Research Report 46

International Performance Indicators – Road Freight

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Foreword

As Australia's traded industries become more exposed to the pressures of international competition there is an increasing need for non-traded services to be supplied to them on an internationally competitive basis. The development of performance indicators for key non-traded service industries provides a mechanism for benchmarking their performance relative to their overseas counterparts.

In March 1991 the Prime Minister announced that the Bureau would undertake a study to develop international performance indicators for the more significant infrastructure services. These services include electricity, rail freight transport, road freight transport, telecommunications, waterfront, coastal shipping and gas. A report on the Australian electricity supply industry was released in February 1992, a report on rail freight in May 1992, and a report on telecommunications in December 1992. The project is being supported by the Business Council of Australia (BCA).

This report on the Australian road freight industry represents the fourth in the series of reports and has been undertaken for the purposes of comparison with the earlier rail study and to facilitate examination of the effects of infrastructure charging on the industry.

The Bureau would like to thank those representatives of road transport companies, associations and authorities and industrial users of road freight, in Australia and overseas, for their invaluable assistance and advice during the course of this study. Valuable comments were received from the Bureau of Transport and Communications Economics and the National Road Transport Commission. The research team would also like to thank the members of the BCA Advisory Committee: Tony Daniels (Tubemakers), Bill Bytheway (Mayne Nickless), Reg Patterson (AUSTROADS and VICROADS), Bob Lim (BCA), Philip Norman (BCA), Robin Stewardson (BHP), Richard Clarke (Shell), David Balkin (McKinseys), Ian Edwards (Alcan) and Philip Stern (Port Jackson Partners).

The report was researched and written by Don Smale and Andrew Morris with assistance from Claudia Leslie. The study was supervised by Ian Monday, an Assistant Director of the Bureau.

4 December 1992

John Ryan
Deputy Director

Executive summary

This study develops and reports a range of indicators which allow an assessment to be made of the performance of the Australian road freight industry and the operating cost environment it faces, both in a domestic context and in comparison with the industry in several overseas countries.

The international comparisons focus on the United States, Canada and the United Kingdom. These countries were judged to have operating environments broadly similar to that of Australia and/or provide examples of 'best practice'. Information relating to the road freight industry in other countries is also included in the report.

The study also facilitates a comparison of the services supplied by the road freight industry relative to those examined by the Bureau in an earlier report on the rail freight industry (BIE 1992). Beyond this, it also provides an opportunity to examine the effects of government regulation and taxes and charges on the performance of the road freight industry. Related to this, the study examines the broad effects of charging for road provision and use on the road freight industry.

The performance indicators reported in this study were identified in consultation with road freight operators and users in Australia, supplemented by discussions with road freight operators in a number of overseas countries.

Three broad categories of performance indicators are reported: customer oriented indicators focused on freight charges and the services offered to road freight users (eg price, timeliness and quality); operating efficiency indicators focused on the key drivers of operating performance (eg capital and fuel productivity measures); and indicators setting out a comparative analysis of vehicle operating cost structures, including the impact of government taxes and charges on these costs.

In making international comparisons it is important to have regard to differences in the underlying nature of the road transport task as well as other features of the operating environment (eg regulations). Available industry data both for Australia and overseas precluded the Bureau from making systematic adjustments for such differences between countries, particularly in relation to measures of operating efficiency. Nevertheless, the comparisons reported here are seen as providing a useful indication of the relative performance of the Australian road freight industry.

Customer oriented and operating efficiency performance indicators

Table 1 summarises the customer oriented and operating efficiency performance indicators developed for this study.

Table 1 Road freight industry: customer oriented and operating efficiency performance indicators, 1992 or latest data

Performance indicator	Australia	US	Canada	UK

Customer oriented				
On-time delivery (%)	96	97	96	92
Loss & damage rate (%)	0.4	0.9	0.4	0.4
Operating efficiency				
Kms ('000) per vehicle p.a[(a)]	78	96	87	82
Tonne-kms ('000) per vehicle pa[(b)]	1020	1283	980	281
Empty kms/total kms (%)[(a)]	31	27	16	28
Fuel usage (litres/100km)[(a)]	51	53	54	41

Notes: (a) Articulated vehicles.
(b) All vehicles.

Sources: ABS 1992, Survey of Motor Vehicle Use 1991; US FHWA Highway Statistics 1990; UK Dept. of Transport Continuing Survey of Road Freight 1991; BIE Survey 1992; Statistics Canada 1992,Trucking in Canada 1989; American Trucking Associations F & OS Annual Report 1990 and other data (1992); Canadian National Transportation Agency Annual Report (1991).

Data for Australian and overseas road freight operations set out in Table 1 suggests that in terms of on-time delivery in relation to promised time, Australian road freight services are on a par with overseas services. The incidence of lost and damaged freight is below that in the United States, but comparable with Canada and the United Kingdom. Operating efficiency data relating to capital (ie vehicle) and fuel productivity indicate that the comparative performance of Australian road freight services varies from fair to good. While the Australian industry is behind the United States for all measures of vehicle utilisation, its performance compares favourably with the United Kingdom and Canada in terms of tonne-kilometres per vehicle per annum. In the case of fuel usage, Australia's performance is similar to that of the United States and Canada but inferior to that of the United Kingdom.

In relation to price, indicative data presented in the report suggests that Australian road freight rates are broadly similar to those applying overseas.

These findings are consistent with the views expressed by road freight users in a survey conducted by the Bureau which pointed to general satisfaction with the performance of the industry.

Overall, it would appear that the generally competitive nature of the road freight industry in Australia, together with the additional disciplines imposed by inter-modal competition, notably with rail freight, gives rise to strong incentives for operators to provide a good level of service to users.

Comparative analysis of vehicle operating costs (VOC) and taxes and charges

Analysis of the comparative total VOC reported in Table 2 reveals different outcomes for two broad classes of vehicles:

- For short-haul vehicles, Australia's costs are above those in the UK, similar to those in the US, but below those in Canada; and
- For long-haul vehicles, Australia's costs are similar to those in Canada, below those in the UK, but somewhat higher than those in the US.

Table 2 Operating cost components, short [(a)] and long haul[(b)] vehicles, 1992 or latest data, c/km

Vehicle operating costs	Australia		US		Canada		UK	
Cost component	**Short haul**	**Long haul**	**Short haul**	**Long haul**	**Short haul**	**Long haul**	**Short haul**	**Long haul**
Capital	21	31	17	25	19	26	23	22
Driver	87	40	97	49	87	45	56	42
Fuel & oil	16	27	9	14	14	22	22	38
Repairs & maintenance	15	22	14	19	22	28	23	34
Other	7	8	8	9	8	9	9	10
Total vehicle operating costs	**146**	**128**	**145**	**116**	**150**	**130**	**133**	**146**
Road related taxes and charges[(c)]	17	27	4	10	12	17	25	37
Adjusted VOC [(d)]	**129**	**101**	**141**	**106**	**138**	**113**	**108**	**109**

Notes: (a) Short haul vehicle: 17 tonnes gross vehicle mass (GVM), 80,000km p.a.
(b) Long haul vehicle: 42 tonnes GVM, 150,000km p.a., prime mover plus tri-axle trailer.
(c) Includes fuel taxes, registration fees, other road related taxes/charges, sales tax and excise duty on trucks and spare parts.
(d) Total VOC minus road related taxes and charges (as defined in (c) above).

Sources: Thoresen (unpublished), 1991; BIE survey; industry supplied data 1992;American Trucking Associations 1992, Trucking Trends; Trimac, 1991; Transport Canada 1990, Operating Costs of Trucks in Canada; Motor Transport Magazine (UK) 1992, Cost Tables; UK FTA 1992, The Managers Guide to Distribution Costs; World Road Statistics 1986-90, International Road Federation.

Analysis of the specific components comprising VOC reported in Table 2 sheds some light on the reasons for differences in VOC between countries. Higher capital costs (arising in part from taxes and duties applying to vehicles and their components) are a factor in Australia's higher VOC. Australia's driver costs are similar to those in Canada, below those in the US but higher than those in the UK. While wage differentials were found to exist, variations in the driver cost component largely reflected differences in the rate of utilisation of drivers. Fuel costs in Australia are significantly higher than those in the US,

higher than those in Canada but below those in the UK. Australia's repairs and maintenance costs generally compare favourably with those in other countries.

While road related taxes and charges in Australia are below those in the UK, they are much higher than those applying in Canada and the US. The higher incidence of these taxes and charges in Australia relative to the US in particular, appears to be a major factor giving rise to Australia's higher VOC compared with the US.

On the basis of adjusted VOC (total VOC less the cost of road related taxes and charges), the Australian road freight industry achieves lower cost levels than the US and Canada for both short and long haul operations. A conclusion that can be drawn from these data is that the level of taxes and charges applying to the industry is an important, although not the only, source of variation in observed VOC.

Analysis based on Australian Bureau of Statistics data shows the Australian road freight industry is much more highly taxed than other modes of transport and than the average for all industries in the Australian economy. However, after allowance is made for a road user charge that compensates for the public provision and maintenance of roads, the road freight industry is seen to be taxed at a rate similar to that for industry in general. Nonetheless, even after allowance is made for the road user charge, road freight transport is considerably more highly taxed than its main competing mode of transport - rail freight.

Given the significance of road related charges in the overall tax/charge regime facing the Australian road freight industry, the industry has an obvious interest in the efficiency with which road infrastructure is provided and maintained. Reflecting this, as part of the benchmarking project, the Business Council of Australia commissioned a study to examine the efficiency of the road construction and maintenance industry in Australia compared with other countries. The study is being undertaken by PPK Consultants and should be available for publication in early 1993.

Current reform initiatives

The creation of the National Road Transport Commission at the beginning of 1992 has given rise to the potential for accelerated regulatory reform of Australia's road freight transport industry. Uniform road user charges have been proposed to take full effect in 1995, and proposals have also been put forward for uniform vehicle regulations and driver technical standards. While it is difficult to compare the impact on the road freight industry of the regulatory environment in different countries, the move towards uniform regulations in the above areas within Australia is expected to improve the operating efficiency of the industry.

Given the generally competitive nature of the Australian road freight transport industry, any reductions in vehicle operating costs, whether through reduced capital costs, labour costs or reductions in taxes and charges faced by the industry, should translate into reductions in the price Australian users pay for road freight services, and hence into improvements in the international competitiveness of those users.

The Bureau will continue to monitor and report on the performance of the Australian road freight industry and its regulatory environment over the next three years. The extent to which the indicators identified in this report show improvement over time will provide a guide to the benefits associated with the regulatory reforms currently being pursued.

1. Introduction

1.1 Background

In the Prime Minister's statement of 12 March 1991, 'Building a Competitive Australia' the Bureau was directed to identify the importance of major infrastructure services to industry costs, develop a clear understanding of relevant measures for international comparisons, and publish these comparisons on a regular basis.

The background to this project is a recognition that the competitiveness of Australian enterprises in international markets is determined in part by the costs of inputs and services provided by other enterprises. A proportion of these inputs are obtained from enterprises which are not directly subject to competitive pressures. Where this occurs the development of performance measures offers a way of introducing competitive pressures indirectly through performance targets or yardsticks. While Australian road freight transport services are competitively supplied they have been selected for examination to allow a comparison to be made with non-competitively supplied Australian rail freight services, and to permit an analysis of the impact of the government regulatory and infrastructure charging regime on the industry.

The performance measures developed for this project seek to achieve two objectives. The first is to compare Australia's infrastructure service performance against that of our international competitors. In particular, the project addresses the question as to whether Australia's traded goods sector is disadvantaged by the performance of domestic infrastructure service industries. The international comparisons developed for this part of the study focus on customer oriented indicators of price, quality and timeliness. The results show Australia's competitive position relative to other countries.

The second objective is to measure the operating efficiency of Australia's infrastructure industries relative to their overseas counterparts. These latter comparisons indicate the extent to which efficiency can be improved. The key questions are how do we rate against world best practice and to what extent can we improve our performance?

The selection of performance indicators and the determination of world best-practice are difficult tasks. The process followed by the Bureau is to involve suppliers and industrial consumers in the selection of the performance measures and the determination of appropriate international comparisons. The intention is to develop credible and relevant measures which both suppliers and users are interested in monitoring to assess performance changes. The selection is consistent with the guidelines for effective performance monitoring. According to Hilmer (1991) measures should:

- deal with relatively few factors;
- highlight tangible factors;

- encourage improved performance; and
- relate to credible goals.

This report on the road freight industry represents the fourth in a series of studies of Australia's infrastructure service industries. The objectives and project methodology for this report are broadly consistent with those of the earlier studies covering the electricity supply, rail freight and telecommunications industries.

1.2 Project outline

The framework of this report is to outline the main economic characteristics of the road freight industry, indicate the importance of road freight as an industry input and then provide details of the customer and operating efficiency performance measures determined for the industry. The performance measures reported here were selected following discussions with road freight suppliers and their major business customers and are broadly consistent with performance indicators applied in a number of other countries. Analysis of comparative vehicle operating costs in Australia and selected overseas countries is presented, with attention paid to the comparative impact of government regulation, in particular the influence of taxes and charges on these operating costs. The effects of charging for road infrastructure on the road freight industry form part of this analysis.

The road freight industry has been defined for the purposes of this study as activities encompassed by the following Australian Standard Industrial Classification (ASIC) 4 digit codes:

5111 Long Distance Interstate Road Freight Transport
5112 Long Distance Intrastate Road Freight Transport
5113 Short Distance Road Freight Transport
5114 Road Freight Forwarding

This study aims to add value to work already undertaken or underway by:

- developing indicators with a customer focus (in addition to those with an operational focus);
- seeking to make comparisons not only within Australia but also internationally where similar overseas road freight services can be identified;
- regularly publishing simple, understandable, agreed performance indicators on a consistent basis over a period of time (3 years); and
- examining the impact of government taxes and charges on the operating costs involved in the provision of Australian road freight services relative to their impact in other countries.

The Business Council of Australia has commissioned a study to examine the efficiency of road construction and maintenance in Australia relative to other countries as part of the road freight benchmarking project. The study, which is being undertaken by PPK Consultants, complements this report and should be available for publication in early 1993.

1.3 Consultation with industry and users

Consultations were held with several road freight industry associations and companies in Australia and overseas, and with Australian users of road freight services to identify the nature, range and sources of data that should be collected for the purposes of this report.

1.4 Structure of report

Chapter 2 describes the general characteristics of the Australian road freight industry and its importance as an industry input, and makes some observations on the industry overseas. Chapter 3 examines the regulatory environment in which the Australian industry operates and comments on these aspects in other countries. Chapter 4 reports customer oriented indicators - price, timeliness and quality, and operating efficiency indicators for the Australian industry and develops some international comparisons. Chapter 5 compares the vehicle operating costs (including the influence of taxes and charges) faced by Australian freight operators with those faced by comparable operators in selected countries. Chapter 6 presents the summary and conclusions of the report.

2. The road freight industry

This chapter examines the importance of the Australian road freight industry in the economy and as an industry input and outlines some key features of the industry.

2.1 Road freight in the Australian economy

According to the Australian Bureau of Statistics (ABS) the transport and storage sector as a whole accounted for 4.7 per cent of Australia's Gross Domestic Product (GDP) in 1991-92. Road freight transport accounted for about 2 per cent of GDP (using 1984-85 data on a constant price basis).

In 1987, the Bureau of Transport and Communications Economics (BTCE) estimated the size of all transport operations (road, rail, water and air) as 4.5-5.0 per cent of GDP, while the estimate for the broadly defined transport sector (including vehicle manufacture and repair and road construction) approached 10 per cent of GDP. The IAC (1989) estimated that the road freight industry generated over $15 billion in revenue during 1986-87.

Estimates of employment in the road transport industry vary. The ABS Labour Force Survey indicates about 131 000 persons were employed in ASIC Group 511 - Road Freight Transport - in August 1992 (which represents 1.7 per cent of total employment). The Road Transport Forum (RTF), a peak national industry body, has estimated road transport industry employment at around 400 000, taking into account those employed both directly and indirectly.

Table 2.1 provides information on a number of aspects of the transport task performed by different transport modes in Australia.

Transport tasks can be measured in various ways. One measure is that of tonnes carried, but as this provides no information on distances travelled the measure of net tonne kilometres is usually preferred. On this basis, road services accounted for about 33 per cent of the Australian freight transport task in 1988-89, slightly ahead of rail but behind that for sea transport.

The length of the haul is one factor in determining the choice of transport mode. Road tends to be used for the short haul movement of goods due to its greater flexibility and because it avoids much of the double-handling associated with other modes. Over 48 per cent of road freight kilometres travelled are within urban areas and almost 90 per cent of all road freight kilometres travelled are within the state / territory of origin.

Table 2.1 Freight transport tasks in Australia, 1988-89

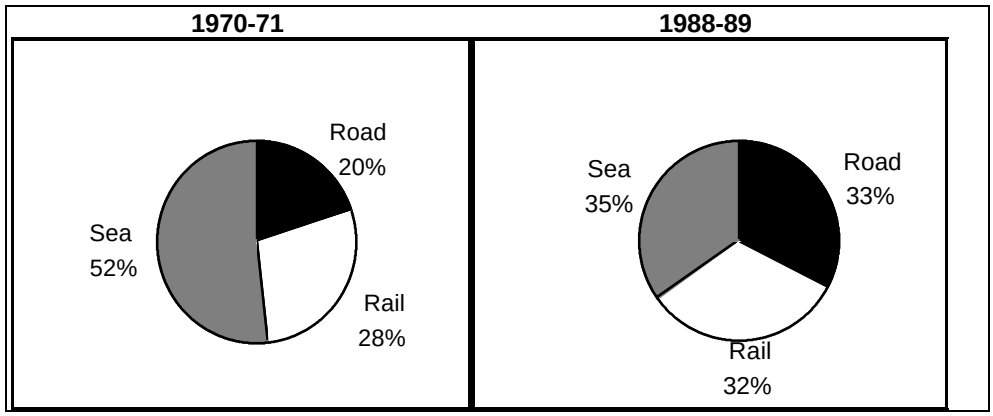
Task	Tonnes carried (million)	Share of transport market (%)	Net tonne kilometres (billion)	Share of transport market (%)	Average length of haul (kms)
Road	990	74	85	33	86
Rail	304	23	81	32	270
Sea	43	3	91	35	2100
Air	0.15	0.01	0.14	0.1	900
Total	**1337**	**100**	**257**	**100**	**192**

Source: IC 1991, Rail Transport, Report No. 13, AGPS, Canberra.

Rail is generally used for longer hauls and particularly in the transport of bulk commodities, such as wheat and other grains. Transport by sea is generally much slower than road or rail and is often used for the movement of bulk goods over very long distances. Air transport, while of limited significance in relation to the total freight task, is used to move high value goods where speed of delivery is an important consideration. In some situations, such as remote locations, the choice of transport mode may be limited. The average road haul in 1988-89 was 86 kms compared with 270 kms for rail, 2100 kms for sea and 900 kms for air.

Changes in transport modal shares from 1970-71 to 1988-89 are shown in Figure 2.1. Since the early 1970s, the main trends in domestic freight tasks have been the sizeable increase in the share for road freight and the marked decline in the share for sea transport. Rail's share has increased slightly.

Figure 2.1 Trends in domestic transport modal shares (net tonne kilometres)



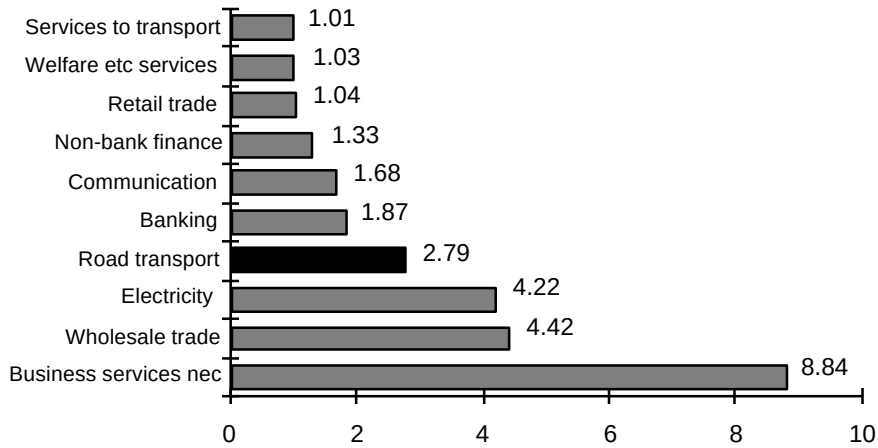
Sources: IC 1991, Rail Transport, Report No. 13, AGPS, Canberra; and Inter-State Commission 1990, Road use charges and vehicle registration: A national scheme, AGPS, Canberra.

The same transport task can often be performed by two or more modes. The choice of transport mode is affected by price which in turn depends on distance, traffic density, locations of source and destination, type of traffic and capacity utilisation. However, price is not the only consideration and service characteristics such as transit time, reliability, flexibility, frequency of service and security can be critical factors. The trend in land transport has been for high volume bulk hauls to be performed by rail, while low volume hauls, both freight and passenger, have been delivered increasingly by road transport.

