Fair and efficient pricing and the finance of roads

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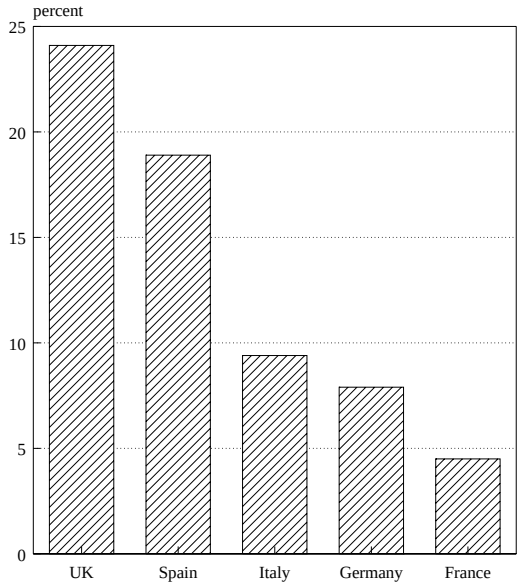
I have a very simple proposition to put, that transport finance is in a mess and some radical thinking is required to solve the problem. I think the time is ripe to draw the lessons of history, and a remarkable number of pieces of the jigsaw are now falling into place. I shall propose a way of reforming the management of public sector assets, and specifically the road system. I think it is a suitably millennial task for the present Government, and a nice response to the previous Government's success in privatising public utilities.

Percentage of congested road links



(delay of one hour or more per day)
The State of European Infrastructure,
European Centre for Infrastructure Studs

Fig. 1

Road charges and road quality
Britain

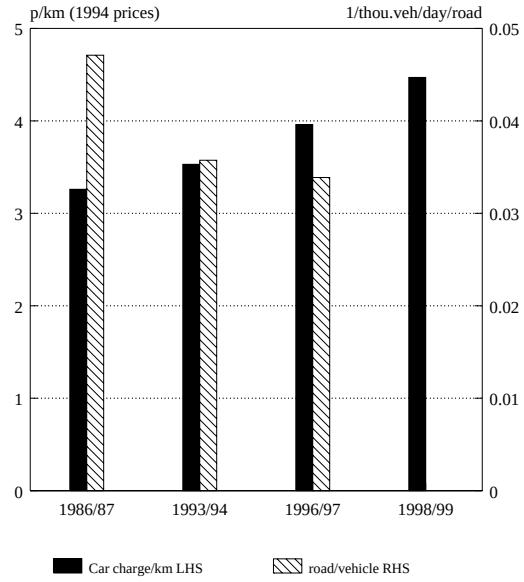


Fig 2

Let me start with some evidence that all is not well with our transport policy. Figure 1 compares congestion in the UK with other European countries, and it is striking that compared to France, Britain has more than five times as much traffic delay, while projections in the Department of Transport suggest that the situation will rapidly

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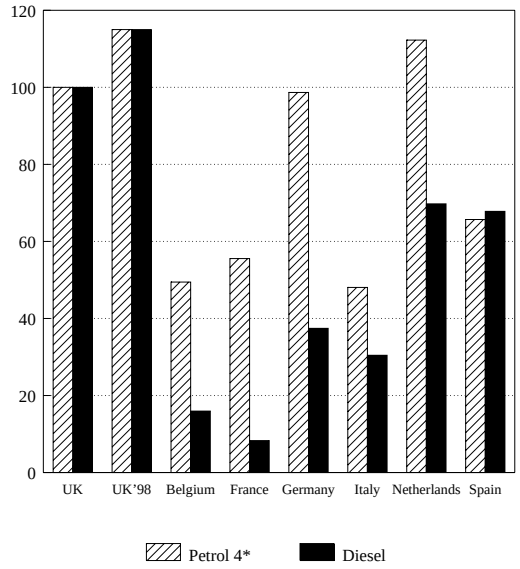
deteriorate in the coming years. Figure 2 compares the costs of providing road services in the charge per kilometre of road on the left hand scale, showing a steady increase over time, while the amount of road space provided per vehicle on the right scale steadily deteriorates. Figure 3 compares road finances in Britain and other European countries, and shows the road tax revenue per kilometre of road for 1996, and also for Britain for 1998. Although in 1996 the Netherlands had higher petrol taxes per kilometre of road, by 1998 the UK had exceeded even the Netherlands.

