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Land Transport Infrastructure Pricing:
AN INTRODUCTION

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LAND TRANSPORT INFRASTRUCTURE PRICING: AN INTRODUCTION

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FOREWORD

The Bureau of Transport and Regional Economics (BTRE) projects that the total freight task will continue to grow strongly. Such growth will increase the infrastructure maintenance needs and possibly hasten the need for capacity expansion. Setting prices for infrastructure use that reflect costs provides important signals as to the appropriate level of transport activity, choice of transport mode, and the level of infrastructure spending.

At the Australian Logistics Council (ALC) meeting on 7 November 2002, the Council asked the BTRE to provide a comparative analysis of current land transport pricing regimes and their objectives and to present the findings at the next Council meeting, held on 27 February 2003.

This working paper comprises the paper prepared for the ALC and already released by the ALC as a discussion paper.

The paper was written by Peter Kain, David Mitchell and Phil Potterton. The team acknowledges the information and comment provided by the National Road Transport Commission, the Australian Rail Transport Corporation, WestNet Rail and ARRB Transport Research, as well as by colleagues in the BTRE and the Department of Transport and Regional Services.

Tony Slatyer
Executive Director

Bureau of Transport and Regional Economics
Canberra
June 2003

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SUMMARY

There are differences and also important similarities between existing road and rail freight infrastructure pricing arrangements. Table 1 summarises the main features of pricing in each mode.

Objectives

The key road infrastructure pricing objective is to recover the expenditure by eight jurisdictions that is attributed to heavy vehicles in respect of a national road network available to all licensed vehicles, heavy and light. The National Road Transport Commission (NRTC) develops and recommends nationally consistent road user charges for heavy road vehicles under the *National Road Transport Commission Act 1991*. Five charging principles require the NRTC to balance cost recovery, efficiency, equity and administrative simplicity.

In some contrast, Australia's seven rail infrastructure managers, as corporate entities, seek commercial returns in respect of assets under their control. Their pricing has regard to National Competition Policy (NCP) frameworks, which include: promotion of the efficient use of the infrastructure; non-exploitation of monopoly position (e.g. in respect of bulk traffics) and incentives to reduce infrastructure costs. Rail infrastructure managers also implement specific transport policy objectives, where applicable (e.g. to increase rail traffic).

Cost attribution to heavy vehicles

Heavy vehicles are currently allocated 21 per cent of total road expenditure, while light vehicles are notionally allocated 50 per cent. The remaining 29 per cent—which includes substantial local road expenditure—is not allocated to road users. Whether sufficient costs are attributed for recovery to heavy vehicles in the aggregate and to the heaviest vehicle classes in particular is itself an important issue deserving further attention, particularly from a competitive neutrality perspective. Attribution is the subject of continuing research by ARRB Transport Research.

Cost recovery

Current heavy vehicle infrastructure pricing arrangements achieve the objective of recovery of aggregate attributed costs, including capital costs (108 per cent). However, due to a geographically-based exception in respect of road trains in an otherwise nationally uniform system, the arrangements achieve only 90 per cent recovery for the heaviest vehicles (i.e. road trains and B-doubles). There is over-recovery from smaller heavy vehicles, i.e. rigid trucks (138 per cent).

Australian rail infrastructure managers generally report positive financial returns on assets. However, while these returns may be sufficient for track maintenance, for most lines the returns are probably not sufficient to fund the track renewals and investment needed for a continuing operation. It follows that current charges may not reflect the economic cost of providing rail freight infrastructure in the long run.

TABLE 1 COMPARISON OF ROAD AND RAIL INFRASTRUCTURE PRICING ARRANGEMENTS

	Mode	
	Road	*Rail*
Number of regimes	1 (Statutory authority)	7 (Mix of privatised / corporatised entities)
Pricing objectives	Cost recovery, efficiency, equity and administrative simplicity	Market-based—satisfactory return on equity Satisfy NCP requirements Government-specific objectives
Cost recovery		
- Aggregate	Yes	Long-term objective (ARTC)
- Vehicle class/train type	Not heaviest classes	Not applicable
Charging structures	Two-part - annual registration fee - fuel-based excise	Generally two-part: - flagfall charge per train - per gross tonne-km
Charging process	Posted	Negotiated
Published charging	Yes	Some (ARTC 'reference' charges)
Charging parameters:		
Marginal cost	No	No
Mass–distance charging	No	Yes
Route-specific	No	Generally, yes
Vary by vehicle/train type	Yes	Yes (ARTC)
Charge for capital expenditure	Yes	Yes—partial
Charge for externalities	No	No
Incentives to improve efficiency	No	Generally, yes

Charging structures

Land transport infrastructure charging in both modes employs two-part pricing, so that cost recovery objectives can be met without unduly deterring use of the infrastructure. 'Efficient' variable charges should therefore be as close as possible to the cost the additional user imposes.

Heavy vehicle infrastructure charges comprise the first 20c of diesel fuel excise and annual registration fees, which differ by vehicle class. The diesel fuel excise, which comprises just under 70 per cent of total heavy vehicle charges, is less than optimal as a variable charge. Due to vehicle economies of scale, fuel use increases at a declining rate with respect to vehicle load. However, the cost of road-wear increases exponentially with axle loading. Variable charges that more closely matched the individual vehicle's marginal cost of road use (e.g. mass-distance charges) would ensure that pricing did not encourage over-use or under-use of roads by individual vehicles. This would help to provide more appropriate road investment (including maintenance) signals.

Rail freight infrastructure prices for use of each line segment are negotiated, within a floor-ceiling price band. Charging structures typically comprise a flagfall charge per train and a variable use charge per tonne-kilometre. The flagfall usually differs according to operating characteristics, e.g. trains with higher speeds and axle loads. There may be scope for more differentiation in variable charges than currently exists, for example on the basis of wagon suspensions.

Externalities

There is no charging for externalities in either mode, although the NRTC is to consider inclusion of some types of heavy vehicle externalities in the third heavy vehicle charges determination.

Externalities such as congestion, noise and local air pollution vary significantly by location and time of day and other dimensions, as well as by vehicle class and the extent of vehicle use (i.e. the existing heavy vehicle charging parameters). This gives rise to threshold issues of measurement, valuation, attribution to the individual transport user and technical feasibility, if externality charges are to take the place of, or supplement, regulatory approaches. In addition, while externalities are lower for rail freight than for road freight, it would generally not be appropriate to charge heavy road vehicles (and/or freight trains) and exclude light vehicles (and/or passenger trains).

Where feasible, well-designed charging for externalities would present users with the social cost of their behaviour and would thereby improve the efficiency

of land transport infrastructure use. However, from the road-rail competition perspective, it is notable that externalities are less significant over the non-urban routes, where this competition primarily occurs, than in urban areas.