2.2 Road freight as an industry input

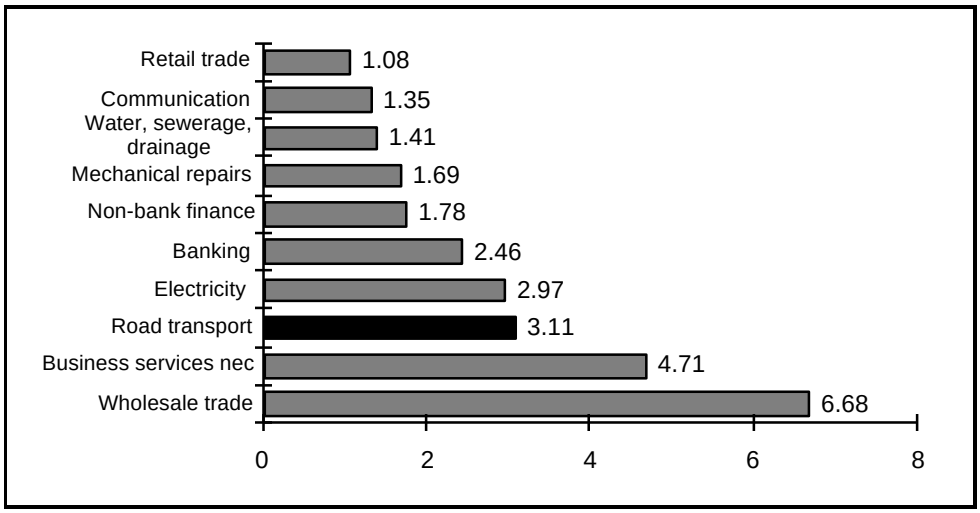
Analysis of the ABS input-output tables (which measure direct and indirect inputs used to produce a unit of output) indicate the quantitative significance of road transport as an industry input in comparison with other service industries in 1986-87. Road transport accounts on average for 2.8 per cent of final output in the mining sector (Figure 2.2). As shown in Figures 2.3 and 2.4 and 2.5, road transport accounts on average for 3.1, 4.5 and 5.2 per cent of final outputs in the agricultural, manufacturing and service sectors respectively. For the manufacturing sector, road transport inputs are at least twice as important as communication inputs and more than four times as important as rail transport inputs.

Figure 2.2 Service industry outputs required directly and indirectly to produce $100 of final mining sector output, 1986-87



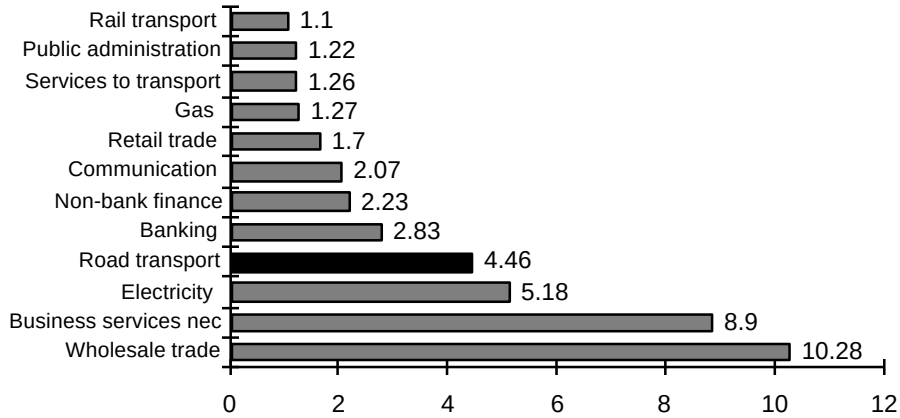
Source: ABS 1990, Catalogue No. 5209.0.

Figure 2.3 Service industry outputs required directly and indirectly to produce $100 of final agriculture sector output, 1986-87



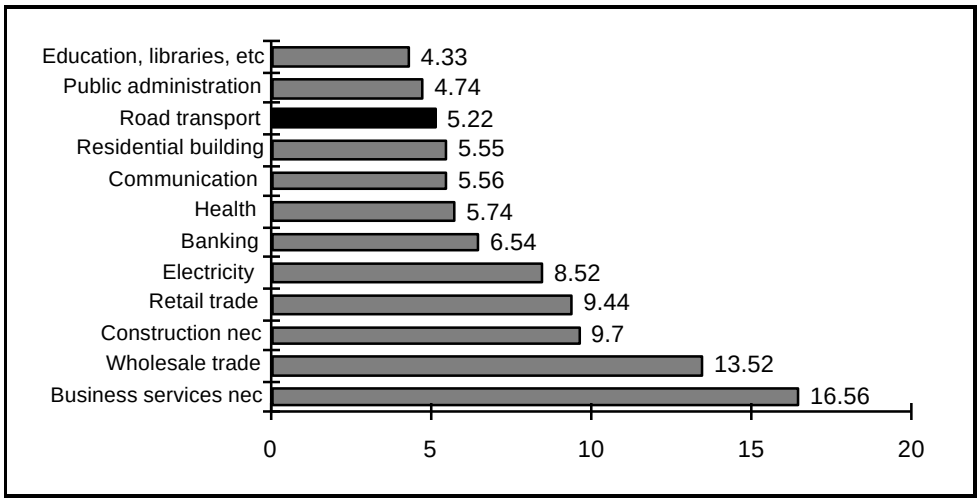
Source: ABS 1990, Catalogue No. 5209.0.

Figure 2.4 Service industry outputs required directly and indirectly to produce $100 of final manufacturing sector output, 1986-87



Source: ABS 1990, Catalogue No. 5209.0.

Figure 2.5 Service industry outputs required directly and indirectly to produce $100 of final service sector output, 1986-87

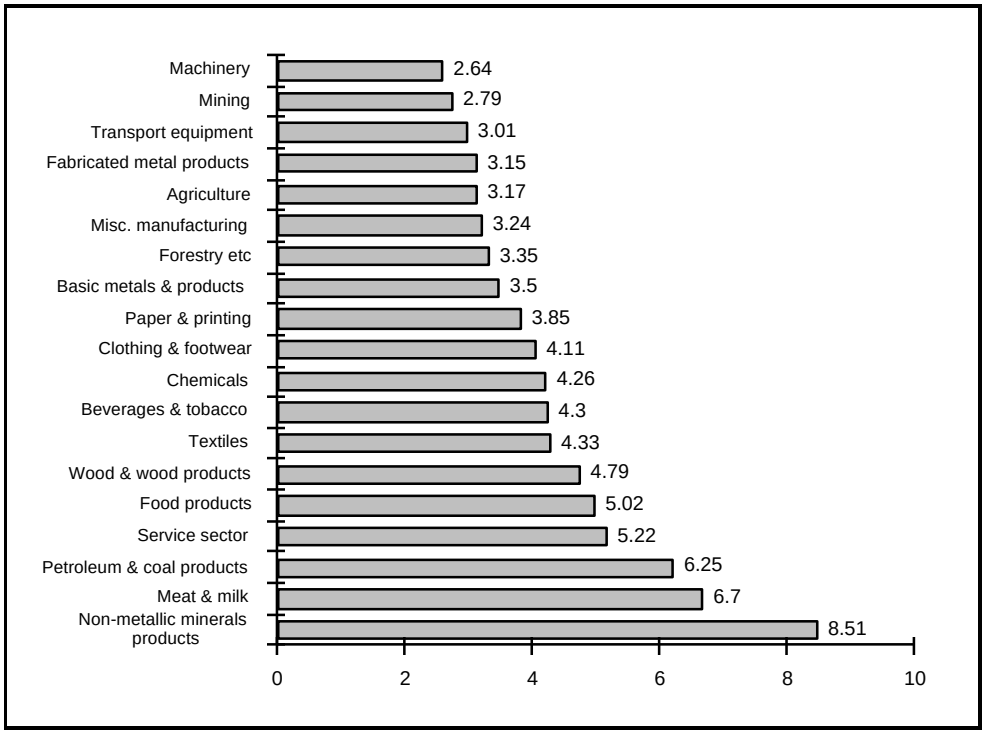


Source: ABS 1990, Catalogue No. 5209.0.

Although input-output analysis can establish the significance of road freight services in terms of their value as inputs or proportion of total costs, it does not capture the influence of other cost factors, such as the incidence of service failures or loss and damage of freight. The survey of road freight users carried out by the Bureau provided valuable information on the impact of these factors. Beyond this an efficient road transport industry gives rise to benefits to user activities in other areas as well. For example, reductions in inventory and warehousing costs with the adoption of just-in-time systems have been facilitated by improvements in the efficiency of transport, including road transport.

The requirement for road transport services as an input varies considerably on an industry basis. As revealed in Figure 2.6, it is most important for non-metallic minerals products (eg cement, bricks, lime and glass), meat and milk, and petroleum and coal products.

Figure 2.6 Road transport inputs required to produce $100 of output for various industries, 1986-87



Source: ABS 1990, Catalogue No. 5209.0.

2.3 Some key features of the Australian road freight industry

An examination of the Australian road freight industry in terms of its size and structure reveals a very diverse industry, highly integrated in some segments and quite fragmented in others, and which provides a wide range of services to many areas of the economy.

Size

The industry is made up of a large number of operators, several of which are large transportation firms but most of which are of small size, and is characterised by a significant level of entry and exit of firms. The ABS Business Register Counts indicate 17 301 road transport firms in operation as at August 1992. These firms operate in four distinct segments as follows: ASIC 5111 long distance interstate road freight transport - 3 779; ASIC Class 5112 long distance intrastate road freight transport - 4 058; ASIC Class 5113 short distance road freight transport - 9 022; and ASIC Class 5114 road freight forwarding - 442.

The number of registered trucks in Australia, classified according to type of truck, in 1991, is shown in Tables 2.2 and 2.3.

Table 2.2 Rigid trucks on register by gross vehicle mass, Australia, 1991

Gross vehicle mass (tonnes)	Number
Over 3.5 to 8	155 539
Over 8 to 12	72 593
Over 12 to 16	55 919
Over 16 to 20	7 846
Over 20 to 25	29 177
Greater than 25	4 429
Not stated	7 582
Total	**333 085**

Source: ABS 1991, Catalogue No. 9309.0.

Table 2.3 Articulated trucks on register by gross vehicle mass, Australia, 1991

Gross vehicle mass (tonnes)	Number
18 and under	13 016
Over 18 to 24	8 089
Over 24 to 30	10 698
Over 30 to 34	1 027
Over 34 to 40	3 134
Greater than 40	5 753
Not stated	9 297
Total	**51 014**

Source: ABS 1991, Catalogue No. 9309.0.

Structure

The structure of the road freight industry can be considered in a number of different ways, for example, by types of service provided, by types of operators, or by types of commodities carried.

By types of service provided

The 1984 National Road Freight Industry Inquiry examined the industry on the basis of the ASIC codes covering the industry:

- freight forwarding (ASIC Code 5114)
- line haul trucking (ASIC Codes 5111 and 5112)
- short haul trucking (ASIC Code 5113)

Freight forwarding is the act of taking control of clients' goods at the consignors' premises and moving the freight to the consignees using the most appropriate transport mode, maintaining control throughout the entire process. Freight forwarding can utilise a range of transport modes and operate either on a national basis or concentrate on specific routes or areas. Freight forwarding involves the consolidation of a number of part-load consignments into full truck loads for line-haul, and in blending those consignments to take advantage of the dimension and weight limits of the line-haul vehicle. It requires extensive pick-up and delivery networks, specialised terminal facilities and advanced management control systems. While there are significant scale economies in relation to operation on a national basis, it is usually easier to establish more specialised route or area operations. Freight forwarders can hire the use of rail wagons on either a casual or annual basis and this means of operation is increasing. Forwarders can also use their own vehicles, although they tend to use owner-drivers extensively and to a lesser extent, small fleet operators. Since the mid-1970s there has been increasing market concentration among the national forwarders with the larger firms acquiring a significant number of smaller operators, and related to this, there is evidence that forwarders can in some instances exercise a degree of market power in the purchase of services from railways and owner-drivers.

Line haul trucking involves the movement of goods over long distances (in excess of 100 kms[1]). These services are provided by the fleet operations of forwarders, fleet operators and owner operators collecting loads of consolidated less than full truck load (LTL) freight from forwarders' terminals or full truck load (FTL) freight from customers. There are generally few barriers to entry, particularly for FTL general freight, due to the lack of scale economies and the low cost of acquiring a vehicle. There are low levels of concentration and considerable competition among those providing these services due to the availability of rail and coastal shipping which are close substitutes, particularly for intercapital freight movement.

The **short haul trucking** sector can be broken up into short-haul general freight and short-haul specialised freight. The general freight component uses all-purpose vehicles such as small vans and articulated trucks and is generally characterised by low barriers to entry and exit and a large number of small operators with resulting high levels of competition. The specialised freight component involves industry-specific or commodity-specific equipment such as petrol tankers, concrete trucks and crane trucks. A significant proportion of service providers in this component operate in specialised markets as a result of the specialised nature of the equipment used and the tendency for operators to

1 The 1984 National Freight Industry Inquiry specified this haul length as linehaul trucking.

form established links with users resulting in considerable barriers to entry. Examples of specialised markets include chemicals and waste cartage, vehicle transports, refrigerated trailers, livestock carriers, bulk petroleum products delivery vehicles and armoured vehicles.

The ABS 1991 Survey of Motor Vehicle Use data set out in Table 2.4 shows interstate road freight kilometres as 11.6 per cent of total road freight kilometres, and total non-urban road freight kilometres representing 51.8 per cent of total truck kilometres. On a tonne-kilometre basis, the importance of non-urban freight increases, with intrastate non-urban and interstate tonne-kilometres together representing 68.6 per cent of total Australian road freight tonne-kilometres.

Table 2.4 Kilometres travelled and tonne-kilometres moved by type of haul, 1991

	Capital city	Provincial urban	Total urban	Non-urban intrastate	Interstate	Total non-urban	Australia
Kms travelled (million kms)							
Rigid trucks	3067.9	758.0	3825.9	2146.6	210.7	2357.3	6183.2
Articulated trucks	726.3	336.7	1063.0	1923.0	966.3	2889.3	3952.4
Total	**3794.2**	**1094.7**	**4888.9**	**4069.6**	**1177.0**	**5246.6**	**10135.6**
Tonne kilometres							
Rigid trucks	9649.8	2623.9	12273.7	7681.9	701.6	8383.5	20657.3
Articulated trucks	9345.9	4668.6	14014.5	31321.9	17690.2	49012.1	63026.6
Total	**18995.7**	**7292.5**	**26288.2**	**39003.8**	**18391.8**	**57395.6**	**83683.9**

Source: ABS 1992, Survey of Motor Vehicle Use (1991) - unpublished data.

By types of operators

Providers of road freight services can be categorised as follows:

- owner drivers;
- fleet operators; and
- freight forwarders.

Owner drivers comprise about three-quarters of road freight transport establishments. While some operate as independent providers of services many operate under contract to freight forwarders and prime contractors. They may have equipment bearing the name of the forwarder or they may work for a number of forwarders on an ad hoc basis.

Fleet operators may be either prime contractors, working under their own name or the name of the client, or they may operate as sub-contractors to a larger fleet operator.

Freight forwarders arrange the movement of freight via their own fleet if they own one or via other hired carriers. Freight forwarders typically provide a door-to-door service to their customers and may arrange for a combination of transport modes to provide a service.

By types of commodities carried

Table 2.5 sets out details of commodities carried by road freight services on a tonne kilometres and tonnes basis.

Table 2.5 Total tonne kilometres and total tonnes carried by road by commodity carried, Australia, twelve months ended 30 September 1991

Commodity carried	Total tonne kilometres (million)	Total tonnes carried (million)
Agricultural	24 986.5	170.6
Logs and sawn timber	3 958.6	41.8
Fertilisers & other chemicals	3 503.6	31.0
Sand, stone, iron ore & other crude materials	11 170.5	279.6
Coal	1 248.9	17.3
Petroleum & other fuel products	5 131.9	53.0
Machinery	3 883.5	45.0
Motor cars & other transport	1 575.7	7.8
Cement, concrete & clay bricks	3 519.6	58.0
Metals	3 778.4	26.1
Other manufactured goods	3 553.2	34.5
General freight	13 705.2	72.3
Other(a)	9 650.5	181.5
Total	**89 666.1**	**1018.5**

Note: (a) Includes water, garbage, household effects, tools of trade and other.
Source: ABS 1992, Unpublished data.

In looking at the types of commodities moved one classification which can be useful is the following:

- consolidated freight;
- dry bulk;
- liquid bulk;
- general freight; and
- express.

Consolidated freight is moved by freight forwarders as described above. **Dry bulk** and **liquid bulk** are in the category of specialised services and can be either short haul / urban or intra / interstate linehaul movements. Similarly **general freight** and **express freight** can be either urban or linehaul services. The general and express freight group are characterised by low barriers to entry and a large proportion of owner drivers. This segment includes services ranging from the small van style of operation which delivers small parcels between city offices to the large interstate overnight fleet operators. The express freight market is dominated by the various operations of TNT and Mayne Nickless.

2.4 The road freight industry overseas

Brief comments on the road freight industry in the US, Canada, Japan, the UK and the European Communities are set out in Appendix 1. National data is in general not available on a strictly comparable basis and for this reason the information reported varies from country to country.

Broad observations that can be made are that road freight is in general the dominant mode of transportation for freight in these countries (on a tonnage basis), road freight is invariably an important component of GDP, the industry is an important source of employment, and has increased its share of the overall transport task in each of these countries in the last decade or so.

3. The road freight industry regulatory environment

This chapter outlines the current road freight industry regulatory environment, considers some of the proposals for regulatory reform and the potential gains from these reforms, and looks at current reform initiatives and the reactions of the industry and users to these initiatives. In a recent report on road transport the Organisation for Economic Co-operation and Development (1990) observed that in several countries economic regulation of the industry has been reduced during the 1980s, if not removed altogether, with the aim of encouraging greater competition and efficiency. Some observations on the regulatory environment in selected overseas countries are set out in Appendix 2.

3.1 The current regulatory environment

The road freight transport industry currently operates under nine different sets of legislation, regulation and interpretation operated by both the Federal Government through the Federal Interstate Registration Scheme, and six State Governments and two Territory Governments. Under these arrangements, each State and Territory independently sets charges, generally consisting of a registration fee and various fuel taxes and has responsibility for a number of technical and operating standards and licensing arrangements. The Federal Government also imposes fuel taxes.

Registration fees vary widely as shown in Table 3.1, with New South Wales having the highest for almost all vehicle types and the Northern Territory the lowest. For the commonly used 6-axle articulated prime mover and trailer, fees range from $5870 in New South Wales to a low of $430 in the Northern Territory. There are also considerable differences in the basis for registration fees which may relate to gross vehicle mass, tare mass or engine size. Concessions such as those for primary producers also vary considerably between states and territories.

In addition to differences in registration fees between jurisdictions there are a myriad of technical and operating standards. These relate to vehicle characteristics such as vehicle design and construction, vehicle equipment such as lighting or braking systems, and vehicle operation such as the carriage of dangerous goods. Mass and dimension limit differences primarily present problems in relation to the need to obtain a range of special permits for non-standard hauls, and in the uneven approach to the licensing of high-productivity B-Double trucks[2] to operate on more heavily-travelled routes. Regulations governing drivers' hours also differ between jurisdictions.

Table 3.1 Average current registration fees, selected vehicles/vehicle combinations

2 B-double trucks comprise a semi-trailer pulling a second articulated trailer.

Vehicle	NSW	VIC	QLD	WA	SA	TAS	NT	ACT
2-axle < 12 tonnes	890	400	590	390	570	270	130	1170
3-axle rigid >16.6 tonnes	2220	1500	1940	1820	1300	590	240	2430
6-axle articulated	5870	2400	3280	2880	2980	1220	430	4090
8-axle B-Double	7280	2620	3360	3670	3290	n.a.	520	5850

Note: n.a. Not applicable.
Source: NRTC 1992, Discussion Paper on Heavy Vehicle Charges.

The National Road Transport Commission (NRTC) has identified the following deficiencies in the road freight industry regulatory environment as adversely affecting the industry's competitiveness and efficiency:

- varying mass-distance limits for the road freight system;
- lack of a uniform system of driver working hours;
- constraints in some states on the use of B-doubles;
- no consistent technical standards for road trains on similar road types; and
- lack of agreement on handling non-standard vehicles.

The NRTC's extensive road transport reform agenda directed at addressing these deficiencies is outlined in Section 3.3.

3.2 Proposals for regulatory reform and the potential gains from these reforms

The Inter-State Commission (ISC) was re-established in March 1984 with the purpose of assisting in the improvement of interstate transport. The ISC, in its 1988 report on 'Harmonisation of Road Vehicle Regulations', indicated that the potential savings from streamlining and rationalisation of regulations were considerable, concluding that:

> 'Even a modest saving in costs in proportionate terms resulting from a move to greater uniformity of road vehicle registrations would lead to a significant resource cost saving to the nation.'

The Commonwealth Government released the report of the ISC on 'Road use charges and vehicle registration: A national scheme' in March 1990. The report recommended that there should be a single national scheme of vehicle registration and regulation. The ISC also recommended a national road user charging system, to fully recover the identifiable costs of road provision, maintenance and use, throughout Australia, with identifiable costs to include externalities such as noise and atmospheric pollution. This recommendation was based on a perception that there was a need to redistribute the charging burden amongst vehicle categories on the basis of road use, particularly in relation to heavy vehicles. The report also recommended that road funding, management and planning by the authorities at national, state, territory and local levels be consistent with demand for roads and their usage.

There is widespread agreement within the road freight industry that the adoption of measures such as uniform standards and regulations, and more flexible vehicle operating arrangements could generate considerable savings for service providers and users alike. For example, savings could be realised through measures such as opening up of the remaining transport markets reserved for rail (eg grain, coal and other bulk commodities), introducing higher mass limits for trucks and permitting greater use of high-productivity B-double trucks.[3] As part of its continued concern that microeconomic reforms should be accelerated the BCA released in September 1992 a report on 'Fast-Tracking Economic Reforms'. The report, prepared by Access Economics, discussed the potential benefits available from tackling transport reform. The report was based on earlier work by the Industry Commission (1989) which attempted to quantify the potential cost savings from transport reform by individual transport sectors and to estimate the overall economic benefits to the Australian economy.

