

Road Taxes, Road User Charges and Earmarking

DAVID M. NEWBERY and GEORGINA SANTOS*

Abstract

The UK Road Fund was set up in 1921 and financed by earmarked taxes, but was unsuccessful as a form of road finance and abandoned in 1937. The paper examines why earmarking failed and what problems arise for replacing road taxes by hypothecated road charges. These charges would need to be regulated and could evolve into a more efficient system of road pricing. The paper claims that recent experiences with regulating capital-intensive network industries make road user charging and the commercialisation of the public highway both feasible and desirable, but that recent government proposals for local earmarked taxes are inadequate.

JEL classification: H54, H11, R41, R48.

I. INTRODUCTION

Governments in most industrial countries are wrestling with the problem of how to create an efficient and sustainable transport policy at minimal public expense. Britain has devoted considerable political capital to the Great Transport Debate, which the present Labour Government took up from its predecessor before publishing its White Paper, *A New Deal for Transport: Better for Everyone* (DETR, 1998b). This belatedly recognises that economic instruments, including road pricing, might help ration more efficiently the increasingly scarce road space available. Unfortunately, there is little discussion of the problem of providing and financing an adequate level of infrastructure, and what little there

*Department of Applied Economics, University of Cambridge.

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is suggests fudge rather than rational policymaking. Until recently, the Treasury targeted road taxes as virtually the single instrument to meet our greenhouse gas commitments under the Kyoto Agreement, now that coal use in electricity generation has been protected by the gas moratorium and consumers continue to be subsidised by 12½ per cent on their domestic fuel use.¹ The 1999 Budget proposed a climate change levy whose amount, at £1.7 billion, is about the same as the *increase* in motor fuel duties under the automatic escalator that now raises fuel duty by 6 percentage points above the rate of inflation annually (i.e. RPI + 6%). This climate change levy will fall on fuels not currently taxed by hydrocarbon excises (gas, electricity and coal), but will only fall on industry, so domestic fuel use will continue to be subsidised, and it is not levied on carbon, as would seem logical for a climate change levy.

More recently, the government has published *Breaking the Logjam* (DETR, 1999), which suggests a way of improving the structure of charges facing motorists and, for the first time in over 60 years, hypothecating or earmarking the resulting revenues for local transport investments. This, and other initiatives discussed in this paper, suggest that the government is attempting to grapple with the economics of efficient road transport provision. To date, though, these attempts have lacked a clear framework for successful implementation, and instead reflect the almost irreconcilable tensions between the Treasury and the Department of the Environment, Transport and the Regions (DETR).

The aim of this paper is to show that restructuring the present set of road charges and earmarking part of it to expenditure on highways could lead to a more efficient road charging system. It would improve road finances, clarify the role of environmental, or 'green', taxes and allow for a gradual shift to more efficient road pricing as technology improves in a way that would command support rather than arousing suspicion and opposition. It would also draw on the experience of regulating capital-intensive network infrastructure that has been one of Britain's more useful contributions to recent economic policymaking. The larger part of this paper is devoted to the attractions and problems of tax earmarking, as that is central to the proposals, reflecting the current tensions between Treasury hostility to the notion of hypothecation and the DETR's quest for additional sources of transport finance.

II. EARMARKING AND USER CHARGES

Tax earmarking is the allocation of certain tax revenues to a designated end use, and the US federal gasoline tax, which is allocated to the Highways Trust Fund, is an excellent example, though social security, paid into the Social Security

¹VAT rates on gas and electricity were cut by the present government from the subsidised rate of 8½ per cent to 5 per cent, compared with the standard rate of VAT of 17½ per cent, so, relative to other goods, domestic energy is subsidised by 17½% – 5% = 12½ per cent.

Trust Fund, is quantitatively far more important in the US (by a factor of 20). User charges for publicly supplied services are charges levied on users of the service whose revenue helps defray the cost of providing the service. The distinction between the two in practice is semantic. In the US, taxes require the passage of a law but user fees do not, and the US Supreme Court (*Skinner vs. Mid-America* 87-2098) argued that Congress has the responsibility of defining the difference between user fees and taxes, and hence deciding whether a new law is required. Earmarked taxes are not identified as such in the US budget, but by the characteristic that their revenues are placed in a Trust Fund which can only spend on designated activities (such as highway improvement and maintenance).

User charges are price-like instruments which emerge naturally in financing a service whose use can be restricted to paying consumers (as for entering national parks). In many cases, it may be costly or impractical to charge directly for the service and relatively easy to levy a charge on some commodity needed to enjoy the service — so a road user charge is most readily collected by an annual licence fee on motor vehicles (for access to the highway) and a charge (or tax) on road fuel (gasoline and diesel), whose use correlates well with the consumption of the services provided by the highway.

The British Treasury has always firmly resisted hypothecating or earmarking taxes to particular purposes, but again finds difficulty with the borderline between taxes and earmarked sources of revenue. In practice, politicians decide what label to give each new impost, much as in the US.² One rather contentious example was Mrs Thatcher's community charge — in common parlance, the poll tax — to finance local government services. The fossil fuel levy is a nice example of a tax-like instrument whose proceeds are paid into a sinking fund to meet the cost of future nuclear liabilities, but which the government claimed was not a tax.³ The recent windfall tax, levied on the 'excess' profits of privatised utilities, is also earmarked, as are non-domestic rates (i.e. property taxes), which are hypothecated to finance local authority spending. Remaining taxes are paid into the Consolidated Fund where they are freely available to be allocated to

²The statistical treatment is decided by the Office for National Statistics (ONS), guided by its interpretation of international conventions. It tends to classify almost every tax-like instrument as a tax. For example, payments by Camelot, which has a franchise to run a national lottery, into the National Lottery Distribution Fund, as well as the fossil fuel levy, are listed as taxes on expenditure. The Treasury then follows ONS treatment and presents 'tax-like' charges on the revenue side of the budget, not treating them as charges which would be netted off spending (like the BBC licence fee).

³Nor is this a minor point, for the fossil fuel levy was a very inefficient way of collecting revenue compared with a VAT on electricity, and had the additional perverse effect of transferring some £90 million a year to the French state electricity company. The political argument for not calling it a tax became very clear when the Conservative Government was defeated in its attempt to raise the rate of VAT on electricity and gas, and the opposition Labour Party promised to further reduce the rate, which it did shortly after coming to office and shortly before the Global Warming Summit in Kyoto.

those activities that the government votes. The *System of National Accounts 1993* definition captures the distinctive characteristics of taxes well:

7.48 Taxes are compulsory, unrequited payments, in cash or in kind, made by institutional units to government units. They are described as unrequited because the government provides nothing in return to the individual unit making the payment, although governments may use the funds raised in taxes to provide goods or services to other units, either individually or collectively, or to the community as a whole.

On this interpretation, the fossil fuel levy clearly is a tax, as those paying do not receive any benefits, which go instead to those who are exempt from the tax (nuclear generators). The Treasury's view is that hypothecation of revenues should be limited to a few specific instances for which there is a very good case.

III. A BRIEF HISTORY OF BRITISH ROAD FINANCE

Jeffreys (1949) observes that landowners across whose land roads passed had long tried to place their cost of upkeep on others — first their tenants, then by setting up turnpikes to collect dues from travellers and, when that failed through high costs and the bankruptcy of most of the trusts, by placing the burden on the parishes, which in turn collected rates that fell once more on landowners. The very unequal burden on different parishes was alleviated by revenue sharing under the Highway Act of 1862, and then supplemented by state grants from 1882. A proposal for a van and wheel tax in 1888 was so unpopular that it was withdrawn but the Development and Road Improvement Funds Act of 1909 proposed to 'provide the country with a new system of highways suitable for motor traffic, and relieve the ratepayers of the cost of making and maintaining those highways by placing it entirely upon the motoring community'. The Road Board, however, chose not to spend any revenue on new roads and instead distributed most of the Road Improvement Fund to highway authorities as grants in relief of rates.

The Fund's revenues came initially from motor spirit excise and carriage licences, but these were suspended in 1916 until 1920. In 1920, the Roads Act established the Road Fund, which received all the resources previously held in the Road Improvement Fund. The Road Fund's revenues came from the licence duties on mechanically propelled vehicles imposed from January 1921. Other sources of revenue were added between 1930 and 1934: fees for drivers' licences, goods vehicle licences and driving tests. The Fund was also originally supplemented by a grant from the Treasury but the last such grant was made in 1923. The situation was rapidly reversed and the Fund then started to pay the Treasury. The main outlays were grants from the Fund to local authorities for

road construction and maintenance. However, these grants were reduced by annual payments to the Treasury under the Local Government Acts 1929 and the Finance Acts of 1935 and 1936. Payments to the Treasury amounted to over 40 per cent of all disbursement in 1936–37.

