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MOVING THE ROAD SECTOR INTO THE MARKET ECONOMY

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About the author

Gabriel Roth, civil engineer, transport economist, and early IEA author, researched the benefits from road improvement in the government's Road Research Laboratory, and the economics of car parking at the Department of Applied Economics in Cambridge. He served on the Ministry of Transport's 'Panel on Road Pricing' which reported in 1964. From 1967 to 1986 he was on the staff of the World Bank in Washington, which published his book on the private provision of public services in developing countries. Roth's other publications include *Paying for Parking* (IEA, 1965); *A Self-Financing Road System* (IEA, 1966); two other books on the economics of roads; and over thirty papers on transport pricing, regulation and privatisation.

Summary

- Transport policies which favour rail over road make little economic sense. Investment in roads typically yields higher financial and social returns than investment in rail.

- As a result of current policies, Britain's roads are the most crowded in Europe. Congestion is estimated to impose costs of around £20 billion a year in the UK.

- The basic problem is that roads are outside the market economy. Road users do not receive the facilities they are prepared to pay for. A shortage of road space does not encourage suppliers to provide additional capacity because investment in roads is constrained by government policy.

- Market prices, i.e. prices determined by supply and demand, are an essential part of commercialisation. They are needed to help allocate scarce road space and also to signal shortages and thus help investors relieve them.

- Some, or all, of the payments associated with road use would be treated as fees paid to road owners for the use of their roads, rather than as sumptuary taxes to the Treasury.

- Mileage-based tolls could be introduced on a voluntary basis. Drivers who opted for pricing could get rebates for miles driven and exemption from vehicle taxes. Such a voluntary system would test road-users' reactions and allow firms to test out equipment and billing technology. The current operation of mobile phones shows how a priced road system might work.

- If voluntary schemes gain public support, a comprehensive pricing system for roads could be established. Road-owning entities would take over the existing roads and run them on a commercial basis. The tolls paid to the owners would be matched by an equivalent cut in Fuel Duty and/or Vehicle Excise Duty. The rights of private investors to provide new road capacity should also be established.

- If system-wide charging were not possible, private road providers could be allowed to construct tolled express lanes where government roads are congested. ‘Shadow’ toll schemes could also be re-introduced to bring in private finance for new capacity.

The failure of current government transport policies

Current UK transport policies, which seem to be summed up in the four words, ‘Rail - good; roads - bad’, make little economic or political sense. They make little economic sense because investments in roads typically yield higher social and financial returns than investments in rail (see Eddington, 2006; Dodgson, 2009). And they make little political sense because 90 per cent of passenger traffic and more than 60 per cent of freight movement is by road (DfT, 2012). By contrast just 8 per cent of passenger traffic and 10 per cent of freight goes by rail. Yet government spending on transport now averages approximately £6 billion per year on rail transport and £9 billion on roads (ibid.).[1]

Despite these high expenditures, a recent report[2] suggests that, for almost all destinations, it is often cheaper to travel by air, and much cheaper by coach, than by train. The report finds that for travel from London to Glasgow the standard off-peak train fare is £122, a typical air fare £104 and coach fare £35. For travel by car, the cost for one person is approximately £140, but only £70 if the car is shared. Travel by coach is so much more economical than by train because the coach shares the road right-of-way with other road traffic, while the costs of a train’s right-of-way fall entirely on the rail system.

[1] Rail figure includes Crossrail but not London Underground.

[2] Smith, O., ‘Planes cheaper than trains on half of routes’, *The Daily Telegraph*, 16 August 2012.

Payments by travellers by both road and air are high enough for these modes to be served without subsidy, yet the government chooses to subsidise the mode that is not only the most costly, but is not even the fastest for most trips.

As a result of current policies, Britain's roads are the most crowded in Europe. According to World Bank data[3], there were recently 77 vehicles per kilometre of road in Britain, compared with 39 in France, 72 in Germany and 63 in the Netherlands. In the USA this density was 38 vehicles per km. Adjusted for traffic levels, Britain also has a far smaller motorway network than other developed economies (IRF, 2011). It has the worst congestion in Western Europe, estimated to impose annual costs of approximately £20 billion (Schade et al., 2006; Blythe, 2005).

