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# The Smeed Report at Fifty:

## will road pricing always be ten years way?

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### Introduction

Ten years ago the legacy of Reuben Smeed gave me a salutary lesson. I was a member of an advisory panel for the Road Pricing Feasibility Study (2004) set up by Secretary of State for Transport, Alastair Darling. It had been a big exercise—and a good one—using the considerable analytical fire-power then available to the Department. It was nearing the final draft. I vaguely remembered that forty years earlier I had been assigned the newly-published Smeed Report to read as an economics undergraduate. (That as well as Beeching, 1963 and Buchanan,1963—those were the days when government took analysis of transport policy seriously!) I am ashamed to say that I had not looked at Smeed since my undergraduate days. I thought I ought to check whether the draft Road Pricing Feasibility Study was missing anything.

I was amazed: there was nothing of substance in the draft 2004 document that had not been dealt with in the Smeed Report. The latter included quantitative appendices based on the definitive exposition of the theory by Alan Walters, a member of the Panel (it was a "Report of a Panel") which is summarised in his famous Econometrica paper (Walters, 1961). The social and political considerations were all there. There is a wonderfully clear and concise exposition of the economic fundamentals. Of course the data had improved by 2004 and the technology available had moved on. But the Smeed Report had it all.

Smeed's advocacy of road user charging frightened the politicians of the day into putting their heads deeply into the sand, just as did the Road Pricing Feasibility Study in 2004; then the Eddington study in 2006; and then the 2013 strategic roads policy review forty years on.

There is now a vast and international literature on road pricing, including a number of survey articles. There is no need for me to summarise it here. What follows is an account of the

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experience with attempts to introduce it in England as practical policy. For the proposes of this discussion I use "road pricing", "road user charging", "congestion charging", "pay-as-you-go" and similar terms interchangeably—though each has a special meaning in specific circumstances. I am referring to any scheme that has an element of payment depending on volume of use at a rate that depends in some way on location or time of day.

I give almost no attention to the technologies involved. I regard the technological problems as solved—a luxury that was not available to the Smeed Panel.

*The economists versus the rest?*

At the time of the Smeed Report the definitive study on traffic and urban policy was the Buchanan Report (*Traffic in Towns*, 1963, paragraph 451). It says "We were much interested" in a paper on road pricing by two members of the Smeed panel. But it makes no further mention of the subject!

Road user charging divides those with the economist's way of thinking from all others. To economists it is the obvious solution. To the others it is crazy.

It has an immaculate pedigree. Somewhere I have a typescript by Milton Friedman and Daniel J. Boorstin (now published "How to Plan and Pay for the Safe and Adequate Highways We Need" by Milton Friedman and Daniel J. Boorstin in Gabriel Roth, 1996). Written in about 1951 it is a delightful child of its time in that it advocates road user charging, to be administered by putting radioactive material into road markings and fitting vehicles with Geiger counters. I have already mentioned Alan Walters's seminal contributions, developed in the 1950s. Dupuit, a canal engineer and the inventor of cost-benefit analysis got the right answer when, in 1844, he analysed question of the correct toll for an uncongested bridge. Distinguished contributors also included William Vickrey and James M. Buchanan. Other great names had essentially the same solution in a variety of contexts: Hotelling (pricing freight railroads), Ramsey (taxation), Baumol (public utility pricing).

So road user charging has been advocated by many of the greatest economists. Does the scepticism held by most others—including many in the transport planning profession—come from a distrust of economists or a lack of understanding of the underlying principle?

The fundamental principle is the "the invisible hand" expounded by Marshall and Pigou, and completely codified in Gerard Debreu's (1959) definitive "The Theory of Value". It relies on a crucial distinction between "price" and "cost". Price is what the user pays. Cost is what it costs to supply the user.

Subtleties concern the correct definition of "cost". Generally, an aim in public policy is to account for all the costs that will be incurred by all parties if the user is provided with one extra unit. That will include noise and air pollution costs suffered by bystanders as well as costs to other users—such as additional delay and unreliability because of the incremental congestion; as well as costs to the enterprise that has to supply the extra unit. The technical term for this is the marginal social cost.

To have a price set above marginal social cost is undesirable in that the user is paying more than their decision to consume the extra unit (make the extra trip) would cost. They would be willing to pay a price for the benefit of extra consumption that would exceed the cost of supplying it. Examples of this situation include monopoly pricing, price discrimination and abuse of dominant position. There is a body of public interest regulation directed towards preventing this situation.

If, on the other hand, price is set below marginal social cost the user is not being required to cover the costs incurred by other people because of their decision to consume the extra unit.

The point where price paid and marginal social costs are in balance is one where the user is just covering all their costs. There is no net gain to be had by changing the price. This is said to be the "efficient" price.

Under certain important assumptions, a competitive market will establish this equilibrium point: this is when the price acting as the "invisible hand" guides consumers (who neither know nor care about the costs to others) to the level of use where the value to them is the same as the cost to others of supply.

The congested, under-priced road is an example of failure of these market forces: every user is imposing costs on others which are not fully reflected in any price paid.

*Unintended consequences of under-pricing*

The economics textbooks are replete with examples of the undesirable and unintended consequences of prices being set low. They include free bread (empty shelves), rent control (homelessness) and health services (waiting lists).

An instructive example concerns a large housing estate which was designed so that the waste heat from a neighbouring power station would supply enough hot water to fulfil all normal needs. Since the heat was "free" no charge was made. But this was a geographically spread development and people some distance from the power station found that it took a long time for the hot water to arrive when they turned on the hot tap. Since the hot water was not charged they quickly fell to the idea of leaving the hot tap running continuously. Soon all the hot taps were running, the waste heat output of the power station was inadequate and nobody had any hot water.

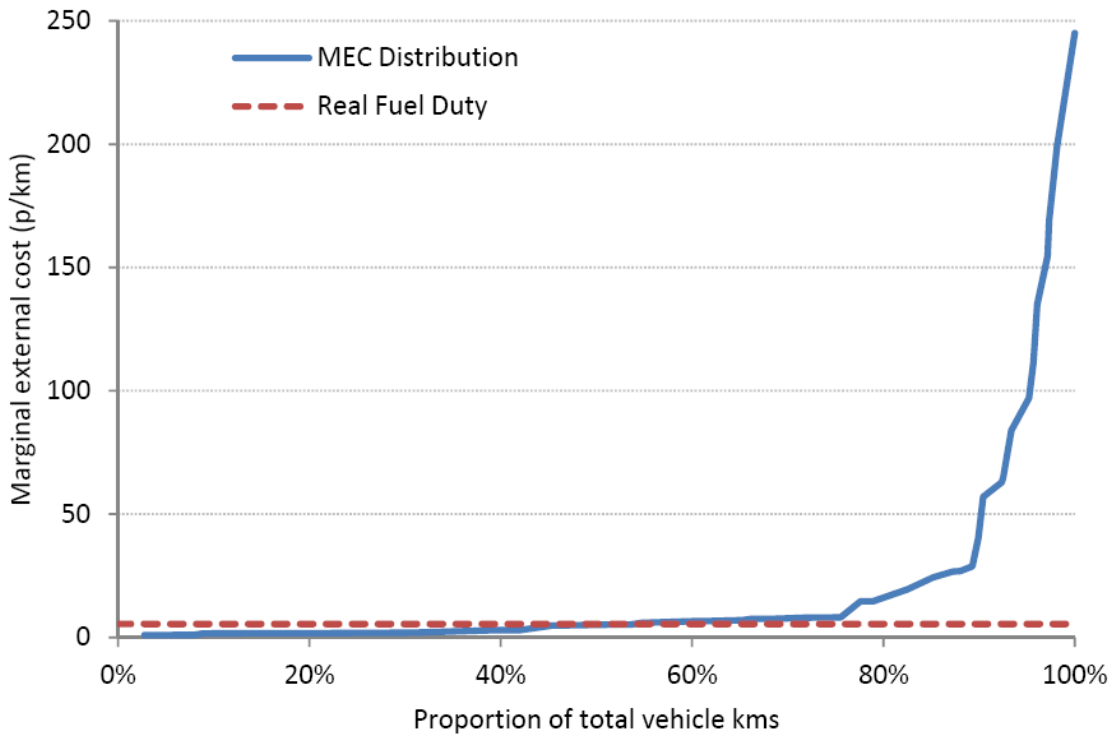
A second example concerns local telephony in some parts of the US. The exchange equipment had spare capacity so extra local calls cost nothing to serve and they were (correctly) offered for free. Then with the arrival of the Internet the average time users used their lines began to increase. As capacity came close to being fully used subscribers began to find that when they wanted to make a call or use the Internet they had to make several attempts to make a connection. So, once they had a connection they would hang on to it by keeping the line open—since it cost them nothing to do this. Soon there was no service at all for most users.

The common characteristic of all of the examples is the absence of a "correct" price to signal to the individual the true social costs of their actions. No "invisible hand" guides them towards the position of the greater good. So we gravitate to a situation of poor service quality that is not in anybody's interest. Rationing by price and—crucially—using revenues to compensate those made worse off, can make everybody better off.

So it is with a congested, underpriced road. Of course, administering charges has its own costs so to that extent it might be better to put up with inefficient charges. That is the stuff of proper cost benefit analysis. And there may well be institutional obstacles to using revenues to compensate losers. That is the stuff of analysis of equity impacts.

Figure 1 illustrates the situation for the English road network.

**Figure 1. Distribution of the marginal external costs of motoring**




Source: Institute for Fiscal Studies, RAC Foundation (2012)

Counting the price people pay for fuel as the price for using the road, the Figure illustrates that over 40 percent of vehicle miles are paying too much, but over 20 percent are paying too little. And in situations of serious congestion they are paying a great deal too little.

Note one important implication of Figure 1 is that serious congestion is by no means universal. The majority of travel is in free-flowing conditions. This is confirmed in the British Social Attitudes Survey (2013) which found that only 28 percent of Britons found that congestion on Motorways was a problem for them and 45 percent of respondents considered traffic congestion in towns to be a problem. So it is important that any solution proposed is

well-targeted and does not impose unnecessary cost and inconvenience in circumstances where there is no problem. A significant proportion of the nation's road congestion is in London.

**What's New?**

Road pricing is a well-established idea that has been considered several times at the highest level in British government and rejected each time. So why not bury it?

There are several new considerations that justify a return to the subject:

- A return to economic growth and rapidly growing population have generated plausible forecasts of worsening traffic congestion. No government is going to be able to provide sufficient road capacity to deal with that. Charging offers one of the only effective means to deal with it.
- In the wake of the 2008 financial crisis there remains a significant problem with the escalating national debt and the many competing demands on tax-funded public expenditure. Charging can be a new source of funds.
- The rapidly improving fuel consumption of vehicles is diluting traditional fuel duty revenues and the structure of Vehicle Excise Duty is encouraging very low-rated vehicles.
- The relevant electronic charging technologies are proven and becoming much cheaper.
- Using road pricing as a means to manage traffic congestion has benefits for both greenhouse emissions and air quality, and possibly road casualties.

*Forecasts of road congestion*

Long-term forecasting is always difficult and controversial, but the road traffic forecasts shown in Table 1are plausible, as are the ranges under different assumptions. The ranges are largely driven by alternative views of demographic change, population growth and economic growth.

**Table 1: Traffic and measures of delay on the Strategic Road Network (SRN) – England**

| | | 2010-2040 change | | | % of traffic in very congested conditions |
|---|---|---|---|---|---|
| | **Road Type** | **Total Traffic %** | **Congestion (Lost Sec's/Miles) %** | **Vehicle Speed %** | |
| **Low Pop & GDP per Cap, High Oil** | SRN | 24 | 36 | -2 | 8 |
| | Non-SRN | 23 | 25 | -4 | 11 |
| | All | 23 | 26 | -4 | 10 |
| **Low Pop and GDP per Cap** | SRN | 28 | 47 | -3 | 9 |
| | Non-SRN | 26 | 31 | -5 | 11 |
| | All | 27 | 32 | -5 | 11 |
| **Low Pop** | SRN | 37 | 79 | -6 | 12 |
| | Non-SRN | 33 | 42 | -7 | 13 |
| | All | 34 | 45 | -6 | 13 |
| **Central** | SRN | 46 | 114 | -8 | 15 |
| | Non-SRN | 41 | 56 | -9 | 14 |
| | All | 43 | 61 | -9 | 15 |
| **High Pop** | SRN | 58 | 179 | -13 | 21 |
| | Non-SRN | 54 | 78 | -12 | 17 |
| | All | 55 | 87 | -12 | 18 |
| **High PoP & GDP per Cap** | SRN | 67 | 245 | -17 | 27 |
| | Non-SRN | 61 | 93 | -14 | 19 |
| | All | 63 | 107 | -14 | 21 |
| **High PoP & GDP per Cap, Low Oil** | SRN | 72 | 278 | -19 | 30 |
| | Non-SRN | 64 | 101 | -15 | 19 |
| | All | 67 | 117 | -15 | 23 |

Source: Department for Transport (2013a)

The implications for the level of service on the roads are not attractive. *Action for Roads*, the 2013 White Paper (Department for Transport 2013b: Para 1.25) offers the following assessment:

> "Without investment, conditions on the most important routes are expected to worsen by 2040. By then, around 15% of the entire strategic road network may experience regular peak-time congestion and often suffer poor conditions at other times of the day.
>
> • Major national arteries will start to jam. For example, the M1 in Northamptonshire will start to resemble current conditions on the busiest parts of the M25. Travel from one region to another will become slower and more congested, hampering business.

- Workers will find their job opportunities constrained by travel times. People travelling between towns and cities in areas like the North West will face significant delays, cutting the number of places where they can easily work.
- Congestion will work against current efforts to help the economy grow. Enterprise Zones, potential housing sites and areas of high growth will be held back by bottleneck conditions.
- British businesses will find it harder to access export markets as stress increases on roads to ports and airports.
- Safety and the environment will also suffer, as congested traffic is more polluting and more at risk of accidents."

As we note below, the Coalition Government has responded to this problem by planning to increase the rate of investment in strategic road network capacity. But nobody pretends that sufficient new capacity will be provided to deal with the traffic growth in full. In any case the strategic road network is only about 2 percent by length (one third by traffic volume) and the rest is the responsibility of local authorities where funding for maintenance and enhancement is very short.

*The shortage of capital and the national debt*

The cost of servicing the national debt in 2007 was £25 billion; by 2011, it had risen to £48 billion. One estimate is that by 2017, even if government has succeeded in eliminating the annual budget deficit, it will have risen to £70 billion a year. The increase in the annual cost of servicing the national debt between 2007 and 2017 (in addition to any repayment, and without a significant increase in interest rates) will be £45 billion a year. This is twice all government spending on transport, more than the defence budget and half the education budget. In December 2013, the Office of National Statistics reclassified Network Rail's debt to bring it onto the public balance sheet. Over the next five-year review period, this will increase from £30 billion to £40 billion. In addition, there will be HS2 and the other transport commitments set out in Table 2 (below).