Incentives to reduce costs

In setting charges to recover actual and budgeted expenditure, road infrastructure pricing arrangements do not provide any explicit incentive for road authorities to improve their productive efficiency. In contrast, the projected path of rail access price increases generally include a 'CPI-x' formulation. However, with prices primarily negotiated between operator and infrastructure manager, it is not clear how significant is the actual incentive to reduce costs.

LAND TRANSPORT INFRASTRUCTURE PRICING: AN INTRODUCTION

Road and rail infrastructure charges are set under quite different institutional circumstances. This paper outlines the objectives and current infrastructure charging arrangements for road and rail freight. The paper also briefly addresses the issues involved in charging road and rail operators for the external costs of their activities.

HEAVY VEHICLE ROAD INFRASTRUCTURE CHARGES

Background

A single statutory authority, the National Road Transport Commission (NRTC), is responsible for developing and recommending nationally consistent regulations and road user charges for heavy road vehicles[1,2]. Commonwealth, State and Territory transport ministers must agree the charges before they come into effect.

The NRTC was established in 1991 (under the *National Road Transport Commission (NRTC) Act 1991*) following agreement between the States and the Commonwealth. Prior to that, regulations and charges were set separately by State and Territory governments and, consequently, there was considerable variation across jurisdictions in both the level and the basis of the charges.

The establishment of the NRTC was intended to improve road safety and transport efficiency, and reduce the costs of administration of road transport.

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1 Heavy vehicles include all vehicles of 4.5 tonnes gross vehicle mass or above.

2 The NRTC is also responsible for the development and harmonisation of a range of regulation covering heavy vehicles, including mass limits, vehicle standards, driver hours and dangerous goods regulations.

Objectives

The Heavy Vehicles Agreement, signed by Heads of Government and included as a schedule to the *NRTC Act 1991*, specifies five charging principles to be adopted by the NRTC in setting heavy vehicle charges:

i. fully recover distributed road costs while minimising over-recovery from any vehicle class, thereby achieving full recovery of all road costs;
ii. adopt a common methodology;
iii. determine and collect charges in a way that achieves a reasonable balance between administrative simplicity, efficiency and equity in the charging structure;
iv. improve pricing, leading to a better allocation of resources, with investment decisions on equipment and infrastructure being based on more relevant demand signals; and
v. minimise the incentive for operators to 'shop around' for lower charges and undermine the integrity of the national charging system.

These principles require the NRTC to balance cost recovery (principle i.), economic efficiency (iii. and iv.), equity (i, and iii.) and administrative complexity (ii, iii. and v.).

Determination of heavy vehicle charges

Heavy vehicle charges are set using a fully allocated cost approach. In brief, relevant road infrastructure costs (expenditure) are first allocated across all vehicle classes, including light vehicles[3]. The heavy vehicle charges are then calculated so as to recover the costs attributed to each vehicle class and fully recover the total costs attributed to heavy vehicles, while minimising the over-recovery from each vehicle class.

Allocated road costs do not include external costs imposed by heavy vehicles on the rest of society. Commonwealth, State and Territory transport agencies have asked the NRTC to consider external costs as part of the third heavy vehicle charges determination, due to be implemented in 2005.

How costs are attributed

Cost allocation

Total road expenditure is allocated between all vehicle classes, including light and heavy vehicles, based on the amount and type of road expenditure and the

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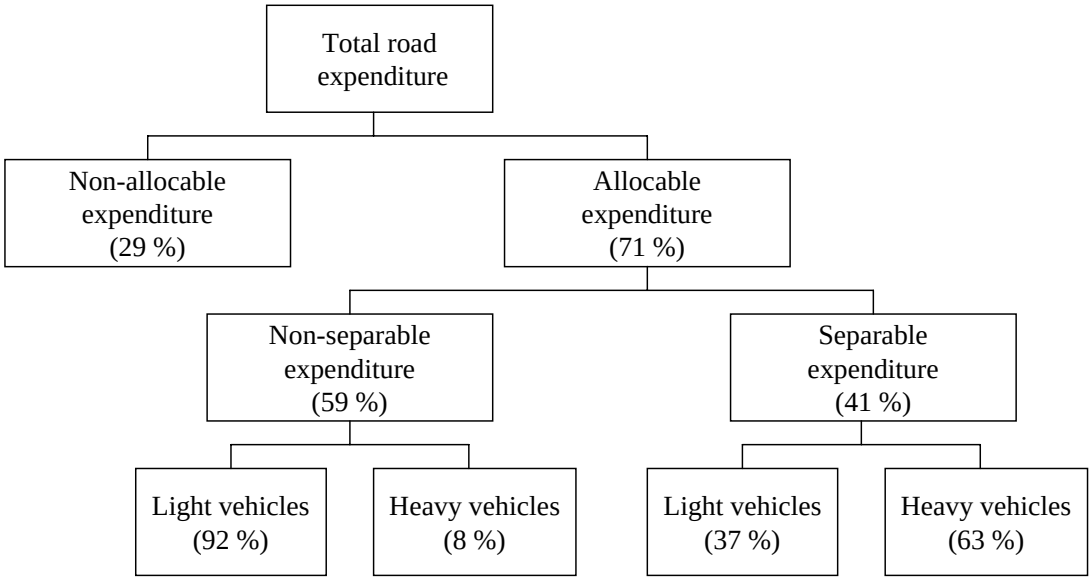
[3] Light vehicles comprise motor cycles, passenger cars and light commercial vehicles.

vehicle use attributed as giving rise to that expenditure. Under the current cost allocation process, approximately 30 per cent of total road expenditure allocated to road users is attributed to heavy vehicles. In total, heavy vehicles are allocated 21 per cent of all State and Territory road agency expenditure.

The cost allocation process itself involves a number of stages. Figure 1 illustrates the cost allocation procedure and the attributed expenditure shares.

FIGURE 1 ROAD EXPENDITURE ALLOCATION PROCEDURE



Note Figures in parentheses denote expenditure shares.

Source NRTC (1998).

Allocable and non-allocable expenditure

The NRTC first divides total road agency expenditure into two components: (i) expenditure to be recovered from road users ('allocable' expenditure) and (ii) expenditure not attributable to road users ('non-allocable' expenditure). (Expenditure on toll roads is not included in the NRTC cost allocation.) For the second heavy vehicle charges determination (NRTC 1998) non-allocable expenditure items included expenditure on vehicle registration, driver licensing, loan interest[4], and heavy vehicle enforcement costs. In addition, 75 per cent of urban local road expenditure and 50 per cent of rural local road expenditure was judged to be solely to provide access, and consequently not allocated to road users[5]. Consequently, non-allocable expenditure constituted

[4] Interest payments on loans by road agencies.

29 per cent of total road agency expenditure in the second heavy vehicle charges determination.

Allocable expenditure: Separable and non-separable items

Allocable expenditure is further divided into 'separable' and 'non-separable' components.