[3] http://data.worldbank.org/indicator/IS.VEH.ROAD.K1. Vehicles per kilometre of road include cars, buses, and freight vehicles but do not include two-wheelers. Roads refer to motorways, highways, main or national roads, secondary or regional roads, and other roads.

What is wrong?

Why are things so wrong with transport in Britain? Why is it that travellers can buy vehicles, can buy fuel, can get insurance, but cannot move quickly on many urban roads? Would more roads, or better investment decisions cure the problem?

All of these proposals could bring some relief but, in my opinion, would not solve the basic problem, which is that roads are outside the market economy, as was food in the Soviet Union. Road users are not required to pay the costs needed to produce their trips, and do not expect to receive the facilities they are prepared to pay for. The shortage of road space in, for example, south London does not encourage suppliers to provide additional capacity, because investment in roads is constrained by government policies.

Things would work differently in a market economy. If commercially supplied roads were to become congested, then some customers would be willing to seek quicker travel by paying more for the roads they used. They would themselves produce the additional funds, for example by delaying the purchase of new cars. This process of capacity expansion would continue to the point at which additional payments by customers equalled the costs of capacity expansion. So it would be customers - not governments - that would determine the amounts and locations of infrastructure expansion.

Milton Friedman and Daniel Boorstin advocated that roads be privatised ‘so as to put the building and maintenance of highways more and more on a common footing with other economic activities in a free-enterprise economy, thereby bringing to our highways the

initiative, competition, efficiency and freedom from political manipulation that only free enterprise can provide' (Friedman and Boorstin, 1996).

Friedman and Boorstin could have added that having roads in the market economy would transform roads from the financial liabilities they are today to productive assets which would enable road users to have most of the roads they were prepared to pay for. Furthermore, roads in a market economy would also pay rents to landowners and taxes to governments.

Commercialisation or privatisation?

The difference between commercialisation and privatisation is that commercialisation can include governments as owners while privatisation requires that ownership be non-governmental. Commercialisation without privatisation is well recognised in Britain. Until privatised by the Thatcher government, telecommunications, water, electricity and other utilities were provided commercially by government agencies. Many port services are still so provided. So are postal services.

Privatisation has substantial advantages over commercialisation. Firstly, governments running commercial services often allow prices to be influenced by political considerations, for example to keep them low, as are the fares on many public transit services.

Secondly, government-owned enterprises tend to be monopolies, so customers do not get the benefits of competition. For example, a recent proposal to improve the management of roads in Britain envisages a 'National Roads Corporation … to develop and manage the strategic road network [and] to collect and disburse the revenues from a national road pricing scheme' (Banks et al., 2007). Such an arrangement would be an enormous improvement over present ones, but a system in which individual roads, subject to common standards, were owned by competing owners free to set their own prices, might offer road users a better deal.

Commercialisation of roads in Britain could nevertheless bring major benefits. So long as private providers were allowed to enter the market and compete on equal terms with government providers, many would welcome commercialisation as an interim step to privatisation.

The need to improve road pricing

Market prices, i.e. prices determined by supply and demand, are an essential part of commercialisation. They are needed to help allocate scarce resources - road space, in this case - to those with more urgent needs, and also, through the medium of profitability, to signal shortages and thus help investors to relieve them.

Except for the M6 Toll Road and some river crossings, road use in Britain is currently devoid of any pricing. When the Smeed Committee was drafting its report on road pricing (Ministry of Transport, 1964), it referred to the fuel tax as being part of a pricing system for the use of roads. Treasury officials strongly objected, and informed the Committee that under no circumstances could the fuel tax be described as a price for road use. Informally, comments were made about revenues from taxes on spirits not being dedicated to 'rest homes for alcoholics'.

So, in advocating the introduction of road pricing in Britain, we should recognise it as a fundamental change that would result in some, or all, of the payments associated with road use being treated not as sumptuary taxes to the Treasury, but as fees paid to road owners for the use of their roads.

We should also recognise that pricing is inextricably tied to commercialisation. Not only is commercialisation impossible without pricing, but pricing road use in Britain would be politically difficult if road users came to regard it as just another contribution to general revenues.