This is only a small part of a broader infrastructure funding problem. Helm, Wardlaw and Caldecott (Policy Exchange, 2009) identified a minimum need for £434 billion by 2020 in addition to investment in public infrastructure like schools, health facilities and housing. The Government's National Infrastructure Plan (HM Treasury, 2010) spoke of £200 billion over 5 years.

The combination of historic underinvestment in maintaining infrastructure and growing demands because of growing wealth and increasing population have created an investment funding gap that can only be filled by increased charges to users or taxpayer funding. Politicians are reluctant to be seen to sanction price increases and the Exchequer is under immense pressure to reduce public expenditure.

As shown in Table 2, the Department for Transport as a whole did relatively well in the *Spending Round 2013* (Table 1.A, HM Treasury, 2013), especially on the capital side. This is partly to accommodate the new spend on HS2 and the increases on conventional rail.

**Table 2: Government long-term spending plans**

Table 1.A: Government long-term spending plans

| £m | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | Total |
|---|---|---|---|---|---|---|---|
| Transport | | | | | | | |
| High Speed 2[1] | 832 | 1,729 | 1,693 | 3,300 | 4,000 | 4,498 | **16,052** |
| Highways Agency | 1,497 | 1,907 | 2,316 | 2,614 | 3,047 | 3,764 | **15,145** |
| Network Rail[2] | 3,548 | 3,681 | 3,770 | 3,789 | *3,824* | *3,859* | **22,471** |
| London Transport Investment | 925 | 941 | 957 | 973 | 990 | 1,007 | **5,793** |
| Local Authority Major Projects[3] | 819 | 819 | 819 | 819 | 819 | 819 | **4,914** |
| Local Authority maintenance | 976 | 976 | 976 | 976 | 976 | 976 | **5,856** |
| Integrated Transport Block[4] | 458 | 458 | 458 | 458 | 458 | 458 | **2,748** |

Source: HM Treasury (2013)

Between 2015/16 and 2020/21, the annual capital investment budget for the HA is to increase by a factor of 2.5, and by the end of this period it nearly reaches the level of spend for Network Rail (though they are both topped by HS2). The £15 billion over six years represents an annual average spend of £2.5 billion each year. Echoing the 1989 fanfare with *Roads for Prosperity* (DoT, 1989), the 2013 *Action for Roads* (Department for Transport, 2013b) talks of "the largest investment in roads for half a century".

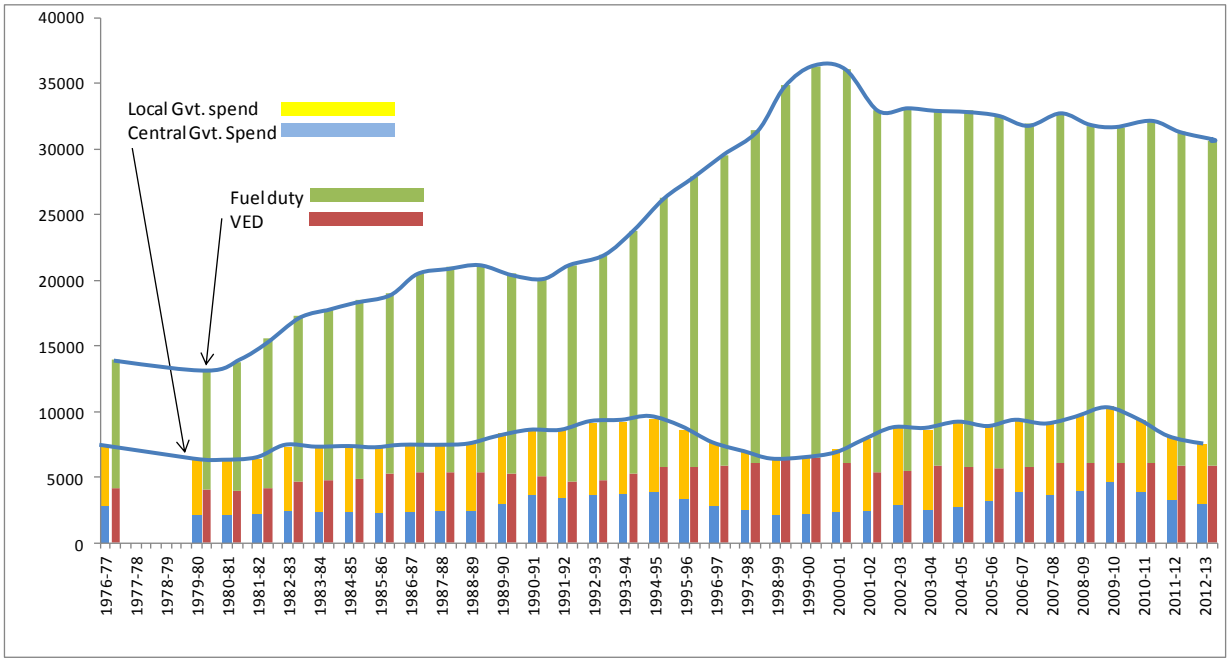
As we note below proposals for a simple form of supplementary access charging for the motorways and some major, all-purpose roads in order to help fund this have been considered but rejected. It follows that any increased expenditure on roads must come entirely from existing local or national taxation. If the aspirations in the White Paper are delivered, this will be a good outcome for the motorist – more of motoring taxes being spent on roads.

However, the competition for desperately scarce public capital will remain fierce. Against this background, delivery of the greatly increased capital programme for roads entirely from public expenditure will be hard work. This will be the reality for all the calls on public capital.

As I will argue, road pricing could be configured to provide a new source of funding that would protect the roads investment programme from these realities of the public expenditure situation. But any such proposition must be seen against the history shown in Figure 2. Since 1976 at least, the total of central and local spending on roads has always fallen far short of the contribution to the Exchequer from VED and fuel duty. The difference increased rapidly in the mid to late 1990s and has increased again under the Coalition Government. The reductions in tax revenues (at constant prices) because of the freeze in duty rates and the greening of the vehicle fleet have been outweighed by the cuts in public expenditure. The difference goes to fund general public expenditure.

The general public is acutely aware of this gap and many argue that this is already "unfair" and that any government should spend more of the roads tax revenues on roads before seeking to raise even more money from distance based charges.

**Figure 2. Central and local Government spending on roads and tax revenues Great Britain, £ million, 2012-13 prices**

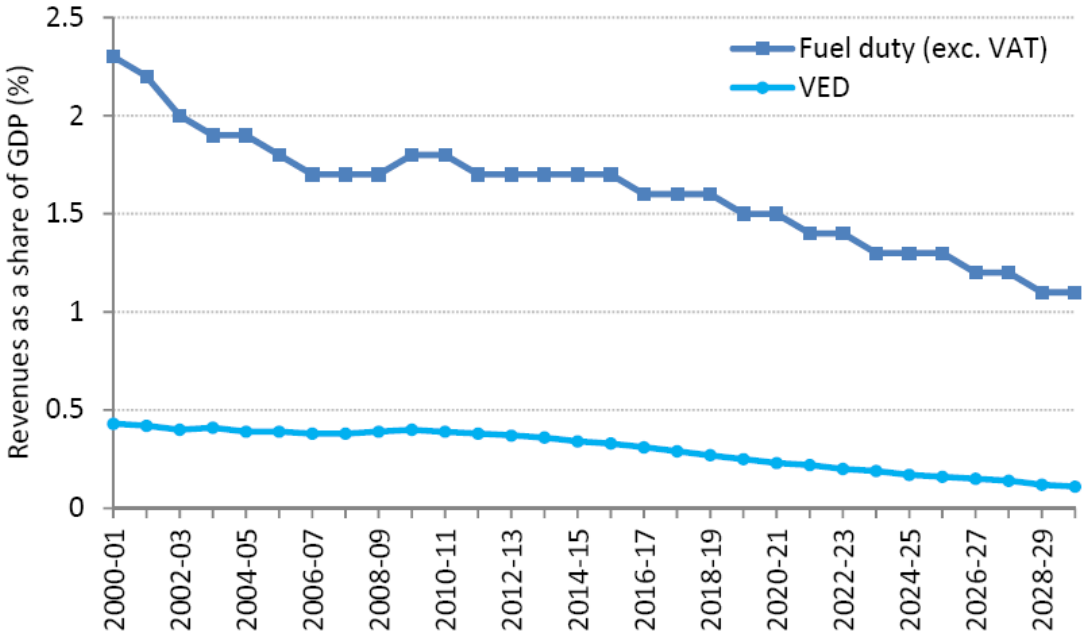



Source: Author's calculations from a number of official publications. (Note that this chart excludes several other taxes such as specific purchase tax on cars between 1973 and 1990, insurance premium tax and, importantly, Value Added Tax both on the fuel itself and on the fuel duty.)

*Decarbonising and tax yields*

Receipts from fuel duty and Vehicle Excise Duty (VED) are one of the biggest sources of funds for the Treasury, contributing about £38 billion in 2010, some 7% of all the Exchequer's income. The government uses more than one way of classifying taxes but motoring taxes account for 85% of all those classified as 'green taxes'.

**Figure 3 OBR Long-term motoring tax revenue projections, June 2011**




*Source*: OBR Fiscal Sustainability Report, June 2011.

Despite a projected growth in traffic the Institute for Fiscal Studies (2012) notes that revenue from motoring taxation is set to drop by £13 billion a year by 2029 (to £25 billion, from £38 billion in 2010). This is simply due to the improvement in the fuel efficiency of vehicles, as existing technologies are refined and new ones are adopted in response to the government's climate change targets for greenhouse gas reduction.

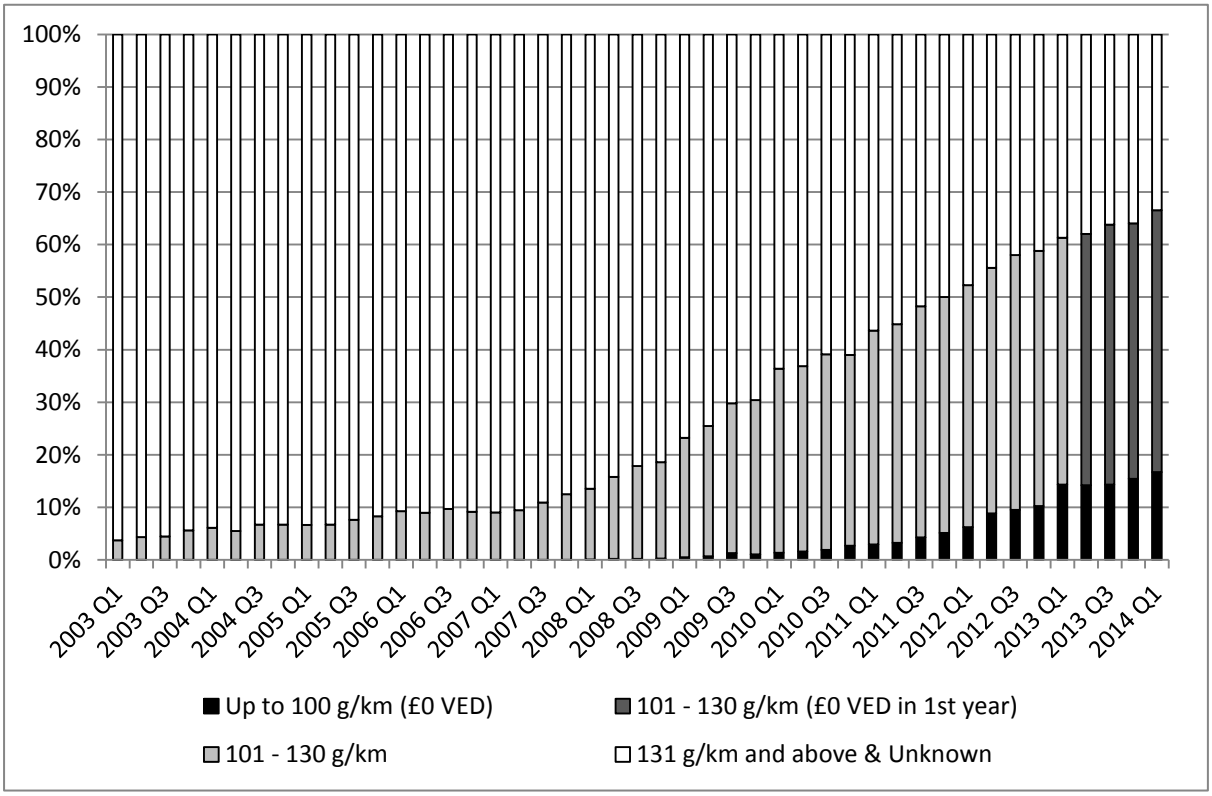
Figure 4 illustates the extraordinary speed with which the vehicle fleet has reduced its official carbon emissions and has been able to take advantage of the lower rates of VED. This has little to do with electric vehicles—their numbers remain miniscule.

The Institute for Fiscal Studies (2012) estimate that to preserve the current level of fuel duty revenue, the duty rate per litre would have to be increased by over 50% above the present 58p/litre (plus VAT, as at September 2014). It is unlikely that this would be politically acceptable. In the longer term, government will have to redesign the system of motoring taxation to be fairer and more transparent across the spectrum of users of different technologies, and to raise the necessary revenue for the Exchequer.

The Institute for Fiscal Studies notes that it is sensible to include within conventional fuel duty a charge that reflects the carbon price of burning a litre of fuel: if carbon is the problem then tax (price) it directly. This suggests a contribution to the duty rate of less than 20p/litre at current official carbon prices. But note that other sectors burning hydrocarbons and producing carbon dioxide pay lower rates of duty than road users: agriculture, railways and bus companies. Most notably, domestic householders pay no duty on gas or oil for heating,

and a reduced rate of VAT. 13% of all greenhouse gas emissions come from this source, as against 19% from roads.

**Figure 4 Composition of vehicle fleet by VED Carbon Dioxide emission bands.**




The advent of the pure electric car charged from the domestic electricity supply creates a further problem. Drivers will pay the carbon charge implicit in electricity due to the generating companies having to pay for carbon credits. But the price of credits is currently much lower than that used by the UK government to make policy decisions. From the perspective of the purchaser, at current showroom prices after government grants, electric vehicles can only compete with conventional vehicles because they are excused duty on their fuel equivalent to that imposed on petrol and diesel. It is uncertain how long government will be able to preserve this inconsistency. The reason for it is, of course, to create an incentive to encourage electric vehicles into the market, when they would otherwise be uncompetitive.

