-model trip rates and the Demand Model calibrated against actual behaviours observed in the NTS such as trip length and trip purpose.
- The NTM's Demand Model then projects the future path of these travel pattern behaviours which are used to predict traffic within a physically constrained road network.

**Further Information on the National Travel Survey can be found:**
http://www.dft.gov.uk/statistics/series/national-travel-survey/

**Further Information on the National Transport Model can be found:**
http://www.dft.gov.uk/publications/road-transport-forecasts-2011/

# National Travel Behaviour Trends imply that the number of trips per person has recently been falling since the late 1970's

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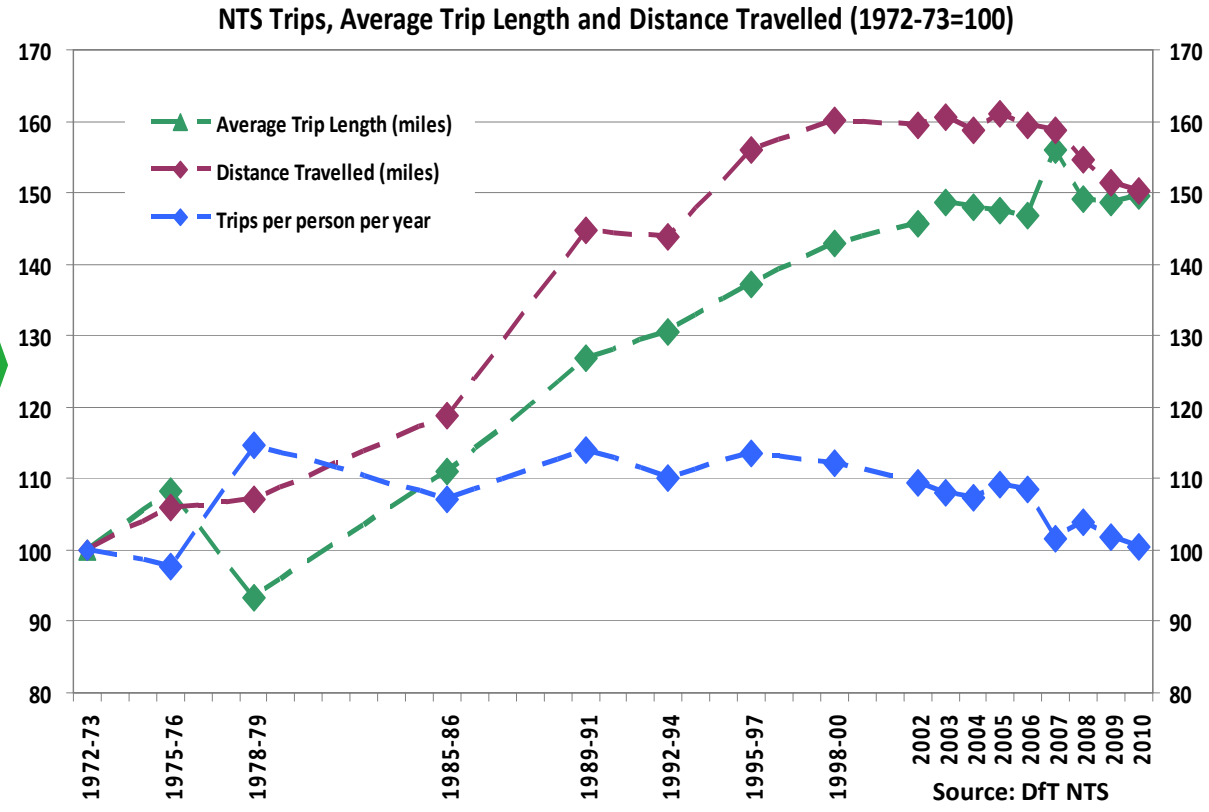
## Background to NTS data over time

- The National Travel Survey has an excellent reputation
- Over time, as with many surveys, the methodology and sample sizes has been adjusted. Notable years in which changes occurred were 1995 and 2002
- In the early years of the NTS multiple years worth of results were combined due to smaller sample sizes. This stopped in 2002 when the sample size was almost trebled.
- Data from 1995 onwards has been re-weighted, causing a one-off uplift in trip numbers and distance travelled.
- In 2002 and 2003 there was an under-recording of short walks.
- In 2007 and to some degree in 2008 there was an under-recording of short trips.

## The NTS and Travel Patterns

- Over the last 40 years, the average annual distance travelled has increased by around 50%.
- Most of this growth in distance happened in the 1980s and 1990s.
- Trips peaked in 1978/79 with a 15% increase over 1972/73 levels but now have fallen back to early 1970s levels.
- The recession has led to a sharper fall in travel demand, much more severe than the long term trend.



# NTS Travel Behaviour Trends since 1995 shows a general decline in trip rates, especially for Cars over the last few years

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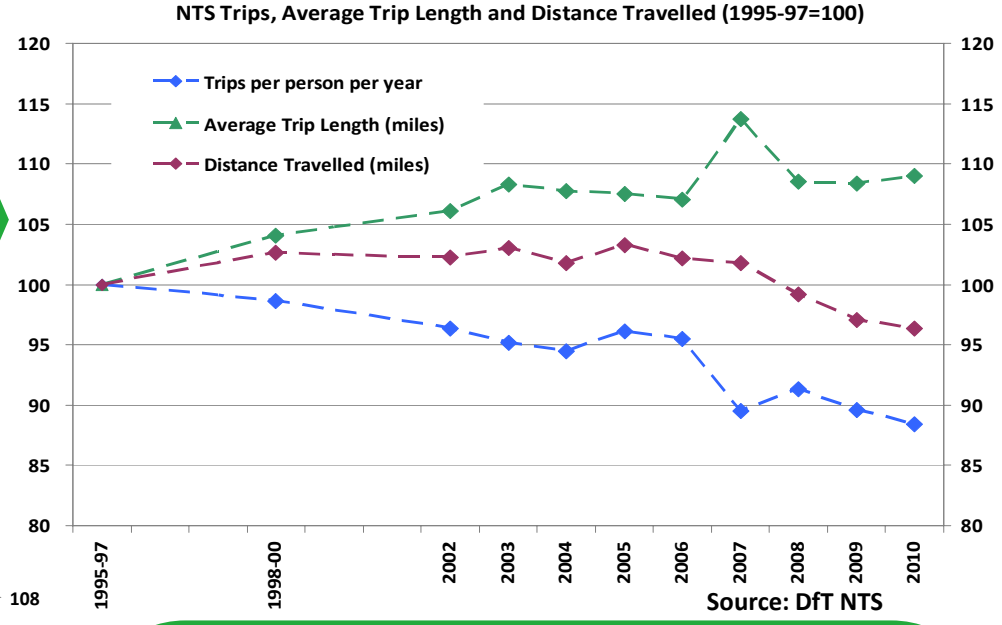
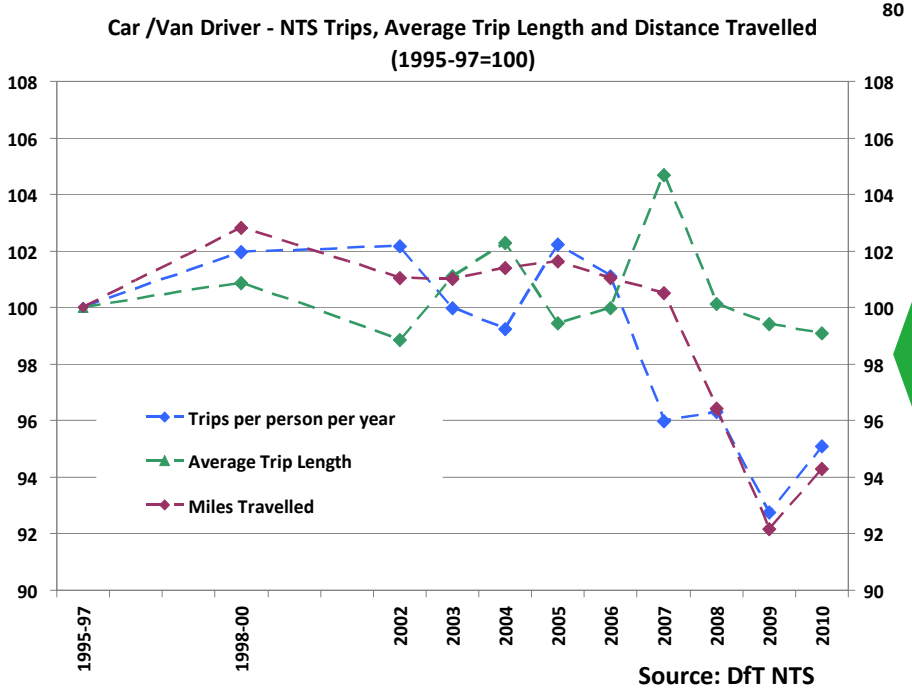
## Recent NTS Travel Patterns

- The chart illustrates that the NTS shows average trip rates per person per year have been falling since 1995, now 12% below 1995 levels.
- During the same period the average trip length has been rising, almost 10% longer than 1995 levels.
- Distance travelled was rising to 2005, but since has been falling and is now 4% below 1995 levels.
- The impact of under-reporting of short trips in 2007 can directly be seen in the one year fluctuation in trips and average distance.




## Recent NTS Car Travel Patterns

- Unlike the 'All Trips' data, average car trips rates were stable from 1995-2006.
- The fall in 2007 may have been due to the known under-reporting of short trips, which is why the average trip length spiked at the same time.
- However, the 2008-2010 falls in car trips show the impact of the economic downturn and high oil prices on car travel.
- Average car trip distance have relatively been stable over the period meaning that the average distance travelled declined with fall in car trips.
- The car trip rate decline, likely caused by the economic downturn and high oil prices, can explain the recent falls in car traffic.

# Younger people appear to be making fewer trips, whereas older people are making more trips

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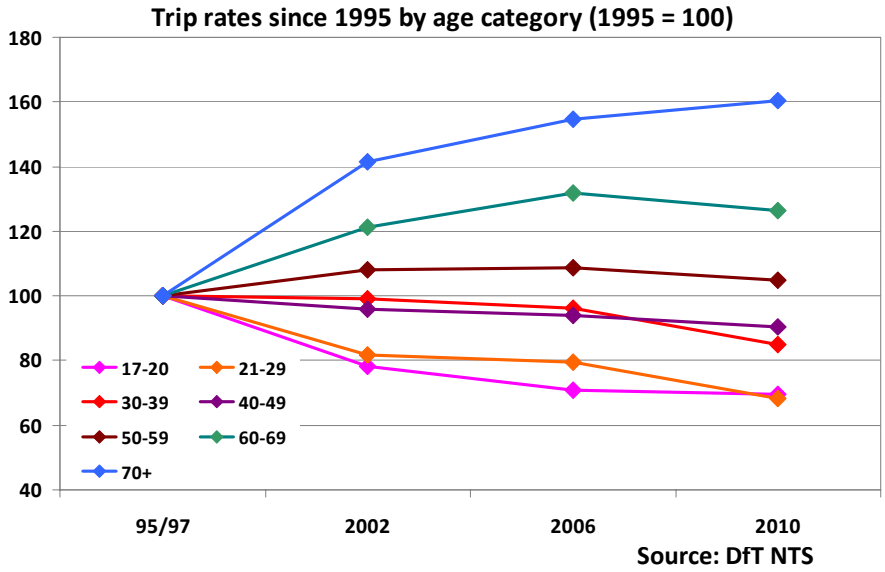
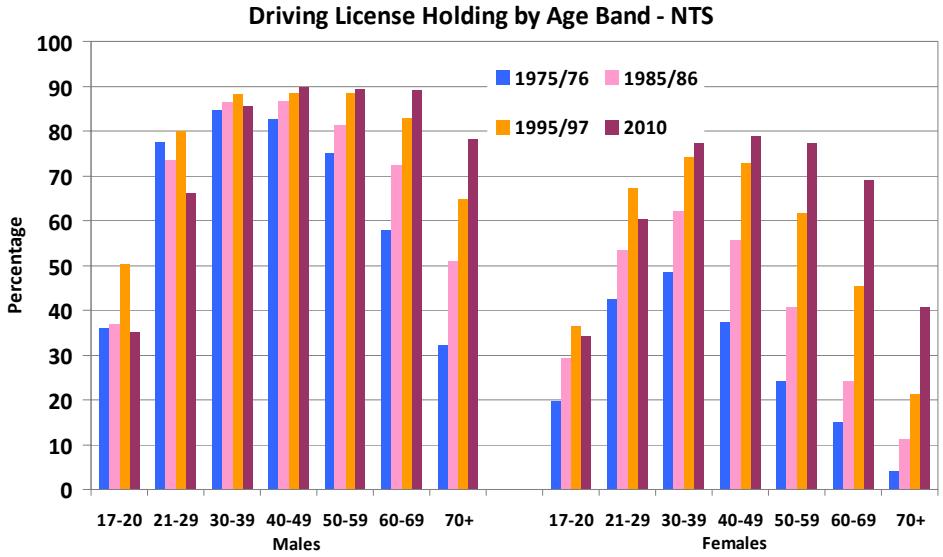
## Travel by Age group

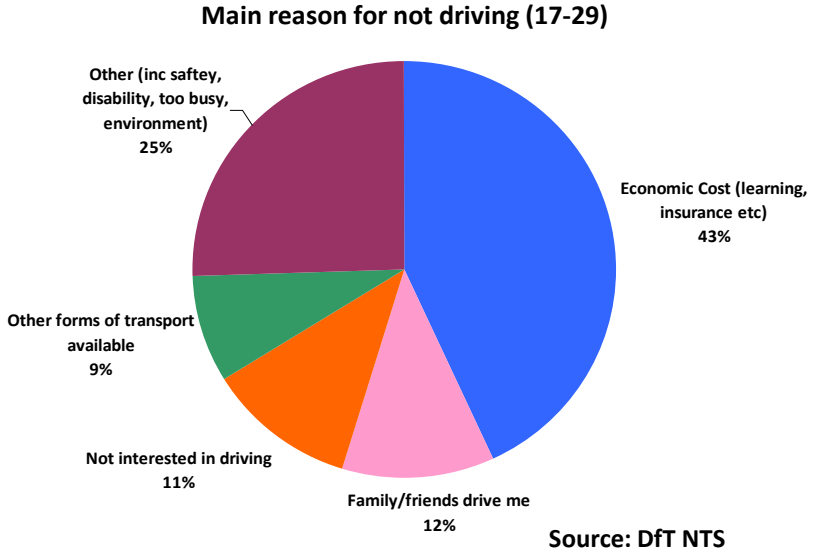
- The chart to the right shows that since 1995 younger people appear to be making fewer trips, whereas older people are making more trips.
- The chart below shows that alongside there has been a drop off in driving license holding among the 17-29 age group. This is especially true for young males who have historically had higher license holding.
- The main reason given for not holding a driving license for this age group is for economic cost reasons (43%), see bottom right chart. Friends/family driving them and other forms of transport also making significant impacts on young peoples decision.
- Only 11% of this age group is not interested in driving.