Aside from not wanting to pay more taxes, many road users also associate electronic road pricing with ‘tracking’ by government computers, and fear it could lead to loss of privacy. Such fears are less prevalent when tolls are collected by non-government entities. When electronic tolling was started in 1995 by a private company in California (a part of the world in which privacy is jealously guarded), toll payers were given the option of opening accounts without disclosing their real names. Fewer than a dozen of the thousands of account holders accepted this offer.

Roads are probably in the public sector because, until recently, it was difficult to charge for their use without requiring road users to stop their vehicles and pay tolls. But electronically-aided payments show promise of overcoming this difficulty, so this seems an appropriate time to re-visit some of the issues relating to the pricing and ownership of roads.

The following will be considered:

- Firstly, suggestions for improving road-use charging;
- Secondly, an example of how new road charging methods might be introduced on a voluntary basis.
- Thirdly, a description of how a privatised road system might operate, if priced in the manner of mobile phones;
- Fourthly, suggestions for privatising road systems even with existing charging systems.

Improving charging for road use

As the commercialisation of roads depends on the ability to charge for their use, methods for charging merit a brief review.

Tolls financed many long-distance roads in the UK well into the 19th century but were not practicable for local roads. Dedicated trust funds enable all roads to be financed by taxes on fuel. They were first introduced by Chancellor of the Exchequer David Lloyd George in 1909, and subsequently in the USA (in Oregon) in 1919. Although the word 'taxes' was (and still is) used in connection with these surcharges, Sir Edgar Harper, economist and Chief Valuer to the Inland Revenue, pointed out that a dedicated road fund

> *'… is not fed by taxation in the strict sense of that term. It provides machinery by which the owners of motor vehicles, in combination and under State guidance, are enabled to expend money on roads for their mutual benefit'* [4]

Surcharges on fuel are used to pay for roads in the USA, and in some other countries, because of their convenience and low collection costs. But not in the UK. Since the winding down in 1938 of Lloyd George's Road Fund (Jeffreys, 1949), there is no formal connection in Britain between taxes paid by road users and government expenditure on roads.

[4] Letter published in *The Times* newspaper, 5 February 1926.

Despite the comparative ease of collecting fuel taxes, they are an unsatisfactory method of charging for road use because the taxes paid do not reflect the costs arising from different trips, which can vary from road to road and also, due to congestion, from one time of the day to another. Furthermore, vehicles of similar weight and size can consume different amounts of fuel, and battery-powered vehicles can consume no fuel at all. So a new method for road charging is needed. The most direct method is a fee for every mile driven. This is now referred to in the USA as a 'mileage-based user fee' (MBUF), and is being promoted there by the Mileage-Based User Fee Alliance.

Requirements for an MBUF system

Ideally a mileage-based user fee system for funding roads should meet the following criteria:

- **It should enable all roads to be charged for.** A system that, for example, charges only for the use of main roads, would result in diversion of trips to local roads. This could lead not only to massive evasion of road charges but also to unacceptable environmental deterioration along the local roads being used for diversion.
- **It should enable charges to be varied to meet different circumstances.** Different owners should be enabled to charge at different rates, and to vary charges by time-of-day, axle configuration, and other relevant factors.
- **It should be 'inter-operable' in the whole of the UK and ultimately in the rest of Europe.** Road users should be able to pay for travel on all public UK roads without having to use more than one payment system. This does not mean that only one system can be used in the UK. It means that all systems in use have to conform to common standards. There are scores of different telephone companies that follow inter-operable formats that enable calls to be made seamlessly to recipients in other places.

- **It should enable charges to be passed from road users to road providers without necessarily needing government intervention.** We pay for our use of electricity, gas, telephones and water directly to the suppliers and the same principle should apply to paying for road use.

- **Fees charged should be verifiable.** Billed road users should be able to check the basis for charges levied on them, to enable assessments to be challenged.

- **Privacy of road users should be assured.** The public would not accept a system that would enable trip information to be accessible to any person except the vehicle owner concerned. One form of assurance would be a guarantee of large monetary compensation to anyone whose privacy is violated.

- **Collection costs should be low.** Recent work (Fleming, 2012) has shown that, in the USA, the costs of collecting both fuel tax and electronic tolls can be about 5 per cent of revenues. Singapore's collection costs for its 1975 manual congestion charging system were 6 per cent of revenues (Hau, 1992). London's costs for collecting congestion charges were reported to be 40 per cent of revenues[6]. The Netherlands, when seeking to introduce charges for road use in 2011, set a cost ceiling of 5 per cent of revenues. Costs in excess of 10 per cent of revenues are often deemed unacceptable.