On top of the component for carbon one can reasonably add fuel duty elements corresponding to external costs such as air pollution. But then there is a problem: by far the most costly damage inflicted by road users is traffic congestion. This is not directly related to the amount of fuel used.

The Institute for Fiscal Studies is driven to the conclusion that if the “paying the external costs” argument is to be sustained then a significant portion of current fuel duty must be replaced by some form of “pay as you go” charge based on distance driven in congested conditions.

*Cost of technology*

It is well known that the cost for the relevant charging technologies is falling rapidly. Walker (2011) gives a survey.

The costs of road user charging remain an issue that cannot be ignored: in particular the compliance costs imposed on individuals. But there is no longer any doubt that there are several distinct technologies available that can be relied upon and that their costs are falling.

*Carbon emissions and air quality*

Congested roads cause fuel to be burned inefficiently. To the extent that road pricing reduces traffic and controls congestion it will contribute to reduction in greenhouse gas emissions. Banks, Bayliss and Glaister (2007) estimated about a ten percent reduction in Carbon Dioxide emissions.

Air quality damages from road transport are now being more widely recognised (see, for example, Air Quality and Road Transport, Ricardo AEA, RAC Foundation, 2014). Like traffic congestion it is highly geographically specific—because the damage depends upon the population exposed—and highly correlated with it. Road pricing designed solely to deal with congestion is likely to have beneficial effects on air quality. But air quality effects can be added to congestion effects in computing road prices. Since the exposure of people to noxious emissions varies greatly by time and place, this would imply strongly differentiated charges on air quality grounds (see Banks, Bayliss and Glaister, 2007 and Bayliss in Glaister, Lytton and Bayliss, 2011, where air quality damages are included).

**Misunderstandings**

There are some misunderstands that have led some people to discount the road user charging proposition.

*Privatisation*

One has originated with the conflation of road user charging with "privatisation". It is neither necessary nor sufficient to have charging in order to involve private ownership. Some of the "free market" economists who have advocated pricing have seen it as an important component of a reform that has roads be owned and provided by private enterprise—like most other goods and services. Whatever the merits or demerits of private ownership, sensible charging is an issue even if a facility is owned and provided by the public sector.

And one can involve the private sector in provision without charging users, providing some other source of payment is provided. This is illustrated by the fourteen Private Finance Initiative, shadow tolled roads in the UK.

Pricing is about efficiency, not ownership. However, as I argue later, governance is absolutely crucial—who has ownership and control of the revenues?

*Fuel duty is a better mechanism*

Another misunderstanding originates from the correct observation, illustrated in Figure 3, that road users already pay handsomely though the duty they pay on fuel; about 60 pence in the pound spent at the pump (including VAT). Some people claim that as a "charge" for using the road. However, as Figure 1 illustrates that the *efficient* prices would vary enormously by time of day and location, whilst the duty on fuel does not. It is certainly reasonable to claim that a part of the duty on fuel constitutes a corrective tax on the emission of carbon dioxide consequent on using the fuel. But that is only a small portion of the duty actually levied. The remainder is better viewed as a non-specific contribution to the Exchequer.

*Road tolls do not work in England*

It is sometimes claimed that the experience of our one major charged length of road, the Birmingham North Relief Road (the "M6 Toll") demonstrates that tolled roads will not work in this country (see, for instance, the Campaign for Better Transport) [http://bettertransport.org.uk/media/19-mar-toll-roads-dont-make-sense]. Certainly, this scheme is less commercially successful then the owners had hoped—although one should not forget that past re-financings have meant that value has been taken out of the scheme and distributed to investors. The traffic has been less because: the original forecasters overestimated the proportion of movement on the existing M6 that was long distance—much of it is local; the competing M6 was significantly improved; the recession has reduced traffic in general.

The M6 Toll road certainly "works" in the sense that road users have an additional, reliable, very high quality choice available to them and there has been no cost to the UK taxpayer.

What the M6 Toll road does illustrate is that an agreement between a promoter and the state in which there are no restrictions on what state-funded developments there might be on competing facilities in return for complete lack of regulation of charges is unlikely to produce a satisfactory outcome.

It also illustrates the difficulty in the English geography, with its high densities, of operating an isolated toll road. This was rediscovered recently when the government proposed an improved A14 funded from tolls: a proposal that has now been abandoned. Revenues would only have serviced about one fifth of the capital cost. The low population densities and long distances in France, Spain and Italy make it much easier to operate their familiar tolled "motorways" on a commercial or semi-commercial basis.

Two lessons are: it will often be difficult to fund a major new road from tolls in full; and, to the extent that the objective of charging is to raise funding, it may be better to deal with a network rather than the singleton road. In any case, people are disposed to consider roads as public utilities and that implies that an appropriate regulatory regime needs to be carefully designed.

One cannot dismiss charged roads on the grounds that they are technologically or politically infeasible. Walker's (2011) paper surveys a number of schemes from around the world that are now in successful operation. They include: the tolled motorways in France, Spain,

Portugal and Italy; the urban road charging schemes in London, Singapore and Stockholm; the several schemes in Norway; the lorry-charging schemes in Germany, Austria and the Czech Republic; and the privately provided highways in Australia.

Walker recounts the common experience that when schemes are first proposed, the population has difficulty understanding the policy or what the benefit might be to them (or others). But once it is enacted, public opinion changes to favouring the scheme because people have experienced the improvements that they could not otherwise have enjoyed. The same observation was made by a review of European experience for the US Department of Transportation (Federal Highways Administration, 2010). This is why it is so important to have some orders of magnitude to help with the debate at proposal stage: it can help to make the ideas a little less abstract.

It is apparent from Walker (2011) that user payment schemes for roads are common and successful across the globe.

In any case much of the English road network was originally funded through tolls. The public trust (or 'public benefit corporation' in US parlance) has a long tradition (see Bayliss, 2008a, for more detail). In the 18th and 19th centuries, the Turnpike Trusts were largely instrumental in creating and maintaining the main roads in Great Britain, using revenues from tolls. By 1830 the Trusts, created by Acts of Parliament, provided about 20,000 miles of road for which users (not always willingly) paid a toll. They were used by hauliers of goods, passenger coaches and postal services. The turnpikes allowed the time taken for a journey between London and Edinburgh to be reduced from 12 days to 4 between 1750 and 1800.

The first effects of competition from canals, and then railways, were curtailment of investment in the turnpikes, and then the gradual neglect of maintenance: consequently many roads were progressively 'disturnpiked' and returned to the local parish for their care.

Interestingly, Dudley and Richardson (1996) note that tolling was considered during the early implementation of the pre-war "tea room" plan for the first English Motorways (H. C. Debates, 2 February 1955, col. 1099)

> "They will be projects of great magnitude and the cost will be formidable; indeed, to enable us to proceed as rapidly as we should like the Government have in mind that tolls should be charged in suitable cases. This will enable the Exchequer to get back something on the money put up and will, of course, include provision for sharing between the Exchequer and local authorities where the latter had also put up money."

However, subsequently "Boyd-Carpenter rejected the idea of road tolls chiefly on the political calculation that the motorways should be free at the point of use to all who owned a vehicle. Henceforth, therefore, the massive cost and administrative resources required to implement the tea room plan would be carried entirely by central government".

Another consideration may have been that at the time the forecasts of traffic that might use the Motorways were very conservative—to the extent that the choice between major new

roads and improved bypasses and local roads was finely balanced—so the revenues from tolling would have been expected to be modest (C. D. Foster, personal communication).

*Road charging is only about congestion or only about raising money*

There is a tendency to discuss road pricing in isolation. However, as with any infrastructure pricing, level of service, physical investment and funding are inextricably linked and should be considered as a whole. Price determines volume of demand and revenue. Volume of demand determines quality of service given the capacity of the infrastructure. Revenue provides the funds to operate the infrastructure and, if justified to service the capital cost of increasing capacity. The funds generated may exceed what is required (long term economic profit), or may fall short (justifying public subsidy) depending on the returns to scale in the technology. See Archer and Glaister (2006) for a theoretical exposition of this and an application to British roads.

The implication is that it is not sensible to regard road pricing solely as a congestion-controlling measure, or a revenue raising measure. It is both. And the level of pricing needs to be considered simultaneously with investment in capacity.

When electricity, gas and water were Nationalised Industries there was a tendency for government to treat pricing and capacity as separate—as now with roads. A consequence of the creation of independent, privatised industries has been to close this loop. Now charges are set so as to pay costs (operating and fair return on capital invested) and fund the investment in capital equipment required to supply. This is achieved under the umbrella of private ownership subject to independent, public interest regulation. But it would have been possible to achieve something similar under public ownership.

Note, in particular, that the revenues from charges have become "ring fenced" to pay for what is provided to the consumer. This is a fundamental change in governance of the industries, which addresses a problem that bedevils roads policy. I return to this later.

**Reactions to past studies**

The bookshelves are replete with studies on road pricing. Here I recount the responses to a few of the best known.

*The Smeed Report*

Sir Christopher Foster was a member of Smeed's Panel and in correspondence notes the following recollection.

> "It is not irrelevant that at the time of the inquiry the Road Research Laboratory (RRL) belonged not to the Ministry of Transport, but the non-ministerial Department of Scientific and Industrial Research (DSIR). Its director's reputation had to do with highway construction. Smeed was his deputy who specialised in Traffic and as a consequence was becoming more and more interested in what we would consider economic problems.

“An ambitious initiative was developing “guidance cables” and “detector loops”, collaborating with private electronic firms. At the RRL’s open day at Crowthorne in July, 1962 some of its outputs were on view. A car passing over a series of detector loops could turn the street-lights on just in front of it and turn them off when it passed. Also on show were blindfold drivers driven by guidance cables. Such ideas apparently now seem more practical than they seemed then, as Smeed was well aware. It struck me that using such equipment, primarily designed for road safety purposes, for road pricing might add considerable value. He was interested in it. He asked me to write a note about it.

“The outcome was the Smeed Committee. I easily persuaded Michael Beesley to join. He persuaded Alan Walters. Reuben was a first-rate chairman. Michael Thomson was an excellent secretary. J. C. Tanner was an excellent researcher. What in my judgement helped the Report to gain its substance was the quality and vigour with which the papers presented were discussed at our meetings.

“The trouble was that Smeed and the RRL had not appreciated the need or even the advisability of getting Minister of Transport, Ernest Marples’s permission beforehand. He was furious when he realised the report was complete and on its way. He was himself up to bold initiatives. But the idea to be pursued had to be his. Therefore his reaction was to get the government not to allow the RRL to release it.

“It only came out, published by the Ministry of Transport (MoT) in 1964, not long after the election when Tom Fraser became minister. The line in 1966 when Barbara Castle and I went to the Ministry of Transport was that whatever its merits we first had to persuade the highways division of the Ministry of the desirability of CBA for road investment before we could get really talking about road pricing.

“Meanwhile Marples had taken two further actions. The RRL was transferred to the MoT, as other parts of DSIR were to other departments. The result was that nothing like the Smeed report could happen again without approval by the departmental minister concerned. He also had an aeronautical engineer, D. J. (Joe) Lyons, appointed Director of the RRL, an appointment Smeed had coveted and which he thought the Road Pricing Report would clinch.”

Wikipedia adds the following.

“The Smeed Report was received with ambivalence by the Macmillan government, which had commissioned it: the Ministry reported in June 1964 that it would first need to study the implications and thus the government was "therefore in no way committed to this form of restraint". It initially withheld release of the full report to the public and took its time to consider it. It was rumoured that the Prime Minister, Sir Alec Douglas Home, had suggested to "take a vow that if we are re-elected we will never again set up a study like this one".

> "Events took over, and two elections were fought in 1964 and 1966 with transport as a major election issue, resulting in a new Wilson government with Barbara Castle as Minister of Transport. A large majority enabled her to bring into law a number of the then-controversial safety concepts that the RRL had been investigating, such as speed limits and breathalyzers. ...
>
> "However, the political will needed to establish such a scheme seemed to be slipping away, and commitment atrophied in the UK as the minister requested more feasibility reports, until, in 1970, the government changed and the scheme effectively died."

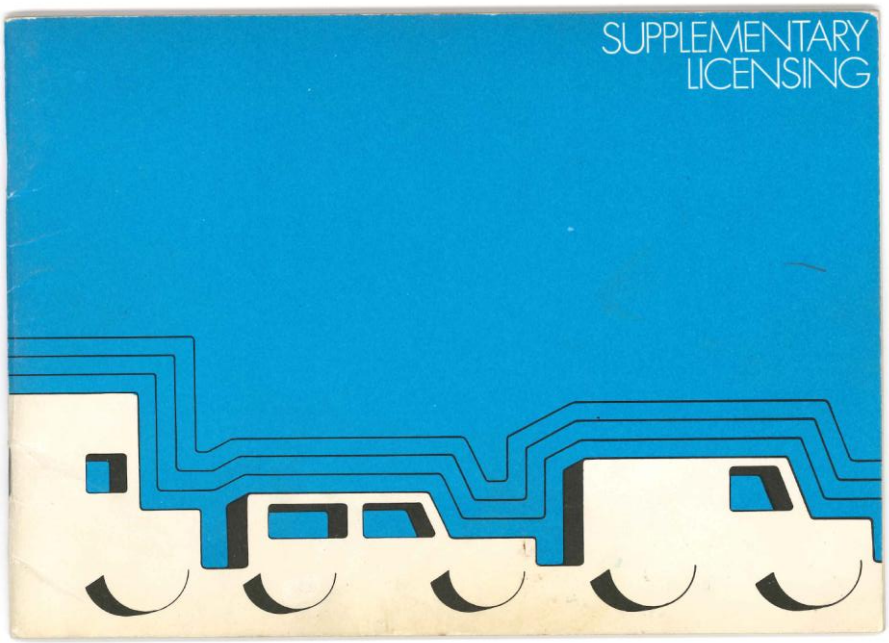
*The London Congestion Charge.*

A significant proportion of all the road congestion in the nation is in London. The Smeed Report discusses the possibility of having a simple area charge.

The story of the London Congestion Charge scheme is instructive. It would have been very much less likely to have come to fruition had it not been for the coincidence of several unusual circumstances: in particular the creation of a brand new city government and the leading candidate for Mayor being forced to run as an untrammelled independent.

In 1974 a joint Steering Group of the Greater London Council (GLC), the Department of the Environment, the London Boroughs Association and the Metropolitan Police. worked up in detail Smeed's suggestion (paragraphs 5.3.1 to 5.3.13) for a paper-based, daily, area licence or permit. This was christened Supplementary Licensing.

Details of enforcement, design of licences, implications for public transport, necessary procedures and much else are worked out. These are illustrated below.