There would be little disagreement in diagnosing our current transport problems. Congestion is at critical levels and becoming ever more serious. Investment in relieving congestion is controlled by Her Majesty's Treasury (HMT), operating tight cash limits and steadily reducing the real resources available. Road transport amongst all other sectors has been singled out for tax increases to meet our agreed targets on global warming, and the government appears to be wedded to a policy of rationing transport by congestion and reducing road investments to reduce traffic growth. By most indicators British transport lags behind Europe, all of which suggests that something must be done. The question is what is an appropriate policy for the new government.

Road tax revenue per km road 1996
Index numbers UK = 100



Transport Statistics GB 1996
Tax/litre x VKT/km road

Fig. 3

The big idea of the 1980s was the privatisation of public utilities. The problems of nationalised industries were of long standing and widely recognised. They included low productivity, poor management of investment, and a low return on capital. The diagnosis was that they suffered from unclear objectives. Different interest groups pursued different goals, and reached compromises behind closed doors in which an equilibrium amongst the interest groups was sustained only by adopting inefficient policies. The lack of any competitive pressure concealed this from the wider public, and the lack of clear governance structures and performance criteria meant that reform, repeatedly attempted, was ineffective, as it rarely disturbed the underlying interest group balance of power.

The solution was to privatise the utilities and subject them to regulation, decisively altering the balance of power and clarifying their objectives, which in the private sector were to pursue profits subject to meeting quality standards specified in the licences and enforced by regulation. The principal, gradually evolved during the 1980's, was to introduce competition where possible and confine regulation to the natural monopolies, typically the networks over which the services were sold. The system was sustained by licences, subject to periodic review, and monitored by independent regulators. The capital

market and the threat of takeovers disciplined the performance of the managers, and revealed the potential for productivity improvements to the regulator.

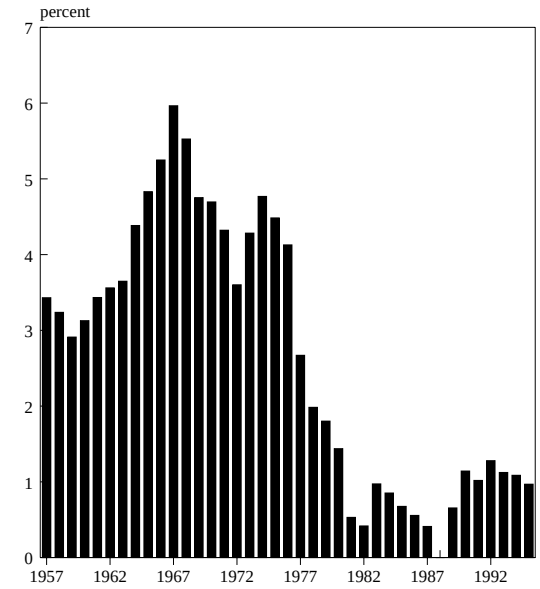
Of course, there were risks as well as benefits, some of which we have seen with the arrival of the new government. Thus the windfall tax could be interpreted as the revival of interest group politics, a worry that was confirmed when the government suspended approval of any new combined cycle gas turbine construction in order to protect the residual coal industry. Worrying suggestions that the regulator should be made more politically responsive have been somewhat allayed by the recent DTI green paper *A Fair Deal for Consumers: Modernising the Framework for Utility Regulation*, and it may be that the system of regulation emerges strengthened rather than undermined.

The more serious worry is that private finance is now seen as the only solution to public sector investment problems, as witnessed by the complex negotiations over London Underground, and that as the public sector becomes smaller, less attention is paid to the management of public capital and to sustaining public investment.

Problems in the Public Sector

Figure 4 shows the dramatic collapse in public sector net capital formation as a share of gross domestic product (GDP) following the visit of the IMF in 1976. Part of this reflects the transfer of some investment responsibilities to the private sector, and the Treasury recently published their estimates of the figures excluding those industries that were privatised, shown in figure 5. Unfortunately, only gross investment figures are available, and they exaggerate the net additions to capital formation.