Source: DfT NTS




Source: DfT NTS




Source: DfT NTS

# Non-behavioural effects could provide some reasons for the apparent fall in trip rates in the NTS since 1995

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## Analysis of trip rates over time (1995-2006) - WSP Report*

A study commissioned by DfT to WSP and presented at the European Transport Conference 2009 analysed the trip rate changes over 1995-2006 within the NTS taking into account changes in survey design, procedure and response rate. They found:

*"The most important finding is that there is no convincing evidence of any substantial behavioural trend through time towards higher or lower trip rates per person for any travel purpose. Although summary analysis of the NTS trip rates appears to suggest a reducing trend in trip rates, more detailed analysis shows that this apparent trend is likely to be due to a mixture of other non-behavioural effects, including:*

*- Reductions in household response rates in the NTS, leading to a lower rate of representation in the survey of those people who make the most trips,*

*- Reductions in trips reported, especially short walk trips, probably in part due to the requirement to report the postcode of trip destinations,*

*- Changes in population profiles (e.g. a greater proportion of those in work being part-time workers)."*

## Conclusions from the NTS Data

- Data from the NTS shows that up until recently car trip rates have been broadly stable. The recent economic downturn and high oil price has had a significant impact on car trip rates since 2008/09 and could be the cause for the recent decline in car traffic.
- General trip rates appear to have been falling for the last couple of decades.
- WSP has argued that this may be partly due to non-behavioural effects such as falling response rates. However, NTS response rates have been relatively stable since 2002 so cannot explain the continued decline.
- Another important factor in travel patterns is the change in the demographics of the population which DfT recognises and models within its forecasts.
- Also, there appear to be changes within demographic sections of the population where younger people are travelling less, but older people more. These need to be monitored and potential reasons analysed.
- Some trip types, such as shopping, may be changing with larger and longer trips to supermarkets replacing. This may mean more deliveries and therefore more non-car traffic. Further analysis on the changes in trips by purpose would add to our overall understanding.

***UNDERSTANDING TRAVEL BEHAVIOUR AND FACTORS AFFECTING TRIP RATES, WSP – ETC 2009:**
**http://www.etcproceedings.org/paper/understanding-travel-behaviour-and-factors-affecting-trip-rates**

# GB Total Car Traffic and NTS Car Travel are not directly comparable but both are essential statistical resources

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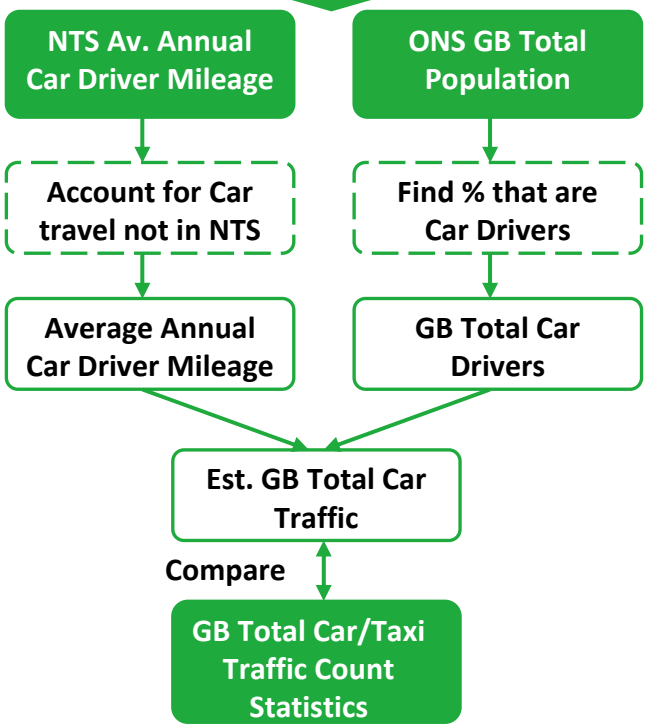
## Trying to compare NTS and Car Traffic Count Data

- NTS and Traffic count statistics are not directly comparable. As the NTS is a study of personal individual travel and the road traffic estimates are concerned with all travel, there are differences in eligible travel between the two sources.
- Households determined to be ineligible by the NTS include those classified as 'Communal' (e.g. student halls, retirement homes), also any trips to deliver goods or convey passengers (e.g. bus or taxi drivers) or by non-UK residents will not be included in the study .
- Flow diagram below shows the kind of calculations needed to get from NTS to car/taxi traffic count data (flow diagram is not truly representative of all the steps needed to compare the two sets of data due to the definitions being significantly different).

| | 2010 |
|---|---|
| NTS Car/Van Driver Av. Mileage | 3,416 |
| ONS GB Population (million) | 60.5 |
| Total Est. Car Driver Miles (billion) | 207 |
| Total GB Actual Car Traffic Miles (billion) | 240 |
| NTS Annual Car Mileage | 8,430 |
| No. Licensed Cars (million) | 28.4 |
| Total Est. Car Driver Miles (billion) | 240 |
| Total GB Actual Car Traffic Miles (billion | 240 |
| NTS Car/Van Driver Av. Mileage | 3,416 |
| NTS Annual Car Mileage | 8,430 |
| No. of NTS Car/Van Drivers per NTS Car | 2.5 |




## Car Traffic Statistics and the NTS are not directly comparable:

- Even when we try a simple estimation of multiplying NTS Av. Car/Van driver annual mileage with total ONS Population we under-estimate Total Actual GB Car/taxi Traffic. See table above.
- A simple estimate multiplying NTS Annual Car Mileage with total number of cars in GB is a better fit to traffic count data in 2010, but still doesn't follow trend over time.
- The Traffic Count Statistics and NTS are two essential data sources for understanding what is happening in road transport, and also within our modelling and forecasting.
- The NTS and traffic count statistics are different sources of data. Thus any analysis trying to directly compare or combine these datasets needs to take these issues into context.

# What are the reasons behind the historic and recent patterns in car travel?

# At the macro level car traffic is determined mainly by Population & Demographics, Income and Fuel Costs of Driving

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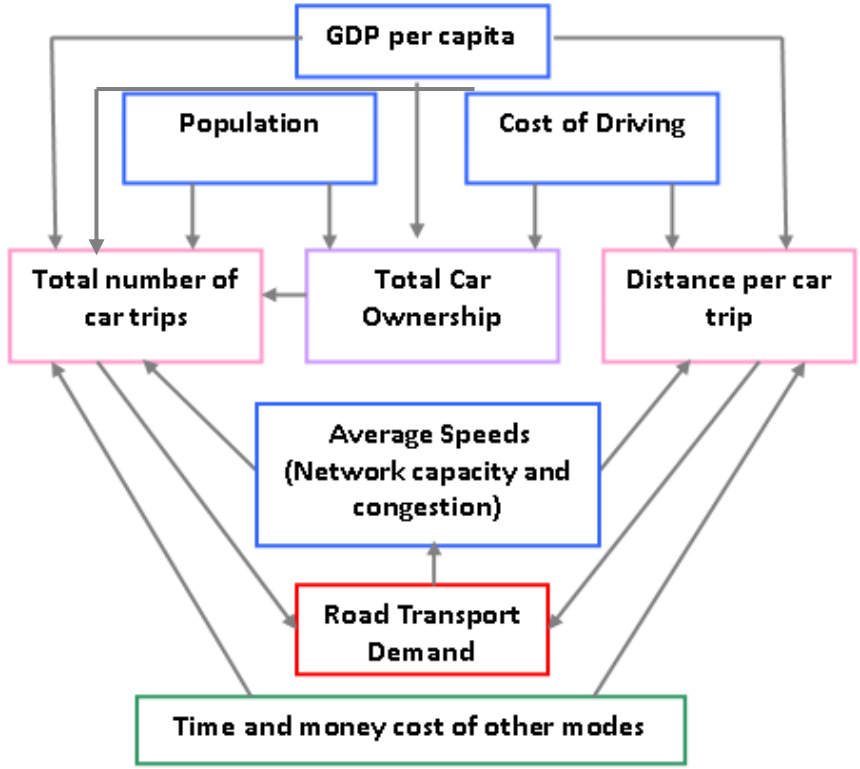
## Car travel demand determinants

- Many detailed individual decisions and influences.
- But at macro level, demand is driven by
  - Population & Demography,
  - Incomes and the economy,
  - Fuel costs - fuel prices & fuel efficiency,
  - and trends in substitutes and complements
- Car travel demand is constrained by network capacities and performance that it shares with road freight and business use.

## Population & Demography

- With an increase in population comes an increase in total transport demand, car ownership and the number of car trips.
- Various sectors of society make different trips rates, mode choice and thus road transport demand.
- The impact of population growth on travel demand will depend on which sectors of society see the greatest growth and their travel patterns.




## Income (GDP per Capita as a proxy)

- Growth in peoples incomes, especially those on lower incomes, makes car ownership more affordable and thus increases car travel (both in terms of car trips and trip length).
- Growth in incomes also increase peoples value of time and when a car is quicker and easier for a given journey individuals will be more likely to choose car as their primary travel mode.
- The impact of income will depend on how it is distributed and the saturation of car ownership and travel.

## Fuel Cost of Driving

- Falls in the fuel cost of driving, which for many is the largest cost of car travel, will increase the demand for car ownership and car use (both in terms of car trips and trip length).
- Fuel cost of driving will be dependant on the fuel cost (where the largest factors are taxation and the price of oil) and the fuel efficiency of the vehicle.
- With increasing incomes over time the impact of changing fuel costs will likely diminish as fuel is more affordable and people value of time becomes more important.

# Population and Demographics – population growth rate has been on a general rise since the mid-70's, with older people making up more of the total

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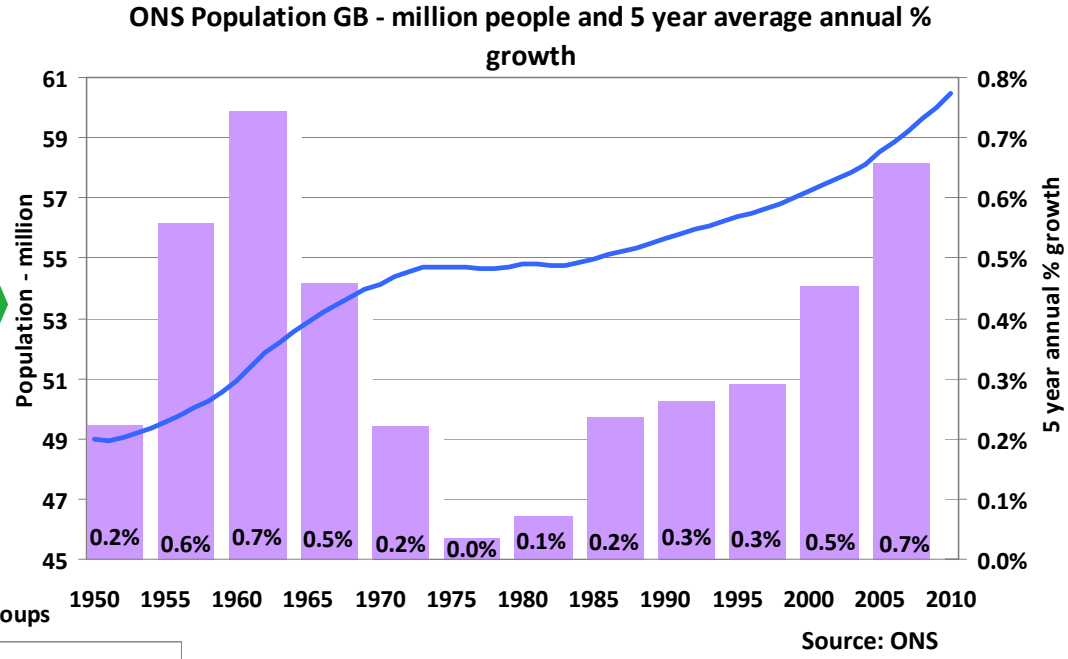
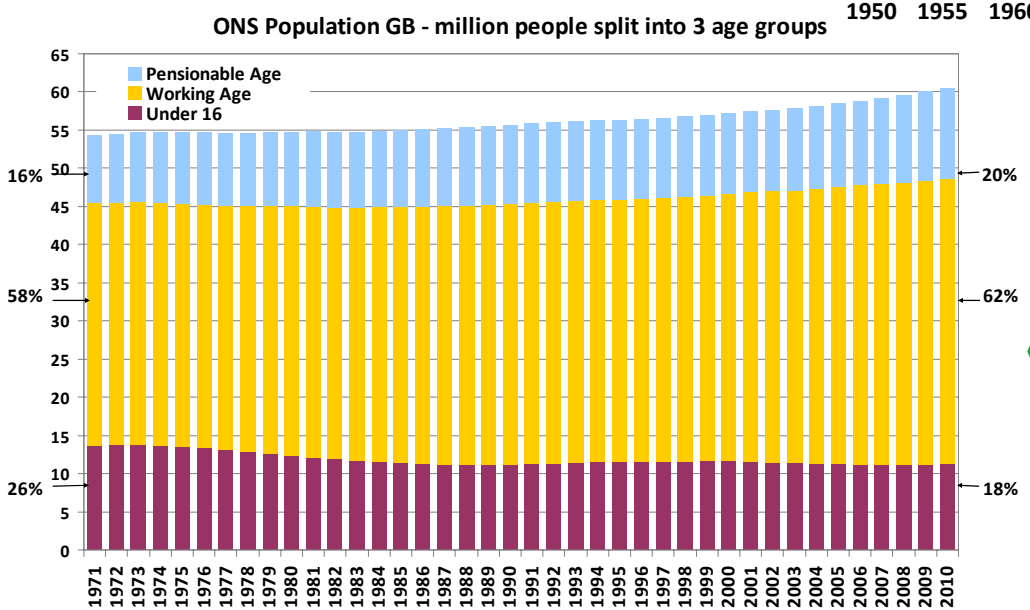
## Historic and Recent Trends in Total Population

- GB Population has generally been rising over the last 60 years, creating more demand, a larger economy and thus causing road traffic has grown for many decades.
- GB population growth rates have also been on a general rise since the mid-70's, partly due to some relaxation in immigration rules in the 1980's and migration from new countries entering the EU over the last decade or so.




Source: ONS




## Historic and Recent Trends in Demographics

- Since the early 1970's the proportion of the population under 16 has fallen from 26% to 18%. The working age population has grown from 58% to 62% and the pensionable age proportion has increased from 16% to 20%.
- Overall the average age has been rising through the last four decades.