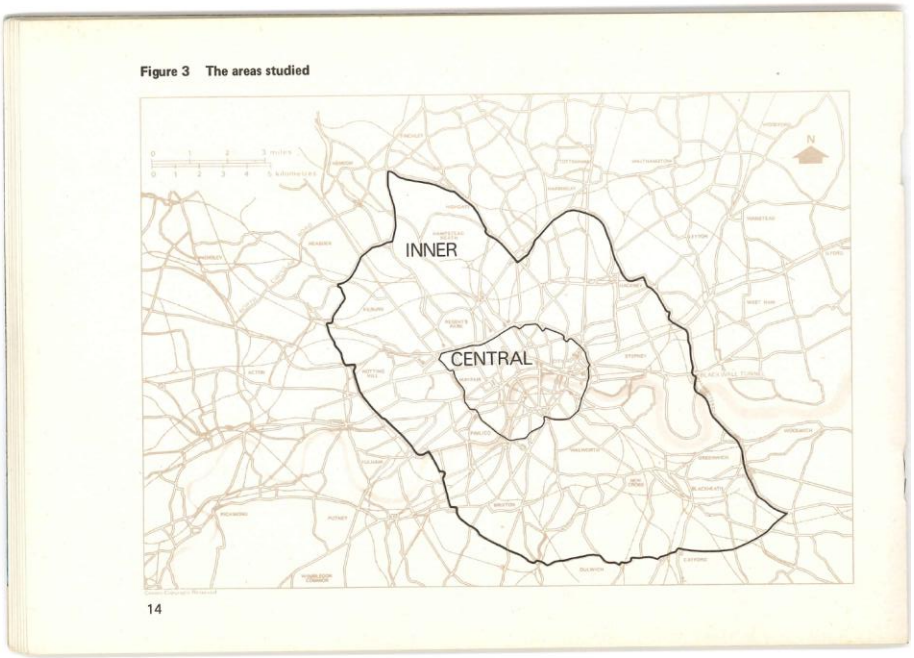
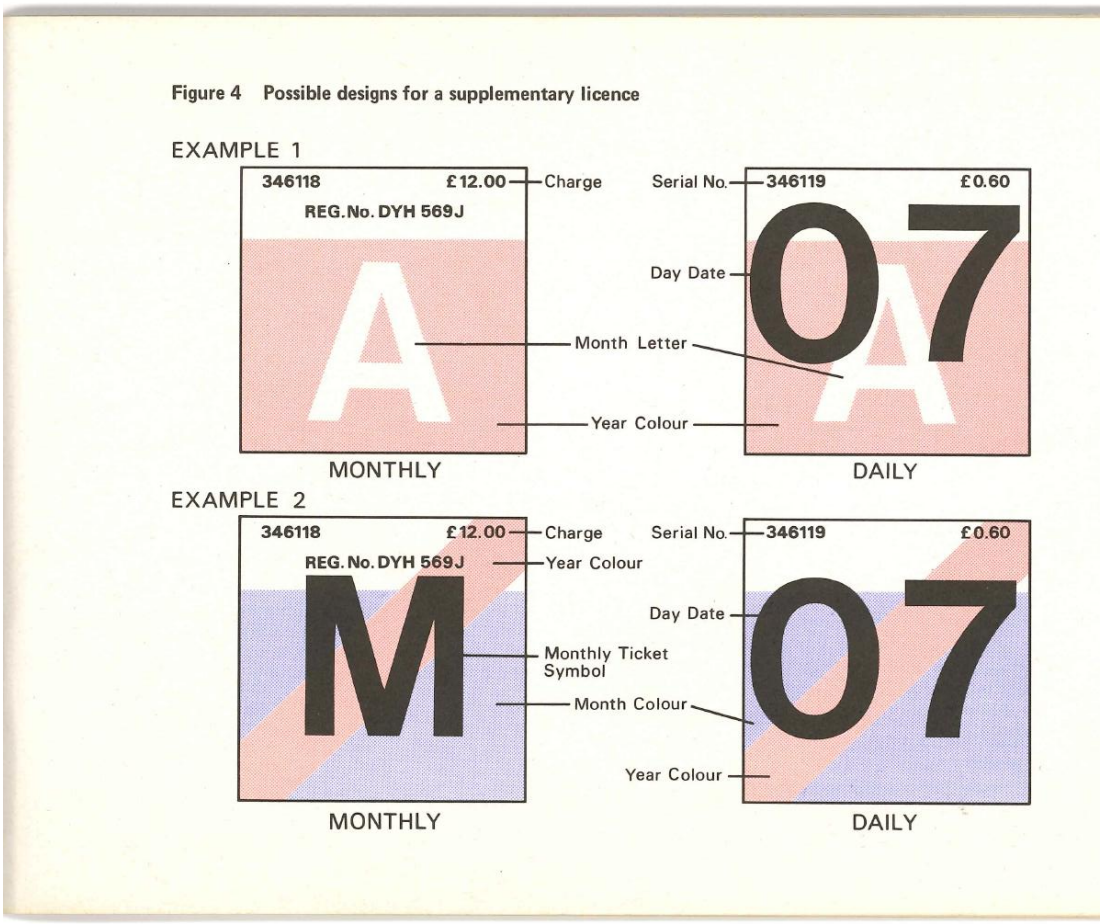



**Figure 3 The areas studied**



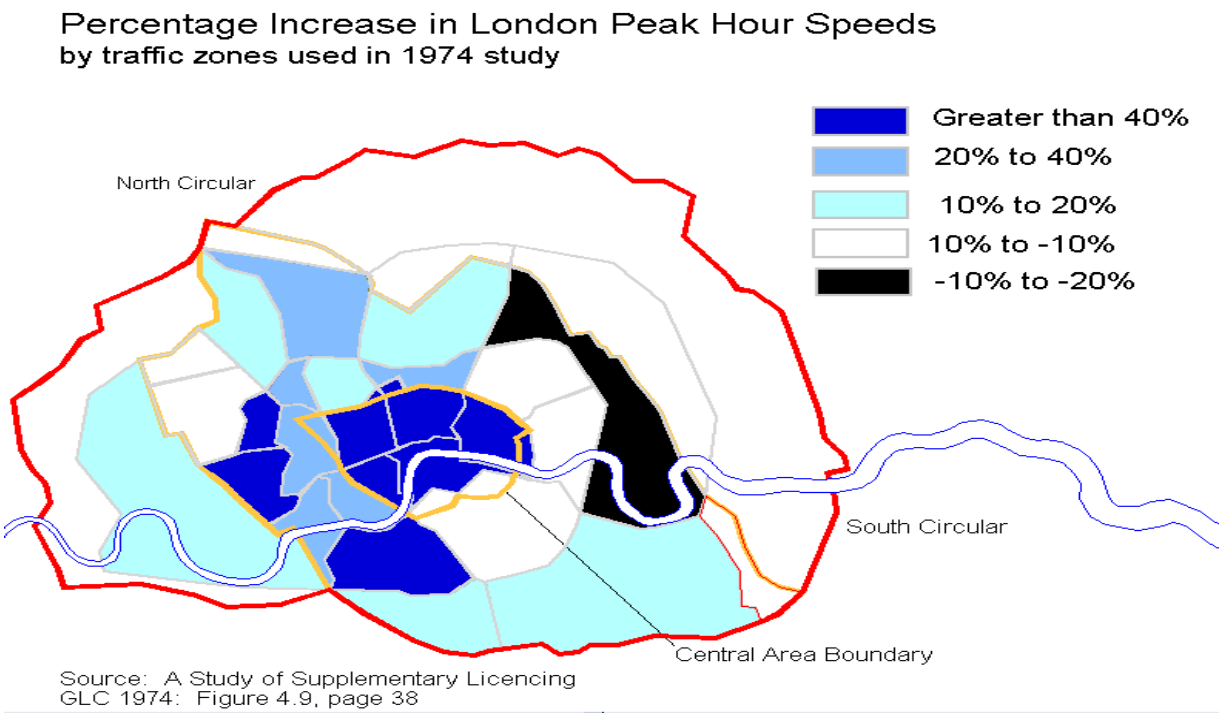
14




Source: GLC (1974)

The study found that most of the available affects could be achieved by having all day control in the Central Area only. The economic gain to the community would be between £230 million and £355 million per annum; the optimum charge would have been between £6 and £9 per day (all approximately in 2013 prices). Figure 5 shows the estimated effects on traffic speeds and their locations. Net revenue would be about £450 million per annum, after £56 million per annum of enforcement administration and other costs. The document worked out complementary environmental improvements in some detail.

**Figure 5**




David Bayliss (private communication) relates the following.

> "This was approved by the GLC for consultation and I appeared with Desmond Plummer on television at the launch. Several public meetings were held and the reactions at these were strongly negative, although there was some institutional/academic support. As a result it was decided to drop the scheme. Later in 1979 we produced the less ambitious 'Area Control: A scheme for reducing car traffic through Central London to limit congestion and improve the environment.' This study was approved by the Chairman of the Transport Committee who, I believe, had kept Horace Cutler (the majority party leader) informed. In anticipation of publication I had agreed to a colleague giving a paper on the study to the annual PTRC meeting - it was known this work was being done and there was strong professional interest in it. However there was a delay in getting it to the Transport Committee and the Evening Standard prematurely produced a piece on it. Horace Cutler got very cross and demanded to have the offender's 'head on a pole'. That was the end of that."

Happily David Bayliss survived!

These schemes had been worked out in some detail and were close to being adopted. It is interesting to speculate how different the histories of London and London government might have been.

In 1986 Mrs Thatcher's Conservative government abolished the local authority, the Greater London Council and took much of the administration of London back into Whitehall. The leader of the GLC at the time was Ken Livingstone, a radical Labour Party member.

The national government changed in 1997. In opposition Labour had made commitments to devolution in general and in particular to the creation of a new Greater London Authority (GLA). There was to be a directly elected assembly and a directly elected, executive mayor. It was recognised at the outset that transport would be one of the most important areas of responsibility for the GLA.

The legislation was controversial and complicated. It took until 2000 to be implemented under the Greater London Act 1999. The legislation enables any mayor to introduce a congestion charging scheme or a workplace parking charging scheme, the revenues from which would be mandated for transport purposes in the Greater London area. The decision to insist on the 'hypothecation' of the net revenues in this manner was highly unusual in UK governance. It was the outcome of a hard-fought battle during which the Treasury was persuaded that it was a necessary condition for the political acceptability of a scheme. The argument was strengthened by the fact that, unlike most of the world's great cities, London government would have little other income over which it would have direct control.

Two years before completion of the legislation, the Government Office for London (the Whitehall department then with lead responsibility for London matters) set up a study group of civil servants and outside experts to propose outline designs to be offered to an incoming mayor should he or she wish to introduce a charging scheme. At that stage it was not known who the candidates for mayor might be.

The group duly researched the matter and published a report, 'Road Charging Options for London' (RoCOL, Government Office for London, 2000). In the event, candidates for mayor representing the established political parties showed little interest in such a policy. In particular the prospective Labour Party candidates were lukewarm about it in spite of the Labour Government having created the necessary powers.

Ken Livingstone had wanted to stand as the official Labour Party candidate in the hope and expectation of being seen to reverse the Conservatives' abolition of the GLC in 1986. But he was rejected as candidate and excluded from the Labour Party. So he stood as an independent.

He saw value in a radical innovation and perceived sufficiently strong electoral support to take the risk of including a manifesto commitment to introduce one of RoCOL's recommended congestion charging schemes. As with all the candidates, improving public transport was an important part of his offering and he was able to present congestion charging in the context of a coherent overall transport package.

Livingstone was always likely to win, not least because he was a well-known public figure and had been the leader of the GLC at the time it had been abolished, an action that had caused resentment among the London electorate irrespective of political persuasion.

Once elected Livingstone was able to include the scheme in the draft of his statutory Transport Strategy and to move to statutory public consultation on the detail. He had a clear electoral mandate for the scheme, and it had been sufficiently fully specified by RoCOL to withstand the inevitable attempts to stop it through judicial review.

Crucially, the chosen scheme had been designed to ensure that it could be implemented well within a mayor's first four-year term of office, leaving time for it to settle down before the next election in June 2004.

The scheme was easily explained and readily understood. It required no modification to any vehicle. The need to implement the scheme quickly and to minimise the technological, administrative and political risks—factors that RoCOL had identified—explains the somewhat unadventurous and expensive technical design that was selected.

Livingstone was re-admitted to the Labour Party and was elected for a second term in June 2004. The principal opposition candidate had said he would withdraw congestion charging.

In short, the factors enabling successful implementation were: time spent on careful preliminary research into a specific, practical and reliable scheme design; easy understandability; a major discontinuity in governance arrangements; and a radical, independent politician with sufficient personal support to win the election and willing to take risks. Crucially the scheme was introduced as part of the creation of a completely new administrative system, rather than being added to an existing one.

Throughout the debate, the Mayor was very clear that the scheme was about managing traffic congestion: the raising of money was incidental. In fact, it was known from the beginning that the particular technology adopted would be expensive to install and operate. It had two crucial advantages. Being based solely on automatic number-plate recognition it required no equipment to be installed in any vehicle; and it had been technically proven though its use by the police and other authorities. No Mayor could have afforded the risk of an expensive technical failure one year before the next election. Such an expensive technology will never be used again.

Another reason that the net revenues were small was that the geographical coverage—Central London—is a small part of London and not the places where the traffic volumes are highest.

Livingstone won the election for Mayor for much broader reasons than any vote for or against the Congestion Charging scheme. A referendum on that sole issue would have been lost at the time: as, it seems, is always the case. Since then public sentiment has changed as the benefits have been understood. The Mayoralty changed hands—and political party—after two terms. But the new Mayor, Boris Johnson, kept the scheme in place, although he did amend it to remove the "Western Extension" a development that Livingstone had implemented for which there had never been a strong case in its form as an extension to the existing zone. In the 2012 election the Congestion Charge was hardly mentioned as a controversial issue.

Once candidates for London Mayor were announced and Independent Ken Livingstone committed himself to introduce Congestion Charging, policy of the official Labour Party candidate became to not introduce it. Blair and his colleagues were careful to emphasise the political and technological risks of using the powers they had themselves created.

In the event the London Congestion Charging scheme went 'live' in February 2003, worked well and was inspected with considerable interest round the world. In October 2003 Blair gave a fulsome acknowledgement:

> "I was very, very sceptical but I think that it has made a difference, and I think that provided the money is ploughed back into transport, then I think it is an interesting example of how we can manage transport policy for the future. I think it is too early to evaluate all the results of it, but you have got to give credit where it is due."