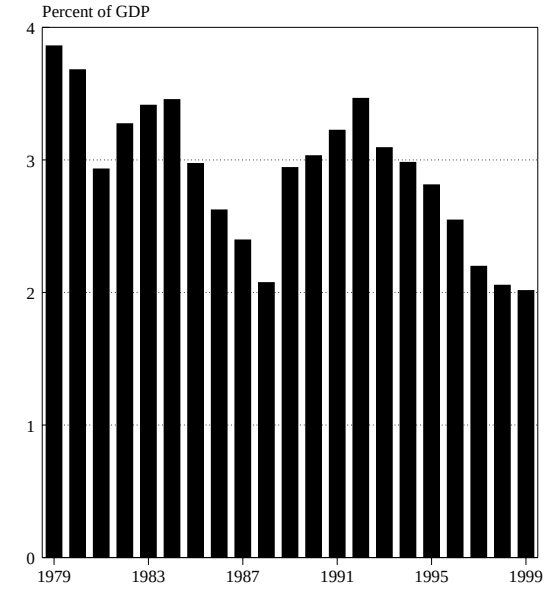
Net public sector capital formation
as share of GDP



Blue Book 1996 (PSinvest)

Fig 4

UK Public Sector Capital Spending
excluding industries now privatised



Treasury FSBR 1997

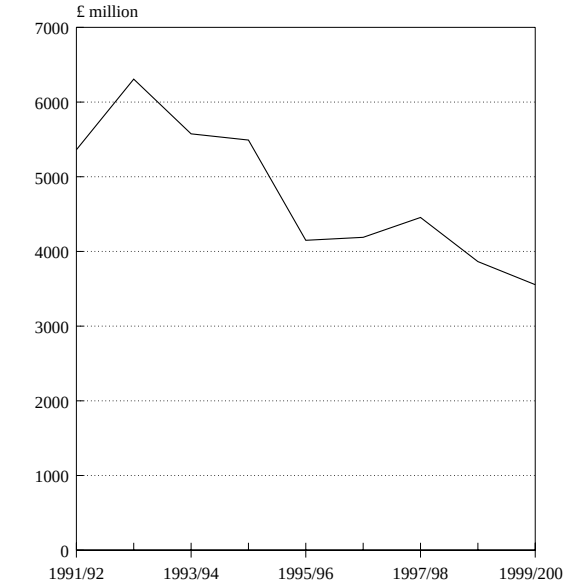
Fig. 5

Not only has there been under-investment, but with the exception of the Post Office, the remaining public assets have not been well managed, and are subject to unstable investment patterns and "the curse of annuality". Figure 6 shows the projected investment in the transport sector (from the 1997 *Transport Report),* showing not only fluctuations, but a steady downward trend after 1992. In part poor management may be laid at the foot of inappropriate and opaque accounting for public assets, and one can see this for the road transport sector, where the confusion over road taxes and road costs has finally persuaded the government to cease presenting its annual report on *The Allocation of Road Track Costs*.

The costs of this inadequate public investment are not immediately apparent, but an increasing number of economists, including David Canning, find evidence that infrastructure investment causes growth above and beyond the ordinary macroeconomic impact of a given level of investment. Canning finds that electricity investment and roads per worker both cause higher rates of economic growth than would be expected from their role in total investment, and these macroeconometric findings are reinforced by microeconomic evidence. Thus the Department of Transport estimates that road investment benefits are typically 2.5 times as high as costs, while other experts claim that road maintenance and construction would be significantly cheaper if they could be planned and managed over longer planning horizons.

Not only have the public assets been poorly managed, but the proceeds from selling state owned assets have not been used either to build up the remaining capital endowment, or to reduce the public debt, but instead have been consumed. Figure 7 shows the steady decline in the net worth of the public sector, which shows it falling from

Transport expenditure by Dept of Transpt
actual and projected (constant prices)



DoT: 1997 Transport Report

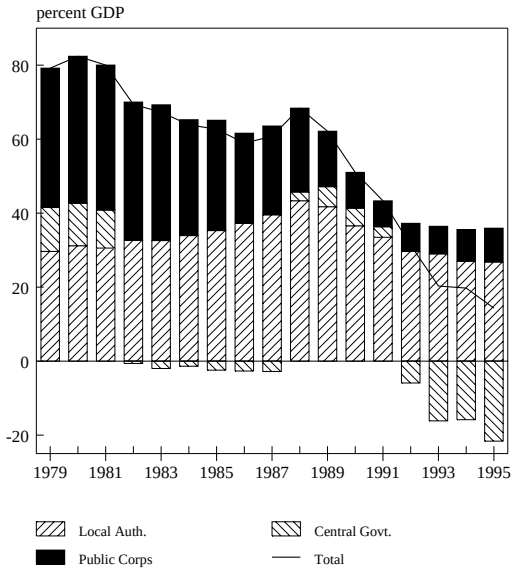
Fig 6

over 80% of GDP in 1980 to less than 20% in 1995 - one quarter of its earlier relative size.