The Access Economics report examined progress in capturing the total potential savings of $6.8 billion (in 1989-90 dollars) from transport reforms identified by the BCA/IC work, corresponding to savings of around 25 per cent of spending on all forms of transport. Two-thirds of the potential cost savings were linked to reforms in the rail, water and international aviation sectors. Road transport was considered to be relatively efficient in a technical sense (ie services provided close to least cost of supply). However, potential savings of $525 million (or 8 per cent of total transport savings) were estimated to be available from reforms to road transport pricing, with $325 million of this potential savings figure judged to have been achieved during the last 2-3 years. In aggregate, the existing charging regimes for road transport appear to result in overcharging for pavement damage costs, passenger and light commercial vehicles subsidise heavy vehicle operators, resulting in inappropriate price signals for road investment decisions. A better system of charging would promote more efficient usage of roads and in the process would yield improvements in road construction and maintenance activity. The above savings estimate does not include potential gains available from the harmonisation of road regulations and the wider use of B-double vehicles. The NRTC has indicated that in its assessment savings from reform in these latter areas are likely to exceed those available from road pricing reforms.

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3 The National Association of Australian State Road Authorities (now Austroads) estima ted that these trucks have the potential to reduce transport costs by up to 20 per cent on designated routes, equivalent to annual savings of $180m in 1984-85 prices.

There is strong recognition generally of the importance of the road transport industry and the potential for cost savings from reforms in this area. Increased funding in the Federal Government's February 1992 One Nation package in the areas of road ($600 million for upgrading the road network) and rail transport ($454 million to complement the National Rail Corporation's ten year investment program) had amongst its objectives increasing the pace of transport reform and achieving a more integrated transport system through the upgrading of connections between transport modes.[4]

3.3 Current reform initiatives

In July 1991, the Heads of Government at the Special Premiers' Conference (SPC) resolved to improve road safety and transport efficiency by adopting a nationally uniform or more consistent set of road transport legislation. Accordingly, it was agreed to establish the NRTC under Commonwealth legislation to develop an acceptable framework of national rules, regulations and charges for the road transport industry. The Commission was set up in January 1992 as an independent body funded by federal, state and territory governments.

Heavy vehicle road user charging

The same SPC also agreed that a full cost recovery system should be implemented for heavy vehicles,[5] consisting of a general road user charge through fuel excise and an additional mass-distance charge for the heaviest vehicles to take account of the additional road damage caused by these vehicles. This was broadly in line with the approach adopted by the ISC in earlier reports. The charges were to be phased in to achieve full cost recovery by no later than 1 July 1995 for all heavy vehicles, except road trains which were to achieve full cost recovery by 1 July 2000. The NRTC was to make an initial recommendation on implementing national arrangements for registration, regulation and charging of heavy vehicles by March 1992, to apply from a date no later than 1 January 1993.

In its April 1992 Discussion Paper on Charges for Heavy Vehicles the NRTC proposed replacing the mass-distance charge proposed by the ISC and SPC with a fixed annual charge (for example $1100 for a 2-axle rigid truck with trailer; $4000 for a 6-axled articulated truck) and a fuel charge component of 18 cents per litre, the latter being the NRTC's notional allocation of the current 26 cents per litre of diesel excise into a charge (this compares with the 15 cents per litre recommended by the ISC). The proposed charge would apply to all heavy vehicles in all states and territories.

The NRTC noted that significant increases in charges applying to the heaviest end of the vehicle fleet (eg. 6-axle trucks and road trains) would impact adversely on remote communities, which are reliant on heavy transport for the carriage of goods into and out of their regions. This issue has also been examined by the BTCE (1992).

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4 In November 1992, the Federal Government diverted some of the proposed rail expenditure under the One Nation package to other areas so as to lessen delays in providing a fiscal stimulus to the economy.

5 Heavy vehicles are trucks and buses that have a gross vehicle mass of 4.5 tonnes or more.

Following a Ministerial Council meeting in July 1992 (comprising Ministers of Transport from each participating state and territory) the NRTC determination on heavy vehicle charging was approved by postal ballot, with NSW and WA voting against the determination. The agreed heavy vehicle charging regime was not substantially different to the NRTC's April 1992 proposals.

The NSW Roads Minister subsequently requested $75 million for extra road funding from the Federal Government to compensate for the reduced revenue from the proposed lower truck registration charges in NSW. An alternative option, proposed by the NSW Minister, involved the imposition of a $1500 environmental charge and $1500 safety inspection fee for non-NSW trucks entering NSW. Western Australia also expressed dissatisfaction with the new charges. It argued that its road transport operators would be subject to a higher level of charges but that, as most work only within the State, they would therefore receive no benefit from other components of the package such as uniform regulations. These issues are the subject of ongoing discussions.

The NRTC has pointed out that its brief on charging is narrow - to develop a uniform system of charging for heavy vehicles for road expenditure which is attributable to their road use - and excludes the following:

- light vehicle charging (heavy vehicles account for only about one-fifth of total road expenditure);
- external costs associated with road use such as noise and atmospheric pollution and congestion;
- hypothecation of the revenues raised by the charging system; and
- any mechanism to redistribute revenues from those states and/or territories which gain to those which lose or between levels of government.

Technical standards

In addition to its responsibility of developing a national heavy vehicle charging scheme, the NRTC was charged with the responsibility of developing a nationally uniform or consistent set of regulations for heavy vehicles. These responsibilities were expanded in May 1992 to cover all vehicles.

The NRTC is addressing the development of national regulations in the areas of vehicle standards, driver standards and road use standards and has proposed that a nationally uniform regime include the following:

- heavy vehicle construction requirements, including dimension and mass limits and vehicle emission standards;

- aspects of traffic codes relating to heavy vehicles and their operations;
- vehicle road worthiness and inspection standards;
- driver licensing standards and procedures;
- special codes of practice covering heavy vehicles such as loading codes, permit conditions etc;
- enforcement levels and sanctions for breaches of regulations; and
- aspects of operator controls particularly affecting heavy vehicles (freight and public passenger licensing) but excluding economic regulation (such as restricting commodities to rail).

Specific progress in these areas includes the near-finalisation of the following codes:

> **Vehicle Standards Code** which includes general safety requirements, vehicle marking, vehicle configuration and dimensions, lighting and light signalling devices, braking systems, external noise and emissions, maximum road speed limiting and mechanical connections between vehicles;
>
> **Vehicle Mass and Loading Code** which includes mass limits, loading dimensions, and loading and load restraint; and
>
> **Overmass/ Overdimension Vehicles Code** which includes mass limits, access provisions, warning devices, requirements for pilot/escort services and permit conditions.

Work is underway on a **Heavy Vehicle Traffic Code** which includes roadworthiness, speed limits and various traffic rules. Other codes to be developed will cover such matters as dangerous goods, driving hours (for which a Technical Working Paper was released in October 1992), traffic regulations, and access for medium and long combination vehicles.

3.4 Road freight industry and user responses to the NRTC proposals

The road freight industry peak national body, the RTF, has been generally supportive of the approach taken by the NRTC, but has argued the need for a stronger link between the new charges and uniform regulations. According to the RTF, the benefits from the new arrangements will only accrue where those operators facing increased charges obtain benefits from improved regulations. The Federal Minister for Land Transport is on the record as saying that the revised charges should not come into effect until the regulatory reforms have commenced being put into place.

The approach taken by the NRTC to road user charges has been criticised by Access Economics (1992) which observed that 'The current approach to road user charges is flawed because of its exclusive focus on road wear charges for heavy vehicles'. The same

study argues that the NRTC should be required to include congestion charges and to link road wear charges with optimal investment in road durability. In addition, it maintains that road wear charges should be based on the general principle of a uniform tax per standard axle passage. However, the RTF has been critical of this approach and continues to support the NRTC's recommendations, including that environmental effects be excluded from the calculation of road user charges, arguing that other industries do not pay fully for external costs arising from their activities.

The Bureau's survey of road transport operators, reported in Chapter 4, found that operators considered the level of road user taxes and charges and regulations setting vehicle mass and dimension limits, to be key factors adversely affecting the cost or quality of road transport services.

4. Performance indicators for the road freight industry - international comparisons

This chapter examines two types of performance indicators relating to the road freight transport industry:

- customer-oriented indicators; and
- operating efficiency indicators.

Customer-oriented performance indicators typically cover areas like price, timeliness and other aspects of quality of service. Comparisons across competing transport modes in Australia and with road freight services in other countries in these areas give an indication of the relative performance of Australian road freight services. They also give an indication of the impact of differences in the delivery of road freight services on the competitiveness of user industries, particularly those competing in international markets.

Comparisons of operating efficiency indicators provide a measure of the underlying relative efficiency of road freight service providers and indicate the scope for improvement.

Discussions between the Bureau and road transport operators, industry associations and transport authorities in Australia and overseas (eg US, UK, Canada and NZ), revealed a limited and varying amount of published data across countries. The Bureau sought to extend this data by undertaking a survey of overseas road freight operators, and in the case of Australia, a survey of operators and users. The response rate for the Australian operators survey was satisfactory (about 30 per cent of questionnaires were returned of which in excess of 80 per cent were useable) but that for overseas was disappointing. In consequence of this, it has only been possible to make limited comparisons between the Australian and overseas road freight industries.

It is important, in making international comparisons, to have regard to differences in the underlying nature of the road transport task as well as other features of the operating environment such as regulations. Available industry data precluded the Bureau from making systematic adjustments for such differences between countries, particularly in relation to measures of operating efficiency. Nevertheless the comparisons reported below are seen as providing a useful indication of the relative performance of the Australian road freight industry.

4.1 Customer oriented indicators

Appropriate customer oriented performance indicators for the road freight industry were identified in consultation with a range of road freight transport providers and users. A survey of Australian road freight users was undertaken to determine what aspects of road freight services they regard as important and what they think of the industry's performance in relation to these aspects of service. The response rate for this survey was excellent with more than 50 per cent of questionnaires despatched being returned, useable questionnaires.

User perceptions

As evident from Table 4.1 price, on-time delivery, care of goods and availability of equipment to meet user needs are the aspects of road freight services considered to be of most importance to users (ie highest rankings for 'critical' and 'very important' categories). Timely and acceptable responses to queries, invoice accuracy and shipment tracing were also judged to be of particular importance to users. Liability coverage and claims procedures were judged to be less important, perhaps reflecting the industry's low loss and damage rates. Interestingly, suitability of electronic data interchange (EDI) capability has not yet become a factor of key concern to users.

Table 4.1 Users' perceptions of the importance of various aspects of road freight transport services, 1992 (per cent of respondents in each category)

Aspect of service	Critical	Very important	Marginally important	Not important	Total
On-time pickup	34	48	12	6	100
On-time delivery	59	36	3	2	100
Transit time	24	48	22	6	100
Rates and pricing	41	53	6	0	100
Care of goods	69	27	3	1	100
Claims procedures	2	41	38	19	100
Liability coverage	22	38	27	13	100
Invoice accuracy	27	60	6	9	100
Timely and acceptable reply to users inquiries	42	49	3	6	100
Shipment tracing	43	43	10	4	100
Driver performance and attitudes	34	49	14	3	100
Equipment available to meet needs	65	29	6	0	100
Suitability of EDI capability	6	28	39	27	100

Source: BIE, Survey of Road Freight Users.

Table 4.2 sets out users views on the performance of road freight operators relative to those areas nominated as being important in Table 4.1.

Table 4.2 Users' perceptions of the performance of road freight transport service providers, 1992, (per cent of respondents in each category)

Aspect of service	Excellent	Good	Fair	Poor	No answer
On-time pickup	42	46	8	1	3
On-time delivery	44	42	13	0	1
Transit time	32	53	11	0	4
Rates and pricing	13	66	20	0	1
Care of goods	27	61	12	0	0
Claims procedures	13	31	21	6	29
Liability coverage	30	29	13	8	20
Invoice accuracy	25	56	11	1	7
Timely and acceptable reply to users inquiries	29	55	9	2	5
Shipment tracing	38	42	10	3	7
Driver performance and attitudes	27	52	15	0	6
Equipment available to meet needs	33	56	11	0	0
Suitability of EDI capability	6	28	20	6	40

Source: BIE, Survey of Road Freight Users.

The picture which emerges from the table is one of users being generally satisfied with the transportation services they receive (in contrast with the BIE's study of rail freight which found that users considered rail to be inferior in terms of reliability and service quality[6]). Key findings of the survey include:

- nearly 90 per cent of respondents rated care of goods as either excellent or good;

6 Freight forwarder and general freight users, in cluding steel, auto and paper products manufacturers, advised in the context of the Bureau's rail study (BIE 1992) that rail's reliability, whether measured by transit time between origin and destination, on-time arrival performance, availability of trains or wagons for loading/unloading at promised times, or terminal performance, was inferior to that of road transport, and that rail was only the mode of choice in those cases where a clear price advantage existed. It has been suggested that the advantage road has in its door-to-door delivery requires rail to be up to 20 per cent cheaper to compete successfully with road. It was conceded by rail systems that even with appropriate pricing of general freight on rail, a market would exist only for products requiring next day or subsequent day service, and that it was this area where rail freight should seek to increase its market share.

- the reliability of pick-up and delivery services was regarded particularly favourably by users (nearly 90 per cent of respondents found these services to be either excellent or good);
- 79 per cent of respondents found rates and pricing to be either excellent or good, and the remainder of respondents found them to be at least fair;
- in excess of 80 per cent of respondents indicated that the industry provided either an excellent or good level of service in responding to customer inquiries;
- the road freight industry performed well in the provision of suitable equipment available to meet user needs, an aspect of freight services on which users placed considerable importance; and
- claims procedures, including promptness in paying claims, was one of the areas of least satisfaction to users (although over 40 per cent of users considered this very important or critical to them).

Using published data for Australia and other countries the Bureau sought to assess the relative performance of the Australian road freight industry in a number of the areas referred to above.

Price

Freight rates for road freight services impact directly on users' cost structures. Many factors interact to determine freight rates, including the actual service offered, the route concerned and related to this opportunities for backhauls, extent of intra-industry and intermodal competition, and the regulatory environment facing operators.

Road freight rates exist at several levels - published list rates, award rates (eg for owner drivers), negotiated contract rates and spot rates. There are significant differences between these rates. For example, contract and spot rates are typically 15-20 per cent less than published and/or award rates. In addition, freight rates are sensitive to broader economic conditions and it is not unusual for operators to discount their rates during depressed periods to retain market share. A number of Australian operators and users indicated that the incidence and extent of discounting has been greater during the current recession compared with the pre-recession period.

Price comparisons over time and across countries are also complicated by difficulties in comparing prices for like services for common years, and accessing price data on similar bases. Road freight services are priced in many different ways, including; $ per tonne, $ per kilometre, $ per container, $ per litre, $ per truckload/pallet, and in many instances may not relate in a simple way to either distance or weight. This is especially true of urban services, where an additional problem can be the integration of warehousing and other handling services. Price in some instances may relate to time or be set cubically (ie by volume). Published rates are only available for limited market segments in Australia and the US. The Bureau was advised by industry associations in several countries, including the UK and NZ, that publication of freight rates is effectively restricted by regulatory rules, and price data is therefore not readily obtainable. Actual or market rates are commercially sensitive and are therefore difficult to obtain.

Nonetheless, it has been possible to access some data which provides a broad indication of the price differentials facing users in different countries. Cents per net tonne-kilometre

(c/ntk) has been adopted as the unit of measurement to allow a comparison of dissimilar services on a common basis, and to capture both the distance and weight components of road transportation services.

Price data reported in the survey of Australian users for general freight for 1992 averaged about 8 c/ntk, while consolidated freight and dry bulk freight averaged in each case close to 10 c/ntk. Price data for consolidated freight reported in the survey of Australian road freight suppliers (for different services than those reported in the user survey) averaged about 7 c/ntk for an average haul of about 700 kilometres, and for dry bulk freight averaged about 7 c/ntk for an average haul of some 150 kilometres.

Available overseas data for prices on a c/ntk basis, in general for 1991, indicate prices at a broadly comparable level to those reported above for Australia. For example, US price data for general freight services for hauls of about 700 kilometres ranged from 5 c/ntk for heavily trafficked routes to a maximum of 11 c/ntk on less trafficked routes with fewer opportunities for back-hauls. In the case of NZ, rates of 11 c/ntk were reported for general freight hauled over 450 kilometres. Canadian data shows consolidated freight rates averaging about 8 c/ntk for hauls averaging about 700 kilometres.

On the basis of this price data Australian road freight services appear to be competitively priced relative to similar services overseas. This finding is consistent with the user survey results showing broad satisfaction with road freight rates and pricing.

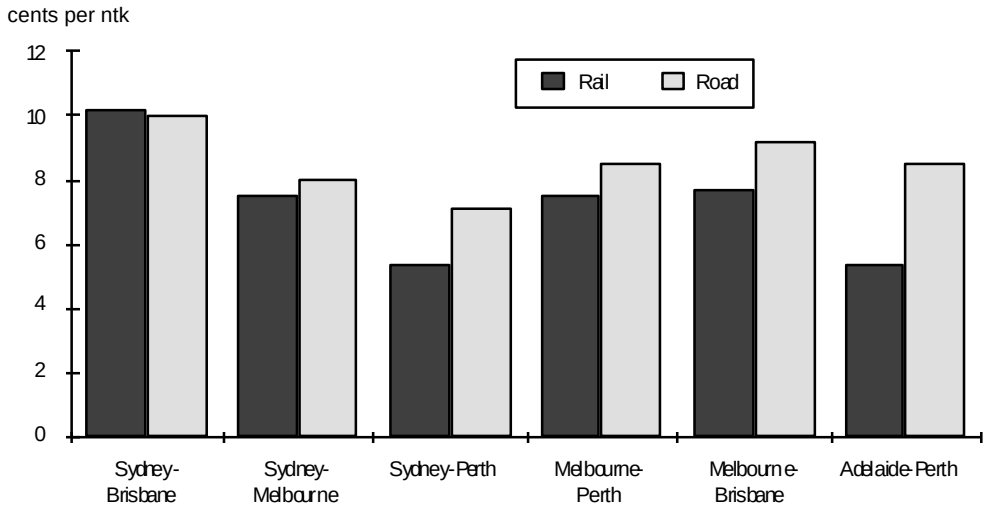
It would appear that the generally competitive nature of the road freight industry in Australia as well as overseas, arising from the existence of limited economies of scale and scope and the relatively low costs of entry and exit from the industry, provide strong incentives for operators to price their services competitively to users (OECD 1990). However, these incentives are not uniform across the industry with market related barriers to entry providing operators with market power in some segments of the industry such as freight forwarding as well as within the more specialised transport segments. In this context, the Trade Practices Commission has recently alleged that operators within the express road freight segment of the road freight industry in Australia have colluded to set agreed freight rates and limit competition between themselves for market share.

Road/rail comparative price data

The Bureau (BIE 1992) documented total door-to-door costs for moving goods by rail just below total door-to-door costs for moving goods by road (Figure 4.1). The lack of cost recovery by the railways for general freight suggests that the rail price is set so that it will undercut corresponding road prices to compensate for rail's inferior reliability and to counteract the preference amongst users for road's superior door-to-door service at identical prices.

The National Freight Forwarders' Association Rail Committee provided data in the context of the rail freight study comparing the price of door-to-door delivery for road and rail transport for a full load, concentrating on the Melbourne-Sydney corridor.

Figure 4.1 Comparative rail and road freight rates, door-to-door, selected general freight services, 1991



Source: BIE 1992, Survey of major rail freight users.

Prime linehaul rates in Table 4.3 indicate that during 1991 rail was about 20 per cent cheaper than road on the Melbourne-Sydney route[7] (a similar picture emerged for the Sydney-Melbourne service). Taking into account a range of other factors including costs associated at either end with delivering and retrieving the rail haul, routine market discounts in the case of rail and spot pricing in the case of road, the two services are offered at a similar price.

7 Some reports indicate that these relativities may have changed since 1991, with greater discounting by both modes, although official rates appear to have changed little if at all.

Table 4.3 Comparative freight charges, road versus rail superfreighter, full load, Melbourne - Sydney, (direct pickup and delivery (point-to-point)), 1991 ($)

Freight charges	Road ARTF rate	Road Real Rate	Rail 26T Gross	Rail After Discount
Prime Linehaul	1188	1050	827.00	703.00
Pickup cost plus delivery to railhead	0	0	90.00	90.00
Retrieve from railhead plus delivery cost	0	0	112.50	112.50
Equipment Cost	0	0	92.00	92.00
Delay at Sending rail head at 1/2 hour	0	0	22.50	22.50
Delay at Receiving rail head at 1/2 hour	0	0	22.50	22.50
TOTAL	**1188**	**1050**	**1166.50**	**1042.50**

Source: National Freight Forwarders' Association 1991, Rail Committee.

In summary, anecdotal evidence, together with data collected for the purposes of the rail freight study, suggests that Australian freight rates for specific 'general' rail services (which are also provided by road transport) are priced below road prices, allowing rail to compete on the basis of price while being beaten in general by road on the quality and timeliness of the service offered.

Service reliability/quality

The Bureau's survey of road transport users yielded a range of data relating to indicators of service quality and reliability. Responses to the survey questionnaire, reported in Table 4.2, confirmed that users considered care of goods, timeliness and reliability to be key aspects of the performance of the freight services they utilise. On this basis, the Bureau sought and was able to obtain data on service transit time, per cent of on time pick up and delivery, and loss and damage rates for Australia and a number of overseas countries.

Comparative data on timeliness and reliability are presented in Table 4.4. These data indicate that on the basis of on time pick-up and delivery the road freight industry's performance in Australia is much the same as that in the US and Canada and somewhat better than that in the UK and NZ.