There is a common perception that the scheme has "stopped working". Congestion levels have returned to their old levels and yet traffic volumes are lower than they were. But this is because both Mayors took the opportunity offered by the Congestion Charge to take road capacity away from conventional traffic in favour of pedestrians, cyclists and other uses. See Transport for London (2014). Were the scheme to be lifted now there would be a significant worsening of congestion.

London First has recently given the following evaluation of the London Congestion Charging scheme ("Jams Today, Jams Tomorrow", London First, August 2014, p7)

> "…the general consensus is that the charge reduced the number of vehicles entering the central zone. This led to a short term reduction in congestion and increase in traffic speeds, which then dissipated as freed-up road space was consciously re-allocated to other modes of transport, in particular buses and cycling as well as to better quality public space. As a result, congestion in central London now is no better than when the charge was introduced, but of course it would now be significantly worse if the substantial improvements to buses and cycling had been introduced with no charge in place.
>
> "This conclusion is supported by recent TfL statistics which show that whilst the population and total trips increased by around 13% between 2001 and 2011, car river trips in London dropped by a similar amount. In contrast, rail trips increased by just over 40%, bus trips by 60% and cycling trips by 66%. So while total trips increased, the number of car driver trips decreased. Average traffic speeds in the central zone increased when the charge was introduced but then fell away and are now lower than in 2003. Improvements to public transport have been supported by net revenues of over £1 billion generated by the scheme which have been reinvested in transport in the capital.
>
> "The current congestion charging scheme appears now to be broadly accepted by all political parties in London… ."

*Where next for London?*

For the future London faces the same issues in respect of road traffic as the rest of the nation, much amplified: serious existing congestion; rapidly growing demands; shortage of funds for investment; and proposals for aggressive, further reductions in road space for general use, in favour of dedicated cycleways (Transport for London, 2014) . Mayor Johnson's statutory Transport Strategy (2010) sets out the problem. Figure 42 indicates that with no intervention vehicle delay would increase by up to 20 percent by 2031. Even with all the interventions he was then proposing—public transport capacity improvements, better management, increasing in cycling—a residual worsening of up to 14 percent is forecast.

It is hard to see how this situation can be resolved without the extension of some form of road charging to a much bigger area of London. The Mayor's Transport Strategy (2010, p.272) recognises this:

> "The Mayor, through TfL, and working with the London boroughs and other stakeholders, if other measures are deemed insufficient to meet the strategy's goals, may consider managing the demand for travel through pricing incentives (such as parking charges or road user charging scheme). This would depend upon there being a reasonable balance between the objectives of any scheme and its costs and other impacts. …"

A broadening of the scope of road pricing in London definitely would not be simply an extension of the exiting zone. Nor would it use the antiquated and expensive technology of the original 2003 scheme.

A particular risk for London is that central government implements a *national* scheme of which London is a part. Then users of London's roads would undoubtedly pay above the national average but there would be no guarantee that London would receive the corresponding share of the national revenues. London may have the necessary autonomous governance and should seek to act first.

Road pricing will always carry political risks. One way in which the opposition from the London public might be mitigated would be if charging for the use of the roads were integrated into the popular universal payment system that is now being implemented for all public transport modes. Then the citizen would be paying for their travel through a common system no matter what mode they chose to use.

The last time I had the privilege of giving a public lecture on road pricing was in 1998 two years before the advent of the present London Government (Glaister, 1998). In relation to London I suggested that ...

> "... rather than introduce a special supplementary licensing scheme, the rule is introduced that during the defined hours vehicles must display a Travelcard valid for the zone in which they are. Zones would be those which apply to Underground travel.

> "This has an appeal for its simplicity. Importantly, it would ease the problem of dedication of revenues because they would be paid direct to the London Transport Authority under the control of the Greater London Assembly. The retailing infrastructure is already in place. Parking charges could be abolished and enforcement resources would be redirected against violations of parking regulations in bus lanes and at places where traffic flow is impeded.
>
> "The Travelcard would then become a kind of civic membership card, giving its holder freedom to travel at no extra cost by whichever mode suited his or her particular trip. Once one has bought one's card any form of passenger transport becomes free (save taxis): at present car users take the option of free access without paying for the privilege - unlike the public transport user. The continuing car user would now have to pay a charge, but he or she would receive a benefit, additional to the clearer roads: freedom to use the public transport system. This might cause quite fundamental changes in mode choice and trip patters: the system would favour "park and ride" type behaviour in cases where public transport still provided the faster alternative.
>
> "The London boroughs control much of the enforcement resources, and they would lose the income from parking charges. They would be paid to enforce the system as agents of the London Authority and they would take a share of the net proceeds for their own purposes, comparable with existing on-street parking yields. The residual would be a cash flow which the London Authority could use (along with other sources) to fund via bond issues which, in turn could finance capital investment in London infrastructure ... emulating the highly successful bond issues by the Metropolitan Transport Authority in New York."

There are signs that the improvements in technology since 1998 may have made this easier, at reasonable cost. The Transport for London official responsible for the rapidly developing payment systems recently remarked (Shashi Verma, *Local Transport Today*, 8 August 2014)

> ' " You could even potentially read a car number plate and then, once the data is in the system the payment system would be exactly the same [as other modes]," Verma points out, observing that this is exactly what happens with London's congestion charging zone and hinting that one day there is no reason why payments for all travel in London (including parking and pay-as-you-drive motoring) could not be integrated into a single payment system."

*The Road Pricing Feasibility Study*

Alistair Darling, who had been appointed Secretary of State for Transport by Blair in 2002, to sort out the transport policy muddle left behind by John Prescott and Stephen Byers was encouraged by the success of London Congestion Charging to take the idea seriously at a national level. He commissioned the Road Pricing Feasibility Study (Department for Transport, 2004) and national road pricing formed the core of the Transport White Paper of July 2004. Prime Minister Blair himself wrote a Foreword. In fact, after some hesitation, he

had already given his endorsement to road pricing in 2002 in his Foreword to the RAC Foundation's Motoring Towards 2050.

Further staff work was carried out and substantial sums of money were put on offer through the new "Transport Innovation Fund" to local authorities that could be encouraged to bid for grants to assist them in implementing pilot schemes (Birmingham and Manchester being two of the most prominent candidates). When Douglas Alexander succeeded Alistair Darling, Blair's remarkable introductory open letter of instruction reaffirmed that

> "Managing demand for road transport and ensuring we get the best out of our existing network are vital. We therefore need to advance the debate on the introduction of a national road-user charging scheme. The successful roll-out of local schemes funded from the Transport Innovation Fund will be critical. I would like you to identify the other key steps for the successful introduction of road-user charging within the next decade."

The Prime Minister was leading on this matter, securing consistency across Whitehall and delegating policy development to the relevant departments.

Then, in early 2007, an "e-petition" appeared on the official No. 10 website: "We the undersigned petition the Prime Minister to scrap the planned vehicle tracking and road pricing policy". Unlike most of the e-petitions it received press coverage and it closed on 20 February 2007 with over 1.8 million signatories.

Within a day Blair sent a personal email response to every signatory, and he created a podcast interview with motoring journalist and TV personality Richard Hammond on the No 10 website.

His new attitude seemed to make little connection with the 2004 Transport White Paper for which he had written the foreword and he made little reference to the Road Pricing Feasibility Study or the other research and policy development work that had been carried out over several years by the Department for Transport to which he had delegated the task: "I see this email as the beginning, not the end of the debate…we have not made any decision about national road pricing…"

The episode laid bare the extent to which the government as a whole had failed to address some of the fundamental issues raised by road pricing, notably, what would happen to the revenues raised. On the 19th February the junior minister Dr Stephen Ladyman said on a radio broadcast "The second thing people are concerned about is that it's going to be an additional charge… and what we are saying it's going to be an charge instead of the additional road taxes … people … in most parts of Wales will actually be better off…" In other words the government had already decided that road pricing would be tax revenue neutral. This had been the line taken by senior Labour politicians on previous occasions. Yet, in his email Blair says "funds raised from these local schemes [potential pilot schemes being worked up in places such as Birmingham and Manchester] will be used to improve transport in those areas." And in the podcast "… part of what you need to do is to raise money to invest in a

better public transport system, because the best way of reducing congestion is if you have a better transport system, … I could name you about five different city schemes for metro links and so on, and light rail systems, and transit systems and so on, but you have got to raise money for all of these."

It was plain that through the mechanism of the e-petition the government had managed to procure a strong public reaction against a policy that the public could not possibly have understood, not least because the government itself had not begun to resolve fundamental questions: and it certainly had not explained what is a complex proposition. It had sought to imply that it would be possible to spend the revenues on offsetting other motoring taxes and spend them on improving other modes of transport as well as defraying the costs of the scheme itself. Perhaps the public were unconvinced that all this was plausible!

This poor management by No. 10 of what could have been a truly radical development of transport policy undoubtedly weakened the chances of its implementation in the foreseeable future. As Blair himself observes in his podcast "Well as I say this is years in advance, but having gone through the fuel protest, I think it is highly unlikely that you will find politicians in the future putting something forward if people just are completely rebelling against it."

A significant issue impacting on the adverse public reaction to road pricing propositions has been the perception that they would create a new, open-ended item for everybody's household budget.

This is a perfectly understandable concern. Figure 1 above, applied literally, would imply that a few charges would be very high. A commitment to cap charges could, if carefully designed, "catch" relatively few cases and thus make little difference to the success of the policy in the round whilst avoiding the damage to public confidence.

The consequences of failing to consider this were well illustrated by the Road Pricing Feasibility Study: deep in the text it was noted that the highest rate of charge considered had been 80 pence per vehicle kilometre and that this would apply to 0.5% of the traffic. The press reported the Study with a front page headline "Motorists to face £1.34-a-mile toll" (Daily Mail, 21 July 2004). Capping of charges has played an important part in the public acceptance of electronic ticketing systems on the London transport system.

Whatever kind of pricing proposition may be envisaged a published, predetermined cap on liability should be incorporated. While this may not be strictly logical from an economic standpoint it is helpful from a psychological and emotional point of view.

*The Eddington Transport Review*

Sir Rod Eddington was commissioned in 2005 to carry out an independent review of the country's transport policy jointly by the Chancellor and the Secretary of State for Transport. This was a well-resourced, major study. One of its principal conclusions was (Eddington, 2006, Pragraph 1.108)

> "Introducing markets (pricing) where none exist can have a very powerful and positive economic effect in any sector. The transport sector is no exception, and in particular the potential for benefits from a well-designed, large-scale road pricing scheme is unrivalled by any other intervention."

He pointed out that there is a strong case for investment in new road capacity with or without road pricing, but that quantum of investment would be much reduced if road pricing were used to manage the peak demands.

Although the government of the day formally accepted the recommendations of the Review little happened to implement it. It was largely forgotten during the financial crisis and the advent of the Coalition Government in 2010.

*The Coalition Government roads policy review*

The 2010 Coalition government soon began to realise that it had a problem with capacity on the strategic roads. Prime Minister Cameron himself became publicly involved. In a speech on infrastructure, he said (Cameron, 2012):

> "There's nothing green about a traffic jam – and gridlock holds the economy back… We need to look urgently at options for getting large scale private investment into the national roads network – from sovereign wealth funds, pension funds and other investors… . We need to look at innovative approaches to the funding of our national roads – to increase investment to reduce congestion."

It is significant that, while recognising the need, he was not making a commitment that more conventional, Exchequer funding would be forthcoming. Rather, the Prime Minister was hoping that institutional infrastructure investors would provide the capital. One of the motives here is apparently to reduce capital expenditure and the fiscal deficit by replacing it in the national accounts by private capital investment and interest payments spread over many years.

Elsewhere in the speech, Cameron indicated that he had the water industry in mind as an analogy. In principle, water is a good analogy: since privatisation, a large capital investment programme has been financed by institutional investors. Roads and water supply are both technically simple, long-lived assets, the demand for which is likely to grow in the future. So they do have attractive characteristics for investors such as pension funds.

Water investment has been *financed* by the lenders but it has been *funded* (that is, paid for) out of charges to end users. The same could be achieved for roads, but only if some form of charging for use were implemented, to create a defined cash flow, or some other source of funds were to be dedicated to servicing the interest and repayment of capital. However, in his speech the Prime Minister emphasised that: "Road tolling is one option… but we are only considering this for new, not existing, capacity…" Since most schemes are incremental improvements to existing roads, this stricture largely precludes the water industry solution – of servicing private capital investment from charges.

Following the Prime Minister's speech, a number of new reviews were announced. One was the development of a roads strategy, to be conducted within the Department for Transport. A second study, jointly between the Department for Transport and HM Treasury, was a "Feasibility Study on Roads Reform… to carry out a feasibility study of new ownership and financing models for the national roads system".

It was rumoured that during this review consideration was given to introducing some form of supplementary charging for users of the strategic road network. For example in a newspaper article (*Local Transport Today* 25 January 2013) Edmund King commented on a suggestion that he said was under consideration which would involve a reduction in Vehicle Excise Duty or fuel duty (both are taxes) together with introduction of an access charge for those who want to use major roads—say, £150 per annum. Others have proposed more sophisticated versions (for instance Wadsworth, 2011) of a similar idea.

This would have been technically feasible, probably with enforcement by the use of automatic number plate recognition and it would have been consistent with the Prime Minister's stated wish to create a new funding stream against which investors could lend.

In the event the idea of any new kind of charge was dropped. The 2013 White Paper announced a reform of governance for the Highways Agency and a significant increase in investment in the strategic road network, funded entirely from the Exchequer. By the same token the opportunity to service capital borrowings out of new income streams was lost.

**Charges to replace existing taxes**

In spite of the high rates of taxation road traffic is a robust "market": it is possible to increase (reduce) revenues by increasing (reducing) charges or taxes. For a moment we put aside the considerations of efficient pricing and speculate on the options for using road user charging to raise more, or less money in association with changes in existing motoring taxes. (The detail is to be found in Glaister, Lytton and Bayliss, RAC Foundation, 2011.) If desired, such changes could be engineered to increase net revenues in order to fund roads maintenance, management and enhancement.

We set up a 'ready reckoner' to allow us to estimate the revenues that would be generated from distance-based charges at various rates on different types of road. This allows us to estimate the orders of magnitude of the consequences for traffic volumes and net revenues of changing the following variables: the rate of charge (which, in this exercise, does not vary by road type); the types of road to which it applies; the level of VED; and the rate of fuel duty

Note that in some of the scenarios we report below these charges do not apply in urban areas; therefore they are not tightly targeted towards the most congested parts of the system..