Separable expenditure items are those that vary with road use by the different classes of vehicle. Separable expenditure is attributed among the different vehicle classes, including light vehicles, using a set of empirically estimated 'attribution parameters' and estimates of road use that give rise to that expenditure. The attribution parameters are: vehicle kilometres travelled (VKT), passenger car units (PCU-km), equivalent standard axle kilometres (ESA-km) and average gross mass kilometres (AGM-km). AGM-kms and ESA-kms are alternative indicators of road wear, while VKT and PCU-kms measure use of road capacity.

Non-separable expenditure is that which cannot directly be attributed to road use; it includes the costs of mowing roadside verges and the costs of building a minimum possible standard of road (NRTC 1998). Non-separable expenditure is distributed across vehicle classes according to total vehicle kilometres travelled[6].

Expenditure attribution

The choice of attribution parameter can have a significant influence on the share of total road expenditure attributable to heavy vehicles and on the allocation of expenditure between vehicle classes[7]. Heavy vehicles are allocated practically all of the road expenditure attributed to AGM-km and ESA-kms, but only 7 per

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[5] In addition, in new residential developments the costs of building roads are often met by developers, and consequently including this expenditure in a cost recovery target would be double counting.

[6] Total vehicle kilometres travelled in the 12 months to 31 October 2000 was 181 billion km (ABS 2001), of which, light vehicles comprise approximately 92 per cent (167.0 billion km) and heavy vehicles 8 per cent (13.8 billion km).

[7] BTE (1999) estimated that if 100 per cent of the road maintenance and construction expenditure attributed to heavy vehicles were allocated by ESA-kms, instead of the current AGM-kms, then the equivalent annual registration charge for a 6-axle articulated truck would be around $13 000 per annum, compared to the current charge of $4 500 per annum. Total attributable arterial road expenditure for 1997-98 was estimated at $1715 million compared with the NRTC's estimated expenditure of $1055 million. Laird et al. (2001) cite additional studies that attribute higher costs to trucks than under current settings.

cent and 17 per cent, respectively, of expenditure attributed to VKT and PCU-km.

The appropriate choice of road use parameter, and consequently the share of road expenditure attributable to heavy vehicles, is not certain, and, indeed, has varied between the first and second heavy vehicle charge determinations. For example, in the first determination, road maintenance expenditure was attributed according to ESA-kms whereas in the second determination road maintenance expenditure was allocated by AGM-km. The effect of this change was that larger heavy vehicles paid a smaller share of road maintenance costs under the second determination than previously.

The road expenditure attribution parameters are updated periodically, based on the most recent research by ARRB Transport Research into the relation between road expenditure and vehicle use (Martin 2002). It is expected that road maintenance expenditure will be allocated according to ESA-kms in the third determination. (Appendix table I.1 shows the road expenditure attribution parameters used in the second heavy vehicle charges determination.)

From attributed costs to vehicle charges

Current heavy vehicle charges comprise a 20 c/L fuel-based variable charge, collected through the Commonwealth fuel excise[8], and an annual heavy vehicle registration fee[9], which generally increases in proportion to vehicle size. The *NRTC Act 1991* identified five instruments[10] for recovering costs, but directed the NRTC to use fuel excise and registration fees initially. Currently, fuel-based road use charges contribute approximately 70 per cent and annual registration charges 30 per cent of the total revenue collected from heavy vehicles (NRTC 1999).

Fuel-based charges

The fuel-based charge is based on the calculated rate of fuel excise that would be required to fully recover costs allocated to the smallest heavy vehicle class (2-

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[8] The current diesel fuel excise rate is 38.143 c/L (ATO 2002), and is paid by all heavy vehicle operators. Eligible heavy vehicle operations may claim a rebate of 18.15 c/L under the Diesel and Alternative Fuel Grants Scheme (DAFGS), leaving a net fuel-based road use charge of approximately 20 c/L for heavy vehicles.

[9] The charges also include a mass-distance charge for on special permits to operate over-mass and over-dimension vehicles.

[10] The five charging instruments identified in the *NRTC Act 1991* were: (i) road use charge (diesel excise); (ii) access charge; (iii) mass-distance charge; (iv) permit fees; and (v) a fee for travel between zones that reflects full cost recovery

axle rigid trucks). Since July 2000, the fuel-based road use charge has been fixed at 20 c/L. Fuel excise is paid to the Commonwealth Government.

Registration charges

For each heavy vehicle class, the annual registration charge (paid to state and territory governments) is calculated as the average charge required to fully recover the difference between attributed costs and the revenue recovered through the fuel-based charge.

The calculated registration charge, however, is not the actual charge levied on heavy vehicles. In estimating the heavy vehicle registration charges the NRTC attempts to meet two additional conditions:

1. that 'access' (registration) charges at the light end of the heavy vehicle classification be consistent with existing State and Territory registration charges for light vehicles[11]; and
2. that the heavy vehicle charges do not send signals that encourage inappropriate vehicle choice for the task[12].

The effect of these conditions is that smaller heavy vehicles are charged more than the costs attributed to those vehicles and some larger heavy vehicles, particularly road trains and B-doubles are charged less than the costs attributed. For example, on the basis of attributed expenditure, the second determination estimated registration charges for B-doubles and road trains should have been $10 200 and $11 700, respectively. The actual registration charges applied to these vehicles was $6 800 and $8 900 (NRTC 1999, p. 28).

Table 2 lists the annual heavy vehicle registration charges applying to articulated trucks at November 2002 (and appendix table I.2 provides an illustration of the current heavy vehicle registration charges for selected heavy vehicles). Since 2002, heavy vehicle registration charges are subject to automatic adjustment each July, based on growth in road expenditure (*Road Transport Charges (Australian Capital Territory) Act 1993*). The adjustment is capped to not

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[11] While there is no direct legislative requirement for consistency between light and heavy vehicle registration charges, it does fit with the directions outlined for the NRTC in charging principles (iii) and (v).

[12] In the first heavy vehicle charges determination, and in the technical paper prepared for the second determination (NRTC 1998), the NRTC also ensured that total revenue from heavy vehicle charges was not greater than allocated expenditure. This condition has been dropped for the charges actually implemented following the second determination.

increase by more than the annual increase in the consumer prices index (CPI) and to not decrease[13].

By way of example, the total annual road use charge paid by a single six-axle articulated truck, travelling a fleet average 112 000 km per year, with an average fuel intensity of 0.50 L/km, would be approximately $15 784 per annum—$11 200 (71 per cent of total charges) in fuel-based charges and a $4 584 (29 per cent of total charges) fixed registration charge.

TABLE 2 CURRENT ACCESS CHARGES AND MASS LIMITS – ARTICULATED TRUCKS

Vehicle class	*Access charge*	*Mass limit[a] (tonnes)*
6 axle	$4 584	42.5 (45.5)
8 axle B-double	$6 930	59.0 (62.5)
9-axle B-double	$7 250	62.5 (68.0)
Triple road train	$9 490	115.5 (125.0)

a. Figures in parentheses are mass limits for vehicles with 'road-friendly' suspensions.