A new idea for the millennium - the proper management of public sector capital

How might the government improve the management of public sector capital? First, let us consider various remedies that have been proposed by the previous government, and so far warmly accepted by the current government. The most obvious of these is to continue with privatisation. Thus Railtrack was privatised shortly before the election, and although the Labour Party in opposition stated that it would not allow the privatisation of London Underground, various complex mixtures of public and private capital are being proposed, with no clear guiding principals. The Post Office was due for privatisation, but public opinion overwhelmingly rejected that, and its performance in the public sector remains as good as can be expected given the unreasonable restraints on its power to manage capital and borrow to finance new investments. Roads remain recalcitrant, and a variety of initiatives have been proposed, most notably the Private Finance Initiative. One popular model is the DFBO (Design, Finance, Build Operate) scheme under which contractors propose road schemes which they build and manage for the life of the franchise. After an initial and unsatisfactory experiment with toll roads, the government has recognised the distortionary and unsatisfactory nature of these tolls, and has accepted the concept of shadow tolls, under which the contractor specifies an amount to be paid to the contractor per vehicle

Net worth of UK Public Sector
as percent of GDP



Blue Book 1996

Fig. 7

kilometre. The government then chooses the scheme with the lowest tolls or the best value for money.

The claimed benefits of all of these approaches invariably revolve around solving the problem of financing investment, which it is claimed is difficult to provide within the tight overall budgetary constraints in the public sector. In addition, it is claimed that private sector management can deliver superior performance, in part because it can plan, borrow, and is forced to provide transparent accounts.

Problems with the remedies so far

The first point to make is that if investment is undertaken by the private rather than the public sector, then the macroeconomic balance in the economy is unchanged, and the impact of the investment on inflation and the balance of payments is identical. As far as managing the economy, the PFI if anything reduces Treasury control. Raising risk capital in the private sector is more expensive than borrowing in the public sector, particularly as some of the risks are of a political nature. Thus, traffic forecasts on which the revenues of DFBO roads are based, depend critically on public transport policy, the extent of road building, and future fuel taxes.

There is a potentially important market failure in identifying suitable projects, as it will not pay individual contractors to devote the necessary resources to fully identifying projects unless they can be assured of winning the subsequent contract, which is not compatible with a competitive bidding process.

In addition, the projects which are most complex to design and operate will be left in the public sector, which it has been argued is the least well suited to deal with these projects, while the network benefits of integration will be harder to realise where projects are selected, not for their contribution to the overall efficiency of the transport sector, but for their ability to generate identifiable revenue streams to the private operator. Furthermore, the liabilities of paying the stream of revenues to the private operators will reduce the funds available for other public investment, while these liabilities are shifted off balance sheet in a most unsatisfactory manner.

Indeed, the Accounting Standards Board in its recent set of draft rules, states that PFI obligations should be counted as on the balance sheet, and therefore should count under the PSBR. Mr. Robinson of the Treasury immediately responded (24 April 1998) “we won't be able to allow Professor Tweedie's view about FRS 5 to bring the whole of the private finance initiative and public private partnerships grinding to a halt”. This suggests that the key driver for the PFI is that it does not count towards public borrowing, which is hardly a compelling justification for adopting such solutions. The Chancellor, in his budget statement, does give some interesting if somewhat opaque information about the present status of the PFI. Accounting for projects already in hand up the year 2000, and accumulating past investments forward at 6 per cent real, while discounting future expenditures, the value of capital created appears to be £13 billion, while the present value of liabilities arising from these projects discounted to the same date at 6 per cent amounts to £33 billion. Although the liabilities cover services provided and not just the

return of capital, nevertheless, the public sector net position as a result of these projects will presumably be a decrease in net asset value of £20 billion, or 5 per cent of the Maastricht definition of national debt, 2.67% of GDP, or 30% of public sector net wealth

As 40% of PFI is spent on transport projects, it is interesting to examine the experience of the first four DFBO road contracts, which have been recently assessed by the National Audit Office. The NAO reports that together these four projects saved 13% of their total cost in the public sector, but that although two reduced costs, two were more expensive, and the A69 cost 20% more than in the public sector. The NAO observed that the Highways Agency discount rate had overestimated the gains by 68%, which suggests a worrying over optimism about the scheme. One is forced to conclude that if these were the best projects (and, as there was great emphasis on making a success, they were presumably so selected) then one should be worried about future schemes.

