

Briefing on the relative impact on fuel duty and time savings with speed limits of 70mph and 80mph

There is continuing discussion about the impact of enforcing the current motorway limit, of reducing it, and even of raising it. Government claims that increasing the speed limit will benefit motorists overall, and this analysis aims to examine this claim, setting out the likely balance of effects between any increase in fuel costs, broken down to show fuel duty as well as resource cost, and time savings.

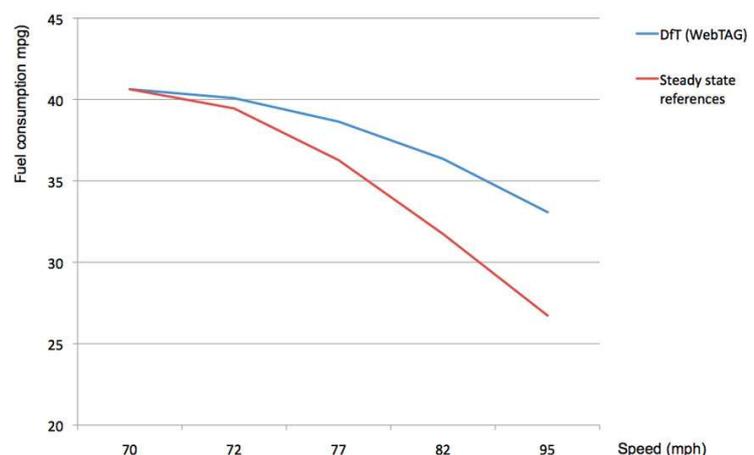
The effect of not enforcing the current 70mph speed limit

There are a range of extremely difficult issues to resolve if an absolute figure for costs and benefits is to be produced, and there have been several analyses of the different options. For the purposes of this note, the balance between costs and benefits is the key and thus the simplifying assumptions are less critical, providing they are maintained for the different speed options. The assumptions used are discussed below, and a spreadsheet has been produced to carry out the calculations, which can be used to vary these assumptions.

The conclusions of this note are of wider interest, because there is one assumption that is critical to the balance between motorists' costs and benefits (for the moment leaving aside accidents, climate change and other environmental disbenefits). This is how far fuel consumption increases with vehicle speed, particularly in the free flow conditions on motorways.

There is a major difference between the formula proposed by DfT in its WebTAG tool, which seeks to predict average fuel consumption at speeds from 5 mph upwards, and most other observers, who calculate fuel consumption at a steady speed (a 'steady state model'). The difference lies in the fact that the WebTAG model for fuel consumption is designed for a wide range of traffic analysis tasks, not for the high, steady speeds seen on the UK's motorways. Other observers, including US authorities, UK researchers and European car magazines, prefer to use steady state models in these situations, as these better reflect motorway driving.

In broad terms, the DfT WebTAG figures show far slower increases in fuel consumption as speed increases. The effect on applying each model to the change in fuel consumption from 70 mph upwards (taking the WebTAG figure at 70mph as a starting point for both curves) is shown in the chart opposite.



The reason that DfT figures for the drop-off in fuel efficiency are so low is that their formulae are based on average speeds which include patterns of acceleration and deceleration, and have to cover very different aerodynamic conditions – these are mostly irrelevant at low speeds but very important at motorway levels where air resistance is a major factor in fuel consumption.

This difference is sufficient to mean that, if the DfT figures are used, the model predicts that motorists gain more in the value of travel time saved (assuming that current time values are valid) than they pay in extra fuel when driving above 70mph. In contrast, if the steady state figure is used instead, they lose more in the cost of extra fuel than they gain in time.

In this case, the failure to enforce current speed limits, and allowing many cars to drive above 70mph, results in increased tax revenues and an overall loss to drivers.

Using DfT measurements of the current distribution of speeds above 70mph on motorways, we calculate the value to Government of not enforcing the 70mph limit is over £300 million a year in fuel duty and VAT (2010 prices). In financial terms, the time that motorists save overall is insufficient to compensate them for the extra they pay for fuel.

A summary table from these calculations is reproduced below. The calculations only consider time savings and fuel costs to motorists, and do not include costs due to accidents or any wider environmental costs.

Costs/revenues at current speeds of not enforcing the 70mph limit:

£ million 2010 prices	Steady state model for motorway driving	DfT model (WebTAG)
Govt Fuel Duty income	222.93	95.49
Time savings	424.88	424.88
Fuel resource cost	168.27	72.08
Govt VAT income	78.24	33.51
Overall cost/benefit for car users	-44.56	223.81

Webtag source is average car figures from Unit 3.5.6, Tables 9-11

The effect of a higher speed limit of 80mph

Following on from the work above, which modelled the extra tax received from speeding drivers, compared with the value of the time they saved, a new spreadsheet designed to estimate the impact of raising the speed limit to 80mph has been prepared.

For this, we have had to make assumptions about the level of speeding. It is assumed that speeds will increase, but that driving above the new limit will follow a less extreme pattern than current speeding above the 70mph limit.

The measured data for current speeding over 80mph is not as detailed as that below 80mph, and this is an area where accuracy could be improved slightly. However, a new distribution of speeds has been estimated so that the average speed rises from 70 (as it is co-incidentally today) to an average of 77, rather than the full 80mph. In the estimated distribution, there is no new very high speed category, the >90 definition is maintained and it is assumed these drivers travel at 95.

This speed distribution provides a reasonable first estimate of the actual effect on revenue of raising the limit to 80mph, while maintaining current levels of enforcement. It must be remembered that the

estimate of the current tax gain to Government from speeding over 70mph, as outlined at the beginning of this note, relies on the existing measured speeds of over 400,000 drivers and is considered very robust.

In this second case we estimate that any Government action that encouraged speeds to increase by raising the limit to 80mph would raise tax revenues further and disbenefit drivers even more.

The table below summarises these findings. Again, it only looks at time savings and fuel costs, and it does not include the cost of the increased severity or number of accidents, or the cost of the extra carbon emissions.

The difference between the two models is explained in the first part of this note, and occurs because the DfT makes an unrealistically low assumption about the way fuel consumption increases with speed on motorways.

£ million, 2010 prices	Additional costs/revenues from current speeding above 70mph limit		Additional costs/revenues from driving above 70mph, at new speed distribution, with 80mph limit		Change in costs/revenues from move to 80mph limit (difference between two steady state model figures)
	Steady state model for motorway driving	DfT model (WebTAG)	Steady state model for motorway driving	DfT model (WebTAG)	
Govt Fuel Duty income	222.93	95.49	586.95	252.25	364.02
Time savings to car users	424.88	424.88	986.77	986.77	561.89
Fuel resource cost	168.27	72.08	443.05	190.41	274.78
Govt VAT income	78.24	33.51	206.00	88.53	127.76
Overall cost/benefit for car users	-44.56	223.81	-249.23	455.59	-204.67

Source: DfT traffic and speed surveys, DfT webtag Tables 9-11, Unit 3.5.6 (converted to 2010 prices), MTRU speed fuel spreadsheet model

What is clear from the table is that the way in which the fuel consumption changes determine the balance between time savings and extra cost to motorists. In a wider cost-benefit analysis, resource costs only should be used, but accidents and other impacts (such as noise and air pollution, which are also speed related) would need to be included.

What is also omitted is any analysis of the impact of heavy vehicles, whose speed limit would not be changed. For example, on a three lane motorway, having a faster fast lane, with motorists wishing to move into it to avoid HGVs overtaking in the middle lane, creates new risks which have not yet been addressed.

The conclusions of this initial analysis suggest that an increase in speed limits would result in an overall financial disbenefit for drivers.