[6] http://en.wikipedia.org/wiki/London_congestion_charge#Income_and_costs

The first condition, that use of all roads should be charged for, may require that 'In-Vehicle Units' (IVUs) be in every vehicle to record details of its travel, with trip details remaining in the vehicles. This avoids the necessity of gantries being placed on every road segment to record the passage of vehicles on it. A comprehensive road pricing system should also take account of the time, distance and place of travel. Those advocating the use of GPS (Global Positioning System) based units claim that they can, without violating travellers' privacy, assess total charges payable for the use of individual road segments without broadcasting information about individual trips. Billing organisations, as used for credit cards, then debit or credit users' accounts as appropriate. This technology is already being used to assess charges for lorries on Germany's Autobahn. A US Congressional Commission recommended in 2009 that such units be developed in the USA to replace the federal fuel tax (NSTIFC, 2009). However, other technologies may be superior, and only large-scale testing can determine the most suitable.

So road user charging needs more research, but considerable work has already been done. A successful pilot test was conducted in Oregon (Whitty, 2007), and studies have been made by the Puget Sound Regional Council in Washington state (Puget Sound Regional Council, 2008), and by the University of Iowa (Hanley and Kuhl, 2011). Furthermore, ISO (International Organization for Standardisation) standards have been developed to cover members of the European Union[7]. Thus further research can benefit from work already done. For example, the ISO standards recommended for Europe, which include strong privacy protections, could be taken as starting points.

[7] ISO 17575, Parts 1 and 2 (2009), Parts 3 and 4 (2010)

Proposal for a voluntary change in one UK county

One way to introduce these new methods would be on a voluntary basis, i.e. to allow mileage-based charging to be used by those who choose to do so. This would require the new systems to incorporate features attractive to road users, for example access to convenient street parking; to Pay-As-You-Drive insurance (attractive to low-mileage drivers) (Grush, 2010); and to rewards and discounts, such as cash rebates for miles driven or exemption from vehicle license fees (Kalmanje and Kockelman, 2004). Such voluntary systems would not only test road users' reactions, but also allow equipment manufacturers to try out new products, and billing companies to apply their experience to bill for road use.

This is not a new idea. The late professor Peter Hills, who was involved in the preparation of road pricing schemes for Cambridge, suggested it in 1998 (Hills, 1998). RAC Foundation researchers suggested it in 2007 (Banks et al., 2007). And the House of Commons Transport Select Committee called for 'the Government to look for volunteers who would be ready to accept "pay-as-you-drive" charging. In return they would not have to pay Vehicle Excise Duty and could also see their fuel taxes reduced or scrapped.'[8]

[8] 'MPs call for motorists to take part in voluntary road pricing scheme', *The Daily Telegraph*, 24 July 2009.

The proposal below is based on one made by me to the 2009 public enquiry set up by the Cambridgeshire County Council when it was considering introducing a congestion charge to reduce congestion in the city by 10 per cent[9]. The essence of the proposal was that owners of vehicles registered in Cambridgeshire could, for a trial period, elect to pay a variable cost-based mileage charge for all vehicular travel on county roads, paying less than they did for travelling on uncongested roads, and more for using the most congested ones. Those choosing not to participate would pay no congestion charges, and get no rebates for using uncongested roads.

Equipment. Road users with vehicles licensed in the county could choose to place appropriate 'In-Vehicle Units' (IVUs) in their vehicles to record the details of travel on the roads for which the county is responsible (i.e. not on roads such as the M11 and A14, which are national roads going through Cambridgeshire). The county council would select the most suitable equipment for the IVUs.

Billing. Every participating road user would have a county 'road account', similar to a telephone account. The IVUs would be programmed to transmit to designated billers information about totals of miles travelled, but not details of individual trips. The billers would then arrange for the accounts to be debited or credited. The billers could be council officers, or a specialist billing firm, possibly one that currently handles telephone billing. Accounts would generally have to be in credit, and could be set for automatic replenishment when low in funds.