# Fuel Cost of Driving – Fuel prices are driven by events and long term trends in global supply and demand

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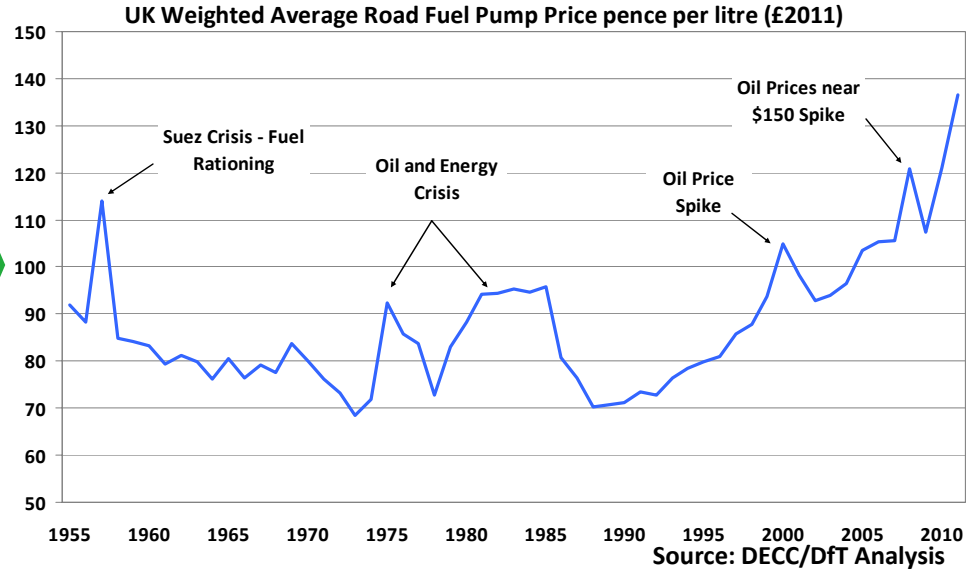
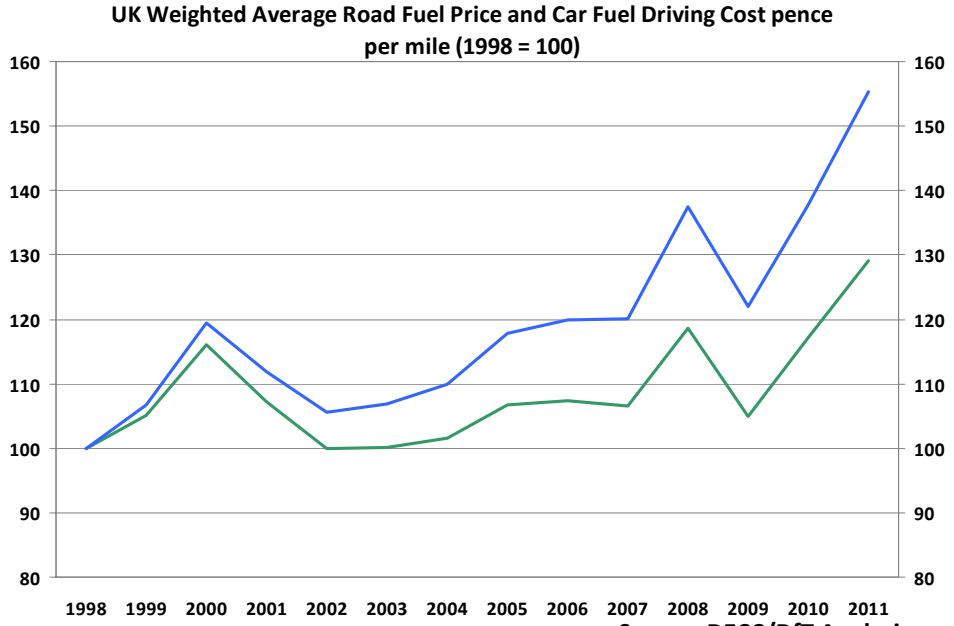
## Road Fuel Cost – Historical Trend

- Over the last 55 years the price of fuel has fluctuated with highs and lows due to significant changes in demand & supply.
- Regional conflicts in oil producing areas and OPEC supply quota policies have had pronounced impacts at times – such as the energy crisis, with the Iranian revolution and subsequent war with Iraq in the 1970's.
- Since the late 1980's there has been a general upward trend in the fuel price, increasing by 94% since 1988..
- However, the price of road fuel is only one part of the story. We need to take into account the fuel efficiency of cars and thus the fuel cost of driving per mile..



Source: DECC/DfT Analysis



Source: DECC/DfT Analysis

## Road Fuel Cost of driving – Recent Trend

- We have limited data on the average fuel efficiency of cars within the UK as proper recording of this only started recently.
- Since 1998 the Road Fuel Price has increased by 55%, but we estimate that the average fleet fuel efficiency has improved by 16% due to improvements in vehicle technology and a move to more diesel vehicles.
- The overall increase in the average fuel cost of driving is estimated to have risen by 29%, still a significant increase.
- Although people may focus on the pump price of fuel, it is the total money cost people will feel coming out of their disposable incomes.

# GDP per Capita – has been on an upward trend over the last 60 years with occasional falls during economic recessions

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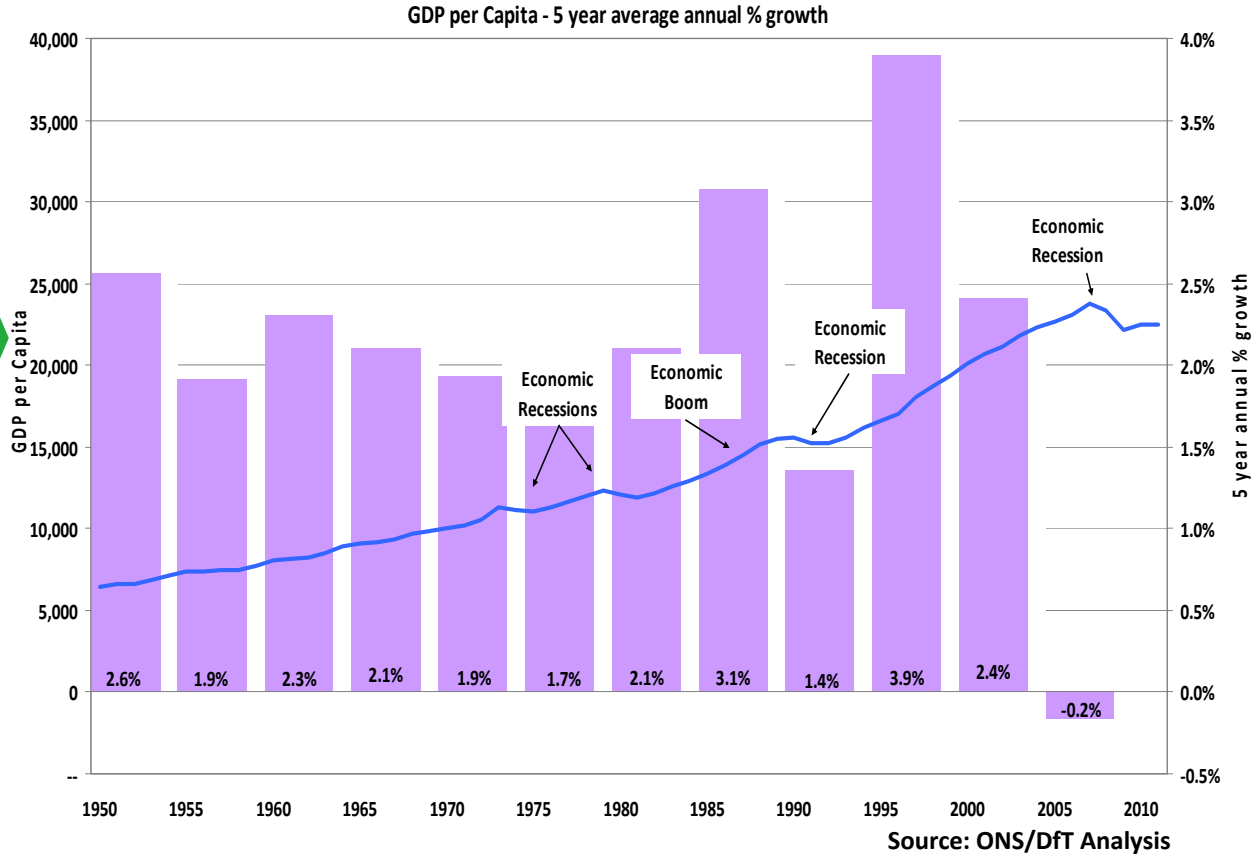
## GDP per Capita – Historic Trend

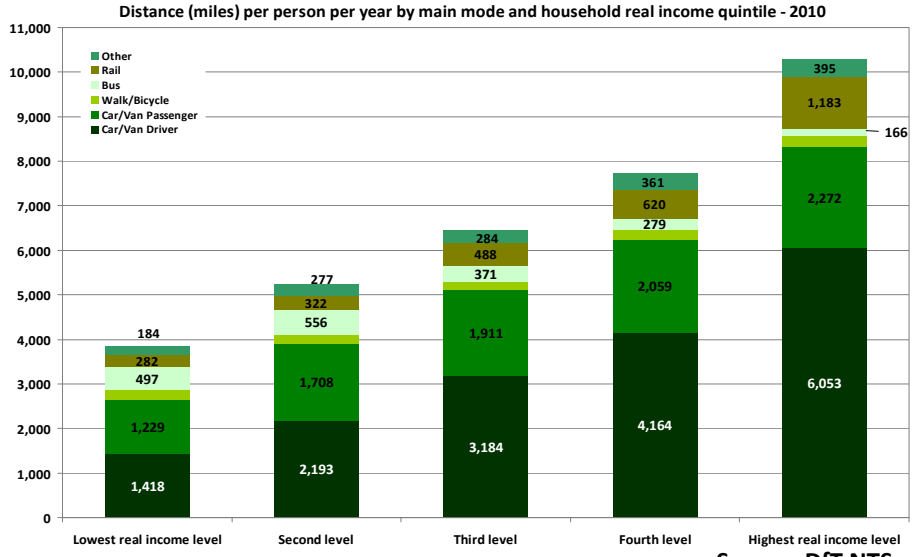
- Over the last 60 years GDP per capita has been on a general upward trend over the last 60 years with occasional falls during economic recessions.
- The average annual growth rate has been 2.1% per annum from 1950-2010.
- However, recent years we have seen quite substantial falls in GDP per capita.



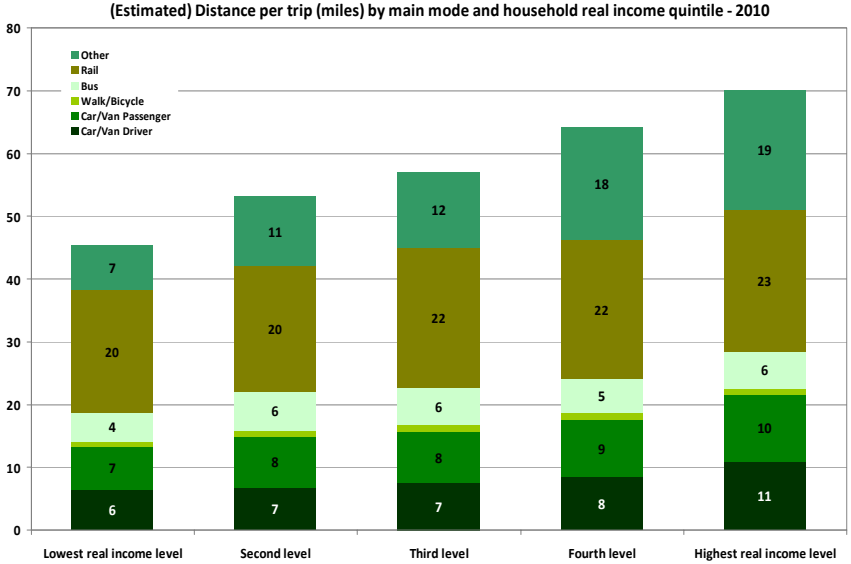
Source: ONS/DfT Analysis

# Cross-sectional analysis shows that those with higher incomes and car ownership have higher demand for car transport

- The charts show the number of trips taken per person, distance per trip and total distance per person by mode and by household real income quintile for 2010.
- Those households with higher real incomes and thus have greater ownership and access to a private vehicle make more car trips, the car trips are longer and thus the overall distance travelled in cars is longer.
- The majority of the higher car driver total distance travelled per person across the income quintiles comes from an increase in car trips rather than length in car trips.
- This implies that a rise in incomes and car ownership increases demand for car transport. This helps support the impact of the recent economic downturns impact on car trips.




Source: DfT NTS

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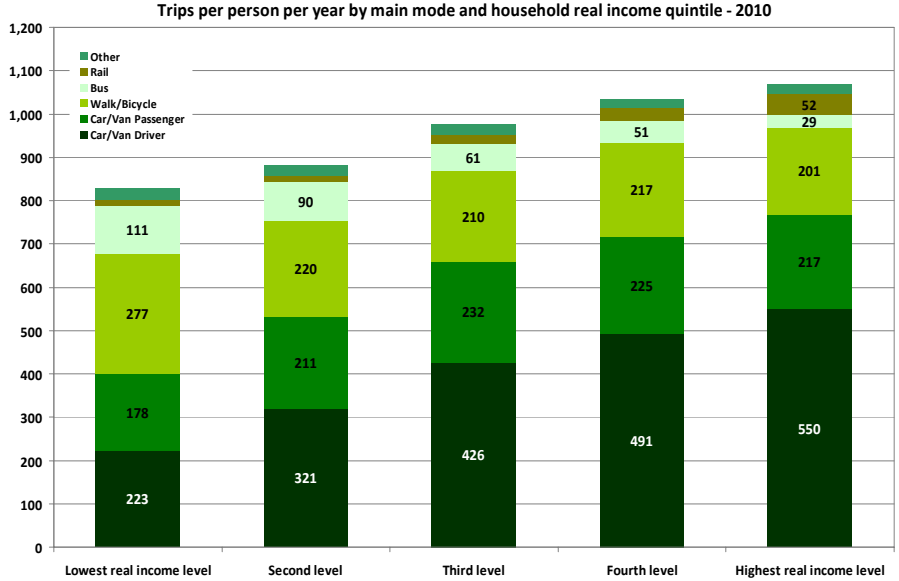