Note Further details are available in appendix table I.2.

Source NRTC (2002).

Do heavy vehicle road user charges achieve objectives?

This section addresses the extent to which current heavy vehicle road user charges meet the charging principles specified in the *NRTC Act 1991*.

It should be noted that there is an inherent tension between the cost recovery objective (principle i.) and the economic efficiency objective (included in principles iii. and iv.). Principle iv., in particular, entails pricing to match use of existing capacity, potentially leading to under-recovery or over-recovery. Principle iv. also can mean highly differentiated pricing, by location, time of day, road used, vehicle type, etc., whereas principle i. implies variation of pricing only by vehicle class.

Principle i: ***Fully recover distributed road costs while minimising over-recovery from any vehicle class, thereby achieving full recovery of all road costs.***

Current charges over-recover the total road expenditure allocated to heavy vehicles (NRTC, 1999). In the second heavy vehicle charges determination,

[13] Charges for certain permits, for vehicles carrying indivisible loads of more than 125 tonnes GVM, may not be increased or decreased by any more than 5 per cent over the previous year.

approximately $1 280 million of road expenditure was allocated to heavy vehicles, and charges were set to recover $1 390 million.

For each vehicle class, however, the charges imply differing levels of cost recovery. Table 3 illustrates current allocated expenditure and estimated revenue by broad vehicle class. For most smaller heavy vehicle classes, current charges over-recover the costs attributed to those vehicles (by 38 per cent for rigid trucks and 29 per cent for buses). For many larger heavy vehicle classes, particularly B-doubles and road trains, current charges under-recover attributed costs (by almost 10 per cent each for B-doubles and road trains). Charges for other articulated trucks, which account for almost half of the total expenditure attributable to heavy vehicles, almost exactly recover costs.

The NRTC (1999), however, argues that any over- and under-recovery is not a significant issue. In the case of smaller heavy vehicles, it is argued that over-recovery provides some correction for environmental effects from operation of these vehicles in urban areas. In the case of road trains, the NRTC argues that because such vehicles operate predominantly in remote areas, where road expenditure is relatively low, so should charges be lower. To ensure that charges do not provide inappropriate signals, the NRTC also lowers the registration charge for B-doubles relative to the calculated charge.

TABLE 3 ALLOCATED ROAD EXPENDITURE AND REVENUE BY VEHICLE CLASS

Vehicle class	*Allocated costs*	*Estimated revenue*			*Over-recovery (under-recovery)*	
		Fuel-based revenue	*Registration charges*	*Total*		
	($million)	*($ million)*			*($ million)*	*(per cent)*
Rigid trucks	298	277	133	410	112	38
Articulated trucks	584	395	188	583	(1)	(0)
B-doubles	84	57	18	76	(8)	(10)
Road trains	190	126	45	171	(19)	(10)
Buses	55	59	12	70	16	29
Special purpose vehicles	19	16	6	22	3	16
Truck-trailer	54	38	23	61	7	12
Total	1283	968	425	1393	111	9

Note Figures may not add due to rounding.

Sources NRTC (1999) and BTRE estimates

These arguments raise issues of consistency in the application of the NRTC's charges determination. In particular, environmental effects are implicitly included for smaller heavy vehicles classes and not for other classes. Similarly, the argument that the costs of road use are lower on roads on which road trains predominantly operate than other roads introduces the principle of differential charges by road class, yet this is not applied across all vehicles classes.

Capital costs and PAYGO

The cost allocation principles are specified in the *NRTC Act 1991*. The *Act* stipulated that charges initially be set to recover total road expenditure allocated to heavy vehicles using a pay-as-you-go (PAYGO) approach, rather than, for example, setting charges to recover marginal costs plus the annualised capital cost. Under the PAYGO approach, road user charges are set to fully recover the average of the most recent two years' actual and the next year's budgeted expenditure on road construction and maintenance (all indexed).

Under the PAYGO approach, new road capital expenditure is effectively written off in the year of investment and, equally, past investment is regarded as having been written off in those earlier years (May 1984). Under this interpretation, current expenditure covers the cost of capital. Under another interpretation, PAYGO can be shown to incorporate a return on past capital expenditure—specifically, for a road network that is neither expanding nor contracting, current maintenance and capital expenditure will be equal to the annualised cost of all past construction and future maintenance expenditure (NRTC 1998). Although the Australian road network is relatively mature, whether these conditions are met, and so whether this interpretation is valid, is not clear.

Principle ii: adopt a common methodology.

The NRTC uses a consistent methodology for calculating nationally uniform heavy vehicle road user charges. (See also principle (v) below.)

Principle iii: determine and collect charges in a way that achieves a reasonable balance between administrative simplicity, efficiency and equity in the charging structure.

The current heavy vehicle road use charges provide a degree of balance between the often competing objectives of administrative simplicity, efficiency and equity.

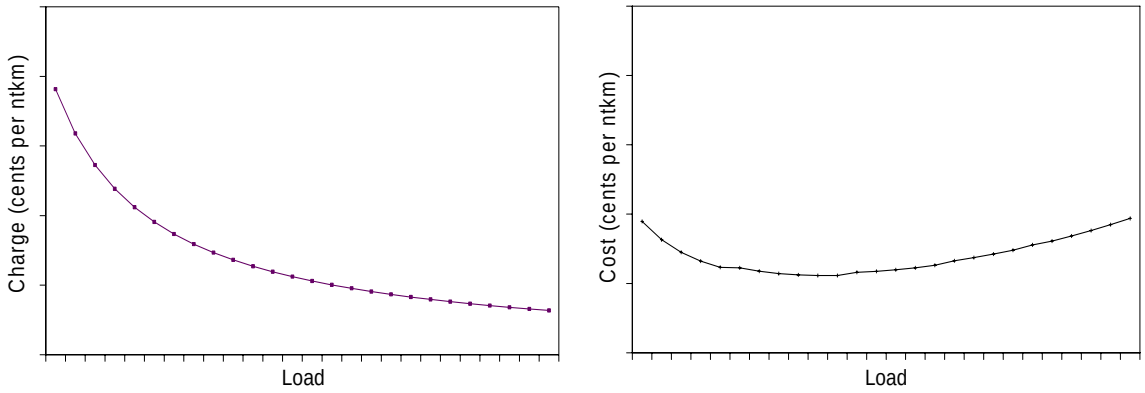
There is, though, scope to improve the efficiency of charges, albeit with additional compliance costs. The costs of individual road use vary in many dimensions—vehicle class, size of load, rural/urban, time of day, type of road, etc. Current variable charges, however, are only related to fuel use. Efficiency (and equity in the user pays sense) could be enhanced with a closer link between the costs of individual vehicle road use and charges.