The early history of road finance

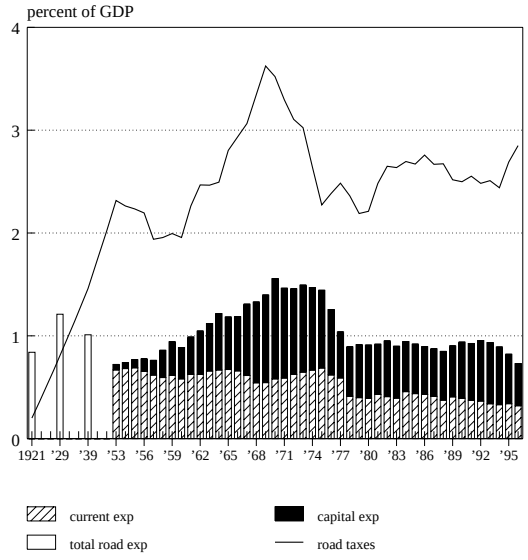
Before suggesting an alternative to public-private partnerships for road investment and the management of public assets, it is instructive to draw lessons from the early history of road finance. Before 1868 roads were largely financed by tolls and local rates, which led to obvious problems in financing through-routes, which were beneficial to other parts of the country, but not immediately useful to the locality which was compelled to finance their upkeep. In 1868 the *Highways Act* proposed a system of revenue sharing, so that parts of the country benefitting from improved roads would contribute towards the upkeep of those roads. The 1888 proposed *Van and Wheel Tax* was withdrawn as it proved too unpopular, and little changed until the 1909 *Development and Road Improvement Funds Act* which proposed to "provide the country with a new system of highways suitable for motor traffic, and relieve the rate payers of the cost of making and maintaining those highways by placing it entirely upon the motoring community." Unfortunately, far from using the revenue to finance the kind of road system suitable for motor vehicles, the money was primarily distributed to alleviate contributions from the rates.

After the first world war, the 1920 *Roads Act* created the Road Fund financed from licence fees. As figure 8 shows, initially the revenue was insufficient to finance expenditures and the shortfall was met by HMT, but by the mid 1930s the ever increasing surplus was transferred to the Treasury rather than to accelerate the development of the road system. By 1936 the *Finance Act* effectively emasculated the Road Fund, which was finally wound up in the 1955 *Miscellaneous Provisions Act.* All that remains is the annual document *The allocation of road track costs* presented to Parliament, together with the statement that "it has been Government policy that road users should pay at least enough in motoring taxation to cover the total expenditure on roads." Recently, it is become increasingly clear even to the government that "... the track cost approach has limitations as the basis for setting motoring taxes, ..." (*Paying for Better Motorways*).

So why did the Road Fund fail in its intended purpose of financing the road transport system? Right from the start its purpose was subverted by other claimants on the revenue, in the early period by the conflict over rate payers or landowners and road

users. During the initial rapid growth of motor transport, the mismatch between revenue and needs was too large to manage, while the Fund never had clear criteria for its performance, nor an adequate system of governance or regulation. These problems were not peculiar to roads and can also be found in the water utilities, where we observe that the public sector finds it particularly difficult for accounting for capital intensive networks. Whereas it seems reasonably simple for the public sector to manage activities where cash income equals cash expenditure on an annual basis, it seems particularly difficult to manage projects where capital lasts for long periods and where there is no obvious reason to match expenditure on investment with current revenue. Nor was Britain unusual in finding it difficult to manage a road fund, for the evidence from around the world is uniformly disappointing.

Road revenue and expenditure
Great Britain 1921-96



Transport Statistics Great Britain
Revenue excludes VAT

Fig 8

A better solution?

In the face of this pressing historical evidence, it requires sound reasons for expecting that a new solution would work where the old one failed. We must ask what has changed to make this possible and I shall argue that three decisive factors are now favourable:

- we now know how to regulate capital-intensive network industries
- we now know how to account in real terms
- for roads, needs and revenue are now in approximate balance.

These three conditions make possible putting the road transport assets into a regulated public corporation or corporations with designated revenue streams. In addition, the present government has accepted or is in the process of considering three key reforms.

The first of these is resource accounting to replace cash flow accounting. The distinction here can be seen from the old annual reports on road track costs. Road costs were defined as (average) capital and recurrent expenditure, excluding interest - in short, the cash expenditure during the course of the year. In contrast, resource accounting identifies the resource cost, which includes the interest on and depreciation of the capital stock, but excludes current investment. Most government departments are now collecting information to allow the introduction of resource accounting as soon as possible, perhaps in the next year or so.