In scenario 1 of Table 3, is a change that is approximately revenue-neutral. The table shows the various categories of road, and the volumes of traffic for cars and vans, and for heavy goods vehicles. A 5 pence per vehicle mile charge ('toll' in the table) is made for cars and LGVs on motorways and rural trunk roads. We assume that HGVs pay three times the charge for cars and LGVs: in this case 15 pence per vehicle mile. Note that this charge is assumed to

apply at all times of day, so there is no attempt to vary the charge to reflect congested conditions. In this scenario VED for all vehicle owners is halved. Fuel duty for all users in the country is reduced by 10%. The net effect on government revenues is a fall of £0.42 billion pa.

For car users of the roads with the distance based charge, the cost per mile has risen from 9.2 pence per vehicle mile to 12.6 pence per vehicle mile. For all other car users, the cost has fallen to 7.5 pence per vehicle mile because of the cheaper fuel. All traffic volumes have changed: they have reduced on the charged roads and increased on the others. These changes are computed by assuming that a 10% increase in the money cost per mile will lead to a 3% reduction in traffic. This is the kind of response observed in the long run (after about five years) in past experience in the UK and around the world (see Graham & Glaister, 2002) and it is the kind of figure commonly used by the Department for Transport and others in modelling the effects of fuel price changes. Overall in Scenario 1 there is a reduction of about 1.2% in national car and LGV traffic and 3.0% in HGV traffic, and therefore a small reduction in total carbon emissions of 1.3%. Car traffic on the motorways falls by 7.2%.

**Table 3: Effects of pay-as-you-go charges with reductions in fuel duty and VED**

| *Scenario* | **Reduction in VED** **%** | **Reduction in fuel duty** **%** | **Charge rate for cars/HGVs** **p per mile** | **Type of road to which charge applies *** | **Change in traffic/$CO_2$ emissions** **%** | **Change in net revenue** **£ billion p.a.** |
|---|---|---|---|---|---|---|
| 1 | 50 | 10 | 5/15 | A, B | -1.3 | -0.42 |
| 2 | 100 | 50 | 9.5/28.5 | A, B, C, D, E | -3.8 | 0.12 |
| 3 | 0 | 20 | 10/30 | A | -0.6 | 1.14 |
| 4 | 0 | 17 | 5/15 | A, B, D | -0.5 | 1.09 |
| 5 | 100 | 25 | 5/15 | A, B, C, D, E, G | -4.1 | 0.78 |
| 6 | 50 | 25 | 5/15 | A, B, D, E, G | -2.7 | 1.30 |
| 7 | 50 | 25 | 2.7/8.1 | A, B, D, E, G | 0.0 | -3.07 |
| 8 | 50 | 25 | 5/5 | A, B, D, E, G | -2.5 | 0.23 |
| 9 | 50 | 25 | 6/6 | A, B, D, E, G | -3.5 | 1.83 |

*Source*: authors' own

*** A – Motorways; B – Rural A trunk; C – Rural A principal; D – Urban A trunk; E – Urban A principal; F – Minor rural; G – Minor urban**

Table 3 summarises the results for some other scenarios. (See Bayliss, Glaister and Lytton , 2011 for a detailed discussion)

In practice all the scenarios discussed in this section could be considerably refined by applying the charges only during the congested times – say, during the working day. This would, of course, somewhat change the traffic levels and revenue yields.

As some of the scenarios in the table indicate it is possible to allow VED or fuel duty rates to decline and still raise of the order of £1 billion extra a year—which could be ring fenced to fund improvements in the road network.

The cost of installing and operating a pay as you go system is an important issue. More work is required to derive firm estimates, but Walker (2011, p.95) suggests that, with 2,500 links on the strategic road network at a cost of £50,000 a link, the capital costs would be £125 million, with annual maintenance costs of £73 million. To this would have to be added the 'back office' costs.

**Fairness**

The public acceptability of any road pricing scheme will of course depend on who would gain and who would lose and, in particular, the extent to which it is perceived to be "fair".

This can only be analysed in the context of a specific scheme:

- who will pay what and at what times
- what will happen to existing road taxation
- and, crucially, who will enjoy the benefits of any net revenues.

Therefore it is not possible to generalise about the equity effects of road user charging. What follows is simply intended to illustrate that analysis is possible once a scheme has been specified.

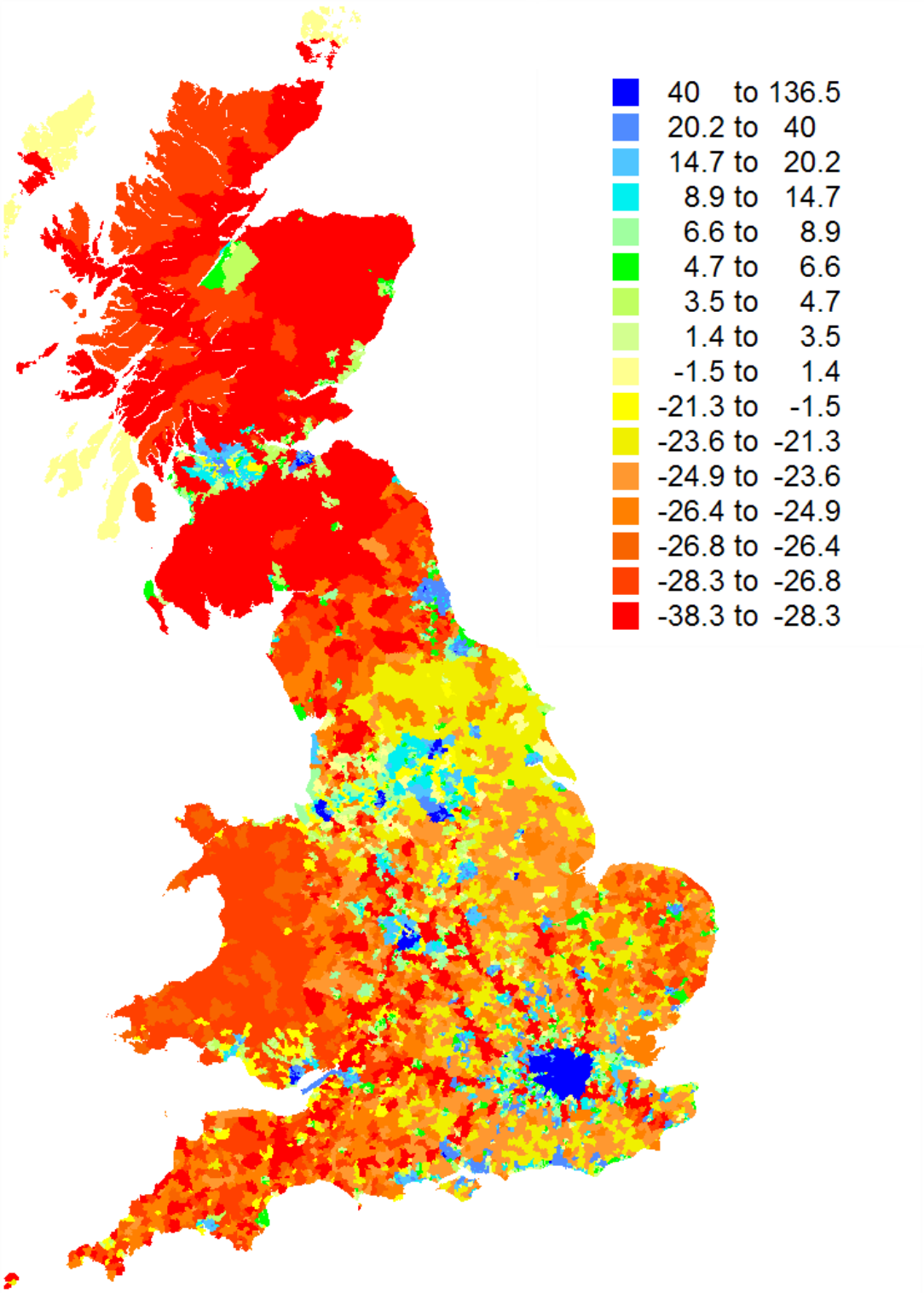
*Equity and revenue-neutral, fully efficient pricing.*

The first example relates to a fully efficient national pricing scheme in (predicted) 2010 conditions with the revenues being fully used to reduce fuel duties: sometimes said to be "revenue neutral". It is fully described and analysed in Glaister and Graham (2006).

Figure 6 shows the percentage money price changes for motorists. These relate to the vehicle operating costs (including fuel purchase) and the road user charges. They are averages across the week: within that there will be times when there are much lower charges and peak periods when they are much higher.

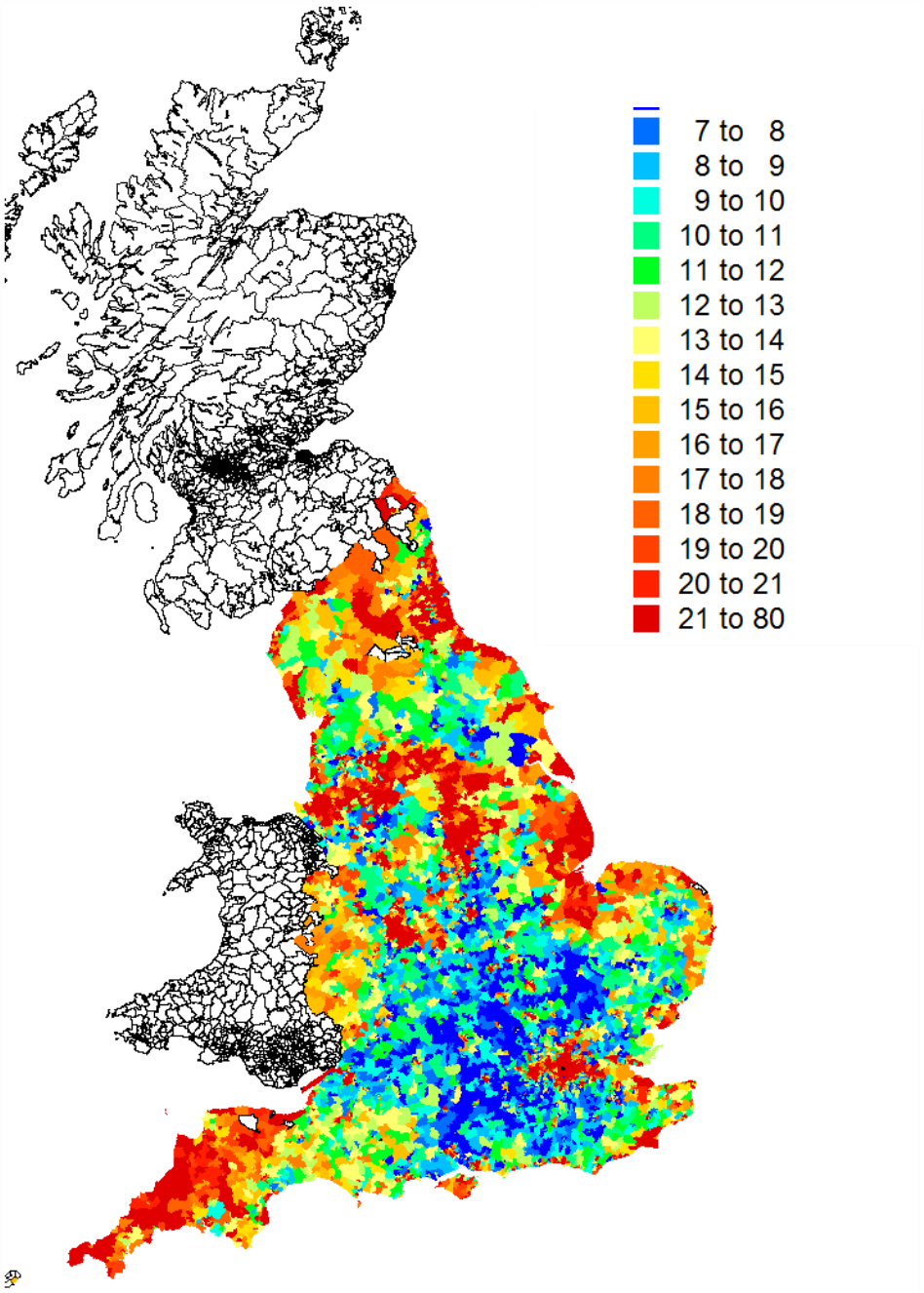
Figure 7 displays a map of the levels of multiple deprivation (ODPM, 2004). It will be noted that concentrations of highly deprived census wards are to be found both in the big urban areas, and in remote rural areas. The former areas would tend to pay more with efficient pricing but the latter would pay less because of the reduction in fuel duty under a revenue neutral policy.

**Figure 6. Changes in cost per vehicle mile under revenue neutral efficient pricing**




Source: Glaister and Graham (2006). This map is designed to be viewed in colour.

**Figure 7. Deprivation Index for England.**
**Low numbers – blue – indicate low deprivation.**
**High numbers – red – indicate high deprivation**

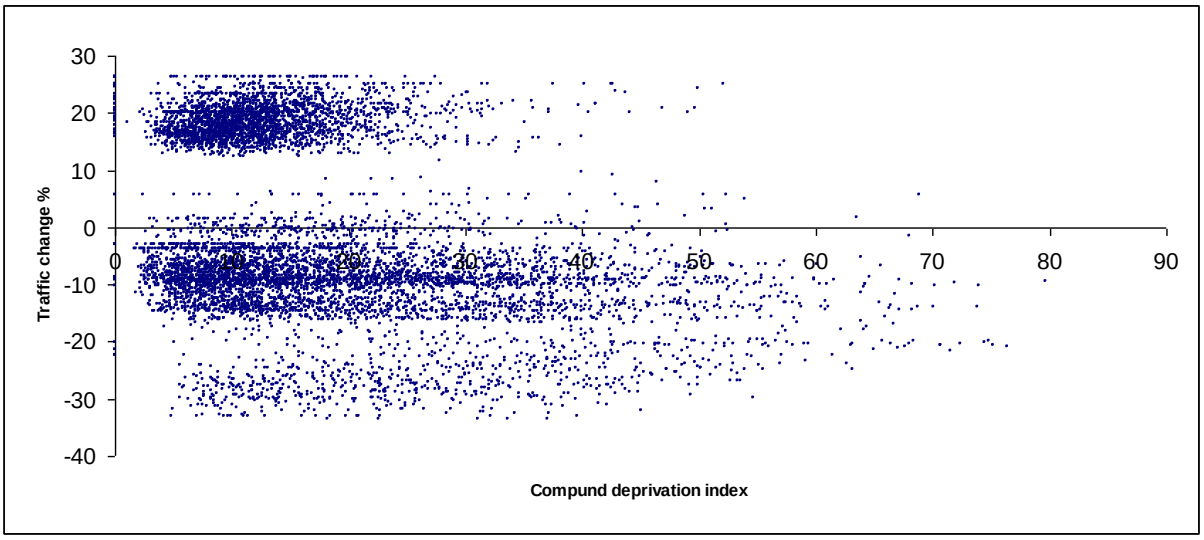



Source: Glaister and Graham (2006). This map is designed to be viewed in colour.