Specifically, the current fuel-based heavy vehicle charges increase linearly with distance but at a declining rate with respect to vehicle load. The cost of road-wear, however, increases in proportion to total axle load raised to a fourth power—the 'fourth power rule'. Figure 2 illustrates the difference in structure of fuel-based charges and road-wear costs (for a six-axle articulated truck). It

shows that, for more heavily laden vehicles the costs of road-wear per net tonne-kilometre increase with mass whereas the fuel-based charge per net tonne-kilometre decreases with mass.

Not all of road pavement deterioration is attributable to heavy vehicles; environmental conditions also influence the rate of pavement deterioration. While disentangling the contribution of vehicle induced road wear and environmental deterioration is complicated, it follows that the costs of pavement deterioration should not be attributed exclusively to heavy vehicles. However, environmental deterioration of a road surface often leaves a pavement more susceptible to structural damage from heavy vehicles (Small et al. 1989).

FIGURE 2 PROFILE OF FUEL-BASED HEAVY VEHICLE CHARGES AND ROAD-WEAR COSTS FOR SIX-AXLE ARTICULATED TRUCKS



(a) Change in fuel-based charge with vehicle mass (b) Change in road-wear costs with vehicle mass

Source BTE (1999).

Charges that more closely matched the marginal cost of road use (e.g. mass–distance charges) need not be administratively complex. New Zealand, for example, operates a mass–distance based heavy vehicle registration scheme. While the administrative costs of such a system would be higher, than under the current NRTC regime, the increased adoption of more advanced technology, for fleet management purposes, offer potentially lower administrative costs in the future. Introduction of such a system, however, would require replacement of the fuel excise or, alternatively, of existing registration charges.

As well as the efficiency concerns, the current heavy vehicle road user charges also result in unequal treatment of different vehicles within each vehicle class. Registration charges are set based on fleet average utilisation. The effect is that vehicles that carry less mass or travel below average distances pay a higher per unit road use charge than vehicles carrying more mass or travelling above average distances.

Principle iv: ***improve pricing, leading to a better allocation of resources, with investment decisions on equipment and infrastructure being based on more relevant demand signals.***

Heavy vehicle charges provide incentives to operators in vehicle choice. The current charges are aimed to ensure operators are provided with incentives to choose the most 'appropriate' vehicle configuration for the task, e.g. articulated trucks' registration charges are less than for heavy rigid truck-trailer combinations. However, because charges are set on the basis of average vehicle utilisation within each vehicle class, there may be some distortion of vehicle choice between heavy vehicle classes.

Heavy vehicle charges are set to recover current road expenditure, not directly to inform investment. However, to the extent that current charges contribute to over-use or under-use of particular roads or roads in general, they affect investment signals and decisions.

In addition, there is no explicit mechanism in place to improve the productive efficiency of road agencies. Road agency expenditure is funded from the budget, not from heavy vehicle charging revenues. Having said this, it is probably true that road agencies generally have more projects than funds available, which may provide limited incentives to seek productive efficiencies.

Principle v: ***minimise the incentive for operators to 'shop around' for lower charges and undermine the integrity of the national charging system.***

The development of the nationally consistent charges by the NRTC has met this objective.

RAIL INFRASTRUCTURE CHARGES

Background

Australia has seven freight rail infrastructure managers (excluding in-house railways built by private mining companies). Two of these managers are Australian Rail Track Corporation (ARTC, managing interstate track principally in South Australia and Victoria) and Rail Infrastructure Corporation (RIC, managing track in New South Wales); the business of these 'vertically-separated' corporations is to sell track capacity to train operators—they do not run their own freight trains. The other five integrated managers manage and maintain the infrastructure and operate their own freight train services; these companies are Freight Australia (managing intrastate track in Victoria), Australian Railroad Group (Western Australia and South Australia intrastate),

Queensland Rail (QR), ATN (Tasmania) and Asia Pacific Transport Consortium (Tarcoola–Darwin).

Pricing objectives

Commercial focus

All the infrastructure managers have been either corporatised or privatised in the last decade. As corporate entities, the objective of these managers will be to set their prices to secure a satisfactory return on equity for their shareholders.

In general terms, interstate and mineral lines have proved more financially viable than other (principally grain) lines. The income base and viability of individual infrastructure managers' businesses can differ significantly. For instance, ARTC's access revenue is almost entirely derived from a single, private sector freight train operator, Pacific National. By contrast, RIC is heavily dependent on access income from New South Wales Government-supported passenger trains and from Community Service Obligation (CSO) payments for track maintenance.

Infrastructure managers' prices are generally set, in the first instance, by commercial negotiation between the manager and the train operator. This negotiation can mean settling on a market-based charging level rather than a cost-based level; that is, a level that accounts for the train operator's competitiveness relative to road freight. These charges are *market-based* rather than *cost-based*. While charges are normally negotiated within a floor–ceiling price band, thus far there is no consensus on how the floor and ceiling costs are derived. The latter cost is particularly important with the bulk haulage movements, which are often priced at the ceiling.

Competition and efficiency

Rail access charges are subject to a degree of regulatory oversight under National Competition Policy (NCP) arrangements. To varying degrees, the National Competition Council (NCC), Australian Competition and Consumer Commission (ACCC) and State regulators oversee the terms and conditions of access. This may involve the regulator being convinced that pricing principles generate sufficient incentives to promote efficient use of track by operators and efficient provision of infrastructure by the infrastructure manager.

For the integrated infrastructure managers, there is particular regulatory attention to access charges. This is because, by contrast to vertically separated managers, third-party access revenues supplement the revenue they generate from running their own freight services: because the access seekers may compete for the same traffic as the track manager, regulatory oversight to

ensure 'fair' on-track competition depends on equitable access charges for the track manager's train operations and those of the access seeker.

For integrated and separated managers, if access seeker and infrastructure manager cannot agree the terms of access, the dispute is settled through a government-based arbitration process. To increase the certainty of access terms and the arbitration framework, an access seeker or infrastructure manager may seek formalisation of access terms with a regulator. This formalisation process may include an agreement by the infrastructure manager to limit annual increases in standard access charges to a rate below inflation. This type of provision is intended, in part, to encourage the manager to seek further unit cost reductions.

There has been limited experience with third-party access as mandated access and privatised train operation is a relatively recent development. To date, the primary arbitration and regulatory issues have been concerned with the general rights of access and the formalised terms of access rather than with access charges for specific train operations[14].

Specific transport policy objectives

Charges may also reflect other specific transport policy objectives. For example, ARTC's commercial strategy reflects the Inter-Governmental Agreement that led to its establishment. In particular, ARTC seeks to facilitate service improvements through a seamless and efficient interstate rail operation and aims to increase the level of rail traffic. Similarly, RIC actively seeks to attract train operators to its tracks.