The second reform was introduced in July 1997 as the Golden Rule, which states that "over the economic cycle, the Government will borrow only to invest and not to fund current spending". This can be rephrased to state that investment can be financed by borrowing, and it is not necessary to resort to PFI for public sector investment.

The last reform is still under discussion and remains highly contentious, and that is tax hypothecation, or the allocating of tax revenue to a designated end use. It is instructive to look at the experience in the United States on tax earmarking, their name for hypothecation. The US budget contains a considerable number of such taxes, for example the US Federal gasoline tax is allocated to the Highways Trust Fund. In contrast, user charges are levied on users and contribute towards the cost of providing the service, as, for example, the fees charged by the National Parks. The distinction, which is not immediately obvious, has been laid down by the Supreme Court as follows. Taxes require Congress to pass a law whereas fees or charges do not require legislation and it is up to Congress to decide whether a law is or is not required.

In the UK, HMT has always resisted hypothecation, but the boundary between what is a charge and what is a tax has been conveniently blurred on occasion. Thus the Community Charge was popularly described as a Poll Tax, while the Fossil Fuel Levy is paid into a sinking fund to meet past nuclear decommissioning liabilities. The Statistical Office defines it as a tax, but quite clearly it would have been extremely inconvenient for the government to impose a tax on energy users, as was seen when the Conservative Government was defeated in its attempt to raise VAT on fuel from 8% to 17 ½%. The recent windfall tax on utilities is an earmarked tax, and non-domestic rates are also earmarked to local authorities, whereas general taxes are paid into the Consolidated Fund and are then available for allocation to departments to spend as agreed by Parliament.

The issue of hypothecation is particularly important for the road transport sector, as many local initiatives have been defeated by the Treasury insisting that all revenue raised should be transferred back to HMT. On 29 April 1998 John Prescott, Minister of Transport, Environment and the Regions, announced that the forthcoming transport white paper would allow road charges to be hypothecated to transport projects. Almost immediately Treasury minister Ms Primarolo stated that HMT would only agree to earmark "green" taxes for environmental spending on a "case-by-case" basis and that HMT remained opposed to hypothecation in principal.

Although hypothecation is potentially attractive for "green" taxes, the problem for creating designated revenue streams to finance road transport can be avoided by defining part of the present set of road taxes as road charges.

The solution: Roadtrack

The proposal is to transfer road assets to a new company, which we may call Roadtrack, by analogy with Railtrack. Almost certainly it would be desirable to have regional Roadtracks, to simplify regulation, but institutional details will not be discussed here. One immediate benefit is that Roadtrack would inherit not only the assets, but appropriate liabilities in the form of debt, whose transfer would reduce the national debt by 40%. In

addition, as part of the former road taxes would now be designated road user charges, the share of taxes in GDP would also be cosmetically reduced.

Roadtrack would be free to finance investment by borrowing under the Golden Rule, subject to performance monitoring by the road regulator. The level of charges would be determined from the resource accounts of the road transport sector, leaving the balance of the present level of road taxes to be justified on other grounds - of which one potentially attractive alternative is a new set of "green" taxes.

In more detail, the balance sheets of Roadtrack would show the regulatory asset value (RAV) as well as the debt. The RAV would be updated by taking the opening balance, adding capital expenditure and maintenance expenditure but subtracting any deterioration in the asset value. The resource cost would then be the interest on the RAV, together with depreciation and operating expenditure, and road user charges would be set to cover these resource costs.

Roadtrack would be regulated by the Office of Road Regulation (OFROAD?) which would set standards and monitor performance. It would agree the level of road user charges given the RAV, planned dividend or interest payments, capital expenditure or forecast operating expenditures, exactly as in the other network utilities of gas, National Grid, and Railtrack. Roadtrack would be able to borrow to finance the investment but would pay the interest and dividends to HMT rather than to the capital market.

A regulated Roadtrack would have the advantage that it would be able to secure funding to allow the efficient planning of investment, while reassuring motorists that the future level of road charges would not be increased merely in order to finance additional roads. Roadtrack would be encouraged to adjust the structure of road charges to improve efficiency, perhaps eventually replacing fuel taxes by more sophisticated road prices, without running into opposition by motorists fearing that road pricing would be additional to existing road taxes. The main worry is that HMT would continue to insist on influencing the investment budget because the corporation remained in the public sector. It will require clear regulatory independence and parliamentary scrutiny to ensure that this does not happen.