Source: DfT NTS

# Car Ownership has been on a upward trend for the last 60 years with periods of stagnation during economic recessions

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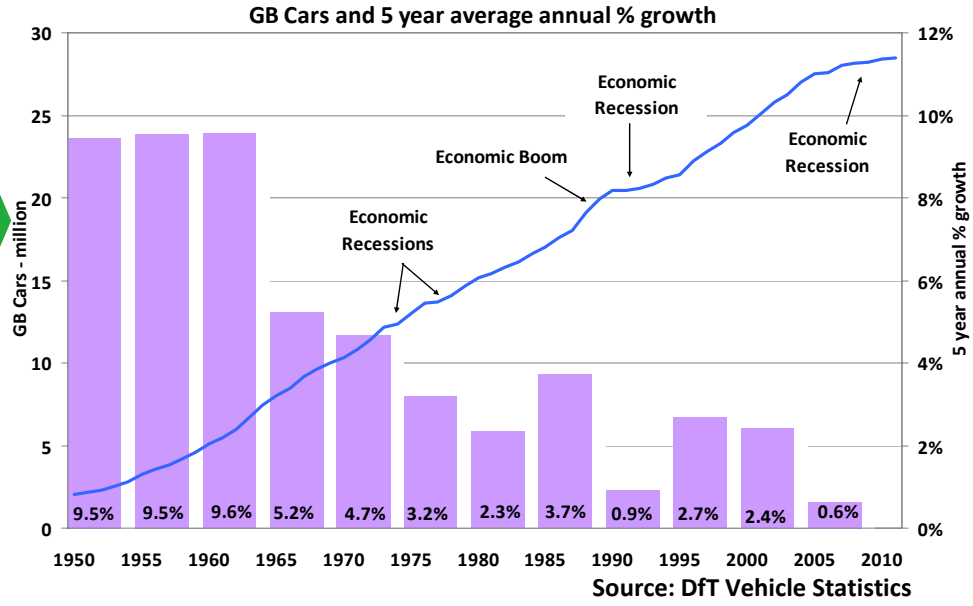
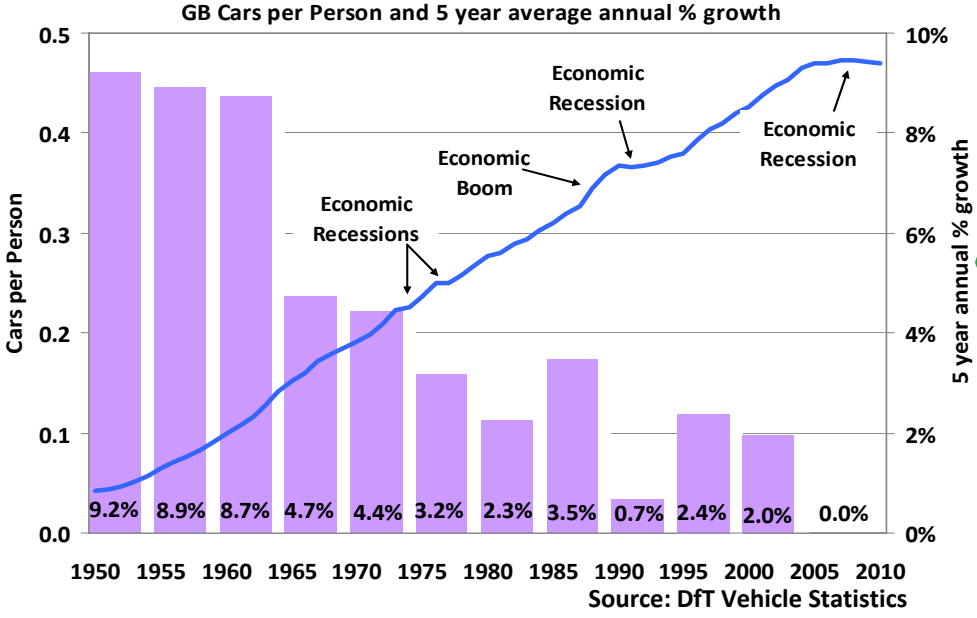
## Car Ownership – Historical Trend

- Previous slides showed that Car Ownership will be based on population, income and prices (upfront car prices and the running cost of cars).
- As with total car miles travelled, car ownership growth was around 10% per annum between 1950-1965.
- Since then though growth has slowed and there have been fluctuations at certain points.
- There are pronounced periods stagnation during times of economic uncertainty or recession, as there has been over the last couple of years.
- However, since this is total car ownership it will also include growth due to a rise in the population level

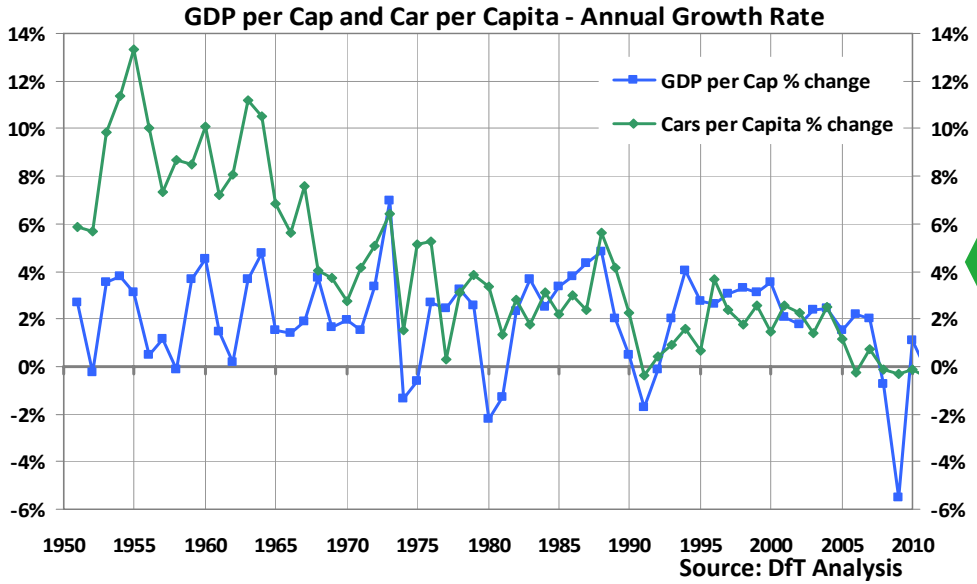



## Cars per person – Historical Trend

- The chart takes out the population growth effect from rise car ownership.
- Even without the population effect there has been a general upward trend in the number of cars per person, although the growth has slowed over time.
- Historically there have been years where the number of cars per person have fallen, such as 1991, during the economic recession.
- Over the last few years we have seen some stagnation and falls in cars per person, most likely due to the recent economic uncertainty and recessions.
- One could expect that as the long trend of saturation continues then fluctuations economic activity will look more pronounced.

# No sudden break between Income and Car Ownership, there has just been a long weakening of the relationship



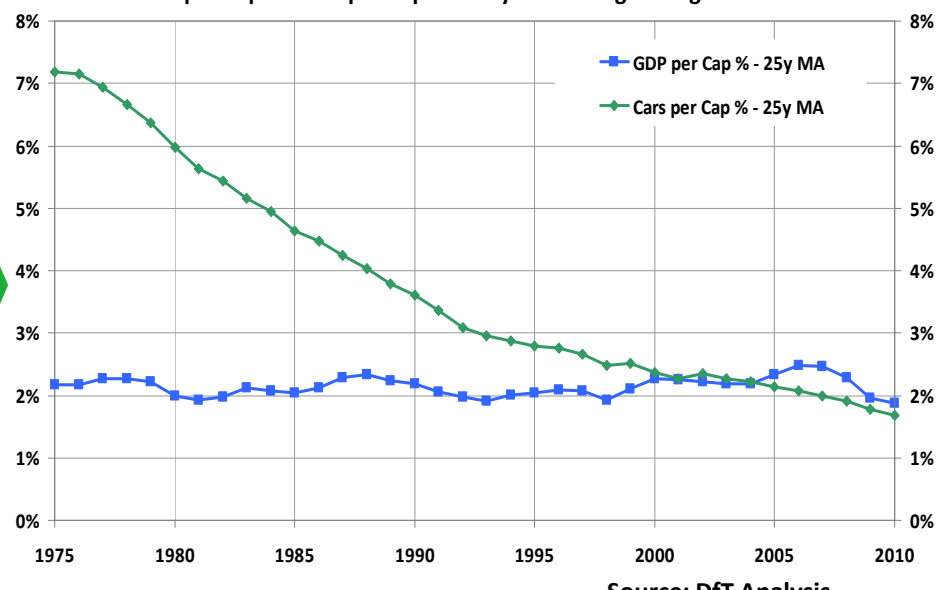

Source: DfT Analysis

## GDP and Cars per Capita Annual Growth

- GDP per capita has fluctuated over the last 60 years, with economic booms and recessions. The fluctuations have been around an average growth rate of 2%.
- Cars per capita has fluctuated with movements in GDP per Capita, indicating the link between the two.
- The growth in Cars per capita has slowed, not recently but over the last 60 years.
- The relationship between income and car ownership has not suddenly 'decoupled' but has slowed down over the last 60 years.

## GDP and Cars per Capita – 25 year moving average of annual growth rates

- The chart to the right takes a 25 year moving average of the annual growth rates of GDP per Cap and Cars per Capita.
- Here we can see far more clearly that GDP per Capita growth has been around 2% pa and that there has been a long slow decline in Car per capita growth rates.
- It is expected that we should see a slow saturation effect on Cars per capita over the long terms once economic fluctuations are taken into account.
- The average annual growth in cars per capita between 1980-2010 was around 2%, thus the recent economic recessions and high oil prices could help to explain the recent stagnation in the car market.




Source: DfT Analysis

# Population, Income and Costs can help explain historic trends in car traffic and we model recent trends very accurately

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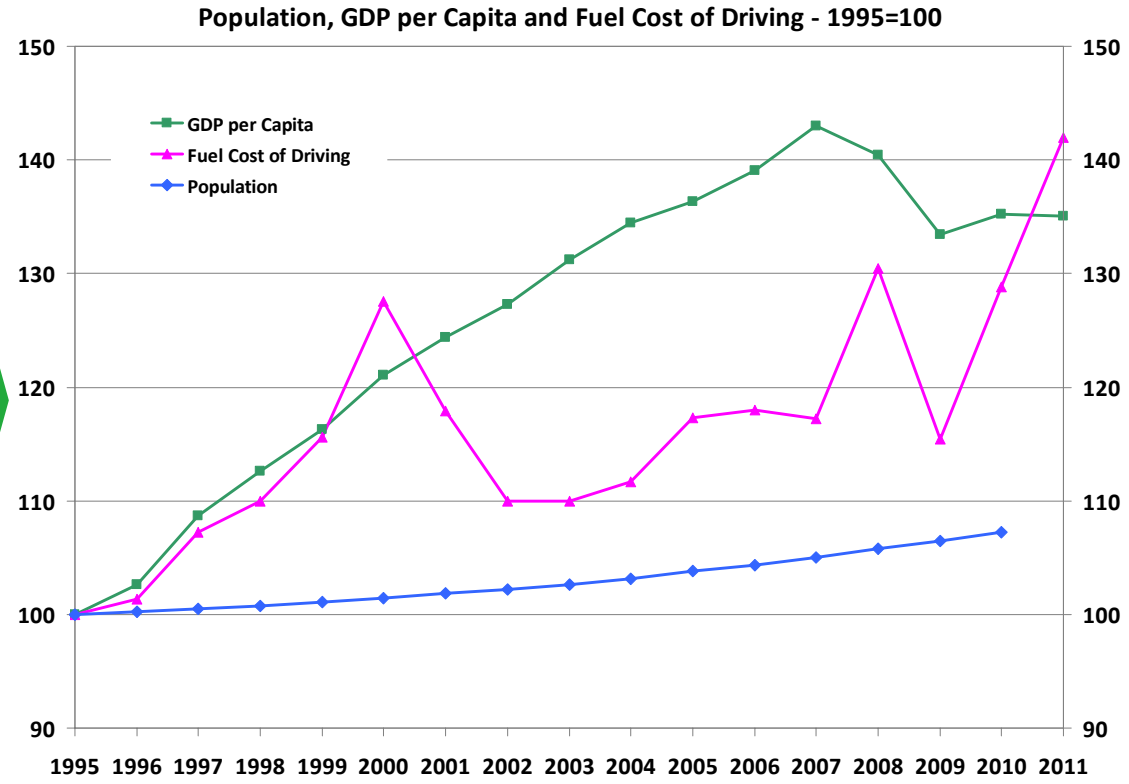
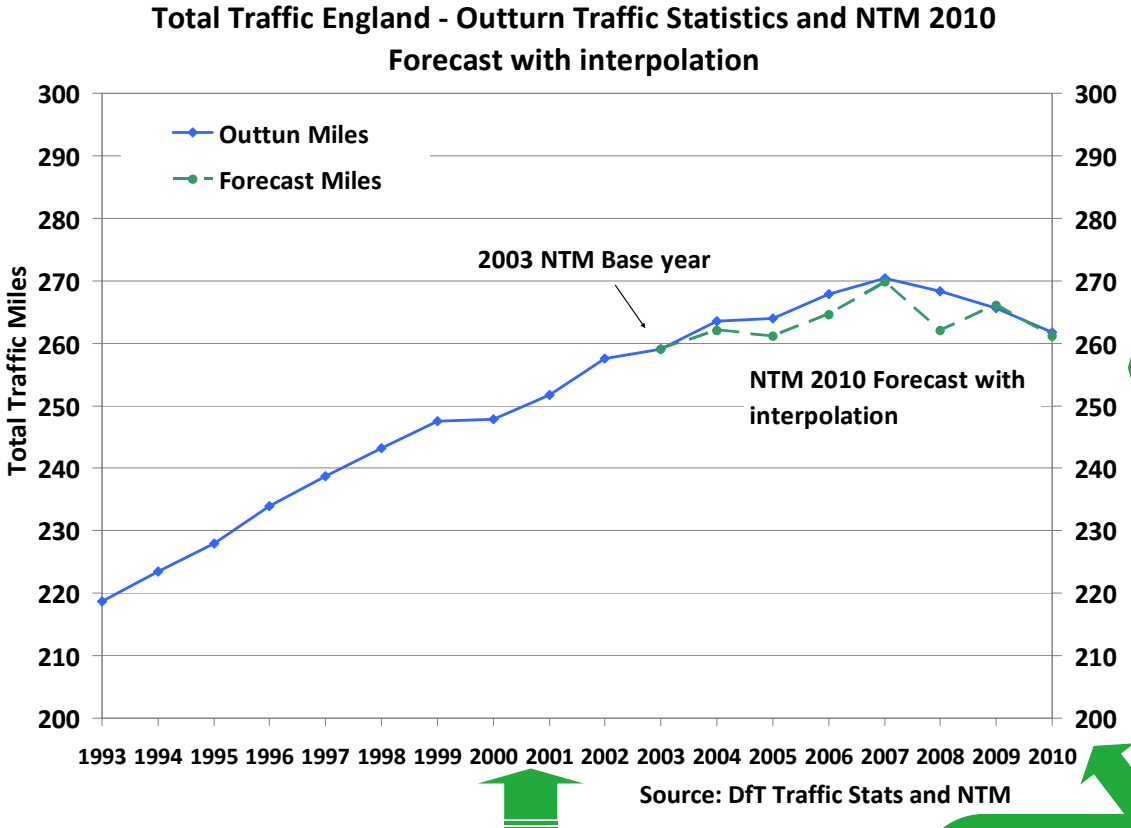
## Recent trends in Key Drivers

- **Population** – grown steadily over the last 15 years.
- **Income per head** rose from 1995 to 2007, then fell 5% to 2010.
- **Oil prices** – more than quadrupled from 1995 to 2011
- **Fuel efficiency** - gradually improved.

- ***These are conditions that could have delivered recent slow growth and then falling demand between '07-'10.***



# Testing the hypothesis: The NTM models recent trends in traffic very accurately using outturns of the Key Drivers




## Testing the Hypothesis: NTM performance

- DfT's National Transport Model (NTM) is indexed to 2003 road traffic statistics and projects from this 2003 base year.
- We can test whether its assumptions predict the 03-10 slow growth, and decline.
- We simply feed in outturn population, oil prices, fuel efficiency, income per head, etc.
- In DfT's 'Road Transport Forecasts 2011' the NTM 2010 forecast using was presented with an interpolation between 2003-2010 using the three key drivers.
- The NTM's 2010 forecast of traffic for England was within 0.2 percentage points of actual traffic statistics at the time.