Table 4.4 Timeliness/reliability - international comparisons

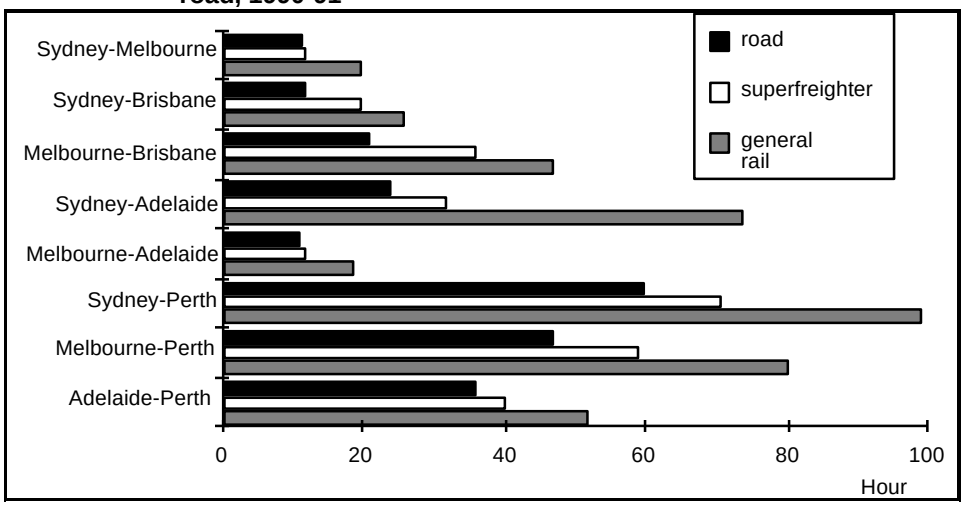
Country	On-time pick-up (%)	On-time delivery (%)
Australia:		
Operator survey	94	96
User survey	95	96
United States (a)	94	97
Canada (a)	96	96
United Kingdom (a)	n.a.	92
New Zealand (a)	n.a.	85

Notes: (a) Data for overseas countries based on operator survey information.
n.a. Not available.

Sources: BIE Survey of Road Freight Users and Operators; other data provided by overseas firms; and data provided by American Trucking Associations 1992.

Data provided by the Railways of Australia Committee on the relative transit times of superfreighter services against equivalent road services is illustrated in Figure 4.2.

Figure 4.2 Intercapital transit times, selected major services, rail versus road, 1990-91



Source: Railways of Australia Committee, data reported in BIE (1992).

A consistent picture emerges from this data, whereby moving freight by rail in Australia typically takes 10-20 per cent longer than using corresponding road transport services. Superfreighter services are in sight of road transit times on the important Sydney-Melbourne and Melbourne-Adelaide corridors.

Anecdotal evidence given to the BIE by major freight forwarding companies and their customers in the conduct of the earlier rail freight study indicated that transit time is not the major consideration for most customers when choosing to move goods by road or by rail; reliability in meeting transit schedules emerged as a far more important determinant of modal choice.

The road freight, and earlier rail freight, user surveys reveal a relatively greater satisfaction with road services than rail services. There is potential for this user perception of the competing modes to change as the state rail systems continue their efforts to become more customer-oriented. At the same time the potential benefits from the creation of the National Rail Corporation have not yet been realised with the commencement of operations stalled by lack of agreement between the various parties.

Beyond this another aspect of quality of service relates to the incidence of loss and damage and the proportion of claims paid. Comparative data covering these measures is set out in Table 4.5 below.

The conclusion that can be drawn from the data reported below is that loss and damage rates for Australian road freight services are broadly comparable with those in the UK and Canada and superior to those in the US and NZ. The proportion of claims paid in Australia is lower than for NZ, although NZ has a loss and damage rate four times that of Australia.

Table 4.5 Loss and damage rates and proportion of claims paid - international comparisons

Country	Loss & damage (%)	Claims paid (%)
Australia:		
Operator survey	0.4	78
User survey	0.6	77
United States [(a)]	0.9	n.a.
Canada[(a)]	0.4	n.a.
United Kingdom[(a)]	0.4	n.a.
New Zealand[(a)]	1.6	90

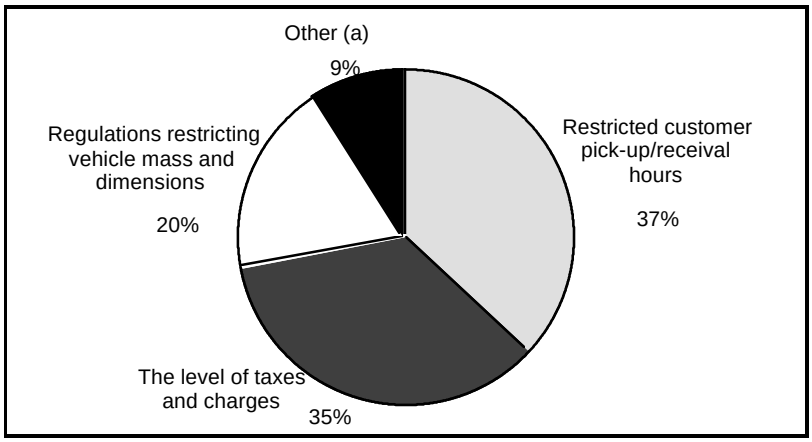
Notes: (a) Data for overseas countries based on operator survey information.
n.a. Not available.

Sources: BIE Survey of Road Freight Users and Operators; other data provided by overseas firms; and US, ATA F&OS Annual Report 1992.

Factors inhibiting operators from offering improved services

One of the effects of the current benchmarking studies is to generate and encourage improvements in the performance of business input services, and in turn lift the competitiveness of industries that use these service providers. As part of this process, road freight operators were asked to identify the key external factors they see as inhibiting their ability to provide improved services to clients. Their responses are set out in Figure 4.3.

Figure 4.3 Ranking of importance of factors external to the control of road freight operators that adversely affect the cost and/or quality of service provision (per cent of rankings)



Note: (a) Main factors mentioned for this group included log book hours and non-uniform vehicle regulations between states.
Source: BIE Survey of road freight operators.

The level of taxes and charges and the restricted customer pickup/receival hours freight operators faced were the external factors considered the most important by road freight suppliers as adversely affecting the cost and quality of the services they offered. Also important were the regulations applying to road freight operations.

The Bureau's user survey also sought to determine key factors behind the choice by users between in-house provided services or externally provided services. Lower operating costs was the main determinant of both the choice for, and against, using externally provided transport services, suggesting that the choice is driven by the specific nature of the transport operations concerned (Tables 4.6 and 4.7). Survey results indicated, for example, that producers requiring bulk freight road transport (both dry and liquid) had a higher propensity to use in-house services than producers requiring non-bulk freight road transport. The approximate split between respondents in terms of reliance on in-house services compared with services externally provided was 17 per cent to 83 per cent respectively. As shown in Table 4.6, concentration on core activities was an important factor in the choice of external services, suggesting a tendency amongst firms for 'sticking to their knitting'.

Table 4.6 Main reasons[(a)] cited for using external transport services

Reasons	No. of citations	%
Lower operating costs	28	64
Not speciality/concentrate on core business	18	41
Improved service quality	15	34
Better access to specialised service, equip, networks	15	34
Greater flexibility	14	32
Other	12	28
Reduced capital outlay	7	16

Note: (a) Multiple responses were received.
Source: BIE Survey of Road Freight Users.

As apparent from Table 4.7, improved service quality and/or lower operating costs were the leading factors for those deciding to use in-house services.

Table 4.7 Main reasons[(a)] cited for using in-house transport services

Reasons	No. of citations	%
Lower operating costs	5	63
Improved service quality	5	63
Greater control	2	25
Other	2	25

Note: (a) Multiple responses were received.
Source: BIE Survey of Road Freight Users.

4.2 Operating efficiency indicators

The analysis of operating efficiency indicators seeks to identify the extent to which there are any differences in the efficiency of operation of road freight services between countries. The objective of these comparisons is to indicate the extent to which road freight users are advantaged/disadvantaged by the comparative efficiency of the road freight services they use.

Discussions with various sectors of the road freight industry in Australia and overseas revealed that there were no universal measures used by firms to measure their operating efficiency. Not surprisingly, those firms that closely monitored their performance had

developed measures tailored to their operations. Nonetheless, six performance measures emerged as the most common indicators of operating efficiency:

- Total kilometres per vehicle per year;
- Total tonne-kilometres per vehicle per year;
- Kilometres travelled empty as a proportion of total kilometres travelled;
- Average actual load as a proportion of full load capacity;
- Number of kilometres per driver per year; and
- Fuel usage by vehicle type.

The main elements of operating performance which these indicators highlight are vehicle utilisation and productivity over an operating period and driver and fuel productivity.

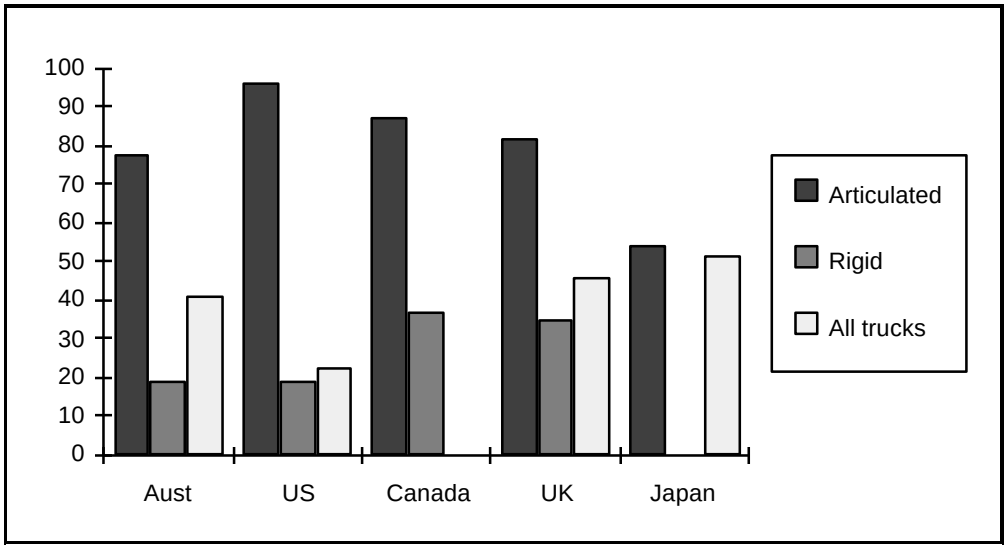
Comparative data for these key operating efficiency performance indicators, obtained primarily from national sources and, in some instances, from survey returns, is set out below. Where possible data is reported separately for articulated trucks and for rigid trucks; data reported for 'all trucks' is data relating in general to the total of articulated, rigid and other trucks. This broad disaggregation, by vehicle type, appears consistently in overseas road freight industry data.

On the basis of data presented in Figure 4.4, the utilisation of Australian articulated vehicles as measured by the total number of kilometres travelled per vehicle per year is comparable with the UK (the latter including trips to continental Europe), but trails that of the US and Canada. Australian utilisation of rigid trucks is on a par with the US but is below that of Canada and the UK. In each case, data is from official country aggregate sources and of necessity includes low use vehicles as well as vehicles fully utilised throughout the year. For this reason, the figures reported are in general lower than normally attributed to fully utilised vehicles.

While kilometres per vehicle per year is a useful measure of vehicle utilisation, tonne-kilometres per vehicle per year measures vehicle productivity - the amount of task the vehicle accomplishes over a period of time. As evident from Figure 4.5, Australian performance for articulated trucks and all trucks is superior to UK performance. Productivity for all trucks in Australia is comparable with Canadian performance and trails that of the US.

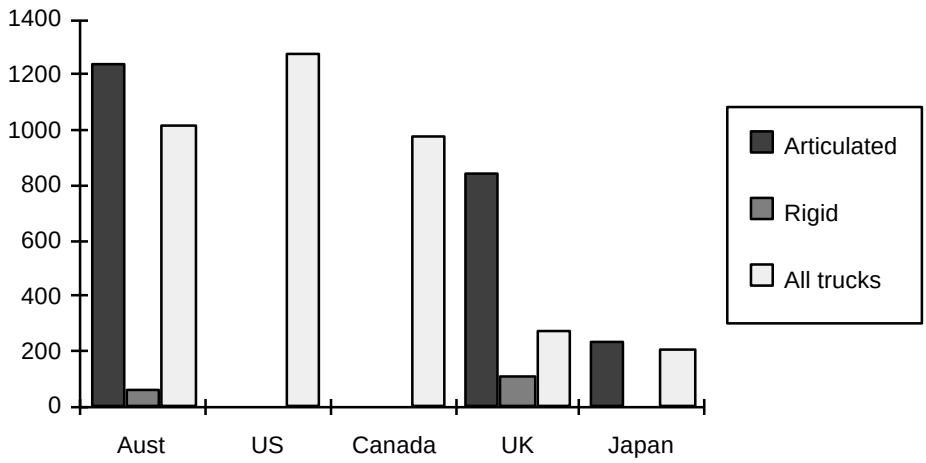
It is often argued that the importance of the transportation task has been increased by just-in-time strategies being increasingly adopted by firms. However, some studies have found that it is possible increased use of these systems could lead to reduced transport productivities as a trade-off for increased manufacturing productivities, the reasoning being that there are increases in demand for smaller, more frequent and more timely deliveries.

Figure 4.4 Total kilometres per vehicle per year ('000)



Sources: ABS, Survey of Motor Vehicle Use 1991 (1992); BIE, Survey of Road Freight Operators 1992; Hensher, Long Distance Truck Drivers - Performance & Economic Reward 1992; US FHWA Highway Statistics, 1990; American Trucking Associations, F & OS Report 1990 (1992); Statistics Canada, Trucking in Canada 1989 (1992); Canadian National Transportation Agency, Annual Report 1991; UK Dept of Transport, Transport Statistics Great Britain 1991; UK Department of Transport, Continuing Survey of Road Freight 1991; and JTA, Trucking in Japan 1991.

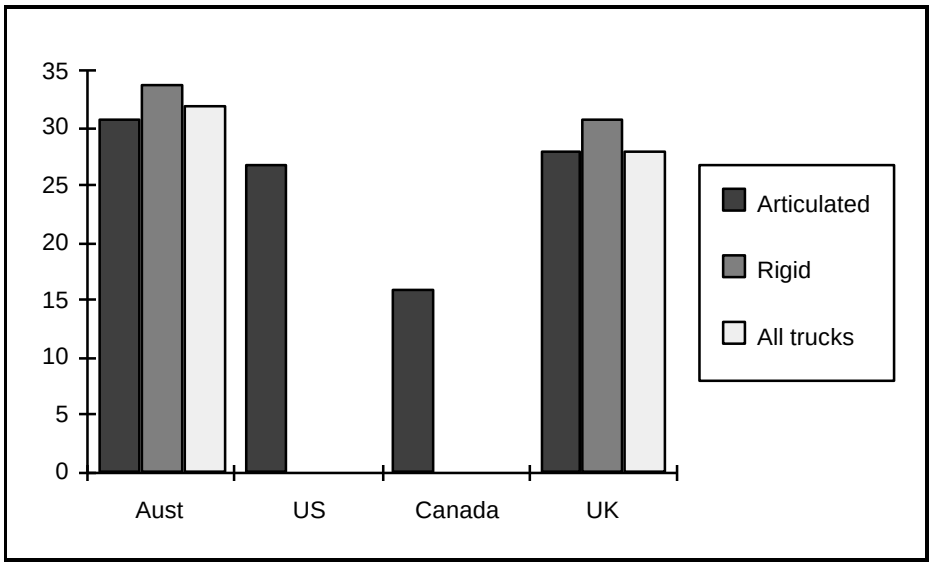
Figure 4.5 Total net tonne-kilometres per vehicle per year ('000)



Sources: As for Figure 4.4.

The empty to total kilometres travelled measure reported in Figure 4.6 measures in the main the extent to which operators are able to obtain backhaul loads. Efficient vehicle and fleet operation require that empty running is kept to a minimum. Figure 4.6 shows that Canada performs well, primarily as a result of strong two way trade flows over the US-Canada border, while Australia compares satisfactorily with the US and UK.

Figure 4.6 Empty kilometres/total kilometres by vehicle type (per cent)



Sources: As for Figure 4.4.

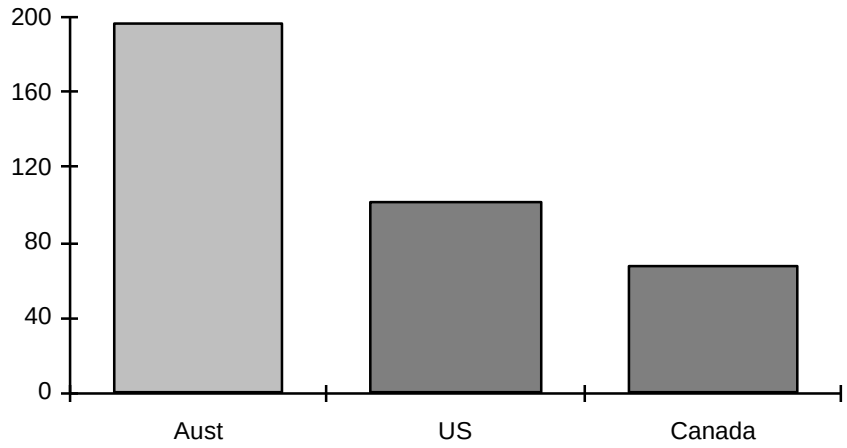
A review of US transportation productivity statistics undertaken for the Highway Users Federation in August 1991 (ICC 1992) found major productivity improvements in trucking over recent years as a result of deregulation. Deregulation had, for example, permitted carriers to fill in empty back-hauls by removing restrictions on permitted routes, thereby increasing load factors substantially.

Data for the average load to full load ratio was drawn essentially from information collected in the BIE road freight operator survey. The available data, which indicates the extent to which operators are able to generate full loads for trips, thereby achieving higher productivity and greater financial returns, shows Australian performance (80-83 per cent) comparing favourably with the other countries (Canada 80 per cent; NZ 74 per cent).

Labour productivity is very difficult to measure in the road transport industry given the widely disparate tasks and operating conditions. One of the few reported measures in this area is number of kilometres travelled per driver per year. Figure 4.7 shows Australian performance relative to the US and Canada. Some care is needed in drawing strong conclusions from this data as the information for the US and Canada are for drivers of all trucks, while data for Australia is taken from a survey (Hensher 1992) of essentially long

distance truck drivers. An ABS figure more comparable to the overseas sourced figures should be available from the ABS 1991 Survey of Motor Vehicle Use early in 1993.

Figure 4.7 Number of kilometres per driver per year ('000)

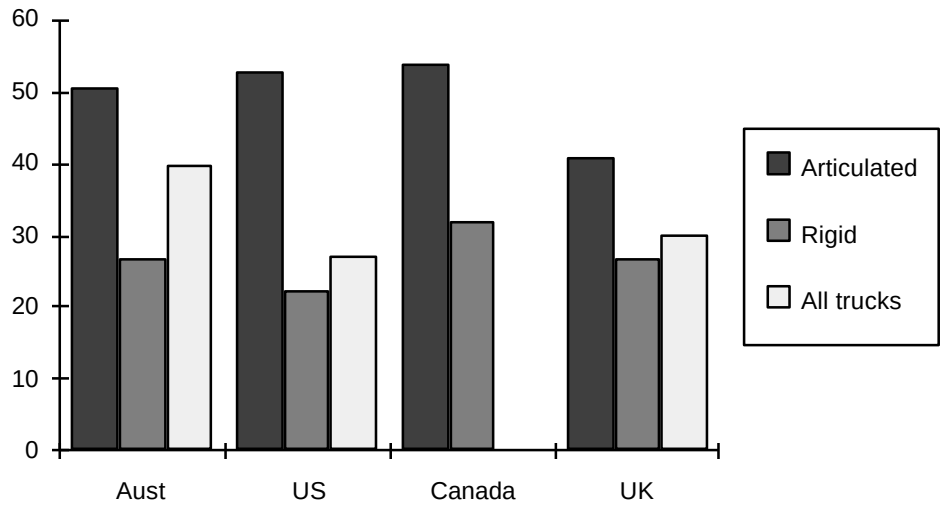


Notes: Data for Australia comprise long distance truck drivers only.
Data for US and Canada comprise all truck drivers.
Sources: As for Figure 4.4.

Average fuel usage by vehicle type indicates how efficiently a vehicle is handled by the driver, but is also affected by other variables such as vehicle size and age as well as by operating conditions such as terrain and urban/linehaul task mix. Figure 4.8 sets out available data for average fuel usage by vehicle type.

Articulated trucks in Australia, US and Canada achieve similar performances. When the performance of all trucks is considered, the US and UK display similar rates of usage on average, with Australia's rate of usage being somewhat higher.

Figure 4.8 Fuel usage by vehicle type (litres per 100 kms)



Sources: As for Figure 4.4.

4.3 Concluding remarks

The survey of Australian road freight users conducted for this study indicates that they are generally satisfied with the level of service they receive. Available data for overseas road freight operations suggests that prices for Australian road freight services are broadly comparable with those observed overseas. The quality of service provided by Australian road freight operators in terms of on-time pick up and delivery in relation to promised time is on par with overseas services. On the basis of operator supplied data, loss and damage rates in Australia are superior to those in the US and NZ and are broadly comparable with performance in the UK and Canada.

Work undertaken for the Bureau's earlier study of rail freight indicated that road transport performs very well by comparison with rail in terms of the quality of service provided to users (BIE 1992). While the prices for rail freight services were lower in a number of areas where the two modes compete, this appears to reflect discounting by rail, (often to below cost recovery), to offset its inferior quality of service.

The Bureau's survey of Australian road freight operators indicated that they consider government taxes and charges and regulations to be two key external factors which inhibit their ability to provide improved services to users.

Available operating efficiency data relating to vehicle utilisation and productivity indicate that the comparative performance of Australian road freight services varies from fair to good. While the Australian industry is behind the US for all measures of vehicle utilisation, its performance compares favourably with the UK and Canada in terms of tonne-kilometres per vehicle per annum. In the case of fuel usage, Australia's performance is similar to that of the US and Canada but inferior to that of the UK.