Table 1 Road costs and taxes for 1996/97

	£ billion
Revenues from road taxes	
Fuel tax	17.2
Vehicle excise duty	4.2
Total tax revenue	*21.4*
Costs of road provision	
Interest on capital at 6%	7.2
(Capital expenditure)	*(3.3)*

Maintenance, policing, etc		3.9
Total road costs		*11.2*
Surplus of revenue over cost		*10.2*
PCU km (billion)	483 billion km	
Cost per PCUkm pence/km		(*2.1 p/km*)
Road taxes per PCUkm pence/km		(*4.4 p/km*)

Possible problems with Roadtrack

Table 1 shows an estimate of possible costs and 1996/97 road tax revenues associated with Roadtrack. The capital value has been estimated at £120 billion, assuming modern equivalent replacement value written down to reflect depreciation, and including the value of land. To some extent the figure is arbitrary, and would be what HMT decided, which in turn, would be largely influenced by the flow of dividends that HMT required. At 6% real, the annual dividends might be as much as £7 billion, although the public sector can borrow at 3% real, suggesting one immediate difficultly as Roadtrack would clearly choose to borrow through debt rather than equity. The annual investment budget, currently about £3 billion, might justifiably be raised to £4 billion, and will clearly need to be subject to close and careful scrutiny. The privatised utilities need to convince both city financiers and the regulator of the prudence of their investment plans, and although the city would only be concerned with the credit worthiness of the state, which can be taken for granted, the role of the regulator would be exactly as with the privatised utilities in ensuring efficient investment.

Recently, the World Bank has revived the idea of Road Funds for developing countries, but has been somewhat disillusioned by their performance. In some cases these funds were eroded by inflation when the tax revenue was linked to administratively set fuel prices, which were not adjusted in line with the price level. In other cases the Treasury diverted earmarked funds to make up budgetary shortfalls, and in many cases the allocation of the expenditure between maintenance, rehabilitation and new investment was not well managed. All these lessons suggest that regulation and governance are critical to the success of Roadtrack, just as they are for the privatised utilities. The question that remains to be tested is whether independent regulation is feasible for public sector corporations as it has been demonstrated to be for private sector utilities.

Fair and efficient road taxes

Table 1 indicated a considerable surplus of revenue over road costs for 1996/97, and since then the 1998 budget has increased various fuel taxes by between 9.2% and 11.8% compared to 1997, so that tax revenue will increase by 16% over the two years from the figures in Table 1. The excess of tax revenue over charges might be £14 billion or 2.8p

per kilometre. How might these remaining taxes be justified, on the assumption that the Treasury will not willingly forego such a substantial slice of revenue?

The government and its predecessor made much of the concept of sustainability, which for transport can be defined as "users pay the full social and environmental cost of their transport decisions, so improving the overall efficiency of these decisions for the economy as a whole and bringing environmental benefits" *(Sustainable Development: the UK Strategy*). This immediately suggests to an economist that if road users should pay the social and environmental costs, then they should do so by "green" taxes. The advantage of green taxes compared to the alternative of mandated standards are two-fold: politically it is clearly more appealing to impose taxes on sin rather than on more virtuous activities, while from the economic perspective, taxes are non-coercive and leave the choice of how best to minimise their impact to the individual. They can be better targeted on the cause of the damage, they apply to all vehicles rather than most standards, which only apply to new vehicles, and to that extent provide incentives to modify the entire vehicle parc.

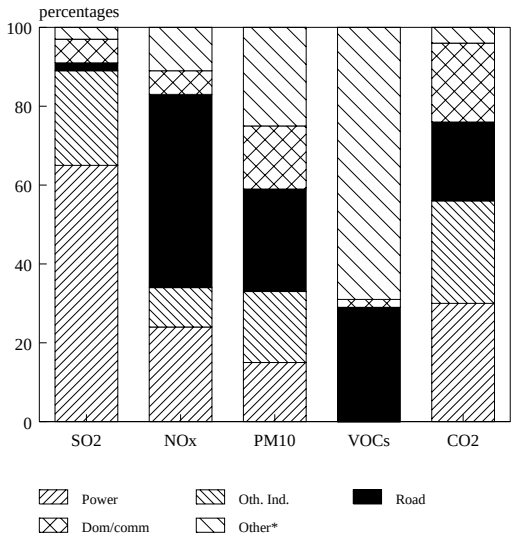
However, if green taxes are to be both politically attractive and economically effective, they must be clearly distinguished from other taxes or charges, set at levels determined by acceptable methods of computing the cost of the damage done, and applied uniformly to all sources of the same damage. That is, green taxes should be *distinct*, *non-discriminatory*, and *defensibly quantified*. These criteria have profound implications for the design of road taxes and charges. For green taxes to be distinct it must be possible to identify the components which reflect the "full social and environmental cost" of the user's transport decision. The full cost is the sum of the road user cost and the social and environmental costs, and if these are to be set at non-arbitrary levels, the road costs must be separately identified and correctly charged. This, in the context of the proposed system of financing Roadtrack, is not a problem, though it would be if green taxes were introduced without reforming the remainder of road taxation.