## NTM modelling of the Recent Past

- The NTM successfully predicts the lack of growth between 2003 and 2010, and the pathway: slow growth 03-07, then decline 07-10
- Thus the recent slow growth and decline in traffic does not mean the key drivers have fundamentally changed, and we retain confidence in our National Transport Modelling.

## Forecast Interpolation using Key Drivers

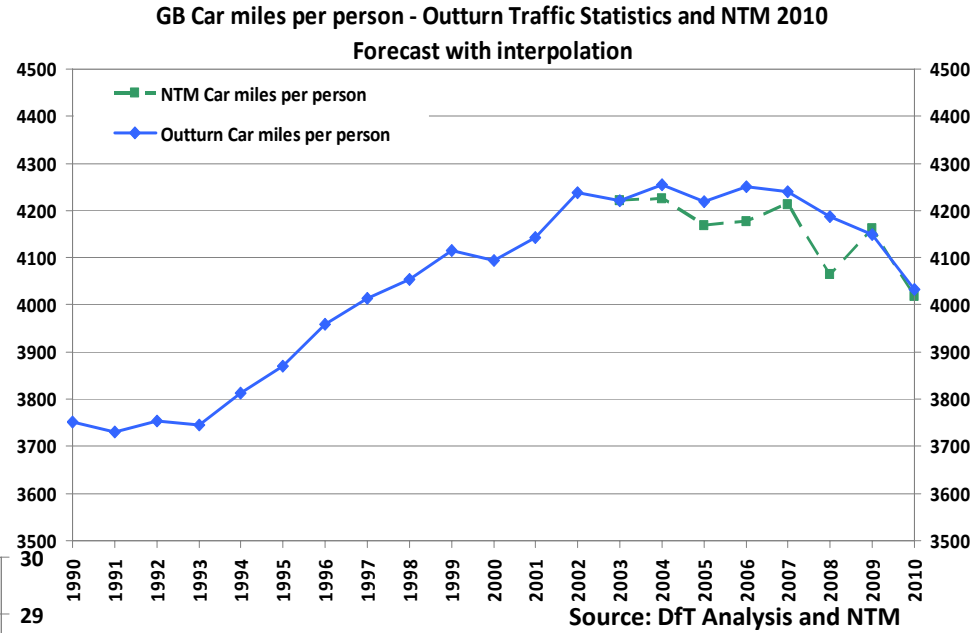
- For the interpolation we used implicit elasticities from the NTM. The elasticities used were:
  - Population = +0.8
  - GDP per Capita = +0.2
  - Fuel Cost of Driving = -0.3
- 2008 interpolation error is due to using long run elasticities during a year of significant fluctuations in the price of oil, where it almost hit $150 per barrel.

# Testing the hypothesis: The NTM also models recent trends in Car miles per person and Car Ownership accurately

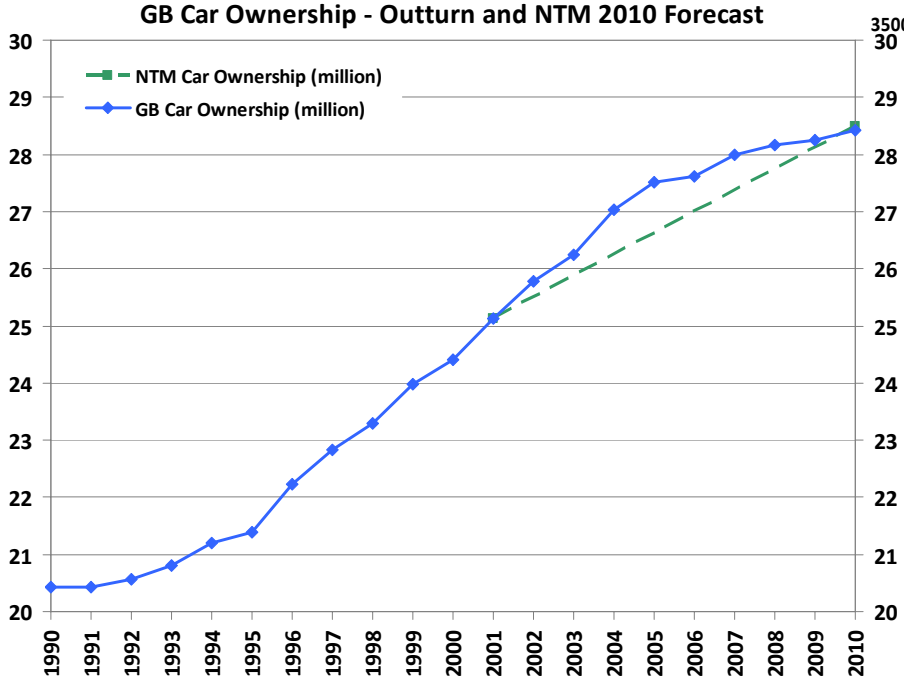
Department for Transport

**NTM performance – Car miles per person**

- Continuing with assessing the accuracy of the NTM and we can see that it explains the recent trend in Car miles per person with the key drivers.
- In 2010 the NTM slightly under-forecasted car miles per person by -0.4%.
- Using the total car traffic interpolation and estimates of population from the ONS, the key drivers can also explain the path from 2003 to 2010.




Source: DfT Analysis and NTM




Source: DfT Analysis and NTM

**National Car Ownership Model - Performance**

- The National Car Ownership model starts from a base of 2001.
- The chart here shows that our 2010 forecast is within 0.2% of outturn statistics (no interpolation has been created).
- This provides us with some confidence that the national level long term trends in car ownership are being accurately modelled, including the long run saturation within the market.

# What are the reasons behind the recent levelling off in car travel? - Conclusions

Department for Transport

**Summary**

• Personal travel demand are based on many detailed individual decisions and influences at the micro level.

• However, at the macro level demand is driven by:

- Population & Demographics,
- Incomes and the economy,
- Fuel Cost of Driving - fuel prices & fuel efficiency,
- and trends in substitutes and complements

• These drivers have caused car travel demand to grow for the last 60 years. However, we have seen that there has also been a long downward trend in the car travel demand growth rate alongside due to long term saturation in car ownership and thus car travel demand.

• From our analysis of the three key drivers (Population, GDP per Capita and Fuel costs) we can explain the trends in car traffic over the last decade, including the recent stagnation and falls. This is proven using the three key drivers through modelling over the period 2003-2010 within the National Transport Model.

• Based on the accuracy of our 2003-2010 modelling from the NTM we have confidence that we currently understand the strength of the relationship between the three key drivers and car traffic.

• It is these three key drivers (inc demographic changes) with long-term expectations in the saturation of car ownership that determine our forecasts for car travel demand

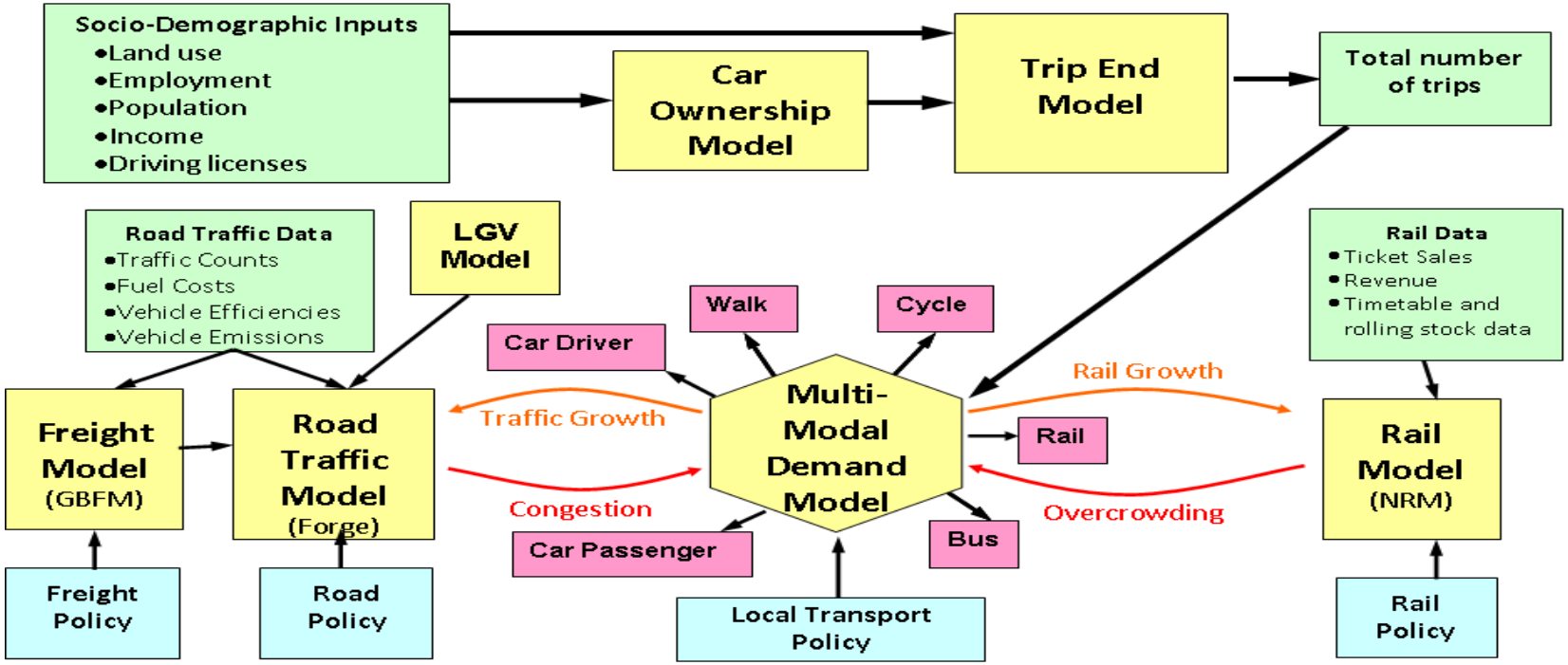
Department for Transport

## Are these recent trends in car travel likely to continue in the future?

# The National Transport Model

Department for Transport

• The National Transport Model is a highly disaggregated multi-modal model of land-based transport for Great Britain. It comprises of six modes: Car driver, Car passenger, Rail, Bus, Walk and Cycle.
• Four-stage behavioural modelling approach to forecast the demand for travel, from the bottom up:
(1) Estimates the total number of trips
(2) Allocates trips to journeys between origins and destinations
(3) Allocates journeys to modes
(4) Allocates journeys via a particular mode to routes across the transport network
• The basic structure of the model is illustrated in the figure below.




**More details on the structure of the National Transport Model:**
http://webarchive.nationalarchives.gov.uk/20110202223628/http://www.dft.gov.uk/pgr/economics/ntm/

# The Car Ownership Model and National Trip End Model

Department for Transport

## The Car Ownership Model and the National Trip End Model

- Based on projections in population (by ONS), GDP per Household (by OBR) and the price/running cost of cars the **Car Ownership Model** feeds forecasts into the **National Trip End Model**. Along with demographic/planning input assumptions that include:
  - 11 person types,
  - 13 employment types,
  - 8 household types (depending on size and car availability)
  - All over 2500 zones are collectively known as NTEM.

- NTEM calculates the number of trips starting in each of its 2500 zones (trip productions) and the number of trips finishing in each zone (trip attractions) for both the base and future year.

- Trip productions are primarily generated by the location and structure of households and trip attractions by the location and structure of employment, schools, shops and leisure facilities.

# The Demand Model and FORGE

Department for Transport

## The Demand Model

- The main **Demand Model** that first determines the distribution of the trips and then the mode by which they are made.
- The inputs to the demand model are total numbers of trip ends as calculated by the National Trip End Model and the generalised costs of travelling (that include peoples value of time based on GDP per capita and fuel cost/fares) between each origin and destination for each mode.
- For any chosen year, the Demand Model then uses these generalised costs to determine how the trip ends are joined together to form trips between origins and destination area types and the mode they are made by.
- The outputs are numbers of trips by each mode segmented by origin, destination area type, trip length, 18 trip purposes and person type. The Demand Model is calibrated to replicate behaviours as observed from the National Travel Survey.
- The Demand Model outputs trips for 6 modes, by 17 regions/area types, 13 distance bands and 8 trip purposes.

## FORGE

- A specialist highway model **FORGE** links with the Demand Model to provide a more detailed estimate of highway traffic flows, congestion and pollution. FORGE uses observed data on the level of traffic using each link of the road network in 2003 and then uses outputs from the Demand Model to forecast future levels of traffic from its 2003 base year.
- FORGE takes data from the national road traffic database which is populated from count censuses of every major road and a sample of minor road sites across Britain. For each of the road types modelled in FORGE a relationship known as a speed flow curve links the average speed on that section of the road to the level of traffic flow.
- FORGE outputs traffic, CO2 and air pollutant emissions by vehicle type, 11 regions across GB, 10 area types, 7 road types, 7 trip purposes and 20 time periods.

# Use of the NTM and Strategic Forecasts

Department for Transport

## DfT uses of strategic forecasts

- DfT has produced and published forecasts of road transport demand for several decades.
- DfT's multi-modal National Transport Model (NTM) is used to forecast road transport demand, carbon emissions, congestion, and air pollutant emissions.
- DfT uses these to:
  - Provide a strategic understanding of likely future scenarios.
  - Simulate impacts of specific national policies or programmes.

## Status of RTF '11 forecasts

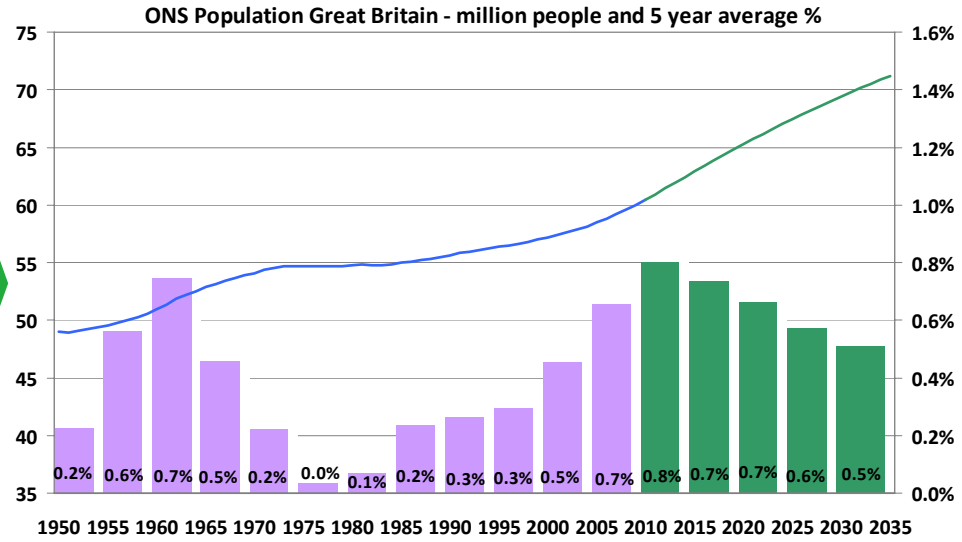
- The NTM is part of DfT's suite of forecasting and simulation models
  - DfT has separate models for national rail and aviation forecasts
  - Detailed road scheme appraisal analysis uses local transport models, of the type outlined in WebTAG
- RTF '11 are the forecasts used in Summer 2011 to update DfT's analysis of policies to meet the first three carbon budgets.
- The 'central case' forecasts include current and announced policies.
- The forecast results are not a statement of policy.