[9] Submission No. 70 on web site http://www.cambstransportcommission.co.uk

Determining the charges. The charges for road use, which would vary in accordance with the time, distance and place of travel, would be determined in accordance with rules set by the council. They should be at least high enough to cover the costs of providing, maintaining and operating Cambridgeshire's roads. Users of congested roads would pay additional charges designed to meet the council's congestion objective, which was to reduce the level of congested traffic by 10 per cent.

Rebates for the use of uncongested roads. As the county spends less than two pence per vehicle-mile on the roads for which it is responsible, and as the fuel duty rate caused road users to spend about 10 pence per vehicle-mile, there was scope to reduce the amounts paid to the level of the cost of using uncongested roads. A typical UK vehicle covers 10,000 miles a year. If, for example, vehicle owners in Cambridgeshire travelled half their miles on the county's roads (excluding those for which the county is not responsible), a rebate of 3 pence per vehicle-mile would yield a total credit of 15,000 pence per year, or £150. These credits could be used to pay the congestion charges, or for 'travel vouchers' to pay for using public transport, or remitted as cash. Whichever way these rebates were spent, those who received them would still have financial incentives to avoid using congested roads and paying congestion charges.

Charges for using congested roads. Expert estimates assumed a daily congestion charge of £3-£5, irrespective of the number of trips or distance covered. They also estimated that £30 million a year would be raised, or £100,000 a day in a 300-day year. These figures imply that 25,000 vehicles could each be charged an average of £4 each weekday. In practice, the optimal charges could be determined only by trial and error.

Discouraging 'rat-running'. To avoid 'rat running' - travel on uncongested residential streets to avoid paying the congestion charges - charges should be high for the use of residential streets, except for those living near them.

No charges for using roads in one's own local area. The charging system should be sensitive enough to be programmed to exclude from charge travel in one's own district, parish or village. For example, vehicle-owners living in Cherry Hinton would pay nothing for using the roads there, but others would be charged. Vehicle-owners could be allowed to choose the local area in which they could travel without having to pay road-use charges.

Treatment of vehicles not registered in Cambridgeshire. Non-county residents coming to Cambridge would be charged the congestion charges but also be given inducements to shop in the area - Cambridge is a major regional shopping centre. Inducements might include vouchers entitling them to discounts at Cambridge stores or subsidies to travel by public transport or to buy cheap petrol in the area. As these 'visitors' would still have to pay the congestion charge, it would be advantageous for them to take the inducements but to avoid using cars on the congested streets at peak periods.

Finances. There were reported to be 304,000 private cars registered in Cambridgeshire in 2009. If 150,000 of them accepted the offer to switch to the new scheme, and if each were paid a rebate of £100 a year, the total cost of rebates would be £15 million a year. The cost of 150,000 In-Vehicle Units, at (say) £100 each, would be £15 million. So the cost of the trial could be of the order of £30 million a year, equal to the expected revenues from congestion charges. So the County could reduce congestion significantly at a comparatively small cost and in a politically acceptable manner.

Weakness of this proposal. The weakness was, of course, that those who expected to use congested roads the most would be the least likely to choose to join the new system during the trial period. But the new system could be attractive to many, so a significant reduction of congestion might have occurred during the interim trial period, and public support for a permanent change thereafter.

Strength of the proposal. The trial scheme, if implemented, would have enabled new charging equipment to be developed and tested, and public reactions to be assessed.

I selected Cambridgeshire for my proposal because the county had invited comments on the proposal to introduce congestion pricing in Cambridge. In the event, the central government withdrew the offer to finance the scheme, and it was abandoned. This need not prevent other trials of road pricing methods, possibly in counties, such as the Isle of Wight, which attract less through traffic than does Cambridgeshire.

How a privatised road system could work

An example based on the current operation of mobile phones

To illustrate how a privatised road system might work, I give an example based on the current operation of mobile phones. The technology for payment, which was described in greater detail in a paper presented to the 2009 Annual Meeting of the Transportation Research Board (Grush and Roth, 2009), has not been tested on a large scale in the UK. But over 900,000 vehicles have been operating it successfully in Germany and Slovakia since 2005 and 2010 respectively.

The mobile phone analogy is given because the use of mobile phones is familiar to many readers. Other technologies are being developed that may be more desirable than the one described in this paper, which is focused on political economy, not technology. Those who can offer different technologies could help develop this topic by describing them.