5. Road freight vehicle operating costs

This chapter provides a comparison of vehicle operating costs (VOC) for major, representative truck types between Australia and selected overseas countries (mainly the US, Canada, and the UK). As well as examining the absolute differences in the cost of operating similar vehicles in different countries, the chapter compares the cost of the major inputs, namely capital, driver costs, fuel and oil, repairs and maintenance and other, and seeks to identify the main factors responsible for observed differences in VOC between countries. The relative level of road taxes and charges (which mainly comprise fuel taxes, vehicle registration fees, sales taxes and excise taxes) between Australia and selected countries is also addressed. Finally, the impact of a broader range of taxes on the Australian road freight industry, including payroll taxes, financial institutions duty and the training levy is examined.

Data on these aspects of VOC have been collected from Government organisations, various regional trucking associations and trucking companies from a number of countries. A survey of trucking companies operating in Australia and selected overseas countries was also undertaken in order to supplement these data.

VOC costs have been measured rather than the overall costs of supplying road freight services for two main reasons. First, the diversity of activities tied to road freight and undertaken by road freight operators makes it difficult to obtain meaningful comparisons on a wider basis (ie inclusive of business overheads and administrative costs). Indeed, significant problems have been encountered in attempting to achieve uniformity both in the list of factors that are included as business overheads and administrative costs and the manner in which they are attributed to individual vehicles. Further, there are substantial problems in obtaining data at the 'business centre' level due mainly to commercial confidentially concerns. However, their exclusion does not detract substantially from the overall comparisons as they usually represent a relatively minor portion of overall VOC. Second, the main issues of relevance to government policy in the context of this study are the level of taxes and charges which are levied on the acquisition and operation of vehicles themselves and these are picked up in VOC.

5.1 The structure of vehicle operating costs

Competition within the road freight industry together with competitive pressures from other transport modes are such that most road freight rates are closely aligned to costs. VOC represent a major portion of these transportation costs[8] and are known with precision by most trucking operators. Not only is data available on a historical basis (eg actual vehicle operating expenditure per annum) from trucking operators and their

8 Other costs, not included in VOC, mainly include pick-up, delivery, storage and business overheads.

associations but there are a number of cost models which accurately estimate VOC for a wide variety of vehicle types operating under a diversity of conditions. The BIE has primarily used observed data rather than VOC models for the purposes of this chapter.

The main components of VOC reported in this chapter are:

- capital costs;
- driver costs;
- fuel and oil;
- repairs and maintenance; and
- other.

The definition and reporting of these components is fairly uniform between countries. While operating conditions vary considerably both within and between countries, the data reported below do provide a broad indication of the main areas of difference and similarity between countries in VOC.[9]

Capital costs refer to the annual depreciated cost of the vehicle and include an allocation for the opportunity cost of funds. Trucks and prime movers are generally depreciated over a five year period on a straight line basis. Trailers are depreciated in the same manner but over an eight year period. In both cases it is assumed that vehicles have a residual value of 21 per cent of the purchase cost at the end of their working lives. This assumption conforms with information from trucking industry sources. All government charges imposed on the purchase of these items, such as sales tax and excise duty are incorporated in the capital cost. For all countries, a nominal interest rate of 7 per cent has been assumed for the opportunity cost of funds tied up for the operating life of the vehicles and their equipment.

Driver costs are based on an average driver wage rate scale applying in each country. There is considerable variation around such an average because of the diversity of scales that apply to drivers and the incidence of cost-cutting by independent sub-contract drivers. For example, in Australia there are Federal and State Government awards for various drivers, a special award for petroleum tanker drivers, an interstate agreement on rates charged by owner drivers and many instances where the actual returns to owner drivers vary from the agreement (see Hensher 1992).

Fuel and oil costs comprise expenditure on fuel and oil to operate a particular vehicle. These costs are inclusive of government taxes and charges.

Repairs and maintenance costs comprise the costs of parts and labour associated with the repairs and maintenance of particular vehicles. The cost of tyres are also included in this category. All government taxes and duties imposed on the purchase of these items, such as sales tax, are incorporated in these costs.

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9 All international comparisons are sensitive to exchange rates. For the purposes of this analysis, exchange rates have been sourced from OECD Economic Outlook (1992), using conversion rates for the Australian dollar as at May 5 of the relevant year, as follows: US (1990)=0.7783, Canada(1990)=0.9156, UK (1992)=0.4083).

The other cost category primarily comprises the cost of comprehensively insuring the vehicle (truck and trailer), compulsory third party insurance and standalone payments to the government for vehicle registration fees and the like.

Whilst there is some variation between VOC models in allocating particular costs components as either fixed or variable, for the purposes of analysis in this report capital costs, vehicle registration fees and insurance premiums have been deemed fixed; fuel and oil, and repairs and maintenance have been deemed variable; while drivers costs are semi-variable. This latter allocation arises because many drivers awards (or enterprise arrangements in Canada) often specify a minimum period (in hours per week) for which drivers are paid (irrespective of the extent of driving) while additional payments are directly tied to the amount of driving undertaken in excess of this minimum (or otherwise defined) working week.

Overall operating costs

Figure 5.1 illustrates VOC in terms of Australian cents per kilometre (c/km) for two major vehicle types, representing short haul and long haul operations, in Australia, US, Canada and the UK. Short haul (or local/urban) road freight tasks are represented by two-axle rigid trucks, gross vehicle mass (GVM) 17 tonnes, travelling 80 000 kilometres per annum.[10] Long haul (or linehaul) road freight tasks are represented by five or six-axle articulated vehicles (2 or 3 axle prime mover plus tri-axle trailer), GVM 42 tonnes, travelling 150 000 kilometres per annum.[11]

It can be seen from Figure 5.1 that Australia has the second highest recorded operating costs for short haul trucks for the selected countries, 10 per cent higher than the UK, 1 per cent higher than the US and 3 per cent lower than Canada.

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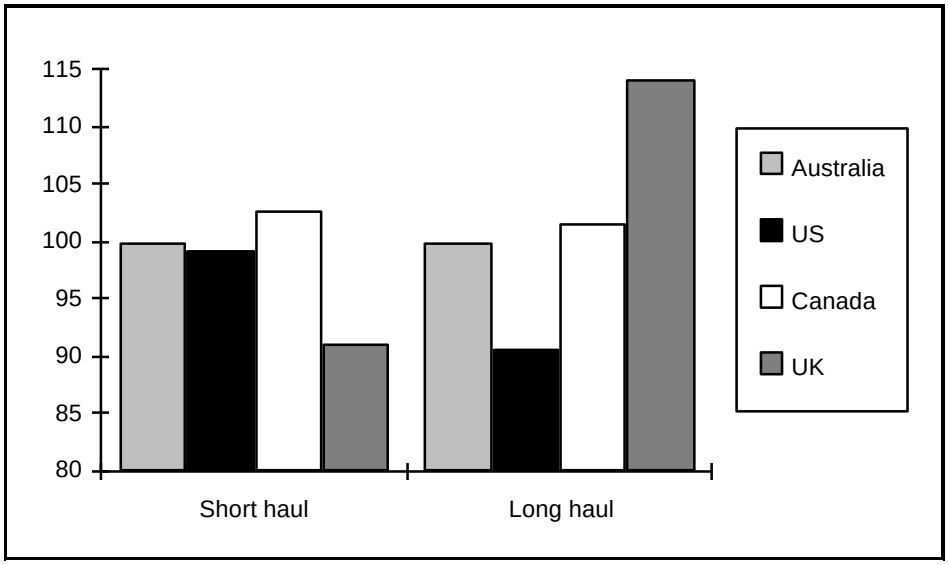
10 While recognising that 80,000 ki lometres is a relatively high annual distance for urban road freight operations, it was not possible to obtain comparable data across the countries selected for a lower annual distance.

11 Six-axle articulated vehicles are used predominantly in Australia for long hauls whereas five axle combinations are more common overseas (particularly in North America).

Figure 5.1 Truck operating costs, Australian c/km, 1992 or latest data, index Australia=100.



Notes: Short haul vehicle: 17 tonnes gross vehicle mass (GVM), 80,000km p.a.
Long haul vehicle: 42 tonnes GVM, 150,000km p.a., prime mover plus tri-axle trailer.
Sources: Australia: Thoresen 1991 (unpublished); BIE survey; industry supplied data 1992.
US: Data provided by the American Trucking Association, 1992; and Trimac, 1991.
UK: Motor Transport Magazine 1992, Cost Tables; and UK FTA 1992, The Managers Guide to Distribution Costs.
Canada: Transport Canada 1990, Operating Costs of Trucks in Canada.

A quite different picture is evident for long haul vehicles. Not only is there more variation between countries, but in this instance the UK has the highest recorded cost (as against the lowest for the short haul rigid vehicles). The cost of operating such long haul vehicles in Australia is about 10 per cent higher than in the US, and very similar to the level observed for Canada.

The following sections examine the reasons for differences between countries in the operating costs of short and long haul vehicles.

Operating cost components, percentage breakdowns

As outlined earlier, the major inputs to the cost of operating vehicles are classified as; capital costs, driver costs, fuel and oil, repairs and maintenance, and other. Before examining the relativities of these input cost components between countries and the extent to which they contribute to differences in overall VOC, it is useful to examine the relative importance of each component for the various truck types and countries under review.

Table 5.1 shows the major cost components for short haul trucks in Australia, the US, Canada and the UK. It is clear from the table that driver costs are by far the major determinant of VOC for all selected countries. In each case, driver costs account for more

than 40 per cent of all VOC. Given the primacy of driver costs in overall costs it is not surprising to find that differences in the cost of drivers are a major determinant of variation in VOC of short haul trucks operating in the selected countries.

Table 5.1 Operating cost components, short haul trucks, 1992 or latest data, percentage breakdown

Cost component	Aust	US	Canada	UK
Capital	14	12	13	17
Driver costs	60	67	58	42
Fuel & oil	11	6	9	17
Repairs & maintenance	10	10	15	17
Other	5	6	5	7
Total	**100**	**100**	**100**	**100**

Notes: As for Figure 5.1.
Sources: As for Figure 5.1.

Capital costs and repairs and maintenance costs are of approximately equal secondary importance across the four selected countries. Capital costs are lower in the North American countries than in Australia and the UK, mainly reflecting the lower retail cost of trucks in these countries. Repairs and maintenance costs are somewhat surprisingly low in Australia. Fuel bills for freight trucking operators are considerably lower in the US mainly because of the lower retail price of fuel in that country. Other costs are relatively low and uniform (5-7 per cent of VOC) for all selected countries.

In the case of long haul vehicles (see Table 5.2), driver costs are again the most important single cost component but not to the same extent as for short haul trucks. Driver's costs are shown to comprise between 29 and 42 per cent of VOC for these vehicles. The next most important cost category varies depending on the country involved. Capital costs are lowest in the UK, reflecting the lower retail cost of trucks. Fuel bills are higher for long haul vehicles than short haul trucks as the former travel more kilometres per annum and have greater fuel consumption per kilometre.

Table 5.2 Operating cost components, long haul vehicles, 1992 or latest data, percentage breakdown

Cost component	Australia	US	Canada	UK
Capital	24	22	20	15
Driver costs	31	42	34	29
Fuel & oil	21	12	17	26
Repairs & maintenance	17	16	22	23
Other	6	8	7	7
Total	**100**	**100**	**100**	**100**

Notes: As for Figure 5.1.
Sources: As for Figure 5.1.

Operating cost components, cents per kilometre

Differences in the absolute costs of the major inputs for road freight vehicles are discussed below.

In the case of short haul trucks, Table 5.3 shows that while there is little observed variation in the overall level of operating costs between Australia, the US and Canada, there are significant differences between operating cost categories. The most important variation is the cost of drivers for the UK compared to the other countries. The reason for this substantial difference in the cost of drivers is explained largely by differences in the utilisation of drivers working hours, since nominal hourly drivers wages exhibit little variation between countries.

Table 5.3 Operating cost components, short haul trucks, 1992 or latest data, c/km

Cost component	Aust	US	Canada	UK
Capital	21	17	19	23
Driver costs	87	97	87	56
Fuel & oil	16	9	14	22
Repairs & maintenance	15	14	22	23
Other	7	8	8	9
Total	**146**	**145**	**150**	**133**

Notes: As for Figure 5.1.
Sources: As for Figure 5.1.

Capital costs of short haul trucks (as shown in Table 5.3) are consistent with the relativities in the purchase cost of these vehicles to operators.

Similarly, differences in fuel and oil costs for short haul trucks operating in the selected countries are determined primarily by differences in the cost of purchasing fuel, although fuel usage is also a factor. Fuel usage is affected by the standard and terrain of the roads, the amount of congestion (average speed), age and condition of the vehicle and the attitudes and practices of the drivers. As will be shown later, the cost of fuel is much lower in the US than the other selected countries, with UK operators facing the highest fuel costs.

Reasons for variations between countries in repairs and maintenance and other costs are discussed in the following section.

On a c/km basis, Table 5.4 again shows that there are substantial variations between countries both in the overall cost of operating long haul vehicles and in the magnitude of most of the cost components. In the case of these vehicles it is somewhat surprising that the greatest variations in the magnitude of cost components between countries arise in the costs of fuel and oil and repairs and maintenance rather than in the costs of drivers or capital. However, for this class of vehicle, each of the cost categories are responsible, at varying instances, for contributing notable differences in operating costs between countries.

Of particular interest is the impact of the differences in fuel costs on overall operating costs. Fuel costs are 13 cents per kilometre more expensive for long haul vehicles in Australia compared to the US. Payments to drivers differ much less than is the case for urban freight, mainly because longer hauls improve the utilisation of drivers working hours and because average travelling speeds are more consistent.

Table 5.4 Operating cost components, long haul vehicles, 1992 or latest data, c/km

Cost component	Aust	US	Canada	UK
Capital	31	25	26	22
Driver costs	40	49	45	42
Fuel & oil	27	14	22	38
Repairs & maintenance	22	19	28	34
Other	8	9	9	10
Total	**128**	**116**	**130**	**146**

Notes: As for Figure 5.1.
Sources: As for Figure 5.1.

Despite quite significant variations in the purchase costs of vehicles between countries, capital costs do not contribute a particularly large difference in the operating cost of vehicles in the selected countries, when measured on a c/km basis. In practice, distances travelled vary between countries (see Section 4.2) and this would also affect capital costs on a c/km basis.

Sources of variation in operating costs between countries

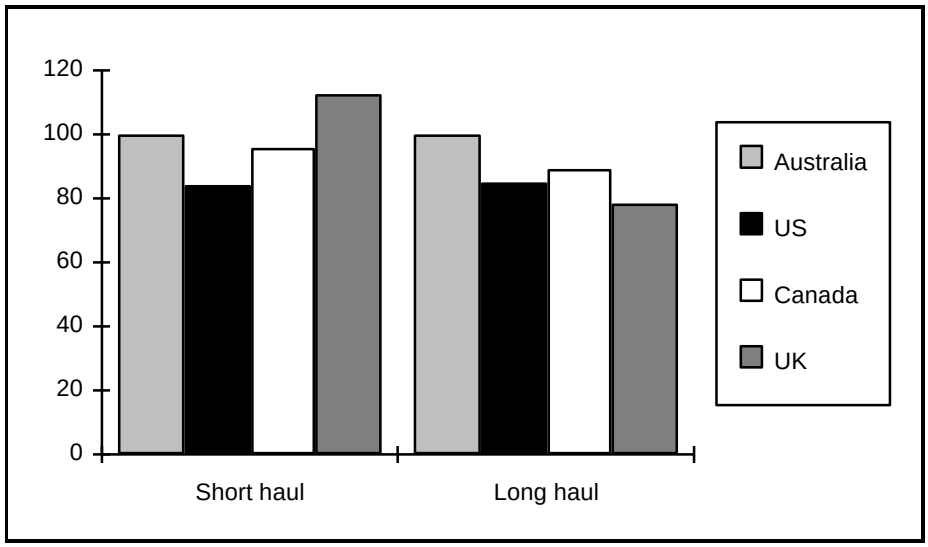
The following discussion examines the sources of variation in VOC between countries by cost component on a c/km basis in more detail.

Capital costs

The capital cost of vehicles is determined by the purchase price, finance charge and vehicle life. However, as discussed earlier, the finance charge, asset lives, residual values, and distance travelled have been standardised between countries for the purpose of this analysis. Thus the purchase price of the vehicles determines the variation in capital costs between countries.

The purchase price of vehicles is determined by the wholesale cost plus the various government taxes and charges and private charges. Government taxes and charges mainly comprise tariffs, sales taxes and stamp duties while private charges comprise handling and margins. Figure 5.2 indicates that there are significant variations in the purchase price of vehicles between the selected countries. This is the case for both the smaller (short haul) trucks and the larger long haul vehicles.

Figure 5.2 Truck purchase costs[(a)], selected countries, 1992, index Australia=100



Note: (a) Purchase costs include all government taxes and charges and private charges.
Sources: Industry supplied data (TNT & Mayne Nickless), 1992; ATA, American Trucking Trends 1991-92; and Motor Transport Magazine (UK) 1992, Cost Tables.

The data on which Figure 5.2 is based, indicates that the cost to an operator of purchasing a heavy duty prime mover in Australia in 1992 was about $180,000 compared to $160,000 in Canada, $150,000 in the US and $125,000 in the UK.[12]

There are a number of reasons why the cost of purchasing a prime mover trailer in Australia is more expensive than in the US. First, most prime movers in Australia are imported, whereas most of these vehicles in the US are manufactured domestically[13]. For this reason, the freight cost of shipping imported trucks is a cause of increased prices to Australian purchasers. Secondly, Australia imposes significantly larger government taxes and charges in the form of sales tax and import duties than the US. Tariff duties in Australia vary according to the type of vehicle and the amount of local content but are generally in the order of 10-15 per cent of the wholesale cost[14]. Sales tax is levied inclusive of the tariff duty in such a way that a 15 per cent tariff duty plus the 20 per cent sales tax results in a charge equal to 42 per cent of the original wholesale price[15]. Tariff duties in the US are negligible, while combined state sales tax and federal excise duties comprise about 20 per cent of the retail price. Finally, conversion to right hand drive and compliance with Australian design rules are additional costs borne by Australian purchasers.

Driver costs

In Australia, wage rates paid to truck drivers are governed by a number of awards. Employee drivers, for example, may be paid according to state, interstate or petroleum tanker driver awards. Remuneration to long haul owner drivers is guided by the ARTF/TWU owner driver rates which set $/tonne freight rates on particular corridors and is reviewed every six months. There is a similar diversity of awards operating in most of the other selected countries, although labour market reforms have led to a more extensive use of enterprise bargaining and other contractual arrangements, particularly in Canada.

Data is not available on the exact split between the number of employee drivers and owner operator drivers, for both urban and long haul routes in all selected countries. However, it appears that owner drivers comprise nearly half of all truck drivers for all selected countries. As noted in Chapter 2, owner drivers comprise about 75 per cent of road freight transport establishments in Australia. As 'drivers wages' for owner drivers are embodied in the overall returns to the operation, which vary markedly between operations (see Hensher 1992), it is difficult to accurately attribute and measure driver costs for the road freight industry overall.

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12 These data indicate that the retail cost of long haul vehicles is lowest in the UK. However, this observation is surprising, especially given the high level of tariff duties (22 per cent) and sales tax (17.5 per cent VAT). Differing technical specifications may account for a significant portion of this price difference compared to the US, Canada and Australia.

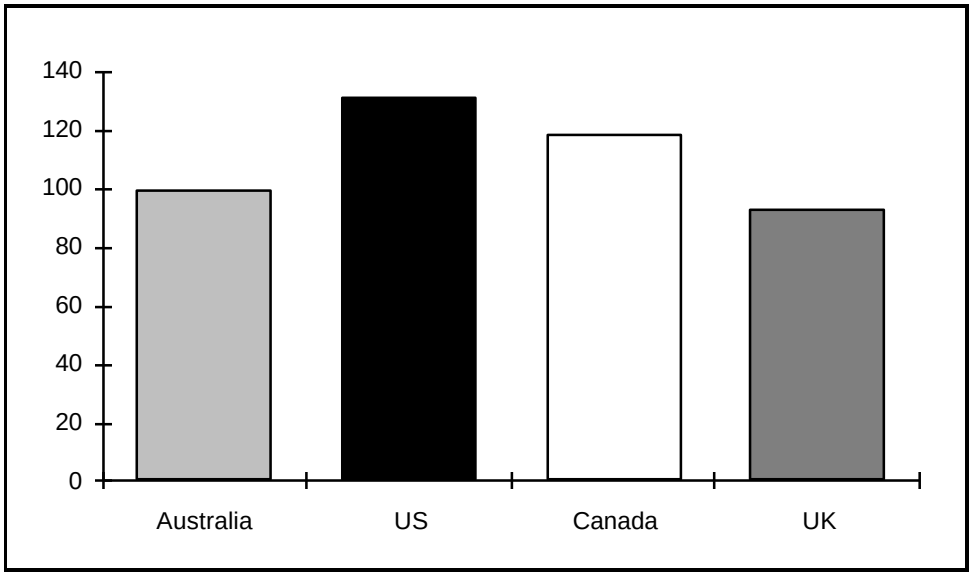
13 The US domestically manufactures about 80 per cent of its truck fleet, with about half of all imports coming from Canada.

14 Concessional rates of duty are not available for most freight trucks entering Australia because, with local assembly, local content is greater than 25 per cent of the cost of production (or because there are trucks undertaking similar functions that have greater than 25 per cent local content).

15 The sales tax effectively double taxes the tariff duty component (eg a 15 per cent duty rate becomes an 18 per cent duty rate after the application of sales tax).

Focusing on those drivers whose wages are closely governed by various awards, a number of sources have provided data on the average cost of drivers both in Australia and selected overseas countries. Figure 5.3 reports this data, indicating that, on average, the cost of drivers (including on-costs) is significantly higher in the US and Canada than in Australia or the UK. It is interesting to note that the variation between countries in the magnitude of the cost of drivers is due more to the extent of on-costs than to the nominal wage paid to the drivers.