# Three key drivers explain most of our forecast – Population, GDP per capita and the Fuel Cost of Driving

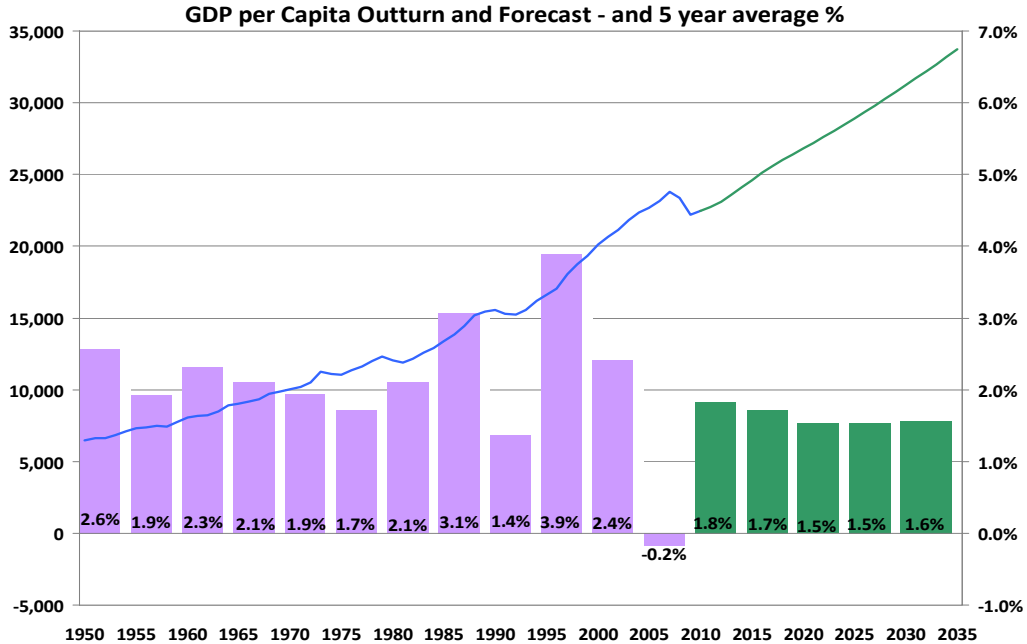
Department for Transport

## Population and Demographics – ONS Projection

- Based on the ONS projections the Road Transport Forecasts 2011 assumed that the population of Great Britain will rise by 18% over the next 25 years, over 10 million more people.
- This is based on the expectation that the growth rate in the population will eventually fall back down to around 0.5% per annum.
- Also over the next 25 years the proportion of the population that is over 65 is expected to rise from 16% to 20%.
- Both the rise in the population and change in the demographics are incorporated into our forecast modelling.




Source: ONS




Source: OBR

## GDP per Capita – OBR Projection

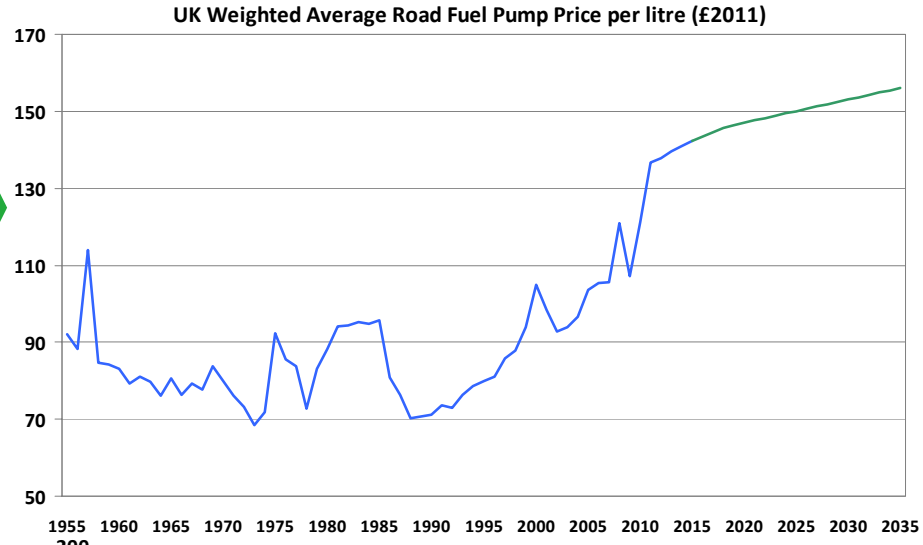
- Based on the OBR projections made at the Budget 2011 the Road Transport Forecasts 2011 assumed that the economy will recover from the recent economic downturn and that real GDP per capita will rise by 50% over the next 25 years.
- This projection in GDP per capita is based on the expectation by the OBR that economic productivity will in the long run be 2% per annum

# The pump price of road fuel is projected to rise but the fuel cost of driving is expected to fall significantly

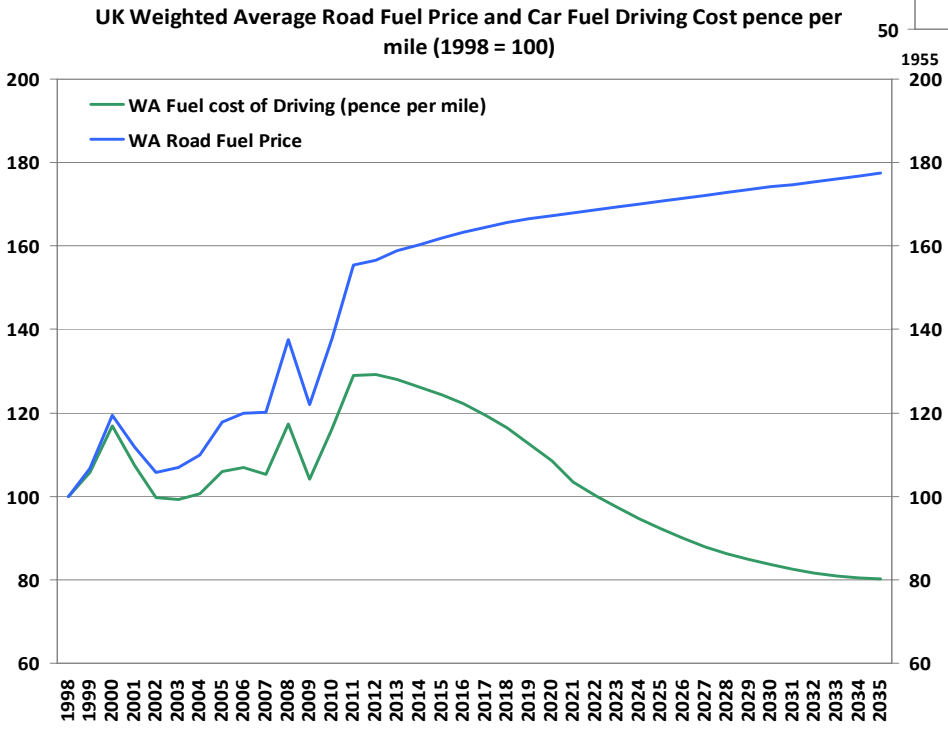
Department for Transport

## Road Fuel Pump Prices – DECC Projection

- Based on the DECC projections on the global oil price published in autumn 2011 the Road Transport Forecasts 2011 assumed that the road fuel pump price will rise by % over the next 25 years




Source: DECC/DfT Analysis




Source: DECC/DfT Analysis

## Road Fuel Cost of Driving – DECC/DfT Projection

- As previously discussed one has to take into account both the road fuel pump price and car fleet fuel efficiency.
- For the Road Transport Forecasts 2011 DfT projected that the average car fleet fuel efficiency will improve by 46% over the next 25 years.
- Overall this means that the DECC/DfT fuel cost of driving for cars will fall by 30% over the next 25 years.

# Relative importance of each factor – rules of thumb

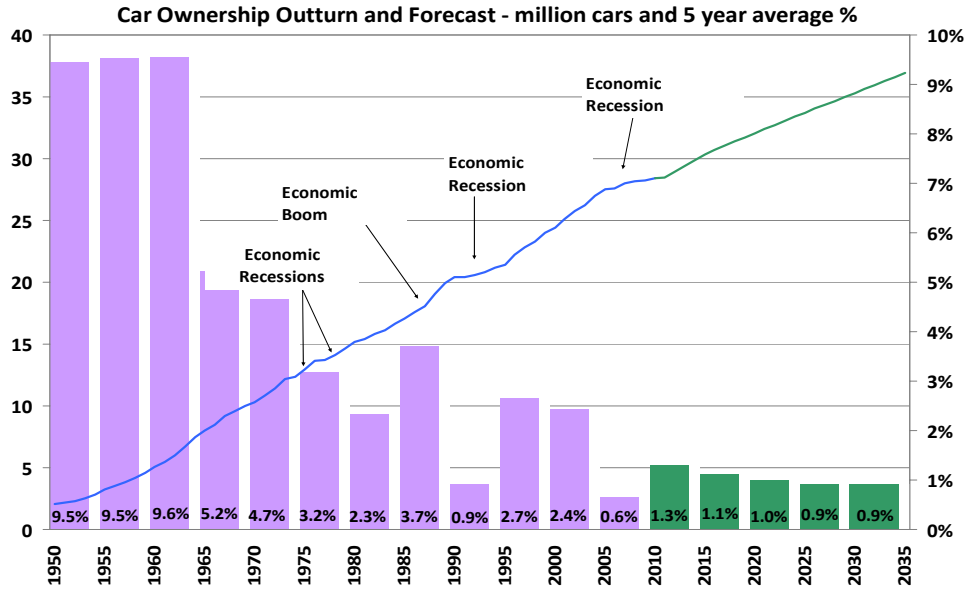
- For each 10% increase in **population**, road traffic grows by around **8%**
- For each 10% increasing **income per head**, road traffic grows by around **2%**
- For each 10% decrease in the **fuel cost of driving**, road traffic grows by **2-3%**
- For 2010-2035 our central forecasts predict:
  - Population +18% → ≈ +15% traffic growth
  - GDP per head +50% → ≈ +10% traffic growth
  - Fuel costs -30% → ≈ +6% traffic growth
- The cumulative impact of the three key drivers over the next 25 years explain the central scenario projection growth in car traffic.

# Car ownership is expected to continue on its long term path to saturation

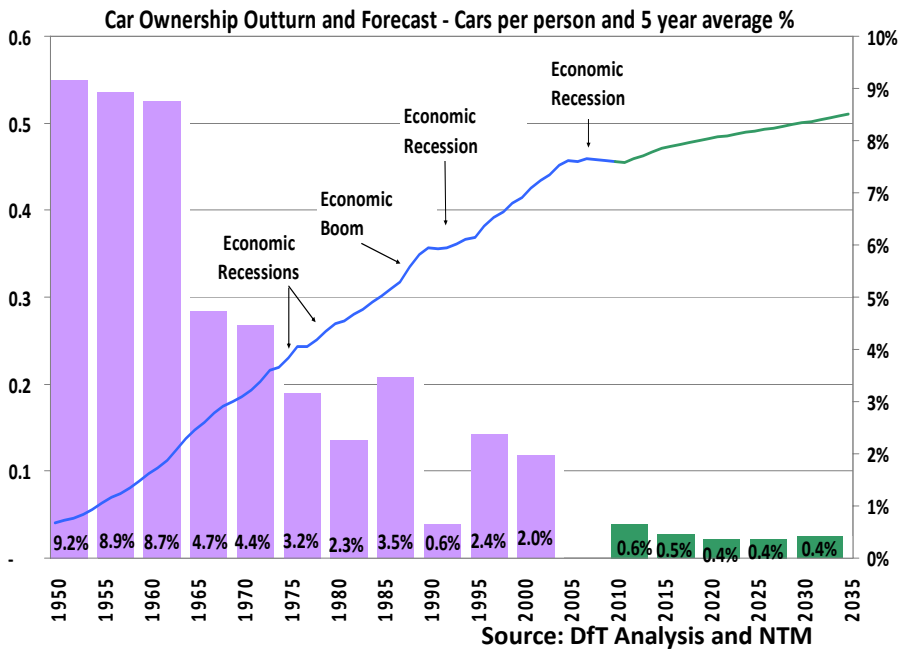
Department for Transport

## Car Ownership – RTF11 Projection

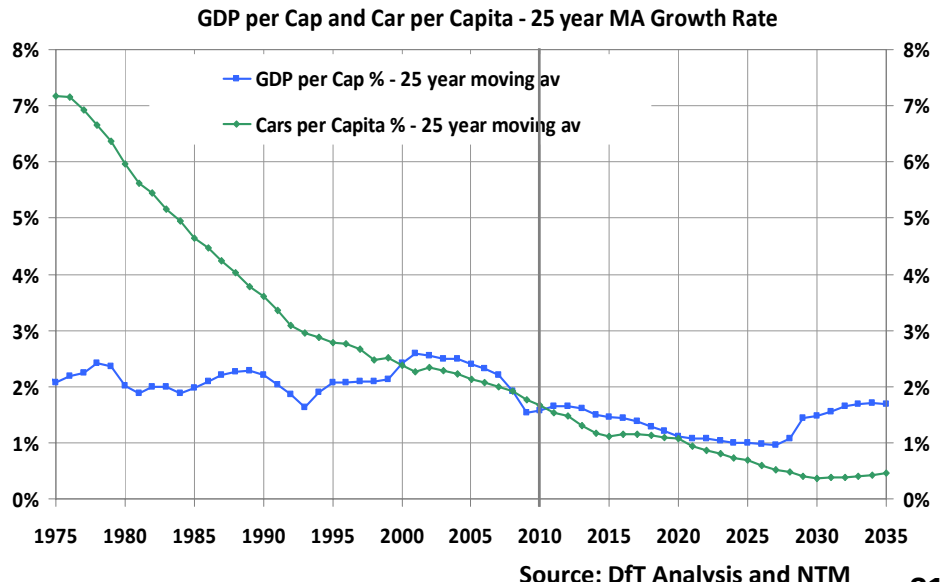
- With the continued rise in the population predicted by the ONS and recovery of the economy predicted by the OBR the National Car Ownership Model in summer 2011 predicted that total car ownership will continue to grow for the next 25 years.
- Although we will see growth the long term saturation we have seen in car ownership over the last 60 years is projected to continue for the next 25 years.
- Car ownership growth rate is expected to fall to less than 1% per annum, around the same average growth last seen in the early 1990's when there was an economic recession.
- The continued saturation will be more apparent in car ownership per capita where growth will fall to 0.4% pa.