Every road segment would have a clear and accessible owner. Road owners would be responsible for the upkeep of their roads and receive all payments made for their use. Road ownership could be either absolute or in the form of long-term concessions, say twenty to thirty years.

Use of all public roads would be subject to an interoperable payment system. 'Interoperability' would provide a framework within which different road charging systems could operate in any part of the UK - or even of Europe - enabling each road user, irrespective of location, to receive one bill for road use, and to have the payments routed to each of the providers of the roads they use.

Every vehicle would carry an 'in-vehicle unit' (IVU) to record details of its travel on different road segments, including details of location and time. The IVU could be built into vehicles, or be a separate electronic unit. The IVU would download information obtained by means of an appropriate technical system, possibly GPS-based. The downloaded information would belong to the vehicle's owner who could keep or destroy it. Precise travel information may be needed by vehicle owners to keep track of younger family members, for commercial applications (such as fleet management), and to enable charges to be challenged.

Payments could be made in the manner of paying for mobile phone use today. Totals of distances travelled, aggregated by road owner - but not details of individual trips - would be sent to a billing agency selected by the vehicle owners. The billers would debit the accounts of vehicle owners and credit the accounts of road providers, as is done with the billing of telephone calls today. Entities currently engaged in high-volume billing - such as for utilities or for credit cards - could profitably also bill for road use. More than one billing company should be employed, with road users being given the choice of selecting those to their liking.

Privacy would have to be guaranteed. A frequent objection to road-use metering, such as GPS-based ones, is that they allow vehicles to be 'tracked'. This objection is based on a misunderstanding. The satellites comprising the GPS enable road users to pinpoint their own locations, in the way that sextants were used at sea to enable mariners to ascertain theirs. But the sextants did not enable ships to be 'tracked',

and neither does GPS enable road users to be followed. If a vehicle equipped with a GPS navigation system is lost, the navigation system on it does not enable the owner to locate it. For this, an additional unit (popularly referred to as a 'bug') has to be fixed to the vehicle, to broadcast its position. Privacy would have to be guaranteed in the sense that those whose privacy was violated would be entitled to substantial monetary compensation.

Travel on local roads. As previously mentioned, use of all roads would have to be covered by the charging system, otherwise road users would be tempted to use local roads to avoid payment. However, to avoid double charging, provision could be made for exempting from road-use charges travel on local roads paid for by owners' property taxes. GPS-based charging systems, for example, can be programmed to exempt road users from paying road-use charges while in their own districts.

Provision of new roads. New roads, or major improvements, would be privately provided where justified by the prospect of private profit. They should of course not be protected from competition from existing, or newer, roads. Similarly, subject to their contracts, road owners would be allowed to sell, downgrade or abandon their roads.

Determination of road use charges. Could the determination of road-use charges be left to private road owners, who may be assumed to want to maximise their profits? This question has intrigued economists since the 1920s, when Frank Knight wrote that, if roads were provided by fee-charging private owners, the prices charged would be socially optimal (Knight, 1924). This assertion was challenged by (among others) James Buchanan and David Mills, who argued that Knight was only right where roads were provided competitively, and not by monopolists (Buchanan, 1956; Mills, 1981).

Long-distance roads are often provided competitively, in the sense that travellers have a choice of routes, but in many cases there may be no convenient alternatives. Local roads are typically provided by monopolies, such as local authorities or (as in rural Sweden) by associations of property owners. It may therefore be difficult to recommend that charges for road use (except in the case of new roads) should always be determined by their owners. On the other hand, it is also difficult to recommend that governments determine the charges, as the risk of politically determined road charges would deter private ownership. One way of resolving this issue could be to privatise roads by awarding concessions, and having the concessionaires bid the lowest charges they would make for an agreed period, such as twenty years. Concessions could be for segments of major roads, or for groups of neighbourhood roads.

Another possibility would be to have road provision regulated, in the manner of public utilities, and have the charges determined by regulators. However, this, like price determination by government, is likely to deter private ownership. Furthermore, recent research found that 'privatization without regulation significantly increases the benefits to motorists and society by differentiating tolls and service' (Winston and Yan, 2011).