The principal modification came under the Finance Act 1936 and the Trunk Roads Act 1936. Motor vehicle licence duties were discontinued from April 1937 and replaced by the parliamentary grant in aid. The Road Fund itself was eventually terminated under section 4 of the Miscellaneous Provisions Act 1955. Bracewell-Milnes (1991) quotes the relevant paragraph of the Second Report from the Select Committee on Estimates for the 1953–54 session: ‘it would lead to greater clarity in the Estimates and more information being available to Members if the Road Fund were abolished, and expenditure on roads provided for in a normal departmental Vote’. Although the Road Fund was officially abolished in 1955, it was effectively terminated in 1937, when hypothecation of motor vehicle licence duties was ended. Between 1937 and 1955, the Road Fund had no revenues of its own and became merely an administrator of the grant in aid.

Part of the difficulty in devising a coherent system of highway finance was that the highway system had already been developed for non-motorised traffic, providing access to adjoining property which increased its value. Naturally, property owners were the logical target for financing highways. The original idea of taxing motorised traffic was that new and better-quality roads would be needed and would primarily benefit motor vehicles, which should therefore pay for this additional expenditure.

What lessons can we draw from this history? First, note that the Road Fund did not receive all the taxes levied on road users, only those elements that looked like charges or fees, such as motor licences. Fuel excises or duties were too clearly tax-like and hence allocated to the Consolidated Fund. Second, quite reasonably at first, the idea was that the revenues were to be used for *additional* expenditures required for motorised traffic (though that was not how they were used in practice). Third, and this survived until 1995, the accounts that continued to be presented to Parliament were cash flow and not proper resource accounts, which only identified ‘the amount spent by national and local governments on building, maintaining and policing the roads network, together with expenditure on roads administration, research and road publicity’ (Department of Transport, 1995). Proper resource accounts would include the interest on the value of the capital tied up in roads, and depreciation (which, in steady state, might be adequately proxied by maintenance expenditure), and would treat investment in new facilities as a capital, not a current, item. Consequently, the accounts were ill suited to the proper management of and charging for a capital-intensive activity in need of considerable early investment.

Finally, the problem with the major road investment programme that Britain clearly needed was that it would require large borrowing in the early stages to build up a capital stock. This would generate revenues to pay off the loans —

initial deficits would be matched by subsequent surpluses. It seems reasonably easy to finance activities with earmarked taxes where there is a fairly constant and predictable stream of expenditure closely related to the services supplied. Revenues can be matched to expenditures without major fluctuations from year to year, and hence without requiring detailed government scrutiny of the reasons for changing taxes. The model of hypothecated revenue where income and expenditure are in close balance thus fails for roads, at least in the early transitional stage.

Of course, the whole purpose of setting up a Fund is that it does allow some smoothing of revenues and expenditures, but the scale of the required imbalances would clearly make the government uncomfortable (see Figure 1 below), and it decided it was easier to transfer the monitoring and executive functions to the Department of Transport, which would then bid for resources in the annual funding round like any other department. This early experiment of earmarking was thus doomed to failure. The main relic was the annual presentation to Parliament of *The Allocation of Road Track Costs*, based on a methodology finally stabilised in 1968, which demonstrated the extent to which the Department of Transport had satisfied government policy 'that road users should pay at least enough in motoring taxation (fuel duty and Vehicle Excise Duty) to cover the total expenditure on roads' (Department of Transport, 1995).

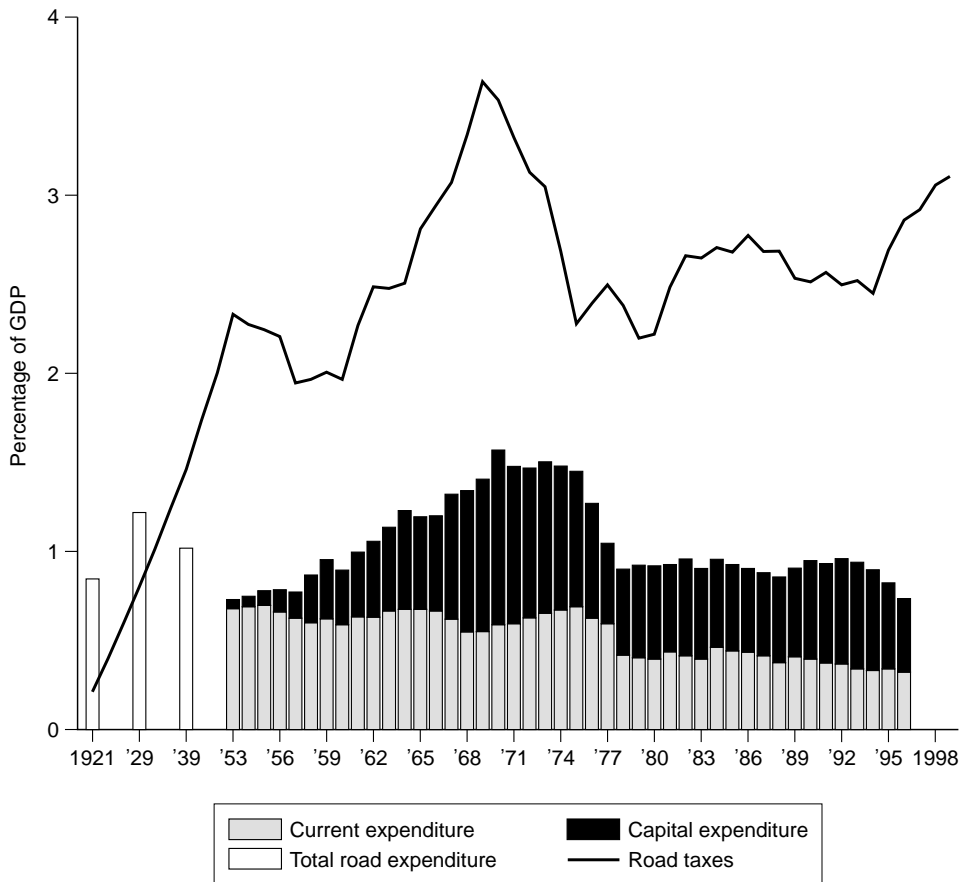
IV. FROM PUBLIC TO REGULATED PRIVATE OWNERSHIP OF NETWORK UTILITIES

Neither Britain nor the US appeared to have much difficulty in financing the substantial expansion of their highway systems after the Second World War, though Britain, under tight Treasury financing limits, was always more niggardly in its design standards and slow to embrace the case for high-quality interurban motorway networks, in contrast to continental Europe. Figure 1 shows, for selected pre-war years and annually after 1953, both the revenue from road users (mostly motor fuel excises and vehicle excise duties, but excluding VAT) and total road expenditures, which are broken down into capital and current (mainly maintenance) expenditure after 1953.⁴ The share of current expenditure in GDP was roughly constant, but investment rose rapidly as Britain belatedly (and relatively slowly) attempted to build a modern motorway system.

This post-war increase in investment was mirrored in the rest of the public sector, which was now committed to the public finance of all infrastructure, most

⁴The boundary between current expenditure (which includes minor repairs) and capital expenditure (which includes reconstruction and surfacing) is not clear-cut, and successive years' data from the published sources often reallocate the total between categories. This is likely to be a special problem in earlier years, before the accounting methodology was stabilised.