Figure 5.3 Cost of drivers, selected countries, 1992 or latest data, index Australia=100



Sources: Various Australian labour awards; Transport Canada, Operating costs of trucks in Canada 1990; ATA, American Trucking Trends 1991-92; and UK FTA, 1992, Managers Guide to Distribution Costs, Vehicle Costs.

Trimac (1991) reports that the cost of drivers are about 10 per cent higher in the US than in Canada, mainly because the total benefits package paid by large US carriers represents about 40 per cent of wages compared to about 23 per cent for both small and large Canadian carriers. The US carriers pay significantly more for social security, workers compensation and private health insurance. The benefits offered by smaller carriers in the US are reported to be lower (about 33 per cent) because they do not provide medical coverage to their drivers (see Trimac 1991). In Australia, the main driver's on-costs are workers compensation and for larger companies, payroll tax, the training levy and the superannuation levy.

The variation in the average cost of drivers between countries for both short haul and long haul vehicles (as shown in Figure 5.3) is not consistent with the differential in average driver's wages in these countries (as shown in Tables 5.3 and 5.4). The main reason for this

apparent inconsistency is the variation in the utilisation of drivers. As discussed earlier, particularly with urban freight, there are often substantial amounts of time where employee drivers are being paid but are not driving. An analysis of various VOC models and survey results has shown quite considerable variation within countries (including Australia) of the costs of drivers for urban freight.

Another reason for this apparent inconsistency is average driving speed. Especially for urban freight, the amount of congestion and the access characteristics for pickup and delivery can lead to significant variations in the average speed of vehicles. As VOC costs for urban freight are measured for 80 000 kilometres per year, vehicles going slower require more labour hours (and thus dollars). Unfortunately, it was not possible to collect reliable data to permit international comparisons on an hourly basis.

Fuel

In all selected countries, virtually all long haul vehicle operators use diesel fuel. Most of short haul operators use diesel fuel although a fairly significant minority use petrol fuelled engines. In Australia, as in other countries, some of the larger trucking companies are able to negotiate deals to purchase fuel at prices below the advertised retail level. However, this analysis only compares retail prices.

On a broad intercountry comparison, Australia has relatively low fuel prices. As shown in Figure 5.4, the average retail price of diesel fuel for 20 member countries of the International Energy Association (IEA) was 11 per cent higher than in Australia. At the same time, the average retail price of petrol for those 20 IEA countries was 74 per cent higher than in Australia.

However, the price of both petrol and diesel fuel to truck operators in Australia is relatively high compared to that faced by US and Canadian truck operators. Diesel fuel is about 78 per cent more expensive in Australia compared to the US and 10 per cent compared to Canada. The differential is sensitive to exchange rate movements which have tended to be volatile of late (particularly in Canada). NZ however has the lowest priced diesel fuel in the western world, selling at a level about 45 per cent lower than in Australia.[16] Diesel fuel prices in the UK were about one-third higher than in Australia in 1992.

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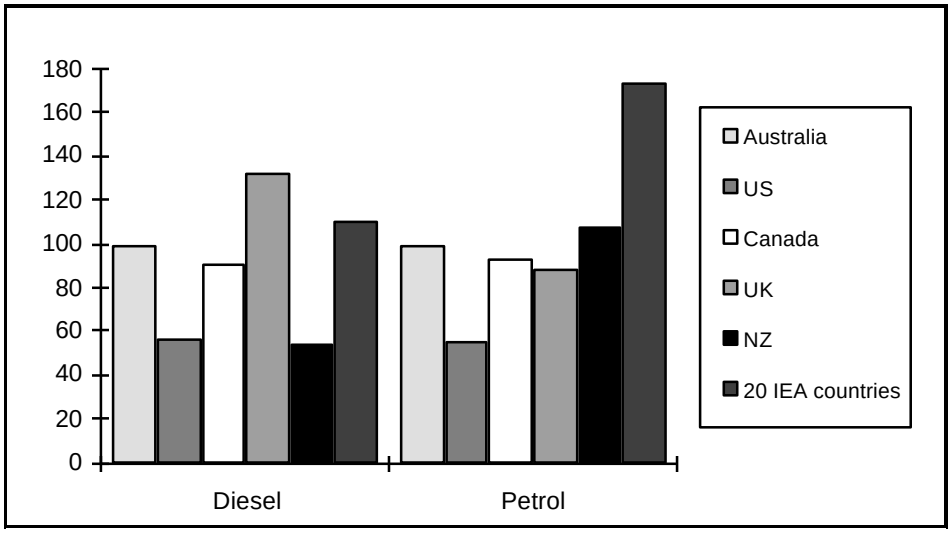
16 Despite the low cost of diesel fuel in NZ, long haul vehicles do not have a correspondingly low fuel cost per kilometre. Presumably this is due to a relatively high fuel usage, stemming from the mountainous terrain and relatively rough condition of the roads.

Figure 5.4 Fuel costs, selected countries, (cents per litre), March 1992, index Australia=100



Note: 20 IEA countries comprise: Australia, US, Canada, UK, NZ, Norway, Greece, Denmark, France, Netherlands, Belgium, Germany, Austria, Japan, Sweden, Portugal, Finland, Switzerland, Ireland and Italy.

Source: Petroleum Division, DPIE 1992, unpublished data.

Most of the variation in fuel prices between countries stems from variations in the level of government taxation. Fuel taxation is generally the primary means for collecting road related taxes and, in most countries, for collecting additional revenue for non-road related government expenditures. Table 5.5 shows the average tax on diesel and petrol fuel (in terms of cents per litre) for the 20 IEA member countries was 13 and 145 per cent higher respectively than in Australia, in March 1992.

Table 5.5 Fuel costs, selected countries, (cents per litre), March 1992

Country	Diesel price cents	Average tax cents(a)	Tax (%)	Petrol price cents	Average tax cents(a)	Tax (%)
Australia	66	32	48	66	31	35
US	37	14	38	37	14	38
Canada	60	22	37	62	27	43
UK	87	51	59	112	77	35
NZ	36	4	11	71	34	38
Average for 20 IEA countries(b)	73	36	49	115	76	66

Notes: (a) Includes taxes imposed by both national and sub-national (ie state/provincial) governments.

(b) IEA countries comprise: Australia, US, Canada, UK, Norway, NZ, Greece, Denmark, France, Belgium, Germany, Austria, Portugal, Japan,Sweden, Finland,

Netherlands, Switzerland, Ireland and Italy.
Source: Petroleum Division, DPIE 1992, unpublished data.

NZ has the lowest tax on diesel fuel because of its policy to rely on a mass-distance based road user charge to collect substantial road use taxes from the trucking industry, while the US has the second lowest diesel fuel taxes and the lowest tax on petrol. This outcome appears to reflect a policy of imposing low fuel taxes on business and households alike.

Repairs and Maintenance

As defined earlier, repairs and maintenance (R&M) costs comprise the costs of parts and labour associated with the repairs and maintenance of particular vehicles and their equipment. The costs of tyres are also included in this category.

The cost of R&M is dependent on the degree of work required and the cost of undertaking it. The two major cost factors are the cost of spare parts and the cost of labour. A proxy for the cost of labour is mechanics wages.

As shown in Table 5.6 the cost of R&M, for both short and long haul vehicles, is lowest in the US and highest in the UK and Canada. Australian operators have a relatively low R&M cost, broadly similar to those observed for the US and significantly lower than those observed for operators in Canada and the UK. Before examining the reasons for these differences it is worth looking at the components of R&M costs.

Table 5.6 Repairs and maintenance costs, selected countries, c/km, 1992 or latest data

Truck type	Aust	US	Canada	UK
Short haul				
Parts and labour	10	10	17	15
Tyres	5	4	5	8
Total	**15**	**14**	**22**	**23**
Long haul				
Parts and labour	14	12	22	16
Tyres	8	7	6	18
Total	**22**	**19**	**28**	**34**

Sources: As for Figures 5.1 & 5.2.

As shown in Table 5.7, the cost of mechanics wages is much higher in both the US and Canada than in Australia and the UK. Whilst there is no conclusive data on the proportion of wages cost in R&M for all selected countries, it is clear that the high cost of wages in the US and Canada acts to countervail the relative advantage of these North American countries in R&M costs stemming from the lower cost of spare parts. These high mechanic costs partially explain the relatively high cost of R&M in Canada compared to Australia.[17]

17 Trimac (1991) reports that the cost of repair and maintenance in Canada has been rising more rapidly than the cost of other inputs comprising VOC.

The high costs of tyres in the UK largely explains the difference in overall R&M cost compared to Australia (and the other countries).

Table 5.7 Repairs and maintenance costs, selected countries, 1992 or latest data

Cost component	Aust	US	Canada	UK
Mechanic cost ($ per hour)	17.50	29.00	30.00	17.00
Tyre costs 11R22.5 Tubeless - Drive (deep thread) ($)	500	380	450	1000

Sources: As for Figures 5.1 & 5.2.

The need to undertake R&M is dependent on a number of factors. These include the age and rate of use of the vehicle, the quality of the road over which the vehicle travels, other road network characteristics (such as the width of roads and access to loading / unloading facilities), climate, topography, and the attitude and professionalism of drivers and mechanics alike.

Other costs

As explained earlier, the other costs category primarily comprises the cost of comprehensive insurance of the vehicle, compulsory third party insurance and standalone payments to the government for vehicle registration fees and the like. It does not include administration and other business overhead costs.

As shown in Table 5.8, there is very little difference in the overall magnitude of the other costs between countries, for both long and short haul vehicles. A more thorough comparison of the impact of government taxes and charges affecting this and other components of VOC is provided in the next section.

Insurance costs can vary substantially between operators within countries depending largely on the accident rate of particular operators. Data (not presented) show that 'typical' premiums paid to comprehensively insure long haul prime movers are of a similar order of magnitude. The data is not robust enough to draw any stronger conclusions.

Whilst these VOC data exclude business overheads, one comment that can be made is that in Australia, recent efficiency drives particularly by the larger road transport companies have led to a reduction in the ratio of business overheads to total transportation revenue. It would be expected that a similar trend has occurred throughout North America where there has been a coincident increase in competition and reduction in administrative burden through the scaling down of regulation. The US Department of Transportation (personal communication) estimated that the cost to road freight operators of reporting to the various regulatory authorities (prior to deregulation in 1981) was approximately $1 billion per year.

Table 5.8 Other costs, selected countries, c/km, 1992 or latest data

Truck type	Aust.	US	Canada	UK
Short haul				
Insurance	6.0	7.8	7.8	5.0
Govt charges (registration	0.9	0.3	0.7	3.9
etc.)	0.0	0.0	0.0	0.0
Other	**6.9**	**8.1**	**8.5**	**8.9**
Total				
Long haul				
Insurance	6.0	5.1	5.1	4.5
Govt charges (registration	2.1	2.0	1.4	5.1
etc.)	0.0	1.8	2.4	0.0
Other	**8.1**	**8.9**	**8.9**	**9.6**
Total				

Sources: As for Figures 5.1 & 5.2.

5.2 Road related taxes and charges in selected countries

In Australia, and the other countries included in this study, there has been much recent debate aimed at defining and separating road use charges from road taxes for the purposes of evaluating what different road users pay for the use of roads and the extent to which they contribute to general taxation.[18] Various bodies in Australia and overseas (including the NRTC in Australia) have addressed this topic, and it will not be explicitly discussed in this report.

The following discussion simply seeks to separately identify the extent of government taxes and charges affecting the operations of road transport suppliers and the significance of these taxes and charges in overall VOC relative to other countries. To the extent that significant differences exist between countries these will in turn affect the relative cost of road freight services to clients between countries. Taxes and charges taken into account in the subsequent discussion include fuel taxes, vehicle registration fees, sales tax on vehicles and equipment and spare parts, import duties and other miscellaneous charges. It should be noted that these taxes and charges were included in the calculation of total VOC, as reported in Section 5.1. An attempt has also been made to compare some of the broader taxes faced by road transport operators in different countries. The effect of these changes on VOC was not included in the figures reported in Section 5.1.

Road related taxes and charges

18 In the absence of clear definitions, the issue of when a tax or a charge constitutes a road use charge is not straightforward. Currently in Australia, there are general revenue taxes (eg wholesale sales taxes and stamp duties) which are in no way regarded as road use charges. In addition, there are general revenue taxes which may have a component which is connected to roads (either formally hypothecated to expenditure or more loosely taken into account). Finally, there may be taxes or charges which are wholly taken to be road use charges.

Table 5.9 provides a summary of the main taxes and charges applying to the road freight industry in Australia and selected overseas countries. This table lists the main federal impositions and provides a summary of the many different state or provincial government imposts.

Table 5.9 Road related taxes and charges, 1992 or latest data [(a)]

Cost component	Aust	US	Canada	UK
Capital - trucks and trailers	Duty varies with import content of vehicles (typically 10-15%) Sales tax on vehicles 20% Stamp duty : varies between states (around 2-3%)	Excise tax: 12% on retail for trucks over 16.5t & trailer >13t gvw Sales tax: State&local govt, to 8% of retail Title tax: Most states $1-50	GST (7%) + provincial retail sales taxes. Total 13-15% GST exempt for trade with US	(VAT) 17.5% of retail price
Fuel & oil -includes Federal and State/provincial taxes	Fed: 26c/l State franch fees: NSW 6.74c/l Vic 7.09 c/l Qld 0.00 SA 6.71c/l WA 7.45c/l Tas 6.11 c/l	Federal + State taxes Ave=14 c/l	Federal + provincial taxes Ave=22 c/l	Excise + VAT Ave=52c/l
Repairs & maintenance - tyres - parts	Sales tax on spare parts, tyres etc. ~20%	Tyre tax: Fed $0-10.50 plus 50c per lb per tyre Sales tax: Most states & a few local	GST (7%) + provincial retail sales taxes. Total 13-15% GST exempt for trade with US	VAT 17.5%
Registration (average) - light commercial - prime mover and trailer	 $400 $3000	 $200 $1600 Property tax: Most states&local 0-$5051	 $500 $2000	 $1000 $7500 called vehicle excise duty
Other varies but relatively minor	Permit fees, tolls, over-dimension licences	Operators licence, tolls, safety fees, transport tax permit fees	Permit fees, tolls, over-dimension licences	Permit fees, tolls, over-dimension licences

Note: (a) Taxes and charges are expressed in Australian currency at the exchange rates applying at the time the data was available.

Sources: Petroleum Division DPIE (Australia); NRTC 1992 Discussion paper on heavy vehicle charges; International Road Federation, World Road Statistics 1986-90, US FHWA Highway taxes and

fees, 1991; and KPMG Peat Marwick Thorne, The effect of taxation on Canada-US trucking competitiveness.

The primary tax imposed on trucks and trucking operations for each of the selected countries is a fuel tax. As indicated in Table 5.5, fuel taxes account on average for 49 per cent of the retail price of diesel fuel for the 20 IEA member countries. In Australia, about 80 per cent of fuel taxation revenue is collected by the federal government. This is not the case in Canada and the US, where federal governments collect only about 40 and 50 per cent of all fuel tax revenue, respectively.

Another major charge imposed on trucking operations by most governments are vehicle registration fees. Table 5.9 shows that the magnitude of these fees for short haul trucks are broadly similar between Australia, Canada and the US. However, for long haul vehicles Australian states impose generally higher average fees than those imposed in the US and Canada. The UK has higher registration fees for both short and long haul vehicles, and along with fuel taxes these comprise the main taxes/charges on its road freight industry. NZ has a vastly different set of registration charges with registration fees being relatively low. However, a road user charge is also levied on trucks and trailers over 3.5 tonnes GVM.

Most countries impose some form of sales tax on the purchase of trucks, spare parts and accessories. Australia has a similar level of sales tax to the other selected countries, (20 per cent of the wholesale price, whereas the US and UK have rates of around 8-20 per cent and 17.5 per cent respectively of the retail price).[19] In the US, the federal component is called an excise tax and is imposed on vehicles over 16.5 tons. Canada has a federal GST of 7 per cent combined with provincial retail sales taxes typically around 6-8 per cent which combine to add about 13-15 per cent to the cost of trucks, spare parts and accessories. Transborder trucking operations between Canada and the US are exempt from the federal GST, with Quebec also about to exempt such operations from its provincial sales tax. NZ imposes a GST on all aspects of trucking operation at 10 per cent.

Tariff duties are negligible for the US and Canada. In the UK, a 22 per cent duty applies to imported trucks. NZ imposes widely varying levels of import duty, depending on type of vehicle and country of origin.

The US collects significant additional revenue in the form of state property taxes and in some instances, mass-distance charges.

Comparative taxes and charges on road freight operations

This section provides estimates for Australia, the US, Canada and the UK of the extent of taxes and charges for those short and long haul vehicle combinations for which VOC were presented earlier. Two types of measures are provided. Firstly, the magnitude of these taxes/charges, in terms of c/km and, secondly, the relative significance of these taxes/charges as a proportion of total VOC.

Table 5.10 shows these taxes and charges in terms of c/km for Australia, Canada, the US, and the UK. These data show a wide disparity in the tax burden on short haul trucks

19 Sales tax in Australia is imposed at the wholesale level whereas in the US, Canada, and the UK it applies at the retail level. The 20 per cent wholesale tax in Australia equates to about a 15 per cent retail sales tax.

between the countries examined. The US has clearly the lowest rate of taxes/charges at only 4 c/km. At the other end of the spectrum, short haul trucks in the UK pay taxes/charges more than six times the US rate. The level of taxes/charges paid by short-haul vehicles in Australia is substantially greater than for similar operators in the US and Canada but significantly lower than in the UK.

Table 5.10 Taxes and charges on road freight operations, c/km, 1992 or latest data [(a)]

Truck type	Aust	US	Canada	UK
Short haul trucks	17	4	12	25
Long haul vehicles	27	10	17	37

Note: (a) Taxes and charges are expressed in Australian currency at the relevant exchange rates applying at the time.
Sources: As for Figure 5.1 and Table 5.9.

A similar trend in the relative magnitude of taxing long haul vehicles is evident from Table 5.10. Again the US has by far the lowest incidence of taxation, mainly because of the low level of federal and state fuel taxes. The level of government taxes/charges in Australia is again substantially higher than observed in the US and Canada but lower than in the UK.

Both short and long haul road freight operators in NZ face tax/charge levels in excess of the UK (which is the most highly taxed of the selected countries).

Table 5.11 shows taxes and charges as a proportion of VOC for Australia, US, Canada, and UK.[20]

Table 5.11 Taxes and charges on road freight operations, as a proportion of VOC, 1992 or latest data

Truck Type	Aust	US	Canada	UK
Short haul trucks	12	3	8	11
Long haul vehicles	21	9	13	15

Sources: As for Figure 5.1 and Table 5.9.

20 This data does not highlight the disparity between the relative gover nment taxes and charges on road operations as clearly as measuring on the basis of c/km because vehicles operating in countries with higher tax/charge regimes tend to have higher vehicle operating costs. However, the level of taxes and charges is often reported in this form.

In line with the differential in taxes and charges per kilometre, short haul and long haul trucking operators in both the US and Canada have a considerably smaller proportion of their VOC comprised of taxes and charges than Australia or the UK. This data shows that Australian government taxes/charges represent 12 per cent of VOC for short haul trucks and 21 per cent for long haul trucks.

It is clear that the tax/charge burden is much lower for the smaller vehicles in all selected countries. This is mainly because they travel fewer kilometres per year than the larger vehicles and thus pay a smaller amount through the various fuel taxes. Smaller vehicles also impose lesser damage to road surfaces.

Table 5.12 contains estimates of VOC that have been adjusted to exclude the impact of road related taxes/charges. These have been calculated by subtracting the cost of road related taxes/charges (as defined in Section 5.2) from observed total VOC. These adjusted data show a markedly different picture than do observed VOC data. On an adjusted basis, Australian short and long haul road freight operators are shown to be lower cost operators than corresponding operators in the US and Canada. In fact, Australia is the lowest cost country for long haul operations. In terms of VOC net of taxes and charges, there is relatively little variation between countries with regard the cost of capital equipment and fuel.

Table 5.12 Total VOC less road related taxes and charges[(a)], short and long haul vehicles, c/km, 1992 or latest data

Truck type	Aust	US	Canada	UK
Short haul trucks	129	141	138	108
Long haul vehicles	101	106	113	109

Note: (a) Total VOC minus road related taxes and charges (ie fuel taxes, registration fees, miscellaneous road use charges, sales tax and excise duty on vehicles and parts).
Sources: As for Figure 5.1 and Table 5.9.

The overwhelming cause of differences in VOC (excluding road related taxes and charges) are differences in the cost of drivers. Data collected for analysis in this report show that the UK and Australia have the lowest cost of drivers for short and long haul operations respectively.

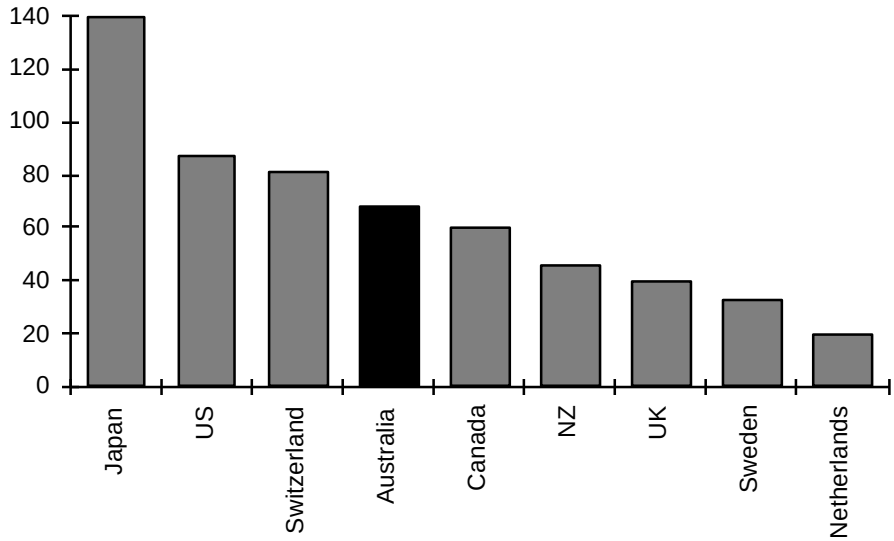
Road expenditure versus road related revenues

Differences in the relative magnitude of road related revenues depend to a large extent on the attitudes of the relevant governments to matching road use expenditure with road related revenues.[21] The greater the extent to which countries use road related taxes and charges to supplement general government revenue, the higher the incidence of road

21 Whilst there are arguments for hypothecating (or earmarking) road related revenues to road expenditures on equity and accountability grounds there are arguments against such hypothecation on the grounds of economic efficiency and fiscal flexibility.

related taxes and charges on trucking operators. Figure 5.5 shows that most countries use road related taxes and charges to supplement general revenue to a significant extent. These data include cars as well as trucks.