Price setting process

Although the pricing systems can differ between managers, there are a number of common features across most providers. The common features generally include:

- negotiated price-setting, with arbitration if that process fails;
- combinatorial floor–ceiling negotiated pricing band;
- two-part tariffs—a flagfall charge per train and a variable charge; and
- variable charges based on a rate per net or gross tonne kilometre.

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[14] For instance, there have been protracted inquiries into formalisation of access terms for the WA, Victorian, NSW, Queensland, Tarcoola–Darwin and ARTC regimes. Further, there have been deliberations over access to Hamersley Iron infrastructure, to the Tarcoola–Wirrida track (on the Alice Springs line) and GrainCorp access to Victorian intrastate infrastructure.

A further common feature of the charging systems is that generally prices are not used to allocate track capacity—train paths are not allocated to the highest value user. For instance, freight paths are allocated, in the first instance, to incumbent users of the path. Further, while passenger trains are normally given first choice allocation of paths and 'real-time' priority, ahead of freight users, this is not necessarily reflected as a premium on the access charge. However, it should be noted that where there is conflicting demand for a train path, ARTC's policy is to allocate the path to the operator generating the greatest revenue stream (in Net Present Value terms) and subject to risk assessments.

The common pricing features are now considered. Note that the focus is on ARTC's pricing, as its price-setting framework is more settled than the other regimes: its Access Undertaking has been approved by ACCC and its (reference) access charges are published.

Negotiation

Because access charges are established by negotiation, in most cases there is no published schedule of charges. A number of factors influence the negotiated charging level. Other things being equal, it would be expected that the greater the competition from road freight, the lower the overall rail access charge. Since access charges represent about one-quarter of a train operator's terminal-to-terminal costs, these charges can significantly influence rail freight competitiveness. Another important factor influencing a charging level is the relative quality of the train path; for instance, on ARTC managed track, 'premium' bi-modal trains attract a higher charge than for 'standard' freight trains—as illustrated in Table 3.

Although charging levels are negotiated, ARTC publishes charges, which apply to trains with certain operating characteristics. Table 3 illustrates these reference charges on the Adelaide–Parkeston and Port Augusta–Whyalla line segments.

TABLE 4 ILLUSTRATIVE ARTC REFERENCE TRACK ACCESS CHARGES

	Adelaide–Parkeston	*Pt Augusta–Whyalla*
Variable price per '000 gross tonne km	$2.14	$3.79
Flagfall price per train:		
"Premium"	$6 236	$144
"High"	$5 403	$125
"Standard"	$4 571	$106
"Low"	$4 157	$96

Note By way of illustration, "Premium" trains are passenger trains or bi-modal trains with a maximum train speed of 115 kph and a maximum axle load of up to 20 tonnes; "Standard" trains are express goods trains with a maximum train speed of 80 kph and a maximum axle load of 23 tonnes.

Source ARTC (2003).

Combinatorial pricing band

The negotiated access charge for a line segment generally falls within a floor–ceiling price band. Combinatorial pricing impacts on the regulated floor and ceiling price levels. With 'combinatorial' pricing, the ceiling access charge for a line segment is constrained so that the total access revenue from all train operators does not exceed the 'full economic costs' or 'stand-alone costs' of a line segment. That is, the charges are constrained to prevent over-recovery of costs, and, thus, to prevent cross-subsidisation of freight market segments across line segments.

Pricing structure

Rail infrastructure charges generally have two components: a 'flagfall', or fixed charge per train, and a variable use charge. Like road, some costs cannot be directly attributed to usage of a given line segment. Given that rail infrastructure provision involves a significant proportion of fixed costs and costs that cannot be directly attributable to a specific use, one option to recover some of these costs is by setting a fixed charge. In addition, a variable charge can be based upon a mark-up from the marginal costs of infrastructure usage. For example, ARTC applies a fixed charge per train, while it sets the variable charge as a rate per gross tonne kilometre: its flagfall-related revenue represents, on average, around 30 per cent of its total revenue.

The split between fixed and variable costs inevitably differs across infrastructure managers; the split will affect how the infrastructure is used and it affects a train operator's decisions on the pattern of operation. For instance, a high fixed charge per train may encourage operation of infrequent, long trains—but with higher wagon marshalling costs in terminals and demands for longer passing loops. A low fixed charge per train may encourage frequent, short trains—but with more train crew required and a need for extra track signalling to cope with the additional flows.

Variable charging

The standard basis for each infrastructure manager's variable charge is a rate per gross or net tonne kilometre. As illustrated in table 3, there can be separate variable rates for trains with different operating characteristics, such as for trains with higher speeds and axle loads.

Like road vehicles, the type of rail vehicles and suspensions can have varying impacts on the track. Nonetheless, while ARTC reference charges are differentiated by axle load and train speed, they do not vary by vehicle type or wagon suspension. However, the terms of the ARTC access undertaking allows a train operator to seek lower charges if the operator can demonstrate infrastructure cost savings of given wagon specifications.

Do rail infrastructure charges achieve their objectives?

Commercial performance

Rail infrastructure charges are generally negotiated on a commercial basis and may not be directly related to the costs of usage. Normally, prices will be set at levels that exceed the marginal cost of infrastructure use and, in general, managers are able to report positive returns on assets.

However, there may still be a significant revenue shortfall when it comes to recovering the full economic cost of infrastructure provision (i.e. operating costs plus the cost of replacing the asset). In particular, even in the absence of road competition, the level of rail freight traffic on many routes is insufficient for long-term infrastructure viability. Consequently, for some line segments, it is not appropriate for infrastructure managers to set charges to recover full economic costs—that is, where the current commercial value of the assets (in its current, or alternative, use) is low. For these lines, a realistic commercial strategy is that such assets are allowed to become 'life-expired', i.e. they are not renewed.

Are rail infrastructure managers generating a return on assets/equity to ensure a sustainable future for assets that are earmarked for renewal? Given the long life of most rail infrastructure, there is not a definitive answer. However, there is some commentary. For instance, the ACCC has concluded that 'ARTC's returns appear to be well below the full economic cost of providing services' (ACCC 2002, p. xvii). ARTC believes that it is not currently in a position to price at levels that recover the full economic costs of its assets (ARTC 2002, p. 5), despite any intentions to renew such assets. ARTC's indicative charges[15] are set

[15] The 'indicative' charges relate to train services with defined characteristics, such as an axle load of 21 tonnes, a train length not exceeding 1.5 km east of Adelaide and 1.8 km west of Adelaide, a maximum speed of 110 km/h and an average speed of 80 km/h. In 2001, just

at levels that 'enable rail to be competitive in the interstate, intermodal transport market'; the charge is, therefore, 'market based rather than cost based' (ARTC 2001, p. 15).