FIGURE 1
Road Revenue and Expenditure as Shares of GDP, Great Britain

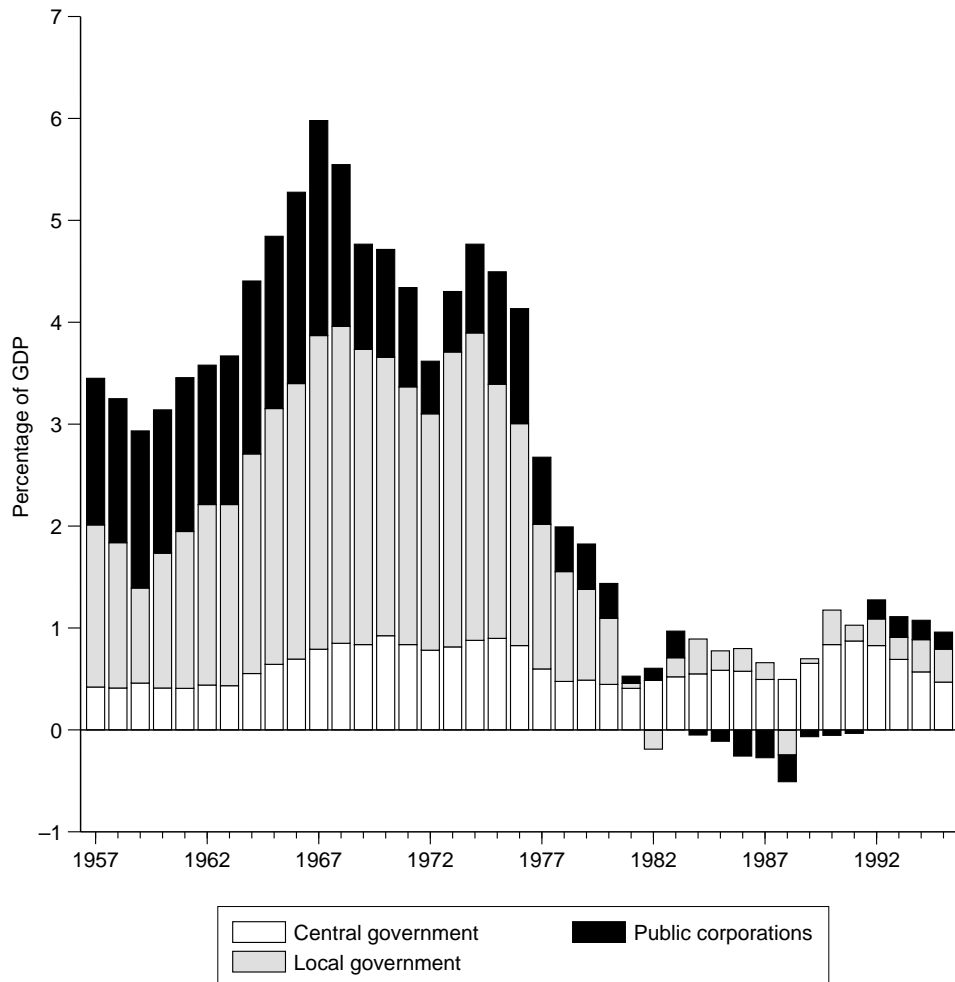


Note: Revenue excludes VAT.

Sources: *Transport Statistics Great Britain*, various years; 1998 and 1999 Budgets (Stationery Office, 1998 and 1999).

of which was managed by public corporations (electricity, gas, water, rail) or within the public sector (post and telecommunications, roads). During the ‘Golden Age’ of West European growth (1950–73), public investment rose as a share of GDP (Figure 2) and the public sector balance sheet improved as it accumulated assets faster than public debt (helped by rising inflation which depressed public sector real interest rates and eroded the real value of the national debt). The slowdown after the oil shocks changed all that. Growth rates

FIGURE 2
Net Public Sector Capital Formation as a Share of GDP



Source: *Blue Book 1996*.

stagnated for a decade, unemployment rose and, with it, public expenditure on unemployment insurance. Profits fell, eroding taxes, while social expenditure continued to grow with an ageing and politically more demanding electorate. In an attempt to rein in public expenditure and bear down on inflation, the government held down the prices of public utilities, causing them cash-flow problems and cutting investment. While investment was not needed in electricity

(which had excess capacity and stagnant demand), it was increasingly urgently needed in telecoms, and less evidently in water. Figures 1 and 2 show the collapse in public investment taking place shortly after the IMF visited the UK in 1976.

The resolution of the investment problem was discovered almost by accident by privatising British Telecom in 1984, transferring investment outside the public sector borrowing requirement, and cashing in some of the public sector net assets in exchange for share sales proceeds. BT's new-found ability to adjust its prices for inflation and the protection from political intervention afforded by its licence meant that investment could be readily financed by commercial borrowing, though in the event the rapid fall in costs and healthy profits meant that investment was mainly financed from retained profits. British Gas was privatised in 1986 as a highly profitable monopoly, though at a substantial discount to its asset value. The water companies followed in 1989, but here the past underinvestment in the public sector and new environmental standards set by the European Commission meant that investment would exceed current profits. Prices were set to rise in real terms, and the protection of licences and regulatory oversight here were critical in enabling the companies to finance the large rise in investment.

The electricity supply industry was sold in 1990, and here the government gave up a flow of net transfers to the Treasury, which was effectively capitalised in the share price. Newbery and Pollitt (1997) showed that, under plausible counterfactual assumptions, the public sector income was unprofitably exchanged for short-term privatisation receipts.

Finally, and most relevant for our present purpose, British Rail was radically restructured into a large number of different companies, and sold off in 1996. The core network utility of the track, signals, tunnels and bridges was kept intact in the monopoly, Railtrack, which was sold, as were the earlier network utilities, to large numbers of domestic shareholders (and others such as pension funds). Railtrack's revenue streams were protected by seven-year (or longer) contracts with train-operating companies (TOCs) which paid largely fixed charges for track access (covering 91 per cent of total revenue), with the remaining 9 per cent as very low variable charges for use (to cover direct wear and tear and electric power for traction). The TOCs in turn bid for the franchises by specifying the level of government subsidy they would need each year to finance the agreed level of services, in some cases falling to negative levels in later years (i.e. payments to the government for the right to earn profits on the protected franchise). Leasing companies in turn leased rolling stock to the TOCs for the duration of the franchise and were responsible for (but remarkably inactive in) investing in new rolling stock. In effect, the government was willing to commit a stream of public revenues to the TOCs for seven years or more in order to transfer the management of the railways to the private sector and, with it, access

to further funds that would no longer be constrained by limits on public sector borrowing.

The comparative advantage of public ownership is the ability to finance capital-intensive networks and natural monopolies, both from its tax base and from its monopoly ownership. This claim may seem curious, given the argument that investment could only be adequately supported by privatisation, but is amply demonstrated before 1973. So long as the government had confidence in the integrity of public sector management and attached sufficient priority to investment over consumption, the system was able to deliver high rates of investment. It was put under stress when the government attempted to reduce inefficiency and increase real rates of return as the fiscal situation deteriorated during the 1970s. The problem was that the industries were able to finance current operations out of current revenues, so that the main impact of tightening cash limits fell on the investment programme. The problem of public sector management was one of finding a way of rewarding efficient investment in an environment of annual renegotiations over the budget. Efficiency that lowered costs would lead the Treasury to require repayments (negative external financial limits), with no benefit to the industry, while inefficiency and high costs forced the Treasury to underwrite costs, as the industries supplied essential services. The only sanction available was to cut budgets and hence investment, with consequent deteriorations in quality.

Privatisation forced the government to devise better methods of regulating and financing these natural monopoly industries. The solution was to grant licences embodying price-cap regulation, reset at periodic reviews every four to five years. What are the advantages and limitations of the UK regulatory model for network utilities? First, it allows regulation to be concentrated on the core natural monopoly component and permits the potentially competitive elements to be exposed to the incentive and discovery effects of the competitive market. Second, setting a price cap for a specified period — typically four to five years — provides incentives to cut costs and earn additional profits for shareholders while periodically allowing the price cap to be reset, transferring benefits to consumers. When it works well, this mechanism mimics the effect of the competitive market where innovation allows the innovator to reap temporarily supernormal profits until entry or competitive emulation drives the price back towards cost. Third, the licence protects the rights of the utility while the privatisation Acts specify the duties of the regulator (which always include enabling the utility to be able to finance its activities). Reasonably well-defined dispute resolution procedures involving the Monopolies and Mergers Commission sustain this regulatory commitment. This enables greater clarity of purpose and reduces the inefficient bargaining over rents that characterises interest-group politics under state ownership. Finally, the duty the regulator has to protect consumers means that he or she is required to monitor costs and investment to that end, and his or her success can be measured by the published

accounts and share prices of the utility, in contrast to the obscure workings of departmental controls over the nationalised industries.