Figure 5.5 Road expenditure[(a)] as a percentage of road related revenues,[(b)] 1990



Notes: (a) Includes construction, maintenance, administration and research.
(b) Includes fuel taxes, vehicle registration fees, miscellaneous road use charges, sales tax and excise duty on vehicles and spare parts.

Sources: NRTC Issues and Objectives Paper, January 1992; World Road Statistics, IRF, 1991; and National Highway Policy in Canada 1989, National Highways Policy Steering Committee.

Japan is the only country for which road use expenditures exceed road related revenues. The US and Switzerland have a reasonably close matching of the two. Australia is shown to use road taxes and charges as a relatively minor supplement to general revenue, compared to most of the selected countries. NZ, which has a high level of taxes on short and long haul vehicles, has a relatively high degree of supplementation of general taxation revenue. The UK, Sweden and the Netherlands all spend 40 per cent or less of road related revenues on roads.

Broader tax and charge regimes

In many countries there are general taxation measures that impact on the road freight industry, apart from road related taxes and charges. In Australia, for example, these include payroll tax, the training levy and financial institutions duty (FID).[22] Set out below is a broad outline of the impact of such taxes, and charges, together with road related taxes and charges, on the road freight industry in Australia compared to the US and Canada. A comparison of the incidence of such taxes and charges on the road industry in Australia with the level of taxation applying to other industries in Australia concludes the treatment.

Data prepared by Mayne Nickless for the 1992 Senate Inquiry on taxes and charges associated with the road transport industry have been used to estimate the additional taxation burden on Australian urban and linehaul road freight transport operators from payroll tax, the training levy and FID. Table 5.13 shows that these taxes and charges comprise 5.9 and 5.6 per cent of the VOCs for urban and linehaul operations respectively. Adding the amount paid in road related taxes and charges as shown in Table 5.11, increases the share of taxes and charges in VOCs to 17.9 and 26.6 per cent for urban and linehaul operations respectively.

Table 5.13 All government taxes and charges as a percentage of operating costs, 1991

Government taxes and charges	Urban operations	Linehaul operations
Payroll tax	4.5	3.5
Training levy & FID	1.4	2.1
Sub-total	5.9	5.6
Total taxes and charges	17.9	26.6

Source: Mayne Nickless Limited 1992, Submission to the Senate Inquiry on taxes and charges associated with the road transport industry.

A stark contrast to these levels of taxes and charges exists for the US and Canada. Based on data provided in the KPMG Peat Marwick Thorne (1991) publication "The Effect of Taxation on Canada - US Trucking Competitiveness", estimates have been attempted of the complete tax burden on Canadian and US trucking companies undertaking a mix of short haul and long haul cross border operations in early 1991.

As evident from Table 5.14, this analysis reveals a very low overall tax burden for both countries. In fact the overall tax burden (including non-road use related taxes and charges) is not substantially higher than the level if only road user taxes and charges are included.

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22 Ideally, this analysis would consider the full range of taxes and charges imposed on road freight operators in the selected countries, as well as the extent of government services provided. However, it has not been practicable to undertake such an analysis.

While data presented in Table 5.14 is not strictly comparable with that presented in Table 5.13, the picture that emerges from such a comparison is that the difference between Australia and the US and Canada in the amount of taxes and charges paid by road freight operators is increased with the inclusion of a wider range of general taxes. In very broad terms, the level of taxes and charges as a proportion of overall VOCs for both short and long haul road freight transport operations averages about 22 per cent in Australia. Comparable averages for the US and Canada are about 10 and 16 per cent respectively, obtained by taking a simple average of the observed level of taxes and charges for the categories of business reported in Table 5.14. However, compared to most countries in the world, the US and Canada impose extremely low levels of taxes and charges on road freight operations.

Table 5.14 Canadian and US government taxes and charges[(a)] as a percentage of operating costs, 1991

Category of business	Canada	US
Owner-operator	22	16
Truck load carrier	12	6
Less than truck load carrier	13	8

Note: (a) Taxes included cover: income and corporate taxes; consumption taxes; fuel taxes; taxes on capital; payroll taxes; registration and licenses; and other taxes.

Sources: KPMG Peat Marwick Thorne 1991, The effect of taxation on Canada-US trucking competitiveness; and BIE estimates.

Many studies (eg ISC 1990, NRTC 1992, NFFA 1992) have shown that the Australian road freight transport industry is much more highly taxed than most other Australian industries. This has given rise to concerns relating to its adverse impact on the competitiveness of road freight relative to other modes of transport as well as the cost competitiveness of users of the road freight industry. Data relevant to this issue are set out in Table 5.15, which presents an analysis of the latest ABS input/output statistics undertaken by the NRTC.

A straight comparison of net taxes (ie taxes less subsidies) on inputs as a percentage of costs of production indicates that road transport is much more highly taxed than other modes of transport and than the average for all industries in the Australian economy.

While there are no comparisons of the general taxation rate for the other transport modes, it is clear that railways receive net subsidies. Since road and rail are competitive modes over a range of transport tasks this could be expected to improve the market share of railways. Road and sea are not usually competing modes so the differences in taxation rates should not affect market share to any great degree. There appears to be limited variation in the rate of taxation of road and air freight.

The NRTC extended this analysis by deducting a road user charge component (equivalent to 15.6 cents per litre of the diesel excise levy as discussed in ISC 1991) to estimate the general taxation component in overall road taxes and charges. Whilst the calculation of the magnitude of the user charge component is contentious,[23] the NRTC analysis suggests that the incidence of taxation on the road freight industry (5.4 per cent of total production costs) does not vary substantially from that for industry in general (4.4 per cent) when the road user charge component is deducted.

Table 5.15 Net taxes and charges by industry, Australia, 1986-87

Industry	Tax on inputs(a) ($m)	Costs of production(b) ($m)	Tax incidence (%)
Road transport industry(c)	703.4	6416.5	11.0
Rail transport(c)	-607.5	3522.4	-17.2
Air transport(c)	273.4	3682.4	7.4
Water transport(c)	39.6	1721.3	2.3
Communication	258.1	5635.4	4.6
Services to transport	115.1	3298.3	3.5
Total all transport & communications.	782.1	24267.3	3.2
Average all industries	28906.0	662517.0	4.4
Road (Taxes - RUC(d))/Total costs of production	346.5	6416.5	5.4

Notes: (a) Taxes are net of subsidies and include fuel tax, registration fees, stamp duty, payroll tax, land tax, miscellaneous road user charges and sales tax and import duty on vehicle spare parts. Taxes exclude sales tax and excise duty on vehicles as these are capital items.
(b) Cost of production includes the cost of intermediate usage, wages and salaries, taxes and imports.
(c) Includes both passenger and freight services as it is not possible to separately report freight services.
(d) RUC (road user charges) is 15.6 cents per litre of the diesel excise tax, as defined by ISC (1991).

Sources: Australian Transport News March 27 1992 and NRTC 1992; and ABS Input-output tables 1986-87.

While the earlier analysis of road freight rates (see Chapter 4) suggests that Australian rates are broadly comparable with other countries, the implications of the above discussion

23 The main problems arise in attributing the extent of damage to the road surfaces contributed by the different types of vehicles using the roads and in determining whether external costs such as noise and air pollution and congestion should be taken into account and if so how.

are that government taxes and charges on the industry have increased its operating costs resulting in either reduced margins for operators, higher charges to users than would otherwise have been the case or both.

5.3 Concluding remarks

Australian urban road freight transport operators have VOC higher than those operating in the UK and similar to those operating in the US and Canada. Capital costs are relatively high for this class of operator in Australia, while repairs and maintenance costs are relatively low.

Australian linehaul road freight transport operators have VOC about 10 per cent higher than recorded on average for operators in the US, very similar to those applying in Canada and well below those of the UK. Again capital costs are relatively high in Australia for these operators.

The purchase costs of both short and long haul vehicles in Australia are about 20 per cent higher than in the US and 12 per cent higher than in Canada. The UK has relatively high retail prices for short haul trucks but relatively low retail prices for long haul vehicles. The purchase price of trucks in Australia is high relative to the other selected countries largely due to the relatively high tariff duties imposed in Australia. However, this impost will be diminished over the next few years as the duties applying to imported vehicles are reduced from 10-15 per cent currently to 3-5 per cent by 1996.

In terms of common awards for drivers, Australia pays middling levels, about 5 and 10 per cent above the levels paid in the UK and NZ respectively, but about 15 and 25 per cent below those paid in Canada and the US respectively. Most of the differences in payments to drivers stem from the level of on-costs rather than the nominal wage component. Differences in the observed cost of drivers do not reflect these wage differentials mainly due to differences in the utilisation of drivers. The UK has the best utilisation of drivers time for short haul trucks while the US has the best for long haul vehicles.

Fuel costs are relatively low in Australia compared to most countries but are still higher than those in the US and Canada. While NZ has the lowest diesel fuel price (because it has the lowest diesel fuel tax) it does not have the lowest fuel cost, presumably due to higher fuel usage levels. Long haul road freight operators in Australia have higher fuel costs than operators in the US and Canada by about 93 and 22 per cent respectively.

Repairs and maintenance costs in Australia are relatively low compared with other countries. For both short and long haul vehicles, costs are similar to those observed in the US and lower than in Canada and the UK. Mechanics wages are higher in Canada while tyres are much more expensive in the UK.

There is very little variation between countries in the other cost category.

Road related taxes and charges (including sales tax and customs duties) are much lower for both short and long haul road freight operators in the US compared with the other selected countries. For short haul trucks, these taxes and charges amount to only 4 c/km in the US compared to 12 for Canada, 17 for Australia and 25 for the UK. Similar relativities apply for long haul vehicles, with the US and Australia recording 10 and 27 c/km respectively.

Fuel taxes are typically the prime road related tax, with vehicle registration fees of secondary importance. NZ is the exception, relying primarily on an explicit mass-distance based road user charge.

On the basis of adjusted VOC (observed VOC less the cost of road related taxes and charges), the Australian road freight industry achieves lower cost levels than both the US and Canada for both short and long haul operations. Drivers wages and associated costs are the main reason for differences in adjusted VOC between countries, for both short and long haul operators.

Most countries use road related taxes and charges to supplement government revenues, with road related revenues typically far exceeding road expenditures. Japan is the exception with expenditure on roads exceeding revenue raised from road related taxes and charges. The US and Switzerland have the closest matching of road expenditures to road related revenues followed by Australia and Canada.

When a broader range of general taxes and charges on the road freight industry are compared, the burden on Australian road freight operators increases substantially (eg taxes and charges comprised 27 per cent of total VOC for long haul vehicles). By comparison, the inclusion of general taxes and charges in Canada and the US did not increase the burden of taxation on road freight operators as much as in Australia.

By using ABS input-output data for 1986-87, the Australia road freight industry is shown to be more highly taxed than most other industries, including competing transport modes. Calculating the incidence of taxation in terms of road related taxes and charges minus a road user charge as a proportion of total costs of production, the road freight industry is shown to be taxed at a rate similar to the average for industry in general.

6. Summary and conclusions

This study develops and reports a range of indicators which allow an assessment to be made of the performance of the Australian road freight industry and the operating cost environment it faces, both in a domestic context and in comparison with the industry in several overseas countries. The international comparisons focus on the US, Canada and the UK. These countries were judged to have operating environments broadly similar to that of Australia and/or provide examples of 'best practice'. More limited comparisons are reported for a number of other countries.

The study also facilitates a comparison of the services supplied by the road freight industry relative to those examined by the Bureau in an earlier report on the rail freight industry (BIE 1992).

In progressing the study the approach followed by the Bureau was to involve road freight suppliers and users in the selection of performance indicators for Australia and for the international comparisons. The objective has been to develop credible and relevant measures which can be updated over time. Variations in industry structure and publicly available data across countries together with commercial sensitivities have placed some limits on the development of performance indicators for this study.

Indeed, in making international comparisons, it is important to have regard to differences in the underlying nature of the road transport task as well as other features of the operating environment such as regulations. Available industry data, both for Australia and overseas, precluded the Bureau from making systematic adjustments for such differences between countries, particularly in relation to measures of operating efficiency. Nevertheless the comparisons reported are seen as providing a useful indication of the relative performance of the Australian road freight industry.

Three broad categories of performance indicators are reported: customer oriented indicators focused on freight charges and the services offered to road freight users (eg price, timeliness and quality); operating efficiency indicators focused on the key drivers of operating performance (eg capital and fuel productivity measures); and indicators setting out a comparative analysis of vehicle operating cost structures, including the impact of government taxes and charges on these costs. Related to this, the study examines the broad effects of charging for road provision and use on the road freight industry.

A description of the indicators is given below:

Customer oriented performance indicators:

Price

- Average freight rate charged per net tonne kilometre (indicative only - refer to Chapter 4 for details)

Timeliness/reliability

- On time pick up and delivery performance

Service quality

- Incidence of lost and damaged road freight
- Proportion of claims paid

Operating efficiency performance indicators:

- Total kilometres per vehicle per year
- Total tonne-kilometres per vehicle per year
- Empty kilometres / total kilometres
- Average actual load as a proportion of full load capacity
- Number of kilometres per driver per year
- Fuel usage by vehicle type

Vehicle operating cost indicators:

- Overall vehicle operating costs - by representative vehicle type
- Vehicle operating cost components - by representative vehicle type

Road related taxes and charges:

- Road related taxes and charges - cents per kilometre
- Road related taxes and charges - as a proportion of vehicle operating costs
- Broader range of general taxes and charges as a percentage of operating costs
- Comparative tax incidence on various Australian industries
- National road expenditure as a percentage of road related taxes and charges

The results of the performance comparisons undertaken for most of these indicators are summarised in Table 6.1.

Table 6.1 Australian road freight industry: performance indicator summary, 1992 or latest data

Performance indicator	Australia		US		Canada		UK	
Customer oriented								
On-time delivery (%)	96		97		96		92	
Loss & damage rate (%)	0.4		0.9		0.4		0.4	
Operating efficiency								
Kms ('000) per vehicle p.a.(a)	78		96		87		82	
Tonne-kms ('000) per vehicle p.a.(b)	1020		1283		980		281	
Empty kms/total kms (%) (a)	31		27		16		28	
Fuel usage (litres/100km)(a)	51		53		54		41	
Vehicle operating costs(VOC)(c)	**short haul**	**long haul**	**short haul**	**long haul**	**short haul**	**long haul**	**short haul**	**long haul**
Cost component (cents/km)								
Capital	21	31	17	25	19	26	23	22
Driver	87	40	97	49	87	45	56	42
Fuel & oil	16	27	9	14	14	22	22	38
Repairs & maintenance	15	22	14	19	22	28	23	34
Other	7	8	8	9	8	9	9	10
Total	**146**	**128**	**145**	**116**	**150**	**130**	**133**	**146**
Road related taxes and charges(d) (cents per km)	17	27	4	10	12	17	25	37
Adjusted VOC (e) (cents per km)	**129**	**101**	**141**	**106**	**138**	**113**	**108**	**109**

Notes: (a) Articulated vehicles.
(b) All vehicles.
(c) Vehicle operating costs are reported for two vehicle types; Short haul vehicles: 17 tonnes gross vehicle mass (GVM), 80,000km p.a and Long haul vehicles: 42 tonnes GVM, 150,000km p.a., prime mover plus tri-axle trailer.
(d) Includes fuel taxes, registration fees, other road related taxes/charges, sales tax and excise duty on trucks and spare parts.
(e) Total vehicle operating costs minus road related taxes and charges (as defined in (d) above).

Sources: ABS 1992, Survey of Motor Vehicle Use 1991; Thoresen (unpublished), 1991; BIE Survey 1992; industry supplied data 1992; US FHWA 1990 Highway Statistics; American Trucking Associations 1992, Trucking Trends; American Trucking Associations 1992, F & OS Annual Report 1990 and other data; Trimac, 1991; Statistics Canada 1992, Trucking in

Canada 1989; Transport Canada 1990, Operating Costs of Trucks in Canada; Canadian National Transportation Agency 1991 Annual Report; UK Dept. of Transport 1992, Continuing Survey of Road Freight 1991; Motor Transport Magazine (UK) 1992, Cost Tables; UK FTA 1992, The Managers Guide to Distribution Costs; World Road Statistics 1986-90, International Road Federation.

Available data for Australian and overseas road freight operations generally reveals that in terms of on-time delivery in relation to promised time Australian road freight services are on a par with overseas services. The incidence of lost and damaged freight in Australia is below that in the US but comparable with Canada and the UK.

In relation to price, indicative data presented in the report suggests that Australian road freight rates are broadly similar to those applying overseas.

A confirmation of Australia's sound performance from a customers' perspective is the survey of Australian road freight users conducted for this study which indicated users are generally satisfied with the level of service they receive. Work undertaken for the Bureau's earlier study of rail freight (BIE 1992) showed road transport performing very well in comparison with rail transport.

Available operating efficiency data relating to capital (ie vehicle) and fuel productivity indicate that the performance of Australian road freight services varies from fair to good when compared to road freight operations in the US, Canada and the UK. While the Australian industry is behind the US for all measures of vehicle utilisation, its performance compares favourably with the UK and Canada in terms of tonne-kilometres per vehicle per year. In the case of fuel usage, Australia's performance is similar to that of the US and Canada but inferior to that of the UK.

The analysis undertaken of the comparative total vehicle operating costs in Australia and several overseas countries reveals different outcomes for two broad classes of vehicles:

- For short haul vehicles, Australia's costs are above those in the UK, similar to those in the US, and below those in Canada; and

- For long haul vehicles, Australia's costs are similar to those in Canada, below those in the UK, but somewhat higher than those in the US.

Analysis of the specific components comprising vehicle operating costs sheds some light on the reasons for differences in VOC between countries. Higher capital costs (arising in part from taxes and duties applying to vehicles and their components) are a factor in Australia's higher VOC. Australia's driver costs are similar to those in Canada, below those in the US but higher than those in the UK. While wage differentials were found to exist, variations in the driver cost component largely reflected differences in the rate of utilisation of drivers. Fuel costs in Australia are almost 100 per cent higher than those in the US, about 20 per cent higher than in Canada but below those in the UK. Australia's repairs and maintenance costs generally compare favourably with those in other countries.

It is interesting to note that the higher Australian vehicle operating costs compared to those in the US are only partly reflected in the indicative price data available for these countries. One explanation for this result could be that the Australian road freight industry is very competitive, with low barriers to entry and exit (compared with the US, for example, where the Interstate Commerce Commission has a continuing regulatory role in relation to entry to the industry) and this keeps prices at relatively low levels. Anecdotal evidence of low returns in the Australian industry lends some support to this explanation, although

subdued returns appear to be widespread in the road freight industry in many countries reflecting lower levels of economic activity.

Of the countries considered in the comparative analysis of road related taxes and charges (including sales tax and customs duties), the US had much lower imposts for both short and long haul road freight operators. For short haul trucks, these taxes amounted to only 4 cents per kilometre in the US compared to 12 for Canada, 17 for Australia and 25 for the UK. Similar relativities can be observed for long haul vehicles, with the US and Australia recording 10 and 27 cents per kilometre respectively.

On the basis of adjusted vehicle operating costs (observed vehicle operating costs less the cost of road related taxes and charges), the Australian road freight industry achieves lower cost levels than the US and Canada for both short and long haul operations. A conclusion that can be drawn from these data is that an important cause of variations in observed vehicle operating costs between countries is the level of taxes and charges applying to the industry.

Looking more closely at adjusted vehicle operating costs, Australian short and long haul road freight operators are shown to be lower cost operators than corresponding operators in the US and Canada. In fact, Australia is the lowest cost country for long haul operations. In terms of adjusted VOC, there is relatively little variation between countries with regard to the cost of capital equipment and fuel.

Road related revenues are raised predominantly by fuel taxes, with vehicle registration fees of secondary importance. NZ is an exception, relying primarily on an explicit mass-distance based road user charge. Most countries (including Australia) use road related taxes and charges to supplement general government revenue, with road related revenues typically far exceeding road expenditures. Of the countries considered, the US has the closest matching of road user revenues to road expenditure.

When a broader range of general taxes on the road freight industry are compared, the burden on Australian road freight operators was shown to increase substantially; total taxes and charges comprising 27 per cent of total VOC for long haul vehicles. By comparison, the inclusion of general taxation measures for Canada and the US did not increase the burden of taxation on road freight operators to the same extent as in Australia.

Analysis based on ABS data shows the Australian road freight industry is much more highly taxed than other modes of transport and than the average for all industries in the Australian economy. However, after allowance is made for a road user charge (to reflect to users the costs of providing and maintaining road infrastructure along the lines of that recommended by the National Road Transport Commission), the road freight industry is seen to be taxed at a rate similar to that for industry in general. Nonetheless, even after allowance is made for the road user charge, road freight transport is considerably more highly taxed than its main competing mode of transport - rail freight (as noted in the BIE study of rail freight services (BIE 1992) these services are subsidised by about $400 million per year on an Australia-wide basis).

Given the generally competitive nature of the Australian road freight transport industry any reductions in vehicle operating costs through, for example, reduced capital costs,

labour costs or reductions in taxes and charges faced by the industry, should translate into reductions in the price Australian users pay for road freight services, and hence into improvements in the international competitiveness of those users.