ARTC's corporate strategy to work towards full economic cost recovery involves two important strands. First, the Corporation's current access charges generate revenues that, in total, are below the full economic costs of the line segment. Secondly, its strategy is to invest in specific network enhancements (such as lengthening passing loops) that provide train operators with the opportunity to make productivity gains and, hence, reduce their effective unit cost of track usage. Effectively, ARTC is assuming that, despite the lower access charging rates and the additional investment costs, these strategies will bring about an 'elastic' response from operators. That is, the lower access charges and the more productive infrastructure will make train operators so much more competitive that the access revenue from additional train traffic will more than offset the lower access prices and additional investment costs.

It should be recognised that the viability of interstate rail infrastructure and of mineral lines is at stark contrast with the viability of other (principally grain) lines. By way of illustration, RIC's access charges generally do not achieve long-run economic cost recovery. These charges are being applied to a number of line segments that are at, or are approaching, life expiration and which have little commercial value; this has consequences for RIC's access charges. RIC applies a zero asset valuation to the majority (94 percent) of system route kilometres because it believes it cannot recover full economic costs (IPART 1999, p. 29). By contrast, RIC applies a positive asset value to the heavily used coal railways (accounting for about 6 percent of the NSW route kilometres).

Efficient use and supply of infrastructure

On most Australian rail infrastructure, particularly such as the network attracting only low traffic levels, it is difficult for infrastructure managers both to achieve efficiency in use—which implies marginal cost pricing—while meeting long-term economic costs.

Discriminatory (Ramsey) pricing can, in principle, improve infrastructure managers' cost recovery with minimum impact on train operators' level of infrastructure use. However, it is not always feasible to identify commodity types by freight container. In addition, in the third party charging environment, it is questionable whether price discrimination can be adopted while still ensuring equitable access charges between incumbent and access seeker.

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under two-thirds of ARTC's access revenue came from operators with these characteristics (ARTC 2001, p. 15)

EXTERNALITIES

All transport users in all modes impose external costs to a greater or lesser extent on other transport users and on the general community. These costs include congestion, noise, accidents, local air pollution and climate change (greenhouse gas emissions).

Estimates of externalities attributable to rail freight are significantly lower than those for road freight (Sansom et al. 2001). To illustrate by reference to greenhouse gas emissions, emissions from intermodal freight movements in Australia have been estimated at between 31 percent and 54 percent of those of 6-axle semi-trailers and between 41 percent and 70 percent of those of 9-axle B-doubles (QR Network Access, p vi).

Alternative approaches: charging and regulating

There are two main approaches in addressing externalities: charging users for external costs or limiting externalities by regulating activity. Where feasible, it may be appropriate to charge the transport user the marginal external cost the user imposes. Central city congestion charging has been introduced in a number of cities internationally with this objective. Where this is not feasible—for example, because it is too difficult to measure the external cost an individual user is imposing at any time with sufficient accuracy—regulating to eliminate or limit the extent of the externality is the more practical approach[16]. For example, traffic noise nuisance is typically managed through local area and/or vehicle-related regulation.

Charging transport users for many externalities is challenging because most externalities vary on many dimensions, including by location and time of day (congestion, local pollution and noise), weather conditions (pollution), engine efficiency (local pollution and climate change) and fuel use (climate change). Externalities also may be already partially internalised (accidents, via private accident insurance and compulsory third party premiums) or compensated for in the market place (noise nuisance, through differential property prices in noisy locations such as adjoining major roads and near airports).

Failure to recognise these different dimensions in an externalities charging arrangement—through an aggregated 'all externalities' charge, say—would result in a charge that is more akin to a tax. Such a charge would not reflect the marginal social cost of the externality and so fail to capture much of the benefits from the resulting changes in behaviour.

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[16] Noise and emissions from heavy vehicles are currently addressed through design standards. A process is in place to align Australian and international standards in this area. This is expected to result in significant reductions in emissions from heavy vehicles.

Charging for freight externalities

Charging heavy vehicles (and/or rail freight operators) but not light vehicles (or passenger rail operators) for externalities would raise important efficiency and distributional issues.

To illustrate, heavy vehicles, which comprise about 5 per cent of the vehicle fleet, both impose congestion costs on other road users and experience the costs of congestion imposed by other road users. Heavy vehicles would be required to pay for the marginal cost of congestion, but the road traffic conditions they experienced would be essentially unchanged. Similarly, heavy vehicles involved in road accidents both impose costs on other road users and experience the costs imposed by other road users that may have contributed to the accident.

Externalities and road–rail competition

Competition between road and rail freight occurs primarily in the long distance and interstate freight markets, where the line haul efficiency of rail freight can enable it to compete with the superior pick-up and delivery flexibility of road freight. As a result, contestable freight is carried over routes that are predominantly non-urban: around three-quarters of total vehicle kilometres travelled by larger heavy vehicles occurs outside urban areas (ABS 2001).

The costs of most externalities are significantly higher in urban than in rural areas. Meyrick (1994), for example, estimated that the charge that would be required to cover the average cost of externalities, for all vehicles, was 7.15 cents per kilometre travelled in urban areas and 0.92 cents per kilometre in rural areas. This limits the price and modal shift impact that might result from introduction of any freight externalities charging arrangement.

CONCLUDING COMMENTS

There are many differences and also important similarities between existing road and rail freight infrastructure pricing arrangements (see table 1 for a summary of the main features of pricing in each mode).

Both road and rail infrastructure charges have principally a cost-recovery objective, albeit administered by statutory authority in the case of road and by commercialised entities in the case of rail. Although there is no relationship between road and rail charges, we note that net tonne-kilometres (ntk) infrastructure charges for road and rail are within the same order of magnitude for many intercity routes and broadly similar on some routes. For example, infrastructure charges are approximately 0.61 cents/ntk for road and 0.55

cents/ntk for rail on the Melbourne–Adelaide corridor[17]—although these estimates will obviously depend on train size in the case of rail and total annual vehicle travel for road.

The key road infrastructure pricing objective is to recover the expenditure by eight jurisdictions that is attributed to heavy vehicles in respect of a national road network available to all licensed vehicles, heavy and light. In some contrast, rail infrastructure managers, as corporate entities, seek commercial returns in respect of assets under their control. They are required to have regard also to National Competition Policy frameworks, which include promotion of the efficient use of the infrastructure and incentives to reduce infrastructure costs and also to specific transport policy objectives (e.g. to increase rail traffic), where applicable.

Current heavy vehicle infrastructure pricing arrangements achieve the objective of recovery of aggregate attributed costs. However, due to a geographically-based exception in respect of road trains in an otherwise nationally uniform system, the arrangements do not achieve full recovery for the heaviest vehicles (including B-doubles). As many heavier vehicles compete for traffic with rail freight, this situation has implications for intermodal competitive neutrality.

An equally if not more important issue in a competitive neutrality sense is whether sufficient costs are attributed to heavy vehicles in the aggregate and to the heaviest vehicles in particular. That is, whether the level of charges that results from the allocation and attribution processes is correct. While a single definitive allocation of the costs of a joint use network is not a realistic objective, attribution is the subject of continuing research.