The drawbacks are that the efficiency gains may not be passed back to consumers or the government, but to shareholders, whose required rate of return is considerably higher than the cost of public sector borrowing. Cross-subsidies, which previously protected vulnerable consumers, will be eliminated by cost-based pricing unless specifically protected. In the case of the railways, it is not yet clear whether the co-ordination benefits of an integrated network can be achieved under very fragmented ownership. Finally, the government no longer feels responsible for protecting consumer interests against excessively costly European environmental legislation.

However, one lesson that does emerge is that regulatory accounting for capital-intensive network utilities has improved and is able to sustain appropriate levels of investment (low in electricity, high in water) without requiring annual adjustments to the regulated prices. Price-cap regulation devolves more responsibility for adjusting individual prices towards costs to those most knowledgeable and provides better incentives for efficient management of investment projects. In all these respects, the experience is of considerable improvement compared with the former public sector management of investment.

V. A PROPOSAL FOR FUNDING PUBLIC INVESTMENT IN ROADS

The optimistic view is that the past decade has provided a wealth of new experience about the management of network industries under private regulated ownership, of which the most relevant for a new system of management and finance for roads are Railtrack and the water companies. It is far from obvious that the road system needs to be privatised to address problems of underinvestment, and the model of a regulated public corporation with clear contractual quality standards may offer a desirable alternative model. New Zealand has pioneered such corporations, sometimes as a step towards privatisation, while state industries in France have long enjoyed greater commercial freedom than their counterparts in Britain. *Electricité de France* is not even a corporation (though it does pay taxes on profits), yet it is free to borrow abroad to finance the acquisition of foreign electricity companies (such as London Electricity) when they are privatised, or to build power-stations and transmission systems.⁵ Indeed, the most enthusiastic buyers of trade sales of privatised utilities seem to be continental state-owned public utilities.

The question to address is whether Britain can evolve a satisfactory institutional framework for managing a publicly owned highway system, and

⁵Corporatisation is an irreversible legislative step that allows the corporation to issue shares and which Socialist governments fear might prove irresistible to subsequent right-wing governments contemplating privatisation.

whether this would be an improvement on the present arrangement, which has been the subject of a continuous transport debate for many years under the previous and present governments. The case for change is that it is inefficient to manage investment projects, most of which last many years, under a system of unpredictable annual budgets, that transport policy lacks direction, that present forms of finance hinder improvements in the efficiency of road charging and that consumers lack confidence in the ability of the government to meet their transport needs at reasonable cost (see, for example, Newbery (1995) and Institution of Civil Engineers (1997)).

The three key institutional changes required to address these problems would be:

- the creation of an agency or corporation (which, for convenience, we shall call Roadtrack, the counterpart to Railtrack) entrusted with the highway assets and responsible for their management;
- a regulatory agency to oversee its activities, which we shall call OfRoad, the counterpart of ORR (the Office of Rail Regulation); and
- the replacement of some part of current road taxes by road user charges under the (regulated) control of Roadtrack, outside the present system of Treasury control.

Roadtrack would need to set road user charges to produce a predictable, stable and adequate revenue stream to finance current expenditure and underwrite the ability to borrow on capital markets at home and abroad where necessary. In practice, sensible levels of road user charges would produce a substantial surplus for payment as interest or dividends to the Treasury (representing the public owner) which might prove adequate to finance investment, though the Treasury may wish additions to capital stock to be financed by borrowing, to ensure that its dividend stream was predictable. OfRoad would be required to ensure that Roadtrack does not abuse its monopoly position, to monitor the quality of service provided and to reset the price or revenue cap periodically after determining the level required for efficient operation of the highway system.

Road taxes, exclusive of VAT receipts, collected £23.9 billion in 1997–98, or nearly 10 per cent of total tax revenue. Figure 1 shows that the road taxes have, for almost their entire history, been considerably higher than road expenditures and that, recently, the margin between the two has widened as the tax share has risen and the road expenditure share fallen, despite a steady increase in traffic and hence demand. The source of this information — *The Allocation of Road Track Costs* — is no longer presented annually to Parliament, not because it shows an apparently embarrassing overtaxation of road vehicles, but because the government claims that the principles of cost allocation used in the document are flawed. In 1995–96, when road taxes collected £19 billion, the costs allocated included £3.2 billion of investment expenditure, together with about £4 billion of

maintenance expenditure, but *excluded* any interest on or depreciation of the road network, which might be somewhere in the range £6–11 billion. Since 1995–96, when this information was last produced, road taxes have risen 24 per cent in real terms (estimate for 1998–99), while maintenance expenditure does not appear to have risen and investment expenditure has fallen (DETR, 1998a).

The government proposes to move to a resource-based system of accounting, in which assets are properly identified and charged for. As the government states in its Green Paper, *Paying for Better Motorways* (HMSO, 1993),

The track cost system, which was originally set up in 1968, takes account only of the *cash* costs of capital expenditure on road construction and of current expenditure on road maintenance. Track costs do not therefore include, for example, a return on the capital investment represented in the road network, as would be the case under normal charging methods, nor can they reflect congestion costs. And they do not take account of the wider costs that road use imposes, such as environmental effects, though there is, at present, no generally agreed basis for putting monetary values on these.

In the government's consultation document, *Developing an Integrated Transport Policy*, issued on 20 August 1997, it invited responses to 27 issues, among which was the question 'How can we ensure, for example through the taxation system, that the prices faced by transport users more accurately reflect the wider environmental and social costs?'. The government therefore appears to be open to a more rational system of determining road taxes or charges. The new system ought to be transparent and consist of three elements. The first would be a set of road user charges based on a careful assessment of the relevant costs to be charged out. The second would be a set of green taxes on environmental impacts such as pollution, CO₂ emissions etc. If the government considers that polluters should pay taxes to internalise external costs, then this principle would logically apply to all sources of such pollutants, perhaps differentiated if the damage done varies with source. The third, economically less defensible but probably politically essential, element would be a pure revenue-raising tax on road transport, set to collect the shortfall between the road charges and environmental taxes and the current level of road taxes. It should be collected as an additional VAT at an appropriate rate or, less appropriately, as an additional pure revenue-raising excise tax on fuel and/or vehicles.

The case for this three-part division is made below, but it is useful to see how large each part might be on the basis of admittedly rather sketchy estimates of the environmental externalities. Table 1 presents the accounts of highways and Railtrack on a comparable basis, where it is assumed that the operating costs, which are largely maintenance for roads, are sufficient to maintain the network

TABLE 1
Level of Costs of Road and Rail, 1995–96

	<i>£ million</i>	
	<i>Roads</i>	<i>Railtrack^a</i>
<i>Capital value</i>	<i>120,000</i>	<i>6,905</i>
Interest on capital (at 6 per cent)	7,200	414
Operating costs	3,900	2,090
Taxes or revenue	18,900	2,300
Surplus excluding externalities	7,800	-204
<i>Externalities:</i>		
Air pollution + CO ₂	3,300	75
Noise	1,300	?
Total identified externalities	4,600	75
Surplus after externalities	3,200	-279

^aCurrent cost accounting values.

Source: Department of Transport, 1995, Appendix Table A1.

at a constant standard (so that it does not effectively require any depreciation).⁶ Present levels of expenditure are probably below those needed to arrest any deterioration in road quality, so the figures may understate the required infrastructural renewals charge.⁷ Setting green taxes to internalise externalities is not straightforward, and is considered first, as it bears on the logic of separating out road user charges.

VI. ISSUES IN PRICING ROAD USE

As stated above, our proposed charging system would consist of three components: road user charges, environmental taxes and a pure tax. While the pure tax element is, inevitably, distortive, environmental taxes are intended to correct for undercharging for environmental externalities and confront road users with the social costs of transport. Road user charges would charge for the provision of transport infrastructure, just as charges for other public utilities

⁶When the government introduces resource accounting, it will have to decide how to treat depreciation, and the natural model to follow is that of infrastructural renewals charge (IRC) as practised by the water and sewerage companies. This would consider the road network as a single system to be maintained in perpetuity. The IRC would be the maintenance and major repair expenditures, averaged over several years, sufficient to maintain the system with no loss of value.

⁷DETR (1998a, p. 83) gives a time series of an index of defects, with a base of 1977=100. Five out of nine of the categories of roads have defects in 1997 higher than in 1977, and the traffic-weighted average value is 107, currently rising and the highest level yet achieved, suggesting that current maintenance levels are somewhat below the IRC requirement. More important, capital expenditures include reconstruction and resurfacing, as well as bridge repairs, which should be included in the IRC figures.

reflect the costs of their provision. There are several issues, however, that deserve some discussion.