For green taxes to be *non-discriminatory* they should apply equally to all sources of damage, not just to the road transport sector. Figure 9 shows the sources of air pollution for various pollutants in 1994, and it will be seen that the transport sector accounts for less than one quarter of carbon dioxide, the main greenhouse gas, somewhat more for particulates (which are particularly costly in their health impact), considerably larger shares of nitrogen oxides, which, however have a relatively low social cost, and a negligible share of sulphur dioxide.

The 1998 Budget made much of the justification of increasing road fuel taxes to reduce environmental damage and to meet the greenhouse gas targets, but it is clear that motor fuel has been singled out for this purpose, since we find that the government has increased the subsidy to domestic gas and electricity from 9% to 12½% (by imposing a low 5% VAT rather than the standard 17½% VAT) while its policy to the coal sector suggests that there is little coherence to present greenhouse gas policy.

Finally, if green taxes are to be justified, they must be *quantified*, and the criteria for setting these taxes must be clear. Newbery (1998) sets out estimates of possible tax

Sources of Air Pollution
UK 1994



Digest of Environmental Statistics 1996
* for VOC incl solvent use, fuel extract and non-combust processes

Fig. 9

levels, and Figure 10 shows the range of consequential road costs and charges calibrated for 1996/97. Only with the high estimates of social and environmental costs (and also rather higher estimates for the value of the road network) do the existing taxes match up to the new structure of charges and green taxes, while the lower estimates fall short by a significant margin. Furthermore, whereas road taxes have recently increased sharply in real terms, emissions have fallen sharply and are projected to continue to decrease (with the exception of the carbon dioxide) suggesting lower future social and environmental costs.

Conclusions

I have argued that the present system of managing capital assets in the public sector is unsatisfactory, but that recent developments offer the prospect of dramatically improving the quality of such management. This is particularly important for the road transport sector, where Britain lags behind its European partners in almost all dimensions. The proposed solution involves setting up a public corporation(s), Roadtrack(s), endowed with the road assets, and subject to regulation by an independent regulator. The regulator would, on the basis of the current asset value and proposed investment and operating plan, set the level of road charges and limit the revenue that Roadtrack could collect. Roadtrack would in turn propose a structure of access and usage charges subject to this revenue limit and would then manage its investment portfolio and its operating activities subject to quality monitoring by the road regulator.

Road Costs and Charges
Britain 1996/97

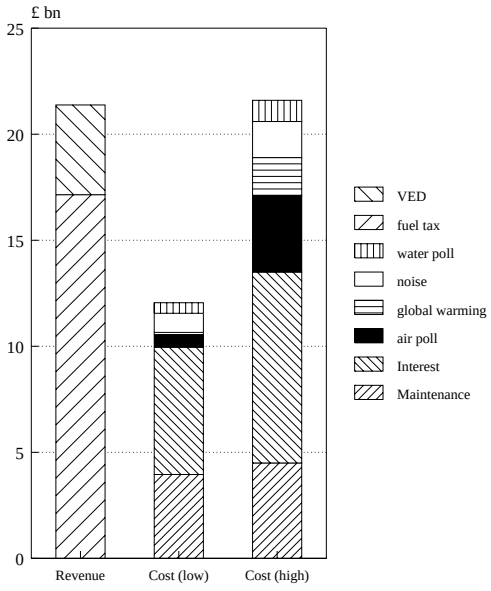


Fig. 10

HMT would set the remaining balance of road taxes based on its view of the desirable total, and possibly as part of a major reform of the system of green taxes for

social and environmental costs, which would be applied to all sources of such costs. This prospect offers a system of road finance which would be fair, efficient, and at last able to meet the challenges of providing an adequate road infrastructure.

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