Source: DfT Analysis and NTM




Source: DfT Analysis and NTM



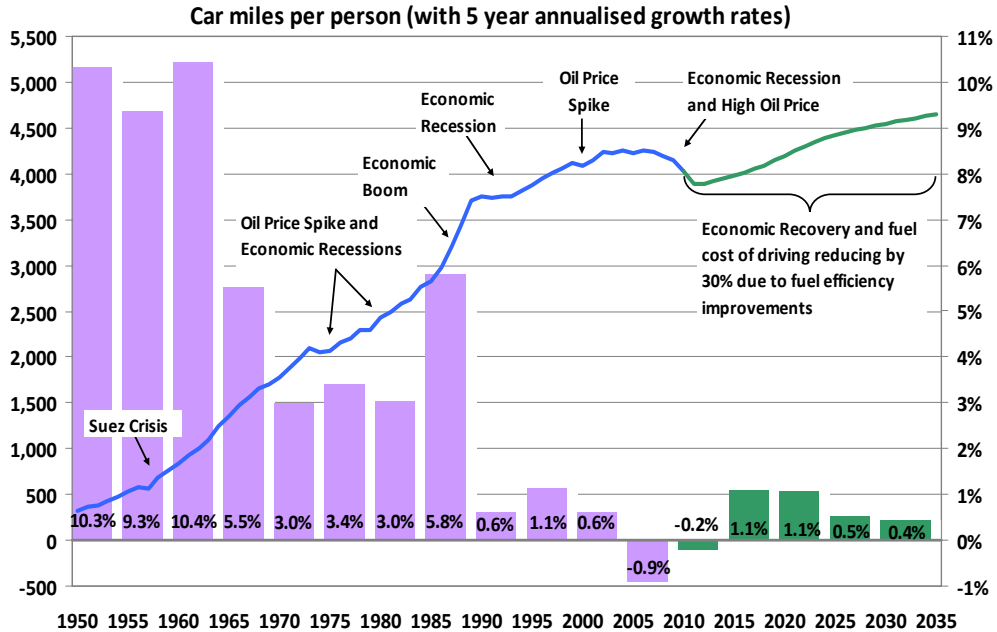

Source: DfT Analysis and NTM

# Projection of Car mileage per person based on the proven key drivers implies that we have not yet reached 'Peak Car'…

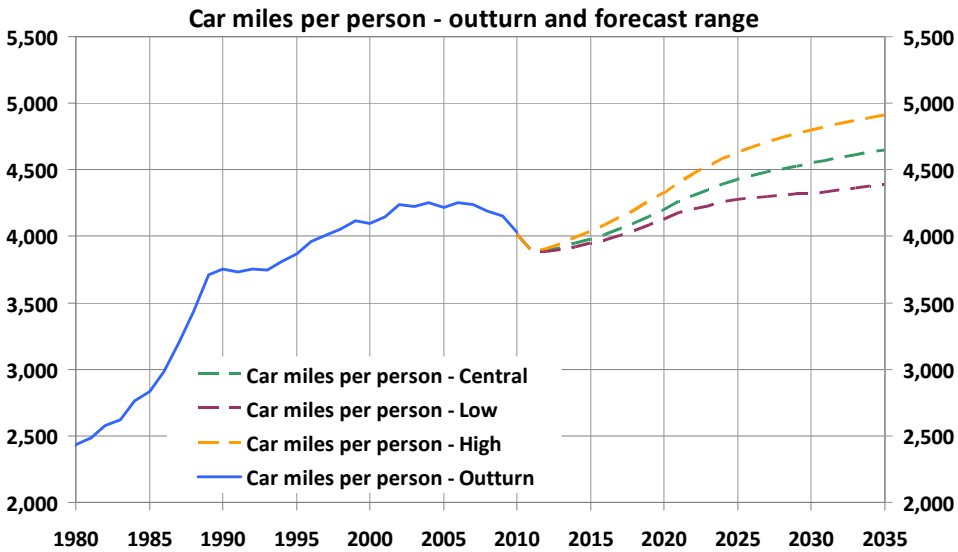
Department for Transport

## Car miles per person – RTF11 Central Projection

- Based on the projections in the key drivers and car ownership RTF11 **projects that** the number of miles travelled by car per person is expected to grow again with the recovery of the economy and reduction in the fuel cost of driving.
- However, RTF11 projects that the growth rate will be far lower than in the past, even below periods during economic recession such as the early 1990s.
- With the recent falls in car travel there has been a question on whether we have reached 'Peak Car' – where car miles travelled per person has peaked.
- The key drivers have explained the recent past and suggest that we have not reached 'Peak Car' but continue down the long term trend of individual car travel saturation.




Source: DfT Analysis and NTM




Source: DfT Analysis and NTM

## Car miles per person – RTF11 Sensitivities

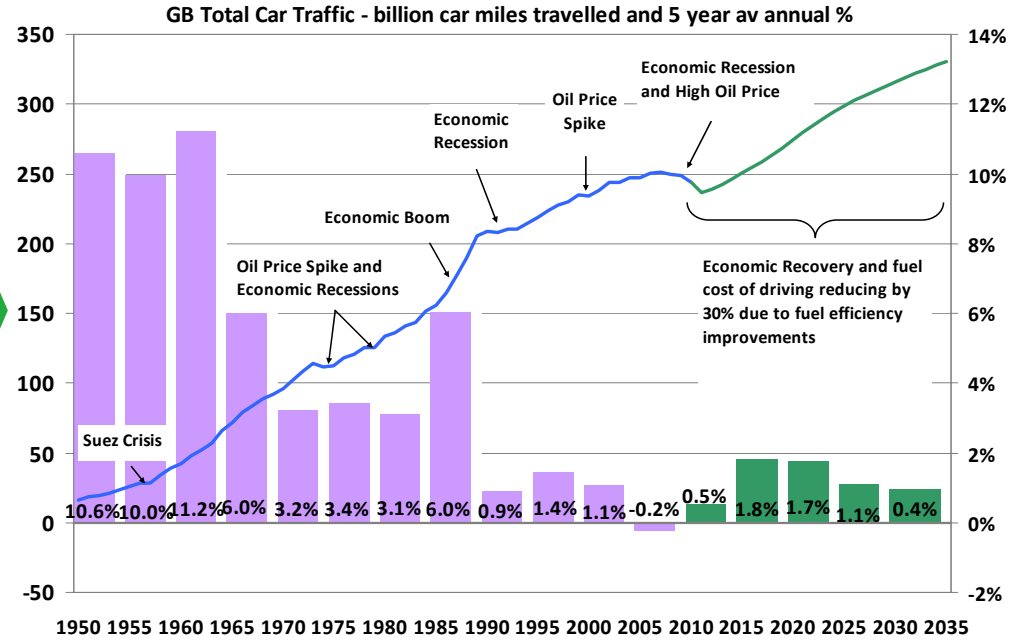
- The Road Transport Forecasts 2011 used high and low projections on long run GDP per Capita from the OBR, Oil prices from DECC and a range on future fuel efficiency improvements to create a set of high and low transport demand projections. These are presented in the chart on the left.
- These high and low projections create a range of +/-6% in 2035 around the central projection.

# Total Car Traffic will continue to grow with population, recovery of the economy and fall in fuel driving costs

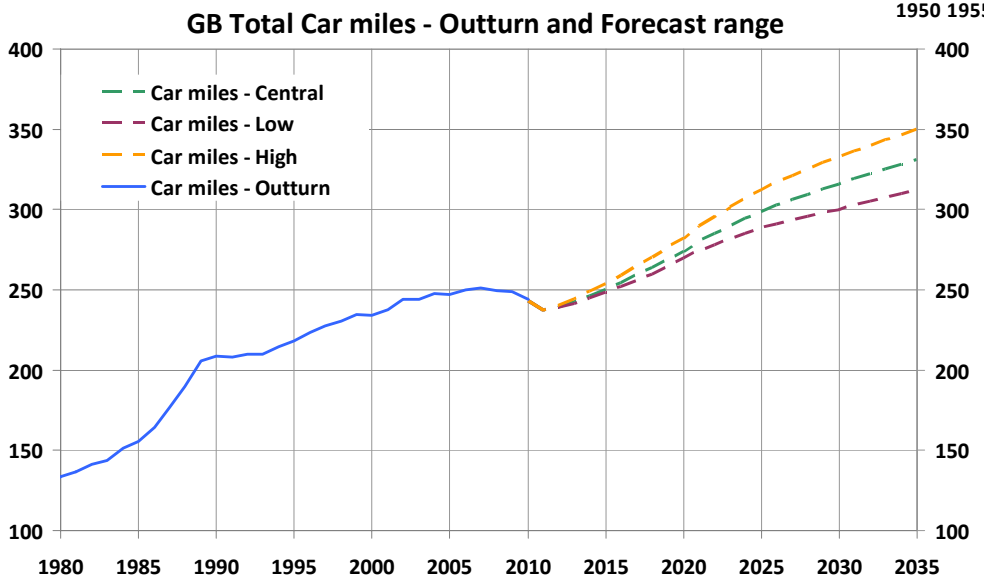
Department for Transport

## Total Car Traffic – RTF11 Central Projection

- Based on the projections in the key drivers and car ownership RTF11 **projects that** total car traffic is expected to grow again with the continued rise in the population, recovery of the economy and reduction in the fuel cost of driving.
- However, RTF11 projects that the growth rate will be far lower than in the past, even below periods during economic recession such as the early 1990s.
- The fall in growth rate in total car traffic will be due to the fall in the growth in population as projected by the ONS and following the long term saturation in car ownership and individual car travel demand.




Source: DfT Analysis and NTM




Source: DfT Analysis and NTM

## Total Car Traffic – RTF11 Sensitivities

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- These high and low projections create a range of +/-6% in 2035 around the central projection.
- In future we also plan to include a high/low population projections as part of our high/low travel demand projections.

# Conclusions - Are these recent trends in car travel likely to continue in the future?

Department for Transport

- A lot of recent trends in car travel can be explained through key drivers and these drive the forecasts for the next 25 years.
- As we have seen from the evidence and analysis provided, including the importance of the three key drivers on car travel demand, the future will depend on changes in the long term drivers, long term saturation and long term social trends. Within DfT modelling and forecasting we continuously take all into account.
- The National Travel Survey (NTS) provides a rich and detailed source of information on multi-model trip rates and the Demand Model calibrated against actual behaviours observed in the NTS such as trip length and trip purpose. Using NTS as the basis of the National Transport Model's travel demand projections results in social trends and attitudes towards travel being at the forefront of travel demand projections. Long term changes in social trends will be incorporated in future updates to the modelling and forecasts with updates to the NTM's Demand Model.
- DfT use other government departments projections to take into account the future of the long term drivers and provided high and low demand forecasts based on sensitivities in the key drivers. DfT will look to expand our sensitivity analysis and include high/low projections for other inputs such as population and changes in demographics.
- DfT's understanding of the drivers of road transport demand is kept under constant review and we will continue to refine our understanding of the recent past, and likely future trends
- DfT are always keen to engage in technical discussions, and hear stakeholders' analysis of evidence.
- DfT continue to use our forecasts to inform upcoming, key strategy and policy decisions and aspire to keep issuing annual forecasts

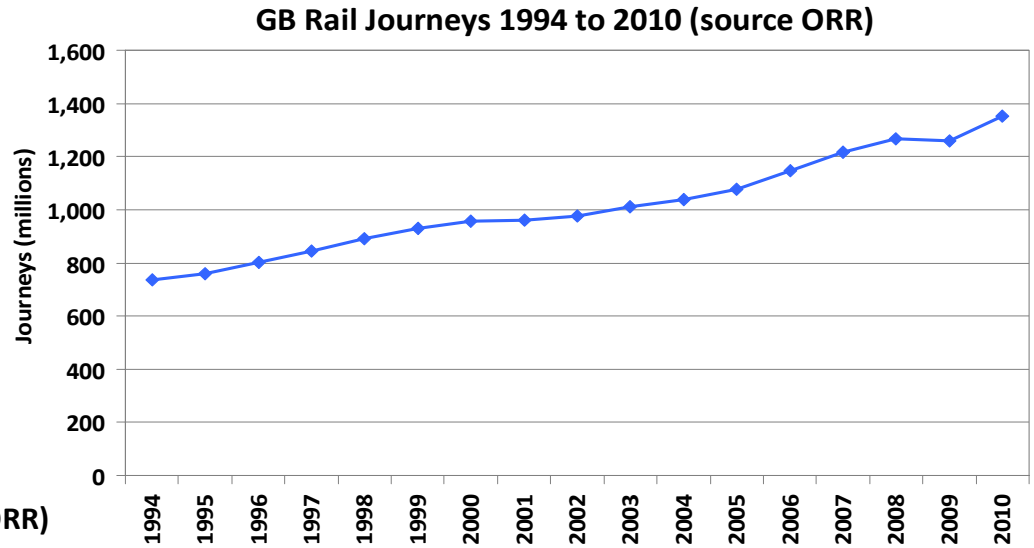
## Why are we seeing such a strong rise in UK rail travel demand?

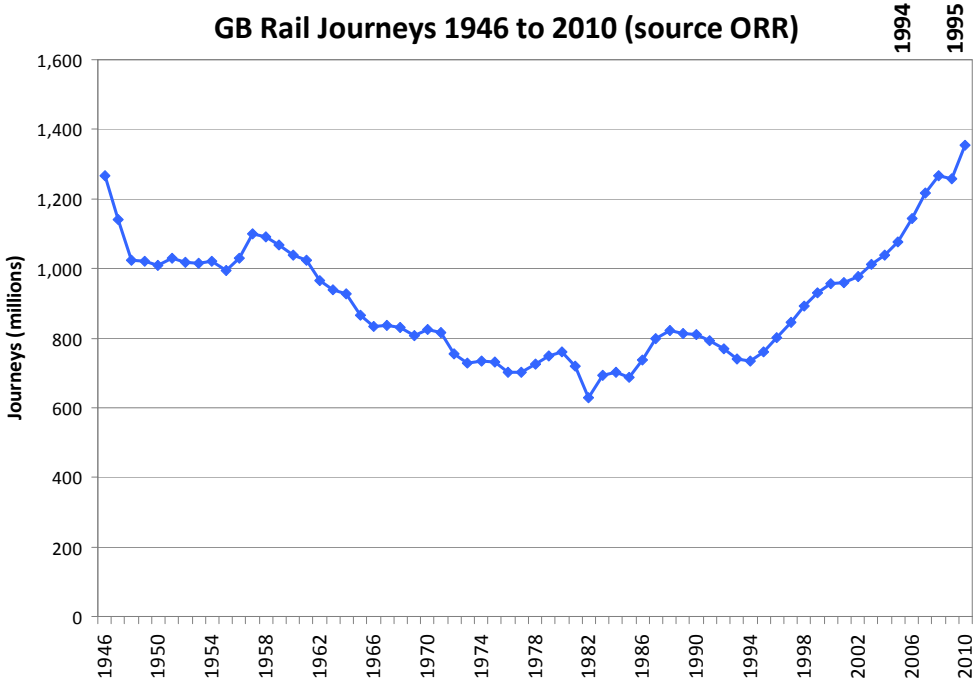
# The number of rail journeys has increased dramatically over the last 17 years

Department for Transport

## Rail Travel - Recent Trend

- In recent years Rail Demand has grown very strongly. Increasing by over 40% in the last 10 years and over 75% in the last 15 years
- Demand growth was flatter immediately after Hatfield and decreased very slightly during the recession (a fall of less than 1% from 2008 to 2009)




## Rail Travel - Historical Trend

- Over the longer period demand has had some periods of decline as well as periods of increase.
- Much of the fall during the 50s 60s and 70s can be attributed to a decline in services. By 1980 the length of Rail Track in Great Britain was 55% of the length in 1946.