1. Implications of Paying for Environmental Damage

The idea that road users (and others) should pay for environmental damage has far-reaching implications. To an economist, the obvious way in which road users should pay is through the tax system, as the environment is held in trust for all — there is no obvious owner to whom payments should be made other than the state acting as custodian. Taxes are not the only way and, indeed, the idea of levying environmental (or green) taxes is a fairly novel concept in Britain. The normal way in which polluters have, in the past, paid for pollution is by being forced to undertake otherwise unattractive expenditures to meet mandated standards of quality. The most obvious example in transport is the vehicle emission standards that are set by the government for new vehicles, but there are a host of regulations about noise levels, safety standards (alcohol levels, vehicle lights, seat belts, road worthiness etc.) designed to control the impact vehicles have on the environment and other road users (some literally). However, using green taxes, in addition to various standards, has a number of economic advantages and political attractions.

The political attractions of green taxes are obvious — they are likely to command more support than other kinds of taxes, as they cloak the painful process of extracting revenue in a mantle of virtue and provide a salve for guilt. The main economic advantage of taxes that reflect the marginal damage is that they leave the user to decide how best to respond, rather than forcing him or her to make one particular kind of decision. They are also more accurately targeted to the damage caused and therefore likely to be more effective at lower cost. Perhaps the best-known example is the higher tax on leaded than on unleaded petrol, which raised the proportion of motorists buying unleaded petrol from 5 per cent in 1988 to 63 per cent by 1993. Forcing all motorists to switch to unleaded petrol would have required major premature scrapping of older vehicles and would not have been politically acceptable. Just requiring new vehicles to be able to run on unleaded petrol would have discouraged the replacement of older vehicles, as the newer ones would require more expensive engines. Nor would it have provided any incentive to actually buy unleaded petrol.

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, environmental taxes should be *distinct*, *defensibly quantified* and *non-discriminatory*. These criteria pose the greatest challenge and will lead to the most radical consequences for the tax treatment of transport.

2. Distinct Environmental Taxes

The central idea of confronting road users with the full cost of their decisions is that it will lead to a better use of all resources, especially those currently unpriced, such as the environment. But this will only work well if all the other resources are properly priced. Road users require road space, which is expensive to provide and often heavily used by other road users. In a market economy, consumers are familiar with the idea that they should pay to use scarce resources, that the payment should be enough to provide the full cost of the service supplied (capital and running costs) and that, where capacity is limited and demand varies, peak users should pay more than off-peak users. This last idea is that there is no need to expand capacity for off-peak users, and so only peak users, who need the extra capacity, should pay for expansion and they should pay the entire cost of the extra capacity. Thus electricity consumers with large metered loads (including regional electricity companies buying for domestic customers) pay a large amount determined by their demand on the three peak half-hours of the year.⁸

On this argument, road users should pay the costs of providing road space and, particularly, they should pay for maintenance (more for the more damaging heavy vehicles) and other operating costs, and interest on the capital of the road network. Ideally, these charges should be higher on congested roads but, until the arrival of a cost-effective and politically acceptable form of charging motorists different amounts on different roads and at different times of the day, simpler and cruder means of setting the charges will have to do. At present, road users pay two kinds of charge or tax — the vehicle excise duty (VED) and fuel tax. Government policy in the past has been that each class of road user should pay at least enough to cover the total expenditure on roads (which is *not* the same as the total *cost* of providing road space), and to that end VED can be finely adjusted by type of vehicle to bring the total level of taxes for that kind of vehicle up to at least the allocated level of road expenditure. To give an example, the VED on a light goods vehicle with a gross vehicle weight (gvw) of 3.5–7.5 tonnes was £150 per year in 1995–96, 6 per cent of the total tax paid by such vehicles, while the VED on an articulated lorry of gvw between 33 and 38 tonnes was £5,000 per year, 29 per cent of the total tax paid by such vehicles, or 33.3 times as large as the smaller lorry.

The total costs of supplying road space are equal to the capital and operating costs, and while the latter are carefully measured, the public sector has been remiss in keeping good capital accounts of the road network, so this part is less readily available. Nevertheless, rough estimates can be made and are given in Table 1. The DETR is currently endeavouring to prepare more accurate estimates

⁸These triad charges must each be separated by at least 10 days. The National Grid collects almost all its annual revenue from capacity charges based on either peak demand or declared generation capacity, and relatively little from variable charges.

of the written-down replacement cost of the road system from careful engineering studies of a sample of roads, and the Commission of the European Communities has invited tenders for rough estimates, based on past levels of investment in roads, for the member countries of the European Union, so better estimates should soon be available.

A rough estimate of the capital value might be £120 billion.⁹ If we take a cost of capital of 6 per cent real (the public sector discount rate, and now higher than the return of 5.25 per cent proposed for the water industry in Ofwat (1998)), the interest cost would be £7,200 million, or rather more than twice the annual rate of investment in roads. Adding on the running costs of the road system gives a total of £11 billion at the 6 per cent interest rate, substantially below the road taxes of nearly £19 billion shown in Table 1.

At the moment, the government does not identify that part of total road taxes that is the cost of providing road space, and therefore cannot define that part that might be environmental taxes or charges for other social costs, such as accidents or noise. It has defended *increases* in fuel taxes in real terms as required to help meet the Rio targets for CO₂ emissions. Unless the government does set out the basis on which road taxes are set, it will be impossible to identify the green tax part, and road users will have no assurance that the total road tax level is set on fair or defensible grounds. Claims that road taxes are being increased to reflect the social costs of transport will carry no credibility and run the risk of bringing the whole idea of green taxes into disrepute.

3. Other Problems with Setting Green Taxes on Transport

Newbery (1997b) argues that successive governments have been highly selective in targeting the transport sector with environmental taxes, particularly carbon taxes. Carbon taxes have been advocated as one of the simplest forms of green taxation, for they can be imposed very precisely on the source of the problem — the carbon content of the fuel, which is easily measured and completely defines the damaging potential of the CO₂. Such carbon taxes have been proposed by the EU, but were soundly rejected by the Trade and Industry Committee of the House of Commons, when it came to examine the market for coal, as being likely to accelerate the decline of the British coal industry. Since then, the Conservative Government was defeated in its attempt to raise VAT on domestic energy from 8 per cent to the standard rate of 17½ per cent, while the Labour Government actually reduced the rate to 5 per cent, thus effectively subsidising domestic gas and electricity use by 12½ per cent. The fossil fuel levy, designed to tax fossil fuel used in electricity generation and initially set at 10 per cent, has

⁹The estimated capital value in Table 1 is found by adding the gross value of the investment in roads each year to the last figure for the capital value of the road system published (for the year 1981), assuming that the expected lifetime of roads has remained unchanged, and revaluing using the cost index of all road construction. See the discussion in Newbery (1995). Numbers between £100 billion and £150 billion could be defended.

almost disappeared, though the proposed climate change levy looks set to replace it at a higher level (but only to tax industrial energy use, and not on carbon content). The tax *increase* of 3.6p/litre from March 1999 amounts to £56/tonne of carbon, or well above \$10/barrel of oil, which was the suggested total EU carbon tax (and only half was to be on the carbon content of the fuel, the rest being on the energy content).¹⁰ In short, tax policy towards greenhouse gases is in disarray.

4. Setting the Road User Charges

The ideal road user charge signals to the potential road user whether, when and by what mode best to make a given trip, and also signals to Roadtrack, as the supplier of road services (and to other modal operators, including Railtrack and the TOCs), where to expand supply. OfRoad will be concerned to ensure not only that Roadtrack responds to these and other signals in making cost-justified investments to maintain the efficient level of quality, but also that it does this at least cost. OfRoad also has a direct interest in ensuring that road user charges reflect marginal social costs as well as possible, to give the clearest signals, while making sure that the estimated costs are not inflated by inefficient provision, just as Ofgas is discussing with TransCo how best to ensure that charges for using the National Transmission System reflect the long-run marginal costs of moving gas from gasfields to final consumers.