Enforcement. Mobile inspectors could ensure that vehicles using the new charging systems carry the right electronic equipment and that it was working properly. The use of cameras on fixed gantries should be minimised. Inspection could be left to private road owners, but cases of fraud would be turned over to law enforcement agencies.

Overcoming obstacles to changing the status quo

Changing the way government works is never easy. The obstacles to commercialising roads are of two kinds:

Firstly, Treasury officials, who tend to be particularly influential, might object to relinquishing their control over payments relating to roads, and reducing taxes on fuel - inevitable elements of commercialisation. Secondly, road users might object to the kind of electronic pricing necessitated by commercialisation, and to the inevitable increases in the costs of using some roads, for example roads that are expensive to improve or that are heavily congested. A voluntary scheme, of the kind described above, could help to meet both of these objections.

Treasury misgivings would depend on the level of sumptuary fuel taxes remaining after commercialisation. This level has inevitably to be determined by negotiations between the parties concerned, on, for example, the reductions of fuel taxes or in annual vehicle licensing fees. Objections from road users could be relieved by the benefits obtainable from electronic tolling; from confidence their travel data could not be obtained without the consent of vehicle owners; and from the realisation that a commercialised road system brings about quicker increases in road capacity where most needed.

If any of the voluntary schemes gain public support, a comprehensive pricing system for roads, possibly along the lines described above, could be established for the whole of the UK. It would also be necessary to establish road-owning entities to take over the existing roads and to run them on a commercial basis. In all likelihood the Highways Agency would be given responsibility for main roads, and the counties for county roads. Guidelines for running these road systems might have to be legislated, for example to ensure that costs of all roads were, as far as practicable, paid for by those who use them or who get access from them.

To be politically acceptable, the pricing system would probably have to start as ‘revenue neutral’, in the sense that the total of monies paid to the newly established road-owning entities would be matched by an equivalent reduction in taxes paid at the time by road users. Taxes to be reduced would be Fuel Duty and, possibly, the Vehicle Excise Duty. Obviously, only the UK Parliament, which currently determines the levels of these taxes, could legislate such actions.

After the new charging systems are established, the road-owning entities should have the power to change the prices for the use of roads under their control. Some might, for example, wish to raise the charges in urban areas and to reduce them in rural areas, along the lines given in my proposal for Cambridgeshire, described above.

The rights of private investors to provide new road capacity should also be established, with the right to charge whatever prices they deem appropriate. Private companies should also be allowed to buy existing roads, or to obtain concessions for operating and maintaining them. This would be the road to privatisation.

Commercialisation without improved system-wide charging

Improved system-wide road charging would be a big boost for commercialisation but is not essential for it. Even under the current 'priceless' system, private concessionaires can be invited to provide new roads or to maintain existing ones.

Private providers being paid 'shadow' tolls

Private entities have been contracted to provide public services at least since 1782, when the Perrier brothers were granted a 15-year license to provide water in Paris. Subsequently, private contractors have been providing water to many cities in France and elsewhere. The municipalities prepare detailed specifications for the required services, and private companies bid the rate per cubic metre for meeting these specifications (Roth, 1987). The provision of road services in this manner is less common, but can be done.

In the 1980s government funding for roads was scarce in the UK, and much of the construction industry was idled. Private consortia then offered to finance new roads and to be paid by the government an agreed amount for each vehicle-mile using the new road. The principal advantages of this arrangement were:

- Private capital would relieve the pressure on public funds;
- Payment tied to road use would reduce the risk of 'roads to nowhere' being financed;
- There would be no tolls to divert traffic to 'free' roads; and
- Private involvement would reduce costs.

On this basis, thirty-year concessions for ten highway schemes were offered in the UK in the period 1994-97 under the Conservative government's 'Private Finance Initiative'. The Highways Agency invited bids from consortia to Design-Build-Finance-and-Operate (DBFO) these roads that, after the end of the concession, were to be returned to the government in good condition (Roden, 2006). Payments to the successful bidders were agreed fees per vehicle-mile, based on traffic counts, the fees being determined by bidding - bidders bid the lowest fee per vehicle-mile that they were prepared to accept. These fees are called 'shadow tolls' because the government, not the travellers, pays them.

The agreement for these DBFO projects included a clear division of risks, and two risks in particular were borne by the private concessionaires:

- Firstly, all construction, operating and maintenance costs, and
- Secondly, all risks arising from errors in traffic forecasting.