Land transport infrastructure charging in both modes employs two-part pricing, so that cost recovery objectives can be met without unduly deterring use of the infrastructure. 'Efficient' variable charges should therefore be as close as possible to the cost the additional user imposes.

Diesel fuel excise, which comprises just under 70 per cent of total heavy vehicle charges, is less than optimal as a variable charge. Due to vehicle economies of scale, fuel use increases at a declining rate with respect to vehicle load. However, the cost of road-wear increases exponentially with axle loading.

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[17] The estimated average road infrastructure use charge is based on a relatively new 6-axle articulated truck with average fuel intensity of 0.5 L/km, travelling 200 000 km per annum and carrying an average load of 20 tonnes. The imputed fuel use charge is $0.20 per litre and the registration charge is $4 442 per annum. The rail charge estimate uses ARTC indicative rates (at 1 July 2002) for a 'standard' train. We assume 60 wagons of 80 gross tonnes weight/40 tonnes net weight. The variable charge is $2.416 per '000 gtk. The flagfall ($1330) is then distributed over 80 tonnes x 60 wagons x 847.5 kilometres; this is $2.743 per '000 gtk or $5.486 per '000 ntk.

Variable charges that more closely matched the individual vehicle's marginal cost of road use (e.g. mass-distance charges) would improve efficiency of use and could also provide more appropriate road investment signals. Rail freight variable charges (generally cents per gross tonne-kilometre) do not have this flaw, although there may be scope for more differentiation than currently exists, for example on the basis of axle loadings and wagon suspensions.

There is no charging for externalities in either mode. Credible charging mechanisms face threshold issues of measurement, valuation and technical feasibility if they are to take the place of, or supplement, regulatory approaches. Externalities are also less significant over the non-urban routes, where road-rail competition primarily occurs, than in urban areas.

In setting charges to recover actual and budgeted expenditure, the road infrastructure pricing arrangements do not provide any explicit incentive for road authorities to improve their productive efficiency. In contrast, the projected path of rail access price increases generally include a 'CPI-x' formulation. However, with prices primarily negotiated between operator and infrastructure manager, it is not clear how significant is the actual incentive to reduce costs.

APPENDIX I ROAD EXPENDITURE ATTRIBUTION AND CURRENT REGISTRATION CHARGES

ROAD EXPENDITURE ATTRIBUTION

The road expenditure attribution parameters are updated periodically, using the most recent research, by ARRB Transport Research, into the relation between road expenditure and vehicle use (Martin 2002). Appendix table I.1 shows the road expenditure attribution parameters used in the second heavy vehicle charges determination (NRTC 1998).

TABLE I.1 ROAD EXPENDITURE ATTRIBUTION PARAMETERS

Expenditure Category	*VKT*	*PCU -km*	*ESA -km*	*AGM -km*	*HVKT*	*Non-separable*
A Servicing & Operating Expenses	100	..	..	..	..	..
B Road Pavement & Shoulder Maintenance						
B1 Routine Maintenance	..	..	..	50	..	50
B2 Periodic Maintenance of Sealed Roads	..	..	..	50	..	50
C Bridge Maintenance & Rehabilitation	..	..	..	33	..	67
D Road Rehabilitation	..	..	45	..	..	55
E Low Cost Safety / Traffic Improvements	80	20	..	..	..	..
F Asset Extension / Improvements						
F1 Pavement Components	..	..	45	..	..	55
F2 Bridges	..	15	..	..	..	85
F3 Land Acquisition	..	10	..	..		90
F4 Earthworks	..	10	..	..	..	90
F5 Other Extension/ Improvement Expenditure	..	10	..	..	..	90
G Other Miscellaneous Activities						
G1 Miscellaneous Works	..	..	..	..	..	100
G2 Corporate Services	..	..	..	..	..	100
G3 Enforcement of Heavy Vehicle Regulations	..	..	..	..	..	..
G4 Vehicle Registration	..	..	..	..	..	..
G5 Driver Licensing	..	..	..	..	..	..
G6 Loan Interest	..	..	..	..	..	..

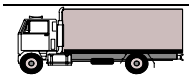
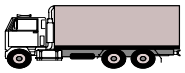
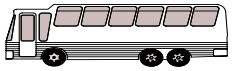
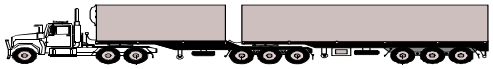
.. Not applicable.

Note VKT = Vehicle kilometres of travel; PCU = Passenger car unit; ESA = Equivalent standard axles; AGM = Average gross mass for vehicles over 4.5 tonnes GVM; and HVKT = Heavy vehicle kilometres of travel, vehicles over 4.5 tonnes GVM.

Source NRTC (1998, table 2.13, p. 27).

Appendix table 1.2 shows the heavy vehicle registration charges for selected heavy vehicles as at November 2002.

TABLE I.2 HEAVY VEHICLE REGISTRATION CHARGES FOR SELECTED VEHICLE CLASSES, NOVEMBER 2002

Vehicle Type	*Size*	*Current charge*
	Up to 12.0t	$320
	Over 12.0t	$533
	Under 42.5t	$586 + $640 = $1 226
	Up to 16.5t	$640
	Over 16.5t	$852
	Under 42.5t	$2 132 + $960 = $3 092
	Over 42.5t	$4 051 + $960 = $5 011
	Under 42.5t	$4 051 + $1 280 = $5 331
	Over 42.5t	$4 051 + $1 280 = $5 331
	Up to 20.0t	$960
	Over 20.0t	$2 132
	Up to 12.0t	$320
	Over 12.0t	$533
		$1 332
		$3 624 + $960 = $4 584
		$5 330 + $1 920 = $7 250
		$5 330 + $2 560 = $7 890
		$5 330 + $4 160 = $9 490

Sources NRTC (2002) and BTRE estimates.

REFERENCES

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ACCC	Australian Competition and Consumer Commission
AGPS	Australian Government Publishing Service
ARTC	Australian Rail Track Corporation
ATO	Australian Taxation Office
BTE	Bureau of Transport Economics
BTRE	Bureau of Transport and Regional Economics
IPART	Independent Pricing and Regulatory Tribunal of NSW
NRTC	National Road Transport Commission
QR	Queensland Rail

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
AGM	average gross mass
AGPS	Australian Government Publishing Service
ARTC	Australian Rail Track Corporation
ATN	Australian Transport Network
BTE	Bureau of Transport Economics
BTRE	Bureau of Transport and Regional Economics
CPI	Consumer Price Index
DAFGS	Diesel and Alternative Fuels Grants Scheme
ESA	equivalent standard axles load
GVM	gross vehicle mass
NCC	National Competition Council
NCP	National Competition Policy
NRTC	National Road Transport Commission
PAYGO	Pay-as-you-go
PCU	passenger car equivalent units
QR	Queensland Rail
RIC	Rail Infrastructure Corporation
VKT	vehicle kilometres travelled