Initially, the road user charge would be levied on the same tax base as current road taxes — namely, fuel and vehicle characteristics — until such time as charging users directly for the costs they incur or the demands they make on scarce road space becomes technically possible and economically justified (i.e. the benefits of improved charging outweigh the extra costs of collection). The advantage of this programme is that such a system of road pricing would be seen as a replacement for and not an addition to the present set of road taxes, and a majority of road users would benefit from the switch (as the majority of congestion and road damage is done by a minority of vehicles). The overall level of charges would be set in the same way as the levels of charges for the National Grid, Transco and Railtrack are set — to earn a return on the asset base and to cover forecast operating costs and depreciation. New investment would be financed either out of retained income (i.e. the return on existing assets) or by borrowing against the return to be allowed on the new assets, just as with those networks.

Clearly identifying the costs and setting the charges for providing road services would allow these services to be financed, while the creation of an appropriate regulatory framework to monitor the quality and efficiency of supply of road services should address the perennial problem of underinvestment in

¹⁰Motor fuel excise duty rises by 7.33 per cent; for higher-octane unleaded fuel, this is 3.57p/litre *excluding* VAT, which is payable on this excise; more for leaded, less for regular unleaded.

roads. One potential advantage of keeping Roadtrack in the public sector is that there should be less tension between the demands of the shareholders to earn profits by cutting investment and the demands of the road users, who see the consequential decline in service quality. ORR is currently concerned that Railtrack (and the rolling stock leasing companies) have been slow to resume pre-privatisation investment levels, and that, as a result, service quality has been falling, while Railtrack's share price more than doubled in the first year after privatisation. The downside is that investment in public corporations was not least-cost, for the attractions of engineering ambitions were not counterbalanced by stock market monitoring.

VII. PROBLEMS OF COMMERCIALISING THE ROAD NETWORK

Given all these obvious advantages, it is striking that no country has yet set up a successful and efficient road fund and system of road charges that might reap these advantages. What, then, are the difficulties in commercialising roads?

The first difficulty is related to the specification of the interest rate and the valuation of the network, both apparently conceptually difficult tasks. Consider what would be needed to commercialise the provision of road services in a similar manner to the commercialisation of railway services. Roads are expensive and durable, and the largest single item in the accounts would be interest on the value of the network, at least if the assets were to be valued at modern-equivalent-asset written-down value (as was the case in the past for nationalised industries). At a very rough estimate (Newbery, 1988 and 1990), the capital value of the road network is £100–150 billion, so at a 6 per cent real interest rate, interest would be £6–9 billion per year, compared with direct operating costs (largely maintenance) of nearly £4 billion, thus amounting to about two-thirds of total costs. Compare the figures for Railtrack in Table 1, where interest is less than one-sixth of total costs.

Valuing an existing road network that evolved from a pre-motor-vehicle age is both conceptually and practically very difficult, though short-cut methods exist (Newbery, 1988). The DETR has been instructed, under the new resource accounting directive of the Treasury, to assess the feasibility of valuing the capital stock of the road network, but it is making slow progress. The difficulty should not be exaggerated. When other networks were privatised, the market price was determined by the revenue that the regulator would allow the network owner to earn, discounted at the market's discount rate. Much the same approach could be used for valuing the road infrastructure — the Treasury would determine what would be an appropriate annual charge for the scarcity of road space, as well as the real rate of interest, and the discounted value of that revenue stream would determine the (indexed) market value of the debt representing those assets.

The real problems lie deeper. Even if the road network remains in the public sector as a commercialised agency, accounting for interest and capital is peculiarly difficult. The first problem is that, in Britain and most countries, the public sector has a poor record of keeping good capital accounts and ensuring that the book value of the assets keeps pace with movements in the price index of modern equivalent assets. But techniques exist to do this and, in the decade or so before privatisation, most nationalised industries used current cost accounting methods for valuing their assets. Given that there is relatively little technical progress in road building (unlike telecoms and power-stations, for example), the problems of properly indexing the capital value of the road network are relatively minor. A whole series of regulatory reviews to reset price caps, and an attendant series of references to the Monopolies and Mergers Commission, have considerably clarified the issues involved in proper capital accounting (Newbery, 1997a).

There are, however, problems in the treatment of old and new capital that have been revealed for the other network utilities and that will have to be addressed before creating Roadtrack. The other network utilities, particularly water and rail, face the problem that their inherited assets were valued by the market at much less than their replacement cost. This means that the current levels of charging (which are based on the market undervaluation of existing assets) would not be enough to cover the costs of new investment. This probably increases the reluctance of these privatised companies to invest, since their marginal returns will be lower than their average returns, and requires the regulators to agree a capital investment programme at each review, while increasing the need to monitor performance standards to reduce incentives to underinvest.

In the case of roads, the problem would only arise if the asset valuation attributed to Roadtrack were substantially below the figure of £120 billion suggested in Table 1 and/or if the required rate of return were less than 6 per cent real. If road user charges were set to recover revenues on that base, as in Table 1, then increasing road capacity in line with traffic to maintain constant service levels (i.e. speeds) should be self-financing and the problem of marginal investment costing more than the allowed revenue would be avoided. This claim rests on a number of defences. At the theoretical level, Newbery (1989) showed that, if there were constant marginal returns to increasing road capacity (for which there appeared to be reasonable empirical support), then even where weather accounts for a large fraction of road damage, setting road charges at their efficient level (to ration road space and internalise congestion externalities as well as charging for road damage) would generate exactly the same amount of revenue as required to finance road operation and expansion. At the empirical level, the benefit–cost ratio for accepted road projects using an 8 per cent discount rate (i.e. higher than the proposed 6 per cent) appears to be well over 1.5, and there is little evidence of any systematic bias in *ex ante* traffic forecasts

and realised traffic levels on which the appraisals were made. Finally, rough-and-ready calculations presented in Newbery (1994) suggested that the marginal cost of providing additional motorway capacity was about 2p/vehicle-kilometre, whereas the average road tax revenue was more than twice that level (at 1993–94 prices and taxes; at current tax rates, the differential would be considerably greater).

Of course, if the assets were written down or the required interest and dividend payments on the asset base made to the Treasury were reduced (perhaps because the Treasury wished to retain control over a larger fraction of road tax revenue), then the charge element might not be sufficient to cover marginal investment costs, and the same problems that occur with the other capital-intensive networks might arise but in a more serious form. While the regulators of the privatised network utilities are statutorily required to set price caps that enable the utilities to finance their activities, there is no guarantee that a regulated public sector utility would enjoy that assurance, and investment funds may be inadequate.

Another serious problem is that the rate of interest at which the public sector can borrow is the index gilt rate, which has typically been about 3 per cent real but has now fallen to about 2 per cent real, which is substantially below the required rate of return for public investment projects in roads (8 per cent real) and also below the rate that regulators allowed network operators such as National Grid to earn (7 per cent real).¹¹ One solution might be for the Treasury to hold equity and insist, as the shareholder, that the weighted average cost of capital is 6 per cent real, so that cheap borrowing would require a compensating increase in the equity return. Unless the Treasury can devise a suitable instrument, there would clearly be difficulties in decentralising the capital budgeting decision, as a public utility with effective taxing powers would be able to borrow at near the indexed gilt rate and would be tempted to select investments yielding too low a rate of return if it were free to borrow at this rate. If, instead, the Treasury were to continue to control investment decisions, then nothing would have changed — roads would not have been corporatised.

In short, there is a fundamental problem of decentralising the finance of a highly capital-intensive essential but public sector network service such as roads, where the ability to raise revenue from users is potentially almost unbounded but where the demand for new investment is relatively modest compared with the return on the existing capital base. Similar problems arise in the private sector where mature capital-intensive industries generate high cash flows that can be used to liquidate debt, leverage mergers or invest in other sectors, often with less

¹¹Since 1996, rates of interest have fallen and so have the returns allowed by regulators, so that the 1999 proposal from Ofwat is 5.25 per cent real. This is a weighted average of an equity return and a rather low debt return, and it may follow that the right rate of return to set on roads is essentially the same as that on other regulated networks and perhaps slightly below 6 per cent real.

than impressive financial returns to the owners. In short, private financial oversight on such industries is not obviously superior, and private ownership appears to work best when there is both intense competition and either a need for new investment in the business (telecoms being the leading example) or an opportunity for profitable investment elsewhere, so that there is a closer match between profits generated and investment requirements. Ironically, these are the circumstances in which old-style earmarking would probably also work quite well.