Figure 8 illustrates the relationship between the degree of deprivation of census wards in England and the change in traffic induced by the introduction of a revenue-neutral package of road pricing and road tax reduction.. We had expected to find a strong relationship, with considerably more deprivation in the large conurbations and less in the rural areas. Since road

pricing would definitely involve higher charges in large urban areas there would be a strong relationship between road pricing and deprivation.

**Figure 8: Percent traffic change and compound deprivation index, England. Revenue neutral.**




Source: Glaister and Graham (2006).

The wards fall into two groups. One group has a traffic increase and it is at the less deprived end of the scale. The other group has a bigger traffic reduction, spreads across the scale of deprivation and does not appear to have any particular relationship to deprivation. The implication appears to be that the rural areas tend to have less deprived wards and suffer less reduction in traffic under road pricing. But, once the rural areas are excluded, there is no obvious, systematic relationship between deprivation and the degree of traffic reduction.

Note that in this particular assessment there is no allowance for the benefits of improvements, such as those to the journeys of bus users or cyclists.

*Road pricing and household income*

The following is taken from an analysis by David Bayliss (Glaister, Lytton and Bayliss, 2011) of how fully efficient road pricing might affect households by income level and type of area in which they live. Car users are a large and diverse community and it is impossible to answer all the questions about the type of impacts that a road pricing system might have. The analysis focuses on the financial impacts – which are usually the aspect of greatest concern – although the improvements in traffic conditions can be of a similar order of magnitude. (See Glaister, Lytton and Bayliss, 2011 for the details.)

Note that these are not revenue neutral changes: VED and fuel duty are replaced by fully efficient charges reflecting congestion, accidents, air pollution, noise, climate change. The net effect is to increase overall revenues and no account is taken of any benefits from the use of the revenues—for instance in improving public transport or roads.

**Table 4: Illustrative ratios of pay-as-you-go charges to road taxes by type of area and income range for CO households – with behavioural change.**

| Area type | London | Mets | >250k | >25k | >10 | >3k | Rural | All |
|---|---|---|---|---|---|---|---|---|
| Lowest Quintile | 1.84 | 1.13 | 1.08 | 1.00 | 1.02 | 0.96 | 0.83 | 1.13 |
| Second Quintile | 1.89 | 1.22 | 1.11 | 1.04 | 0.97 | 0.91 | 0.78 | 1.12 |
| Third Quintile | 1.87 | 1.21 | 1.11 | 1.02 | 0.94 | 0.86 | 0.74 | 1.11 |
| Fourth Quintile | 1.61 | 1.07 | 1.02 | 0.98 | 0.93 | 0.81 | 0.68 | 1.03 |
| Highest Quintile | 1.30 | 0.93 | 0.90 | 0.76 | 0.80 | 0.76 | 0.63 | 0.96 |
| All Incomes | 1.72 | 1.15 | 1.09 | 1.00 | 0.93 | 0.84 | 0.70 | 1.10 |

| | | | |
|---|---|---|---|
| Higher cost | Similar cost | Lower cost | Much lower cost |

Source: Bayliss in Glaister, Lytton and Bayliss, 2011.

The distance based road charging system described above would increase the payments made by road users above that paid through the current fuel duty/VED scheme as shown below:

**Table 5: Estimates of the receipts from a pay-as-you-go charging scheme compared with fuel duty and VED**

| Type of User | Current Taxes | Pay-as-you-go Charges | Difference |
|---|---|---|---|
| Cars | £21.2bn | £23.3bn | £2.1bn (+10%) |
| Vans | £3.87bn | £4.43bn | £0.56bn (+14%) |
| Heavy Goods Vehicles | £5.35bn | £6.3bn | £0.95bn (+18%) |
| All | £30.4bn | £34.0bn | £3.6bn (+12%) |

On this basis there would be a surplus of £3.6 billion per year from which the costs of operating the scheme and additional improvements to the road network could be funded. This scenario is one of many and it would be possible to increase or reduce the surplus by varying the tariff structure. The Exchequer is likely to benefit also from the need for reduced public transport financial support: one option would be to take up this gain in the form of increased support for public transport.

Whilst road users would pay more, they would in return benefit from improved traffic conditions in the short term, and from both reduced congestion and better roads in the longer term. The scale of short-term improvements can be gauged from the findings of the Eddington study. In this it was estimated that marginal social cost pricing would lead to welfare benefits of £28 billion per year in 2025; the study also predicted that it would raise GDP by around £14–15 billion in 2025 and that congestion could be reduced by 50% (Department for Transport, 2006: 50). If this 50% is applied to the £20 billion annual cost of road congestion that is assumed in this paper, then the road users' additional payment would be more than compensated for by more freely flowing traffic.

The costs and benefits of a scheme would not be evenly spread. The greatest increase in costs would be in the large towns and cities, but it is here that the congestion benefits would also be greatest. People living in small towns and rural areas would pay less than at present and receive some benefits from easing of localised peak congestion. Low-income car-owning households would pay significantly less than the better off (the lowest income quintile paying less than 60% of that paid by the upper quintile). This differential would change slightly from that under the current tax regime, and the increase in wealthier households' payments under distance based charging would be proportionately less than those for poorer households (whilst above-average income households' payments would barely change, below-average income households' payments would increase by about £90 per year). Wealthier motorists make more and longer car journeys than poorer car users and so would also benefit more from improved road conditions. However, the improvements to bus services would benefit lower-income and non-car-owning households, thus offsetting, to a degree, these effects.

Vans and lorries would pay more under a pay-as-you-go scheme than they do at present– 14% in the case of vans and 18% in the case of lorries. As heavy users of the road system (vans travel 21,000 km per year and HGVs 64,000 km per year, compared with an average figure for cars of 15,000 km per year), commercial vehicles would benefit most from the improvements to traffic conditions that pay-as-you-go would bring. Moreover, the time and operating costs savings from reduced congestion are significantly higher for commercial vehicles than for cars, so the higher charges would almost certainly be more than compensated for by the benefits of reduced congestion and better journey reliability, which is of particular importance to commercial vehicle operations. If charges vary between the peak and off-peak there is a further advantage that some traffic will shift to off-peak times.

**Governance is the key**

I have noted at several points that people are acutely aware that, whatever the primary aim of road pricing, it raises revenue. There is some evidence that many people feel it is reasonable to pay for things as they use them and that applies to roads. But they care a great deal about what happens to the revenues. In the roads context trust has been badly damaged by the long history of using "charges" in the form of motoring taxes as a prime source of general tax revenues, the spending of which bears little relationship with the spending on roads and over which road users have no control.

This issue has to be dealt with explicitly if there is to be any progress with road user charging. I have related how the acceptability of the London scheme depended on statutory hypothecation of the revenues to transport purposes in the London area—against the opposition of HM Treasury. Furthermore, London has a distinct government and there is sufficient transparency for the elected Mayor to be held to account for the setting of the rates of charge and the use of the revenues. This is a crucial difference between London and the other conurbations, such as Manchester and Birmingham that have contemplated their own schemes and have rejected them.

This ring fencing and accountability is also missing at the national level for roads, though it has been successfully established (in principle at least—perhaps not fully, in practice) in the cases of the regulated utilities such as gas, electricity and water which had the same problem when they were Nationalised Industries.

These points are illustrated in the following. In May 2013 the RAC Foundation commissioned an Ipsos-MORI internet survey of two thousand British adults aged between 16 and 75 of which 80% lived in car/van owning households

Whilst 59% of people thought paying for using motorways in relation to how often they made journeys on them would be fair only 31% supported the introduction of such a scheme and 32% were strongly opposed. Only 8% trusted Government to spend additional money raised from Pay-By-Use charging only on motorways.

When asked about a Pay-By-Use scheme in which motorway users would pay £100 a year or £5-£10 a journey support varied widely according to what was proposed to compensate users and provide safeguards on the use of the proceeds: clear swings towards support in response to further detail on payments and statements 'if…'

| | Support % | Oppose % | Net % |
|---|---|---|---|
| ...road tax, that is the tax disc, was reduced for all drivers (not just motorway drivers)? | 52 | 20 | +32 |
| ... fuel duty, that is the tax on petrol and diesel, was reduced for all drivers (not just motorway drivers)? | 60 | 17 | +42 |
| ...every £1 raised by payments would be matched by a £1 reduction in motoring tax (road tax and fuel duty on petrol and diesel) for all drivers? | 49 | 20 | +29 |
| ...it meant there was an overall increase in the amount spent on maintaining and improving motorways? | 37 | 24 | +12 |
| ...the money raised was spent only on maintaining and improving motorways? | 40 | 26 | +14 |

| | | | |
|---|---|---|---|
| ...there was an independent watchdog to make sure the payments required of motorway users were reasonable and that the money was being spent on what had been promised? | 49 | 23 | +26 |
| ...a regulated private sector company made decisions about how to spend the money raised on motorways? | 13 | 54 | -40 |

There are particularly high levels of support if fuel duty reduced (60% vs 17%) and road tax reduced (52% vs 20%). (But note that no detail was provided on extent of reduction.)

There is also strong support; 32% strongly support if fuel duty reduced, 25% if road tax reduced.

The prospect of an independent watchdog is helpful in generating net support of 26%.

Clear margins in support for all propositions with exception of involvement of a regulated private sector company to make decisions about how to spend the money raised on motorways; 54% opposed, 13% support.

*A ring fenced fund*

Wadsworth (2014, paragraphs 3.1 to 4.7) convincingly argues that, in the context of the strategic road network, the problem of would be greatly eased by creating a new, ring-fenced fund.

> "Creating a free-standing, dedicated fund for roads is *by far* the most important single thing the Government could do to transform the management of our road network and its contribution to the wider economy. ... A new road fund could be established in the wider public sector, sufficiently distanced from central Government to take most of the electoral politics (and associated risk) out of roads planning and delivery. Management of the fund could be placed in the hands of a road fund trust, having appropriate representation on its board. The trust would be empowered by legislation to collect payments into the fund. It would adjust the level and structure of those payments as required to maintain the adequacy of the fund, in compliance with statutory objectives which fix the *enduring principles* of governance. In discharging its stewardship of the fund and its income, the trust would be overseen by an independent Roads Regulator ... .
>
> "Trust has been a serious missing ingredient in the existing funding arrangements for roads. The establishment of an independent, special purpose trust to preside over the future funding of roads, with appropriate user representation, would be both a symbolic and a profoundly significant change. ...
>
> "Initially the fund could be supplied simply by hypothecating the revenues from Vehicle Excise Duty and the lorry road user charge. ... The collection and enforcement processes could continue to work in the same way as today. ...

> "In this new world, the link between the fee and the service provided is transparent and independently regulated. Not only is there a reason why the fee exists: there's also a verified justification for why it needs to be set at a particular level. ...
>
> "The current level of VED receipts would suffice to supply a fund for the national strategic road network, as of today. ... When the time comes that changes need to be made in the level and/or structure of the road licence fee – as it will – the road fund trust and the Roads Regulator will be (and will be seen to be) in control of the decision-making process. ... Funding for roads can progressively be aligned with the realities of delivery planning and asset life cycles ..."

A public corporation or public trust would set policy, allocate budgets, make investment decisions and execute those decisions. High-level objectives would be enshrined in the enabling legislation and subject to variation by Parliament. The overall budget would be set by government and funded by grant.

It could be given powers to make charges to users and to issue debt. There is a long and continuing tradition of using this structure, which still operates for a number of English ports and airports. The London Passenger Transport Board was, between 1933 and nationalisation in 1948 a trust, funded by charges to users and with the board members nominated by a number of non-governmental bodies. Another analogy might be the North American and Australasian trusts set up by statute to deliver public services: NavCanada, the Canadian body delivering air traffic control services was considered as a possible model for both UK air traffic control and when bringing Railtrack out of administration. In the event National Air Traffic Services was constituted as a Public Private Partnership and Network Rail as a company limited by guarantee because it was considered that the relevant trust legislation would have created difficulties. If this model were to be considered again particular care would have to be taken to ensure that independent regulation could be introduced into the trust structure.

Securing a publicly acceptable level of control over the level of charges would be a problem to solve, absent direct political control. The *rules* for setting charges could be set out in the governing statutes and their observance could be independently audited.

A difficulty is that if a significant portion of the funding were to come *via* the Government then the Government is likely to insist on a strong measure of control over the body—for instance by making most of the board appointments—which will risk the body being classified in the public sector. The consequence of this is that revenue and capital budgets would become entangled in the general public expenditure process.

If the body were receiving its income through user charges, with a portion of those revenues designated for transmission to the Exchequer in replacement for present road tax revenues then the cash would be flowing the other way and this problem might be solved. The debt of National Air Traffic Services is classified to the private sector. However, Network Rail has now been re-classified as a public corporation.

It is apparent that there is a great variety of arrangements in existence and that in the past ingenuity has been employed to create bodies with a structure of control and classification of debt to suit the policy requirements of the day.

The July 2013 Strategic Highways reforms are significant and welcome, particularly because, if delivered, they will bring necessary new resources into roads and contribute towards the investment in capacity needed to provide for economic and population growth. Future governments may choose to go no further. Arguably, the separation of the HA is not, in itself, an important reform. However, it could become an important step towards a much more fundamental change in which ownership transfers to a different body such as a statutory public trust, mutual or private shareholder company. This could accompany a change in the charging regime from the present road tax system to, in full or in part, using a distance-based charging scheme.

**Conclusions**

It has become a standing joke that even if any UK politician is unable to deny the logic of the case for some form of road pricing, they are never willing to implement it within the next ten years—by which time they will be long gone. (With the exception, of course, of London.)