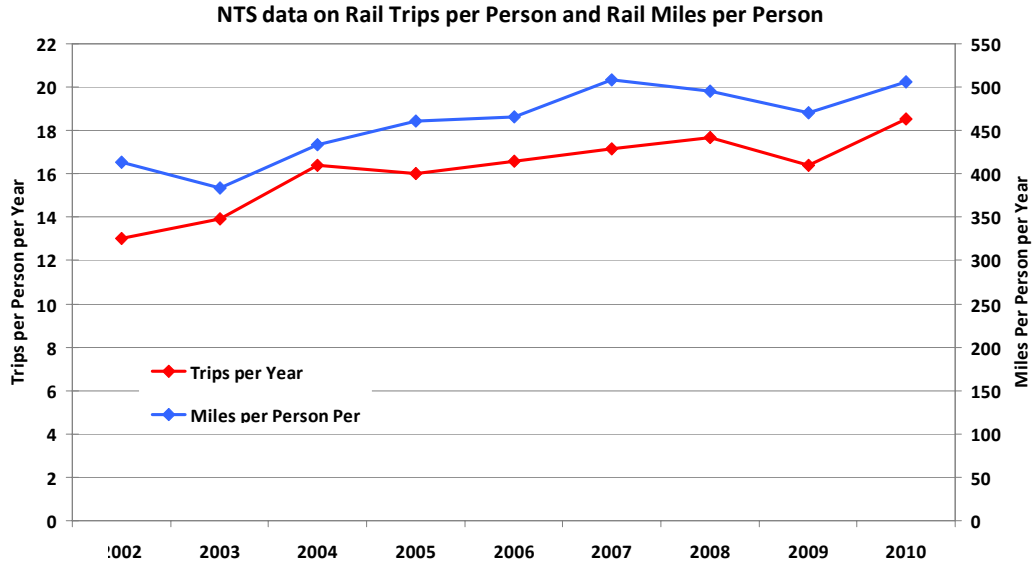
# NTS data shows rail travel rising in recent years, but this does not fully explain the fall in car travel

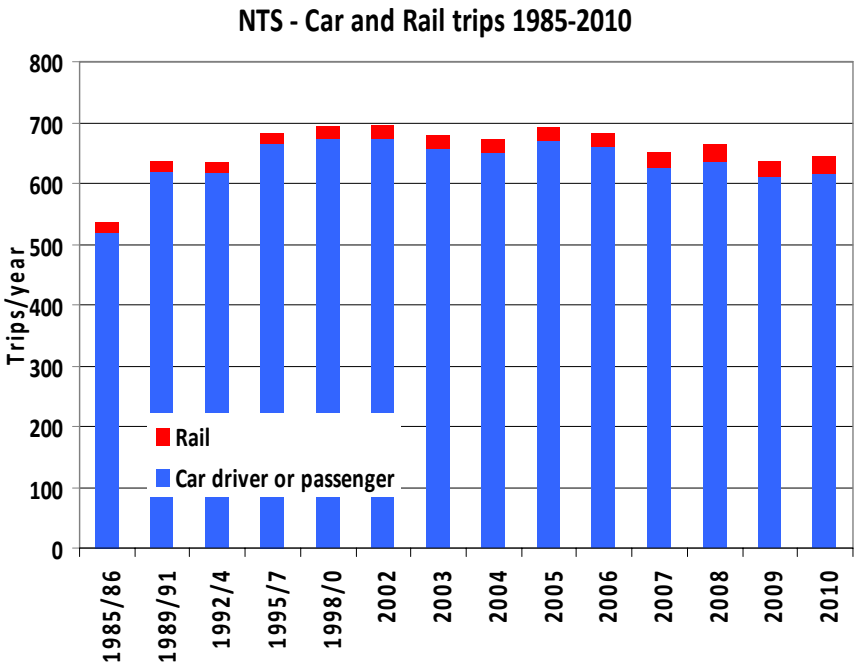
Department for Transport

## NTS and Rail Travel

•NTS data shows very large increases in the trip rate over the last 8 years. According to the NTS the average trip rate in 2010 is 45% higher than 2002 and 62% higher than the average trip rate of 1995/96/97.

• Miles per person per year have grown almost as fast as the average trip rate implying an average trip length that has been constant.




## The fall in Car travel is not fully explained by the rise in Rail

• Since 2005, car driving has fallen around 10% whilst rail patronage has continued to increase – but we cannot tell from the NTS data whether this growth been directly at the expense of car travel.

•To put this into context, since 2005 the number of driving trips has fallen by 50 trips per person per year but average rail journeys per person per year has increased by only 3 trips. Clearly, increased rail use cannot account fully for the decline in car driving journeys

# We model the impact of the drivers on Rail Demand using an elasticity based approach

**Rail Demand Modelling**

- Rail demand forecasting traditionally does not use the traditional four stage approach adopted by other modes
- This is partly because the fact that rail demand makes up a small share of transport demand so that small errors in mode shares can become large errors in rail demand.
- Another reason for not using a transport model is that there is a paucity of detailed origin destination matrices containing detailed data on rail and other modes on a comparable basis.

- Instead Rail Demand is Forecasted using an elasticity based approach based on the Passenger Demand Forecasting Handbook (PDFH).
- For more information see the relevant unit in webtag http://www.dft.gov.uk/webtag/documents/expert/pdf/unit3.15.4d.pdf and ATOC's website which describes PDFH and how it has owned and developed by the Passenger Demand Forecasting Council (PDFC) http://www.atoc.org/about-atoc/commercial-activities/passenger-demand-forecasting-council

$$\frac{\text{Future Demand}}{\text{Current Demand}} = \left(\frac{\text{Future GJT}}{\text{Current GJT}}\right)^{a} * \left(\frac{\text{Future Fare}}{\text{Current Fare}}\right)^{b} * \left(\frac{\text{Future Pop}}{\text{Current Pop}}\right)^{c} * \left(\frac{\text{Future etc}}{\text{Current etc}}\right)^{d}$$

# The Drivers in the Rail Demand Modelling elasticity based approach

Department for Transport

- All of the drivers described below are modelled using a constant elasticity approach apart from crowding which is modelled through people's stated preference responses to loading factors and car ownership which has a log linear relationship.
- Most of the elasticities have been developed using regressions of panel data. The Passenger Demand Forecasting Handbook (PDFH) contains literature reviews on a lot of regressions and bases its recommended elasticities upon these.
- The most recent version of PDFH is PDFH 5.0. DfT "in draft" guidance recommends the use of PDFH for all elasticities and parameters apart from the fares elasticity where PDFH 4.0 is recommended.

| Demographic Drivers | Rail Specific Drivers | Cross Modal Drivers |
|---|---|---|
| Population | Rail Fares | Car Ownership |
| Employment | Generalised Rail Journey Time (A combination of journey time, interchange and headway) | Road Fuel Price |
| GDP per capita | Rail Crowding | Bus Fare |
| | | Bus Time |
| | | Bus Headway |
| | | Air Cost |
| | | Air Headway |
| | | Air Passengers |

# The importance of GDP per Capita and how we model the impact of changes in the car market on rail demand

Department for Transport

**GDP per Capita**

- The Department's National Trip End Model which sets trips in the NTM does not directly use GDP as a driver of trips (although it does use GDP indirectly to inform employment and Car Ownership forecasts).
- In contrast the GDP per capita driver is a very important driver of rail demand in the elasticity based models.
- In fact where the rail **trip** GDP per capita elasticity is used in rail forecasting, it varies between 0.85 and 1.9.
- The implied car **traffic** GDP per capita elasticity that comes out of the NTM is approximately 0.2.

Our rail model picks up the impacts of car market changes on the rail market through three elasticities:

- Car Time
- Car Ownership
- Fuel Price (which is particularly important in explaining movement mode shift from car to rail during the 2000s)

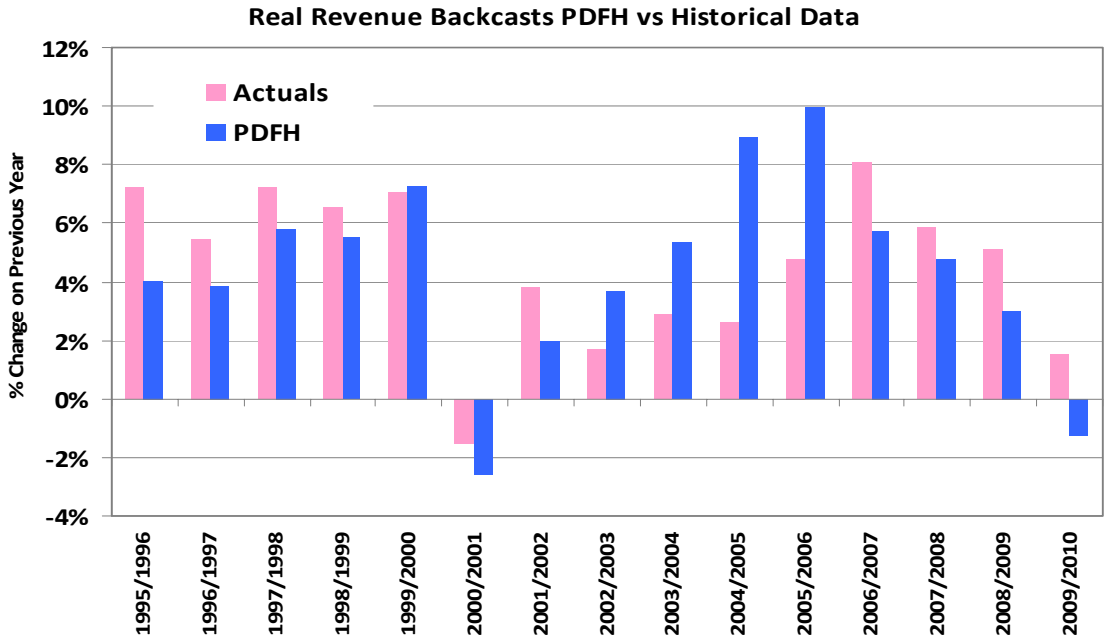
We also pick up demographic movements to areas where train travel is more prevalent with the population and employment elasticities

- The model may not pick up other cultural changes (such as people switching between car and rail modes due to changes in lifestyle and fashion) however. The Department and the Passenger Forecasting Council are looking for ways to improve the forecasting framework and account for impacts that are currently unexplained.

# How well do the drivers explain rail demand trends and why has demand held up during the recession?

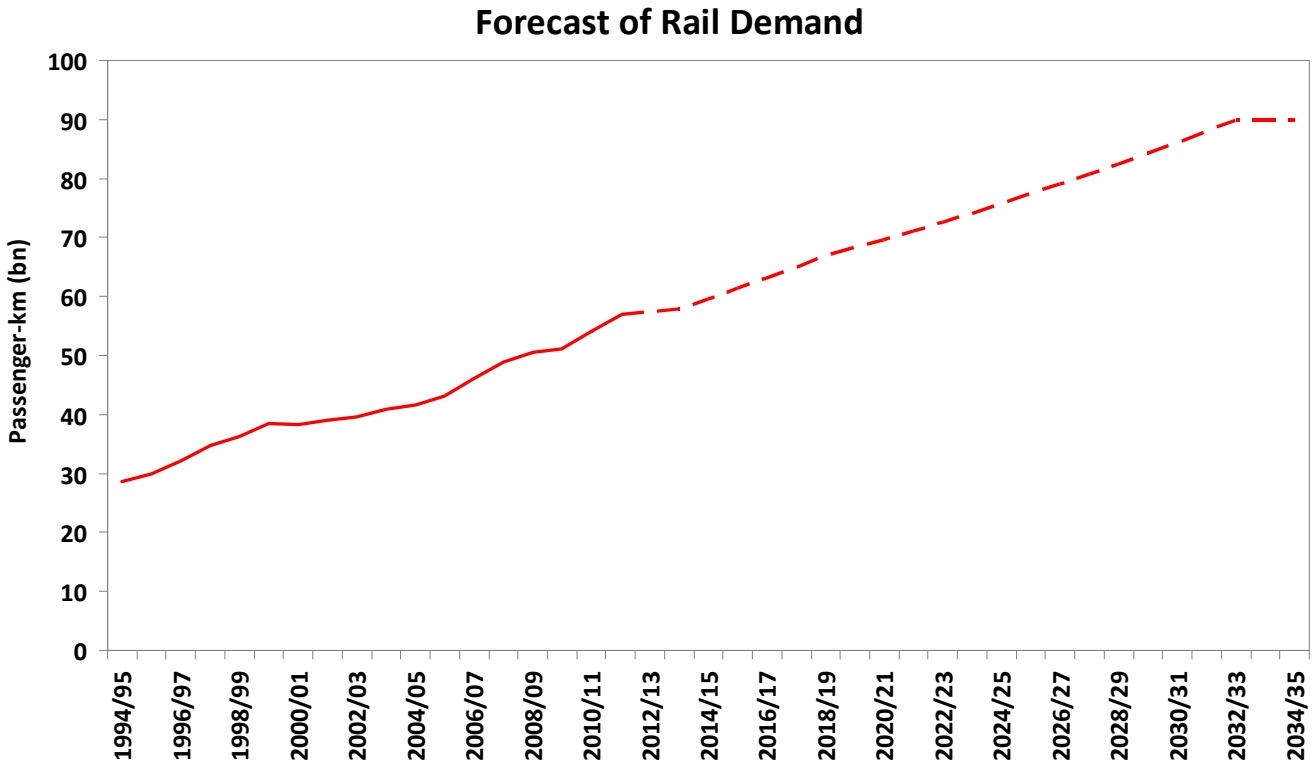
Department for Transport

- The graph below compares actual demand changes to backcast demand changes using the elasticities in the Passenger Demand Forecasting Handbook (PDFH).
- Even though in some years, the backcast change in demand does not match the actual change in demand, overall there is no evidence of systematic bias over the long term.




- For the most recent years we have under forecast demand changes.
- This does not undermine the model which is designed to reflect long term relationships not short term changes.
- A number of reasons why demand has grown strongly during the recession have been put forward:
  - This recession has led to a smaller fall in employment that previous recessions.
  - During this recession employment has become more concentrated in the centre of cities where rail commuting is more prevalent.
  - Rail firms have continued to price more innovatively during the recession, selling more advanced purchase tickets to make the most of capacity off the peak. They have also been more opportunities to buy tickets online.
  - The recession may have caused more rail users to trade down from using first class tickets to standard tickets than it has caused users to sop using the railway.

# Are these recent trends in rail travel likely to continue in the future?




- The above graph shows our forecast for passenger kilometres over the next 25 years. Demand is capped after 20 years to reflect the belief that the relationships implied by our elasticities may not continue indefinitely.
- The large forecast increase in demand is primarily driven the demographic drivers (employment, population and GDP per capita).
- In addition to the central forecast shown above, high and low sensitivities are also produced.