Putting in place an adequate governance structure to set charges related to costs which are directly available to finance investment might be difficult, and the alternative, in which the Treasury sets taxes unrelated to costs and oversees investment directly, appears to be administratively simpler (and allows higher road taxes than might be feasible otherwise). In the past, European governments have been more successful at sustaining adequate rates of infrastructural investment from public funds than now seems to be the case, but it may be that the balance of advantage has shifted back to corporatisation, particularly now there is more experience of regulating such networks and ensuring politically acceptable and economically justifiable revenue flows. Britain appears to be at a favourable juncture in that cost-reflective road user charges, together with sensible green taxes and modest levels of additional tax, might continue to generate the same level of revenue as before, while its cumulative experience with regulating other capital-intensive network utilities provides, for the first time, a possible model. The central innovation in creating a Road Fund is that of the regulator with appropriate powers to set charges and monitor service quality.

A further reason for thinking that the proposed solution would improve the present system of road finance is that the British government is operating under an inappropriate set of financial constraints on public sector investment projects which have perverse effects and which require the kind of radical change in approach suggested here. The government starts from the premiss that public expenditure cannot be increased, but if private finance could be persuaded to undertake the same investment projects, this constraint would be relaxed. In the case of roads, the Private Finance Initiative originally proposed private (unregulated) toll roads, but it was pointed out that this would lead to inefficient diversion to untolled roads. The new approach represented by DFBO (design, finance, build and operate) roads has moved to the more efficient system of shadow rather than actual tolls, as they do not have the adverse effect of costly collection points and undesirable traffic diversion. The model contract set out in Highways Agency and Department of Transport (1995, Appendix E, 6.1) requires that 'Tenderers will bid for shadow tolls in respect of payment bands ... in the form of pence per vehicle/kilometre ...'.

There would therefore seem to be a close similarity in purpose between tolls designed to pay for specific roads and earmarked road charges designed to cover total road expenditure. This similarity is even more apparent in the concept of

shadow tolls, where the road user perceives no increase in road charge but the road supplier is recompensed for the fact that vehicles already pay for the use of roads through road taxes. The net effect is that the government has effectively borrowed at high rates of interest (because of the various political risks that the contract will be renegotiated or its conditions changed by legislation) against the future road budget, reducing the ability to finance later projects. Because the finance is private, it does not appear in the budget as expenditure; nor do the liabilities for future payments, which would under a proper system of accruals accounting. In short, the government has accepted the principle of long-term finance and earmarking road taxes for road investment for a part of its budget, but at high cost and greater inflexibility and inefficiency for the remaining part.

There are other detailed design issues that are important but which do not affect the thrust of the arguments advanced here. The most obvious have to do with managing the interface between interurban roads, for which the corporate model seems well suited, and urban roads under local jurisdiction (and possibly minor rural roads, which have a universal service aspect). The Institution of Civil Engineers (1996) proposes a three-tier structure of national, regional and local roads, and the natural model here is the electricity supply industry, in which National Grid plc owns and operates the national (high-voltage) system while each of the 12 regional electricity companies owns and operates the regional and local distribution systems. Regional corporations permit bench-mark regulation of the kind so important in water and electricity regulation, while benefiting from local expertise and accountability. Whether urban roads should remain under local authority management with public external quality monitoring as at present, or be absorbed into the regional corporations as local affiliates, is a matter of detailed institutional design.

VIII. EVIDENCE FROM OTHER COUNTRIES

New Zealand issued *Options for the Future: Land Transport Pricing Study* (New Zealand Ministry of Transport, 1997) inviting comments on a commercialised model of road funding. The country has a National Roads Fund which receives payments from road users. Roads in New Zealand are also funded by local authority rates. The National Roads Fund receives payments from licence fees, road user charges and part of the fuel tax. The maintenance and construction of state highways are funded entirely by the National Roads Fund, while local roads are funded approximately 50 per cent by territorial local authority rates and 50 per cent from the National Roads Fund. Although part of the motor vehicle registration and fuel excise goes to the Crown Account and not to the Roads Fund, part at least is earmarked and goes straight into the Roads Fund, providing another contemporary example of hypothecated taxes for road expenditure as in the US. The result is a hybrid system in which not all charges paid by road users

are dedicated to roads and not all the road expenditures are funded from the Roads Fund. The system is regarded as inconsistent and inadequate.

The two main problems identified in the report are the lack of a consistent set of financial accounts and the lack of a long-term investment policy. Maintenance and construction of roads rely on the National Roads Fund and the local authority rates. Despite the continuous stream of money available for roads, there are difficulties with funding new roads. Investment decisions are restricted to short-term projects, with money spent in the same year that it is collected. No revenues are put aside from current revenues to provide for known demands on the system; nor are capital costs spread over time. Evidently, the Roads Fund is not trusted to operate as a capital fund. There are various other problems with the present system related to road charges (which are based on average, not marginal, costs), cost allocation (presently done with a model that was last fully reviewed in 1984), depreciation (apparently not properly accounted for) and congestion (i.e. the failure to differentiate charges according to traffic conditions). As in Britain, road users pay substantially more than is spent on roads and contribute large funds to the Crown Account, mainly from fuel duty. The target cut-off benefit–cost ratio for road investment is 4, which is incredibly high, implying a need to increase investment, though it is forecast to increase to 7 by the year 2000 if nothing is changed.¹² Were this to be financed by raising road charges, it would be at the expense of fuel excise currently going into the Crown Account.

Five different options are currently under discussion, ranging from a ‘do nothing’ option to a completely commercial model. The commercial model would require fundamental changes — all territorial local authorities and Crown assets would be transferred to one or more commercial enterprises owned jointly by the Crown and the territorial local authorities. Charging mechanisms would be replaced by time-, weight-, distance- and location-based charging. The present model of cost recovery would be replaced by road pricing, with the implication of a return on equity for new works. Financing of new roads would be ruled not by annual budgets but by a capitalisation regime, with allowance for borrowing to finance new roads. A regulatory regime would be introduced in order to prevent monopoly behaviour, and other policies regarding externalities and environmental problems would also be implemented. The intermediate proposals concentrate more on improving the efficiency of the charging structure and do not propose the final step of commercialisation.

Evidence from developing countries supports the view that setting up a Road Fund without an adequate governance structure remedies few of the normal problems of road finance. According to McCleary (1991), the World Bank, one time enthusiastically in favour of earmarking for highway expenditure, has now

¹²The extra cost of investing to lower the benefit–cost ratio from 5 to 3 would require a doubling of the level of investment.

changed its position. The Bank's experience in the Central African Republic, Colombia, Ghana, Mali and Zaire has not been very good. Ghana is the only country where earmarking has had some success. In the other four countries, earmarking has not succeeded. McCleary summarises the main problems encountered:

- Road funds are eroded during inflationary periods if the taxes are linked to fuel prices and these are administratively set.
- When the money is tight in the Treasury, earmarked funds may be temporarily frozen (as in Ghana), diverted to other uses (as in Mali) or the government and public firms may simply stop paying their fuel bills and therefore, their fuel taxes (as in Zaire).
- Even if road funds are sufficient there is no guarantee of efficient allocation between maintenance, rehabilitation and new investment.

The experience in these developing countries suggests that the governance and regulatory aspect is critical to the success of devolved road financing and that establishing regulatory agencies competent to set charges and monitor road expenditure and quality is at least as difficult, if not more so, than improving the effectiveness of government (and its transport ministry). It does not necessarily imply that developed countries that have evolved effective regulatory agencies would encounter the same difficulties.

IX. EARMARKING UNDER *BREAKING THE LOGJAM*

In February 1999, the government published *Breaking the Logjam*, which proposes primary legislation to allow local authorities to 'have new powers to enable them to charge drivers for using particular roads or roads in a specified area, and to levy a charge on workplace parking' (DETR, 1999, §2.8). The legislation will provide 'a requirement on traffic authorities to establish a free-standing account in respect of income and expenditure associated with the scheme; powers to enable operating costs (including enforcement) to be met from revenue. Powers to require a proportion of the revenue to be paid to central government' (§3.2). The government clearly anticipates that 'charging can be expected to generate a sizeable revenue stream' (§3.10) and proposes that 'local authorities which bring forward *pilot* road charging schemes should be able to retain 100 per cent of the net revenue generated for at least 10 years' (§3.13, emphasis added). Presumably once the viability of road charging has been demonstrated, the government will be able to decide what fraction should be paid to central government.