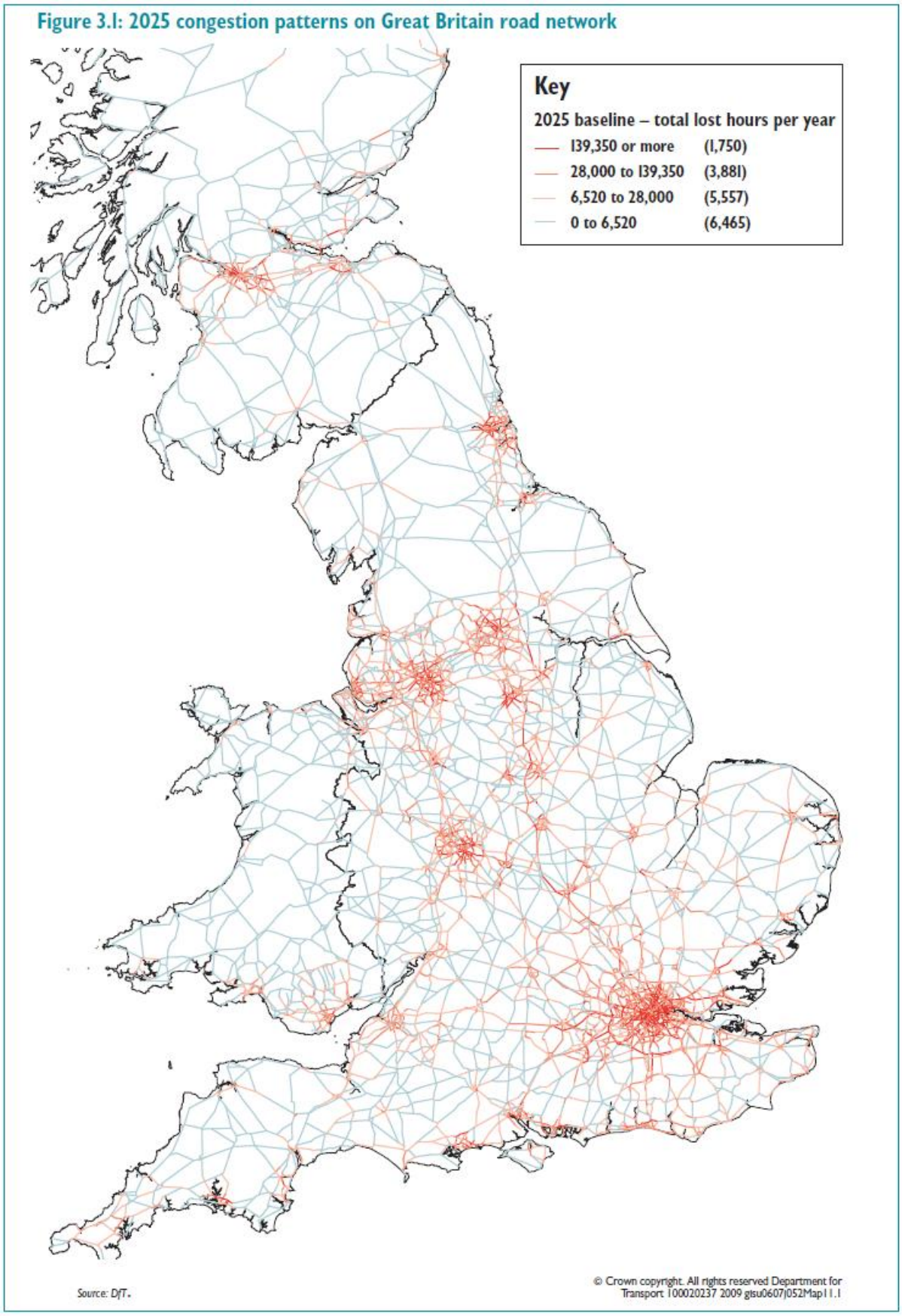
If it is the case that the level of public understanding of the problems is insufficient for anybody to risk proposing the implementation of a "big bang" national scheme then is there scope for considering a staged transition?

*One problem or four?*

Figure 3.1 from the Eddington Report (below) illustrates the location of road congestion as estimated in 2025. This and Figure 1 above illustrate road congestion is a very variable thing, both in time and space. The Road Pricing Feasibility Study and Eddington Study assumed a single national scheme, and therefore that the same "solution" would apply in all circumstances, differences being reflected in rates of charge. Arguably there are several distinct problems.

Table 6 gives an estimate by Bayliss (Glaister, Lytton and Bayliss, 2011) of how social cost-based charges in current conditions could vary by type of settlement. This is derived from *Roads and Reality* (Banks *et al.* 2007) and other sources.

As is to be expected, charges would be highest in London at around treble the national average and double those in the other large metropolitan areas. As the size of settlements




Source: Eddington Transport Study, 2006, page 99.

reduces average charges fall primarily because of much less congestion on single carriageway roads – both major and minor – rather than on dual carriageways.

**Table 6: Charge rates for cars by type of area and type of road (pence per vehicle km)**

| **Road Type** | **London** | **Metropolitan areas** | **>250k** | **>25k** | **>10k** | **>3k** | **Rural** | **All** |
|---|---|---|---|---|---|---|---|---|
| Motorway | 5.1 | 5.0 | 4.1 | 3.2 | 2.3 | 1.8 | 1.6 | 4.1 |
| Dual Trunk | | | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.6 |
| Dual Principal | | | 3.3 | 3.2 | 2.9 | 2.7 | 2.5 | 2.1 |
| Single Trunk | 30.3 | 9.9 | 8.5 | 7.1 | 5.7 | 4.2 | 3.9 | 10.2 |
| Single Principal | 21.5 | 11.5 | 10.2 | 8.9 | 7.5 | 6.2 | 5.7 | 8.0 |
| B&C | 23.8 | 10.6 | 9.0 | 7.4 | 5.8 | 4.2 | 3.8 | 7.7 |
| Minor | 12.1 | 9.2 | 7.9 | 6.6 | 5.3 | 3.9 | 3.6 | 5.7 |
| All | 19.0 | 8.7 | 7.5 | 6.3 | 5.1 | 4.0 | 3.6 | 6.1 |

Source: Bayliss in Glaister, Lytton and Bayliss, 2011.

It is apparent from the Eddington map and Table 6 that London stands alone. Then, one might identify the metropolitan areas and larger urban areas as a group. And finally the smaller townships and rural areas, where there is much less of a problem.

Note that the Motorways and dual carriageway roads appear to suffer less of a problem than the lower capacity roads. However, these are average figures, concealing problems on particular routes and at particular localities.

Also note that there is a crucial time of day distinction: there is very rarely a congestion problem anywhere in the middle of the night.

Hence we might identify five kinds of problem:

- London
- Motorways and dual carriage ways.
- Single carriage way main roads.
- Large urban areas
- Rural areas and small townships.

Here any congestion problems are best dealt with, as now by parking and other traffic management measures. Having said that one must not neglect the problem of traffic diverting from newly-charged roads onto local networks. The risk of this needs to be

The case is clear in London. There is already a successful scheme that is generally accepted. The congestion case for some kind of extension is more pressing than ever. London needs the money. Technical and administrative solutions are available. Rapid implementation of new forms of electronic payment for bus and rail services in London offer a natural opportunity to include road use.

In London concern is growing about the health damage due to vehicle emissions and recently this has been cited as a reason to consider extending road pricing in London (for example, "Boris would scrap tax and duty to charge motorists by the mile", *The Times*, 13 September, 2014). This is a valid consideration and it may be an influential argument to gain public acceptance. However proposals should be properly related to the underlying science and the proper distinction between congestion and air quality motivations should be transparent: otherwise the policy will become discredited sooner or later. The London Congestion Charging scheme was corrupted (to a minor extent) to serve environmental aims. At one time motorists in Richmond were paying 'environmental' parking charges, 'green VED and fuel taxes' and environmentally related 'congestion charges' if they went into central London. Such confusion is unhelpful.

For the Motorways and some of the major roads under the ownership of the Highways Agency under the new arrangements the case depends upon one's view of the likelihood of future governments being able to find sufficient from the Exchequer to fund the maintenance and investment that is required. The historical precedent is not encouraging on this. Conservative, Labour and Coalition governments have all reversed policy at least once on investment in strategic roads. It would be unwise to assume the current government's promise of a massive increase in public spending on strategic roads will necessarily survive long after the General Election, no matter who wins it. I have argued that as in 2010 the new Chancellor will find that "there is no money left."

The simple two-level licensing scheme considered and rejected by the present government seem like a good place to start for raising new funding (see Wadsworth, 2011). It was proposed in the Smeed Report (Section 5.3).

But it would only gain acceptance if a dedicated fund is created to receive the payments and proper governance were created. We have noted that a number of methods for doing this are in use in other contexts—such as the public trust or (publicly owned) independently regulated utility. There would also have to be offsetting changes in existing road taxation. This could create a system comparable with the long-established and successful ones in continental Europe.

This leaves the single carriageway main roads and major urban areas outside London. There is currently discussion of the possibility that in Manchester and one or two other conurbations sufficiently strong local governance may be created to allow replication of the London experience.

However, the present government's move towards devolution of powers and funding to Local Enterprise Partnerships and Local Transport Bodies has created much confusion on

accountabilities. There seems no hope of moving to road pricing in the remaining areas, unless it were a part of a national scheme. Unless, that is, a future government were to return to strong metropolitan transport authorities with wide-ranging powers and responsibilities.

This leaves a large portion of the situations of serious shortages of road capacity untouched. Absent road pricing the alternatives are

(a) Tolerate the ever-declining service quality
(b) Attempt to use alternative traffic reductions measures
(c) Provide more physical capacity

Both (b) and (c) will be sensible and productive in particular situations but they are both expensive and of limited efficacy.

*Lessons from experience*

Some of the lessons from the English and worldwide experience are as follows.

It is near-impossible to win a direct vote on a proposal to introduce road pricing. The arguments in the abstract are too difficult to convey to the general public. This was illustrated in Edinburgh and Manchester. The London scheme was not subject to a specific vote and it would have been lost if it had been. The repeated experience is that, once in place the public will understand the benefits of a well-designed scheme and would vote to keep it (Walker, 2011, US Department of Transportation Federal Highways Administration, December 2010, "Reducing Congestion and Funding Transportation Using Road Pricing in Europe and Singapore").

Any public discussion must have a properly-researched, specific scheme. People have to know who will pay what, when and what the effects are estimated to be. Any scheme must put simplicity and understandability above "accuracy".

This https://www.youtube.com/watch?v=brkWzWtqdJk&feature=youtu.be is an excellent public information film clip by the Department of Transportation of the State of Oregon, giving the motivations for a recent successful trial of electronic road pricing. Interestingly, it was applied only to vehicles with low consumption of fossil fuels, in order to recover the fuel tax revenues to fund the operation of the road network. It is a model of good presentation to the public.

Confidence in a clearly declared cap on the maximum people may be asked to pay would allay fears of an open-ended liability. This would help mitigate the destructive effect of alarmist publicity such as accompanied the Road Pricing Feasibility Study and the Manchester proposals.

Schemes need to avoid being unnecessarily technically complicated and should minimise the extent of physical modification to vehicles. Successful schemes can be rough-and-ready in that they should not require absolute geographical precision—which is expensive—or complete compliance—just as we do not pretend to achieve complete compliance in other

areas of transport charging. Automatic number plate recognition has been in successful operation for ten years in London and could undoubtedly be used easily on motorways.

It is important not to inflict the cost and inconvenience of road pricing when and where there is not a sufficient problem to justify it: and that is most times and places!

Having said that, developments for other purposes are making sophisticated electronic charging systems more plausible. The ubiquity of geographic location systems for navigation, eCall and motor insurance are creating new possibilities.

Not infrequently proponents of road pricing as a practical solution to a real problem have allowed themselves to be portrayed as requiring motorists to pay for what they already get for free. Road pricing can never be discussed in isolation from a complete reform of taxes and charges, together with improvements in level of service to traffic and improvements to public transport and cycling.

Hence, a proposed scheme must be clear about what the net revenues will be and who will benefit from them. In other words it must be explicit and realistic about precisely what is going to happen to the revenues: the extent to which they will be used to offset existing road taxation and to improve the service offered to those paying the charges; as well as complimentary improvements such as public transport. The costs of the scheme must be presented and these must explicitly identify the compliance costs to the users.

The merits of road pricing stand on their own as a way reallocate the space by time and place amongst private vehicles and commercial traffic. That way the economic value of the assets is increased because those that value it most get to use it. But the public are attracted by the argument that public transport, as an alternative to the car would benefit. This in two ways: less congestion reduces bus operating costs and improves reliability, as clearly demonstrated in London; and there is the opportunity to use some of the net revenues to reduce fares or improve service on all forms of public transport. But it is important to be realistic about this last argument. Revenues spent on public transport cannot also be spent reducing conventional road taxation. Also, without the especially high densities to be found in Central London, the cost of improving public transport sufficiently to replace the car in the eyes of users can be prohibitive.

It is crucial that a proper assessment is presented of what will happen if nothing is done and what road pricing has to offer as an alternative. If charges vary by time of day they also will shift commercial vehicles and some other journeys into the off-peak. They will reduce charges in much of the countryside and other uncongested areas. They will have benefits for carbon dioxide emissions and air quality.

In the UK circumstances the alternative to road pricing seems likely to involve

- increasing rates of fuel duty and vehicle excise duty in order to counteract the consequences of the “greening” of the vehicle fleet;
- a failure to deliver promises for increased investment in the strategic network;

- continued decline in maintenance and investment in the local authority network;
- and relentless decline in the speed and predictability of passenger and freight journeys on the roads.

Most importantly, trust must be established that the promises will be delivered: in particular that there is transparent accountability for the net revenues. That implies being explicit about the relevant governance.

For whatever reason the English public are resistant to the notion that there would be any element of privatisation. Proposals need to be clear that the organisational reforms proposed do not need to include privatisation.

Road pricing is not ten years away. It is here now in London and number of places overseas.

It is hard to see how London's special problems can be dealt with unless the London scheme is extended. As I argued in 1998 an attractive way to do this would be to include charging for use of the roads on the standard charge card currently used for all other modes. This may now be possible using the electronic technologies.

The government have already been close to introducing a sensible, simple system to deal with the pressing funding and financing issues for the Motorways and some other major roads. A future government should return to this immediately, developing the current reforms to the Highways Agency and creating a ring-fenced fund to receive and be accountable for the revenues.

That leaves the bulk: non-London local authority roads and the single carriageway strategic roads. The majority of these do not have a sufficient problem to justify intervention. But they do include many pressing congestion problems. It is hard to see how those can be addresses by road pricing except as part of a single national scheme.

A *national* scheme as envisaged in the Smeed Report does, indeed, appear to remain ten years away at the least. But if—as I hope—the targets on carbon dioxide emission are met, it current fuel duty revenues will have to be replaced and it will have to come sooner or later.

Meanwhile the London scheme should be extended. The current move towards replicating the London government model in other major conurbations with more powers and more autonomy over local taxation creates the opportunity to reconsider the matter in the other conurbations. Funding the major strategic roads should be reformed, with an element of charging and ring-fencing the revenues.

All of this, of course, to be placed in the context of a comprehensive reform of conventional roads taxation—something that will be needed in any case.

Whilst this piecemeal approach does not have the appeal of the comprehensive "solution" envisaged by Reuben Smeed or Sir Rod Eddington and many distinguished others, it is more likely to come about within a decade and it could achieve the pricing of a significant portion of the road congestion in England.

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