Appendix 1

The road freight industry overseas

Importance in the economy

In the **European Communities** (EC), transport is a major sector of economic activity accounting for around 7 per cent of GDP and 7 per cent of employment. The road transport sector absorbs about 40 per cent of all public investment.

In the **US**, the entire trucking industry generated an estimated $273 billion in revenues in 1990. This accounted for over three-quarters of the nation's entire freight bill and is equal to about 5 per cent of the GDP. Estimates of employment in the industry vary widely, depending on how private carriage, owner operators, and part-time employees are counted. The American Trucking Associations have estimated that 7.8 million people worked in trucking throughout the economy in 1990. This figure included 2.6 million truck drivers. A figure of around 4 million persons is regarded as a reasonable estimate of total full-time industry employment.

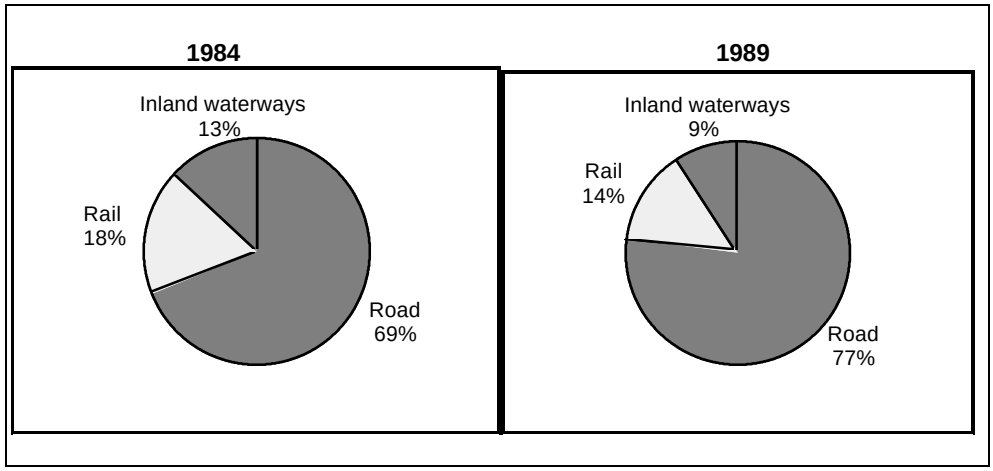
In **Japan** the number of employees by type of carrier in 1991 was reported by the Japan Trucking Association as 890 800 in the general common carrier sector and 146 300 in the special consolidated cargo carrier sector.

Modal share

In the **EC** road freight is the most important transport mode. Road increased its share (when comparing market shares of road, rail and inland waterways) of the transport of goods for the EC as a whole from around 70 per cent in 1984 to over three-quarters of tonne-kilometres by 1989, at the expense of rail and inland waterways. These other sectors had a share of 14 and 9 per cent respectively in 1989 as shown in Figure A1.1.

Freight transport by road has been expanding very rapidly for a number of years both between and within member States. Road's share of intra-EC inland traffic is not as dominating as it is of all traffic, comprising both the domestic and international arenas. Road transport accounts for half of the carriage of goods overland within the Community. Eighty per cent of intra-EC road freight involves five countries, namely Belgium, France, Germany, Netherlands and the UK.

Figure A1.1 EC goods transport trends by mode of transport, tonne kilometres



Source: Commission of the EC 1991, General Directorate for Transport.

Similarly within the **US,** trucking is the most important mode for transporting freight, accounting for 40 per cent of total inter-city tonnage and one-quarter of all inter-city ton-miles of freight as shown in Table A1.1

Table A1.1 US trucking share of freight industry, 1990

Measure	Trucking (billion)	Total freight industry (billion)	Trucking (%)
Revenues	273	350	78
Tons	2.6	6.4	41
Ton-miles	716	2813	26

Source : Interstate Commerce Commission 1992, Office of Economics.

The shares of the various transport modes over the period since 1940 are shown in Table A1.2. While the share of rail in terms of ton-miles has declined considerably since 1940 and the share for truck and pipeline has increased steadily, rail remains the dominant mode.

Table A1.3 gives an indication of the relative shares of the transport task in the **UK** performed by different modes on a tonne kilometre basis.

Table A1.2 US domestic inter-city ton-miles (billion) by mode, 1940-90

	Rail		Truck		Pipelines		Waterway	
Year	Ton miles	%	Ton miles	%	Ton miles	%	Ton miles	%
1940	379	61	62	10	59	10	118	19
1950	597	56	173	16	129	12	164	15
1960	579	44	285	22	229	17	220	17
1970	771	40	412	21	431	22	319	17
1980	932	38	555	22	588	24	407	16
1990	1071	38	735	26	583	20	462	16

Source: US Department of Transportation 1991, ENO Foundation.

Table A1.3 UK freight transport: goods moved by mode, 1990

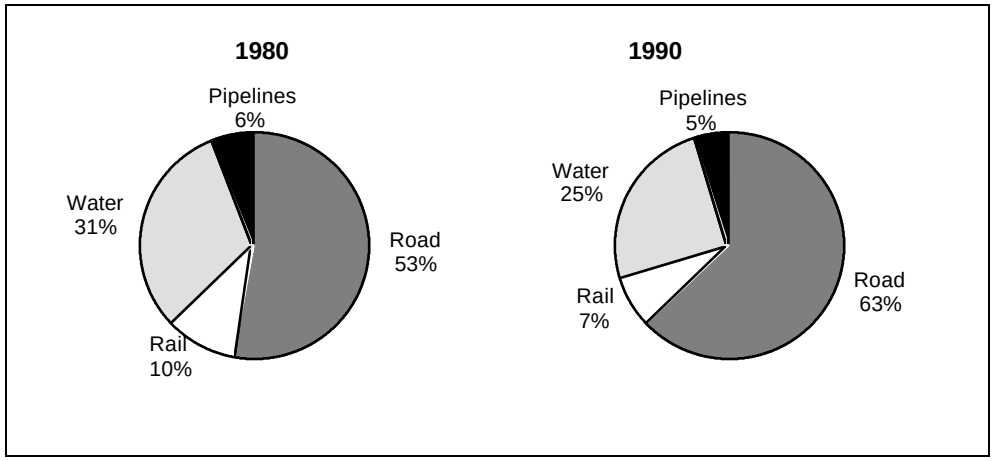
Mode	Freight moved Tonne kilometres (billion)	Share of transport market (%)
Road(a)	136	63
Rail	16	7
Water	53	25
Pipelines (b)	11	5
Total	**216**	**100**

Notes: (a) Road includes all goods vehicles, including those up to 3.5 tonnes gross vehicle weight.
(b) Pipelines are oil pipelines only (excluding offshore pipelines).
Source: Transport Statistics Great Britain 1991.

Road is the dominant carrier of goods moved, accounting for 63 per cent of the UK freight task in 1990, ahead of water transport which amounted to one-quarter and rail which stood at 7 per cent. Water is the dominant mode in terms of tonne kilometres for the transportation of crude oil, petrol and petroleum products. As evident from Figure A1.2, road has grown steadily over the period since 1980 at the expense of the other transport modes.

For the transport of non-fuel products (ie. excluding petroleum and coal and coke) which account for some 67 per cent of goods moved, road's share currently stands at 88 per cent and has been in the range 86 to 88 per cent for the whole of the decade.

Figure A1.2 UK trends in domestic transport modal shares, tonne-kilometres



Source: Transport Statistics Great Britain 1991.

In **Japan** the trucking industry plays a major role in the domestic transport of goods. In 1990, the total volume of domestic cargo transportation amounted to around 6.8 billion tons of which 90 per cent was carried by trucks. Table A1.4 provides an indication of the relative shares of the transport task on a ton kilometre basis. The share of road transport stands at half with coastal shipping accounting for the majority of the remainder. Rail accounts for only 5 per cent of the freight transportation task.

Table A1.4 Japan transportation volume by ton kilometres, 1990

Mode	Freight moved (billion ton kilometres)	Share of transport market (%)
Road	2742	50
Rail	272	5
Coastal shipping	2446	45
Airlines	8	0.1
Total	**5468**	**100**

Source: Japan Trucking Association 1991.

Structure and size

European Communities

While there are a number of substantially-sized road freight companies, the industry is generally dominated by small firms and commentators suggest it is likely to remain a relatively fragmented industry with no significant economies of scale. However, some larger cross-border enterprises are expected to develop, obtaining competitive advantage through distribution management and tracking systems, and through other value-added services. The number of lorries within the EC has increased by about 16 per cent from 1984 to 1989 to over 8.7 million.

United States

There are 15.2 million commercial trucks registered in the US. Of these 13.6 million are single-unit trucks and 1.6 million are combination units. The total US truck population reached 43.6 million in 1989.

The industry can be classified into various subsectors such as; for-hire versus private carriage, inter-city versus local and regulated versus unregulated, in addition to the broad service markets of truckload (in which individual shipment sizes are equal to or at least account for a significant share of the vehicle's capacity and freight is generally hauled directly from sender to receiver without going through sorting terminals), and less-than-truck load freight (where shipment sizes are small relative to vehicle capacity and the haul involves a number of stages).

The industry is highly competitive, consisting of those hauling on a for-hire basis and private carriers (or those hauling their own or 'in-house' cargoes). There are no reliable estimates of private carrier numbers but it seems likely that the large majority of businesses engage in some level of private carriage. The share of truck revenues and goods transported by these two groups is shown in Table A1.5.

Table A1.5 US for-hire versus private carriers

Market shares	For-hire (%)	Private (%)
Truck revenues	57	43
Goods transported (by truck)	55	45

Source: US Department of Transportation 1992.

Canada

The trucking industry in Canada appears to be relatively unconcentrated. The largest ten firms accounted for under 20 per cent of total operating expenses in the for-hire segment and for over 13 per cent in the private carrier segment while the largest 100 firms accounted for 46 per cent and 40 per cent of total operating expenses in these segments respectively in the mid 1980s.

A large proportion of the trucking business is intra-provincial rather than inter-provincial. In 1973, 83.5 per cent of all the tonnage carried was within provinces or territories and by 1985 this percentage had increased to 85.3 per cent. Trucking tends to dominate rail for shorter distances and rail is more likely to be attractive for sending lower value added goods over greater distances.

United Kingdom

The number of heavy goods vehicles rose steadily from 443 000 in 1950 to a peak of over 600 000 in 1967. This number has since fallen considerably due in part to the use of larger lorries. By 1990 the number of heavy goods vehicles that were licensed totalled 460 000, of which 353 000 were rigid vehicles and the remainder were articulated vehicles. The use of 38-tonne articulated vehicles, which were first introduced in 1983, has continued to increase at the expense of the articulated vehicles up to 33 tonnes. These heavier vehicles accounted for nearly 31 per cent of goods lifted by heavy goods vehicles in Great Britain while representing only 14 per cent of all heavy goods vehicle stock. The industry is generally characterised by a large number of operators, the majority of them small firms, frequently one-man owner-driver businesses. Over 60 per cent of road haulage operators had fleets of less than five vehicles in 1987.

In 1990 the average length of haul by road was 78 kilometres compared to 112 kilometres by rail and 352 kilometres by water. The figure for road was some 16 per cent higher than that for 1980. The increase in the average length of haul by road reflects changed distribution patterns based on the use of larger vehicles and the advantage of shorter journey times made possible by the development of the motorway network.

Japan

Japan's trucking industry is primarily comprised of small and medium businesses and consists of about 40 000 truck owners and operators. According to a recent analysis of cargo transportation by trucks, trucks for business use hold a 40 per cent share of the tonnage and a 71 per cent share in ton-kilometres of all trucks, compared to that for trucks for private use. The volume of domestic cargoes carried by trucks for business use has been increasing in recent years. Annual industry revenue in 1989 was estimated at 10 263 billion yen of which 82 per cent was earned by general common carriers.

In accordance with the Trucking Business Law of 1990, Japan's trucking businesses are classified into the following four broad types:

- General common carriers which carry cargoes as demand arises within a licensed area by either chartering vehicles to shippers or using their own vehicles to carry consolidated cargoes.

- Special consolidated cargo carriers who hold a special licœnse, allowing them to collect, carry and deliver cargoes while conducting the regular scheduled operations between their depots. Most of the carriers falling into this category are large companies.

- Carriers for specified shippers are permitted to carry cargo for these shippers alone.

- Light-vehicle carriers using only this truck type to carry cargoes.

Table A1.6 provides data on the number of trucking companies classified according to the type of carrier.

Table A1.6 Japan, number of trucking companies by type of carrier, 1991

Category	No. of trucking companies
General common carriers	36485
Special consolidated cargo carriers	297
Carriers for specified shippers	1434
Other	1856

Source: Japan Trucking Association 1991.

Appendix 2

The regulatory environment in selected overseas countries

Australia has for several decades been a leader in the degree of deregulation of its road freight industry. In more recent years, the trend towards deregulation of the industry has accelerated in, for example, the EC in the lead up to the single market, in the US where the regulatory role of the Interstate Commerce Commission has been considerably reduced, and in Canada where the Canadian National Transportation Agency has been charged with closely monitoring the impact of continuing deregulation on the industry's performance. The following discussion also briefly mentions regulatory reforms in the UK and NZ and compares vehicle and driver regulations in a number of countries.

European Communities

The moves towards a single European market by 1993 have seen changes in the transport sector in order to achieve a goal of free movement and fair competition between carriers and between various modes of transport. The two basic principles underlying the new EC transport policy relate to liberalisation and harmonisation.

In regard to measures to liberalise road transport, there has been a gradual removal of national restrictions which hinder the freedom to provide services in this sector. Cabotage liberalisation arrangements were introduced in 1990 allowing carriers to transport goods within a member State other than their own (for example the transport of goods from Rome to Milan by a German carrier). The number of permits is to be increased by 10 per cent each year until complete freedom is achieved in 1993. From 1993, entry to the road transport sector will be regulated solely by qualitative criteria. Provision has been made for safeguard clauses to prevent serious market disruption.

Measures to effect harmonisation of different national rules have also been implemented. These relate to common maximum standards for the weight and dimensions of road vehicles and common regulations concerning brakes, lights, noise levels and vehicle inspection. A series of safety regulations have also been adopted. The European Commission has tabled proposals on harmonising taxes aiming to reduce the current disparities in road taxes on heavy vehicles and excise duties on diesel fuel. Harmonisation of national road tax procedures is intended to cover all infrastructure costs, by imposition of a fee, adjusted according to the different categories of vehicle. These charges are to take account of congestion and pollution costs.

United States

The US industry has been undergoing considerable deregulation over the last decade or so, although the ICC has a continuing regulatory role. There have been a number of regulatory reforms by the ICC since 1978, culminating in the Motor Carrier Act of 1980 which reduced market entry requirements and the scope of compulsory rates. Restrictions on freight forwarders, brokers and warehousing operations were eased with the result that there was rapid growth in these intermediaries. In 1980 there were less than 20 000 carriers with ICC operating authority and only small numbers of these held either 48-state or contract operating authority. By the end of 1991 the total number of ICC regulated motor carriers had reached nearly 48 000.

Interstate trucking may be exempt from Federal economic regulations (but not safety regulations) for the transportation of exempt goods (eg. agricultural commodities) or for the private carriage of goods. It is estimated that 43 per cent of inter-city freight is exempt from ICC regulation. A large number of States regulate trucking for the movement of intrastate freight within their borders.

There has also been greater access to the Canadian transborder traffic by US operators as a result of reduced entry controls. There have been a significant number of applications for operating authorities submitted by US-based carriers for this trade.

Canada

Under past federal legislation the right to regulate entry and rates rested with the provinces. As a result, a number of practices developed ranging from minimal or nil regulations in some provinces to very binding regulations in others. During the 1980s a series of events culminated in the enactment of the Motor Vehicle Transport Act of 1987. This legislation modified the terms under which the federal government delegated responsibility for the regulation of extraprovincial trucking to the provinces, and led to the reform of regulation regarding entry and price control into the trucking industry.

Reduced entry controls in Canada and shifts in Canada-US trade patterns have meant that there has been increased participation by Canadian-based carriers in the transborder market. The number of applications by Canadian-based carriers for US Interstate Commerce Commission (ICC) authority in 1991 was more than four times that for 1986. In 1991 there were approximately 2100 Canadian carriers holding US ICC operating authority, with nearly 650 of these holding 48-state operating authority. The share of operating revenues gained from transborder services increased steadily from around 12 per cent in 1984 to almost 20 per cent in 1990, dropping slightly in 1991. Similarly, US-based carriers gained greater access to Canadian transborder traffic.

United Kingdom

Road haulage has been extensively deregulated within the UK for many years with quantity controls being removed from the industry by means of the Transport Act 1968. Under this Act, hauliers are free to compete on price and quality of service as long as there are no pricing controls. The only remaining form of regulation is confined to ensuring legal

and safe operations. The thrust of government policy has been to allow market forces to operate. The National Freight Company has been privatised and sold to its employees.

New Zealand

Since 1983 with the passing of the Transport Amendment Act all geographical restrictions on road transport operators have effectively been removed and the system of licensing has changed from a quantitative one (ie based on bureaucratic assessment of demand for the respective services) to a qualitative one (ie based on an applicant's ability to demonstrate that a proposed service will be 'safe and reliable'). Rate-fixing is decided solely between operators and their customers. The current road user charging regime consists of relative low taxes on diesel fuel and a high mass-distance road user charge.

Comparisons of selected vehicle and driver regulations

Tables A2.1 to A2.4 inclusive set out international comparisons of mass and dimension limits for rigid and articulated trucks, together with restrictions on speed and on drivers' working hours.

Table A2.1 Mass limits for heavy goods vehicles

Country	Rigid trucks	Prime mover & semi-trailer
Australia	27.5	42.5
Canada	20.0	37.7
France	26.0	40.0
Germany	24.0	40.0
Japan	20.0	34.0
United Kingdom	25.0	38.0
US	27.1	55.1

Sources: United Nations 1991, Transport Information and ISC 1990, Road use charges and vehicle registration.

Table A2.2 Permissible dimensions for heavy goods vehicles

Country	Height	Width	Length	
			Rigid trucks & buses	Short combination vehicle prime mover & semi-trailer
Australia	4.3	2.5	11.0	17.5
Canada [a]	4.5	2.5	14.6	24.4
France	n.a.	2.5	12.0	15.5
Germany	4.0	2.5	12.0	16.5[b]
Japan	3.8	2.5	12.0	16.5
Sweden	n.a.	2.6	24.0	24.0
United Kingdom	4.6	2.5	12.0	15.5
US [c]	4.4	2.7	18.3	24.4

Notes: (a) Canadian length limits are set by each province or territory so upper limit is shown.
(b) Limit is for goods operating on the national motorway system
(c) In the US limits are set by the States.
n.a. Not available.

Sources: United Nations 1991, Transport Information; NRTC 1992, Discussion paper on national technical standards; and ISC 1990, Road use charges and vehicle registration.

Table A2.3 Maximum speed limits for heavy freight vehicles, kilometres per hour(a)

Country	Urban roads	Motorways	Rural roads other than motorways
Australia	60	100	100
Canada	60	100-110	80-100
France	50	90	60-80
Germany	50	80	60
Japan	60	80	60
Sweden	50	70-90	70
United Kingdom	48	65-96	50-65
United States	40	88	88

Note: (a) The lower values of the range refer to articulated vehicles and/or road trains, or to lower classes of rural road.

Sources: ISC 1990, Road use charges and vehicle registration, updated by industry material.

Table A2.4 Restrictions on driver hours

Regulation	Australia	US	EEC	Canada	UK
Maximum daily driving period	11-12	10	9 (10 twice a week)	13	9 (10 twice a week)
Minimum rest period	0.5				0.75
Maximum driving without break	5-5.5		4.5 (excl. waiting)		4.5 (unless start of rest period)
Minimum daily rest	5-10	8	11 (av. over 2 weeks)	8	11

Source: Hensher 1992, and Industry-supplied data.

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adjusted VOC	VOC less the cost of road related taxes and charges
articulated trucks	a combination vehicle comprising a prime mover and a (usually tri-axle) semitrailer
backhaul loads	when freight flows between two centres are unequal in amount, the direction of the smaller flow is termed the backhaul; backhaul loads usually generate less revenue than movements in the predominant direction
B-double trucks	high capacity truck comprising a semi-trailer pulling a second articulated trailer
capital costs	the annual depreciated cost of a truck (and trailer) including an allowance for the opportunity cost of funds
freight forwarding	the consolidation of general freight by specialist transport companies
full truck load (TL or FTL)	a quantity of freight which, as one load, utilises the full capacity (weight or volume) of the truck
GDP	Gross Domestic Product
GST	goods and services tax
GVM	gross vehicle mass
hypothecation	the dedication of the revenues (in whole or part) arising from road related taxes and charges to road construction, maintenance and other road based expenditure

linehaul trucking	direct origin to destination movement of goods over distances in excess of 100 kms (although some definitions specify a considerably greater distance)
less than full truck load (LTL or LFTL)	a quantity of freight which, as one consignment, does not utilise the full capacity (weight or volume) of the truck
long haul truck	defined as a 5 or 6 axle articulated vehicle (2 or 3 axle prime mover with tri-axle trailer), gross vehicle mass approximately 42 tonnes, travelling 150 000 kilometres per year
mass distance charge	a road user charge based on the mass of the vehicle involved and the distance the vehicle travels over a set period
ntk	net tonne kilometres, the number of kilometres travelled multiplied by the number of tonnes carried
rigid truck	a goods vehicle in which the motive power, driving complement and payload are connected to one rigid chassis
short haul truck	defined as a 2-axle rigid truck, 17 tonne gross vehicle mass, travelling 80 000 kilometres per year
short haul trucking	movement of goods over distances of less than 100 kms
superfreighter	commercial name for dedicated general freight trains running between major Australian State capitals
VAT	value added tax
VOC	vehicle operating costs