These instruments are intended 'for the purpose of reducing congestion or traffic growth, or achieving other objectives contained in a local transport plan' (§2.8). Road pricing, of which charging for parking can be seen as a part,

appears the logical response to the rationing of underpriced and extremely scarce urban road space. Although the theoretical case for road pricing is strong and widely accepted, the proposals set out in the consultation document are deeply flawed. The provision of urban road space is a natural monopoly, and most systems of pricing natural monopolies are subject to regulation. Indeed, the argument made above is that it was the combination of regulation, proper accounting, periodic reviews and a dispute resolution procedure that was decisive in allowing capital-intensive network utilities to be successfully privatised. The present proposals make little mention of the need for regulation of road prices or parking taxes, and appear to leave this in the hands of local traffic authorities. There is also little discussion of the principles that should guide the setting of such prices, as opposed to their design and geographical extent (§4.3). Instead, local authorities are encouraged to set these levies to finance transport or land-use plans as a claimed purely additional source of revenue to block grants and conventional local property taxes. The only recognition that some form of dispute resolution procedure might be needed lies in §§4.20–23 where the suggestion is that it could all be handled by a Parking Appeals Service.

The economic case for setting charges for accessing or parking in congested areas is that the road users should pay the full social costs, including the congestion costs, imposed on other road users. Although these may be difficult to calculate, there are methods available that can give estimates before the introduction of such schemes and which, combined with careful monitoring of traffic levels and responses to charges, can be refined to improve estimates during the trial periods. There are also established cost–benefit procedures for determining the value of public transport investments or infrastructure improvements, and there exist methods of assessing the land-use impacts of road charges and other transport policies.

A proper system of regulation would compare the proposed prices against the criteria of efficient allocation of road space (as measured by the current congestion and other external costs). The same regulatory agency would also scrutinise the social desirability of proposed uses of the revenue raised in new investment projects. Without the assurance of an independent check on the ability of the monopoly supplier of road space to extract revenue from his captive clientele — road users — local businesses and shops will be most mistrustful of the setting of such charges and will redouble their lobbying efforts to suborn the political process and represent their views. This may be a recipe for interest-group politics driving out the social good, and no doubt some towns will be captured by green activists, anti-business groups and the like. Judging from the past history of the business rate, eventually Whitehall will feel obliged to set such taxes at national levels. It would be better to recognise the need to protect minority business interests at the start, but to accept the need for regulation rather than further central government taxation.

There are certainly good reasons for thinking that these proposals further undermine the confidence that road users might have in the process of evolving a satisfactory transport policy. There is no mention anywhere in the consultation document of the current level of road taxes, which are, by a factor of four, adequate to finance a considerable increase in investment in public transport and transport infrastructure. Current road taxes exceed the current level of environmental, social and congestion costs, as argued above. The current government intends to continue to raise real fuel duties by 6 percentage points above the rate of inflation annually, though emission levels are falling. Since 1992, emissions by the total population of cars have fallen by 37 per cent for NO_x (despite an increase of 10 per cent in numbers of cars), by 35 per cent for the more damaging particulates, by 47 per cent for volatile organic compounds and by 49 per cent for carcinogenic benzene (Automobile Association, 1998). Surprisingly, emissions of CO₂, which can only be reduced by reduced fuel consumption, have not increased over this period. The new proposals add to this escalating burden with a system of road pricing that loads additional charges onto road users. The most effective way to generate massive opposition to the new proposals is to suggest that they should be additional to, rather than a replacement for part of, the existing level of road charges.

X. CONCLUSIONS

Earmarking taxes for dedicated expenditure on highways is an obvious application of the benefit principle of taxation, which, properly applied, should lead to a more efficient structure of road charges, perhaps one that eventually matures into a full system of road pricing (responsive to levels of traffic and hence congestion). The consequential price signals would play the normal signalling and allocative function of prices in conventional markets, though the network monopoly aspect of the service would require regulation and quality monitoring if these signals are not to be distorted or ignored. The main advantage at present is that earmarking should facilitate the proper design and management of multi-year investment programmes without the inefficiencies and/or inflexibilities imposed by an annual cash-limited budget and limited precommitment of future revenues. The main potential benefit is that the road user charges could evolve into a set of road prices without raising as much opposition as would be the case were road pricing to be introduced as an addition to current road taxes, as seems to be the danger with the government's current proposals.

The main problems have to do with the large capital element in the proper calculation of average user charges and with the mismatch between the cost of public sector borrowing and the required rate of return to earn on the infrastructure. There are additional problems in setting the environmental and other taxes to bring the total charge and tax on motorists up to their current level

(on the politically reasonable assumption that a fiscally constrained government will not willingly relinquish revenues that at present are not particularly contentious). It may be that this can be tackled incrementally, defining the combined tax and gradually clarifying the division between the environmental taxes, which would be generally applied, and the balance, which would eventually require some justification (other than environmental damage and road costs).

The logical sequence of reforms would be to create OfRoad to monitor the existing road system, to estimate the value of road capital and road user costs, to agree an investment programme over the first five years and, with all this information, to draw up a set of road user charges. In parallel, the Department of the Environment, Transport and the Regions would devise the corporate structure of Roadtrack, and the Treasury would design the remaining taxes for road transport. When all the components are in place, the corporate structure can then be implemented. One of the incidental, if cosmetic, benefits would be change in the measured level of taxes, which would fall by the amount of road user charges. The claim of this paper is that recent experience with regulating capital-intensive network industries makes road user charging and the commercialisation of the public highway both feasible and desirable.

APPENDIX. THE ENVIRONMENTAL COSTS OF ROAD TRANSPORT

Table A.1 gives four different sets of estimates of the environmental costs of road transport. Column 1 gives estimates taken from Maddison et al. (1996), which revise the earlier figures given in Pearce et al. (1993). The figures for global warming (i.e. CO₂) are from Maddison et al. (1996) and are derived from the shadow prices of controlling the last unit of CO₂ released assuming optimal abatement, where the marginal cost is \$(1993)5.87 per tonne of carbon (tC), or \$0.63 per barrel of oil (bbl). This is only slightly less than the cost assuming 'business as usual', calculated as \$6.07/tC, or \$0.65/bbl. This is considerably below the EU's proposed carbon tax of \$10/bbl, which, after negotiation within the EU, was adjusted to 50 per cent on carbon and 50 per cent on energy.

Column 2 gives numbers from the Royal Commission on Environmental Pollution (1994, Table 7.2), which clearly used Pearce et al.'s (1993) estimates of the costs of air pollution but the EC's proposed \$10/bbl carbon tax, all on carbon. Column 3 gives the figures where provided in Tinch's (1995) report for the Department of Transport. The report provides careful literature surveys for air pollution and noise damage, though it computes the latter as the total cost of traffic-related noise which exceeds 55dB(A) and takes each dB(A) as worth a median value of £7.75 (\pm £2.25) per person per year. Tinch admits that this is an average value for the total cost of traffic noise, not the marginal cost of additional noise.

TABLE A.1
UK Transport Externalities, 1993

	<i>£ billion</i>			
	<i>Maddison^a</i>	<i>RCEP^b</i>	<i>Tinch^c</i>	<i>Newbery^d</i>
	(1)	(2)	(3)	(4)
<i>Air pollution:</i>				
Particulates	5.6			0.4–3.0
NO _x	6.2 ^e			0.1–0.3
Other	8.0 ^e			0.1–0.3
Total air pollution	19.7 ^f	2.4–6.0	2.3	0.6–3.6
Global warming (CO ₂)	0.1	1.8–3.8	n.a.	0.1–1.8
Water pollution	n.a.	n.a.	n.a.	0.5–1.0
Noise	2.6–3.1	1.2–5.4	2.6	0.9–1.7
Total externality costs	13.3–35.3	5.4–15.2	n.a.	2.1–8.1
<i>Costs per vehicle-km</i>	<i>2.9–7.7p</i>	<i>1.2–3.3p</i>	<i>n.a.</i>	<i>0.5–1.8p</i>

^aMaddison et al., 1996.

^bRoyal Commission on Environmental Pollution, 1994.

^cTinch, 1995.

^dNewbery, 1997b.

^eIncluding indirect particulates.

^fCentral estimate.

Column 4 is Newbery's (1997b) attempt to improve on the more obvious shortcomings of these other estimates. Its main difference from earlier estimates is that it corrects for the reduction in life expectation associated with pollution-induced mortality, taking a median estimate of one year rather than the 35 years used to value accident mortalities.

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