Total investment on the first eight contracts was £1,093 million, and financial savings in their total construction and financing costs were calculated in 1996 to have been 22.3 per cent.

DBFO contracts for roads have not been offered in the UK since 1997, but there seem to be no logical reasons for the present administration to avoid them.

Private providers being paid real tolls

Tolls for long-distance roads have been levied for at least 2,700 years (since those imposed by ruler Ashurbanipal for use of the Susa to Babylon highway in the 7th century BC (Gilliet, 1990)). More recently, toll roads have been provided in France, Spain, Italy and many other countries in areas lacking high-quality long-distance roads. Some of these toll roads are provided by governments, some by private providers. Toll roads are far less common in the UK, possibly because of the higher quality of the existing government-provided roads that are not tolled.

However, there can be situations where the government-provided roads are congested and where road users prefer to use less-congested, tolled, alternatives. One such example is a ten-mile stretch of California's State Route 91, some 30 miles east of Los Angeles (Sullivan, 2006). In the 1990s the California Private Transportation Company conceived, financed, designed and provided tolled lanes in the median of this ten-mile stretch. These tolled lanes are made available to buses, specific types of high-occupancy vehicles (such as van-pools), and to other vehicles for which tolls are paid. Payments are collected electronically from customers' pre-paid accounts, the payment levels being set to ensure congestion-free travel at all times. Tolls for the 10-mile stretch now vary from $1.35 for much of the night to $9.55 from 3:00 to 4:00 PM on Friday afternoons.[10] All income classes use the tolled lanes, with 10 per cent more women than men switching to them. Those who choose not to pay stay on the non-toll lanes.

The SR-91 express lanes proved popular and have been replicated in Denver, Houston, Miami, Minneapolis and San Diego and on segments of the Washington Capital Beltway.

[10] Orange County 91 Express Lanes http://www.91expresslanes.com/schedules.asp

These electronically tolled lanes, which can be privately provided, have many advantages:

- They offer buses speedy congestion-free travel;
- Single-occupant vehicles get premium service and save time;
- Those who choose not to use the express lanes benefit from reduced congestion in other lanes; and
- The fees collected can cover all or part of the express lane costs.

Such express lanes could be provided in the UK on disused or under-used railway rights-of-way. An opportunity to do so was recently missed when the Cambridgeshire County Council decided to construct a 'guided busway' on the right-of-way of the disused Cambridge to Huntingdon railway. When the scheme was first announced, I met some of the officials concerned and pointed out that the proposed bus service would use only a small fraction of the capacity of the busway, and that there would be room for other vehicles which could be tolled electronically, the tolls being varied (as on California's SR-91) and kept high enough to ensure desired traffic speeds at all times. I was told that my suggestion was unacceptable because the council did not want to help travel by car.

The guided busway has been running since August 2011. Two bus companies are licensed to use it. They carry fewer than 7,000 passengers a day (say, 250 per lane per hour), thus utilising about a tenth of the capacity of the busway, which parallels the notoriously overcrowded A14 road. Cambridgeshire receives access fees from the bus companies that cover the busway's operation and maintenance costs, but the central government receives nothing in return for the grant it gave to pay for building this under-used facility.

Might Cambridgeshire Council now re-consider the costs and benefits of allowing other vehicles to use some of the capacity that is currently wasted, on payment of tolls that could be used to enhance either local or national finances?

The way forward

The provision of tolled express lanes is one of a number of measures that would increase the role of markets in the road sector. New capacity could also be provided by inviting private providers to bid for the right to supply specified road services, and to be paid by means of 'shadow tolls'. More ambitious road pricing systems could be introduced gradually, starting with demonstrations in selected areas in which only volunteers participate.

The policy options discussed above demonstrate that road pricing systems can be introduced gradually and on a voluntary basis. In this way, many political obstacles can be avoided and charging methods can be tested.

These policies should be viewed as steps towards the implementation of much more widespread pricing, ideally on a system-wide basis and combined with cuts in motoring taxes. As long as roads remain outside the market economy, new investment will be constrained by government policy and large parts of the network will continue to be plagued by excessive congestion. Those who prefer services to respond to consumer demand should support road commercialisation or privatisation.

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