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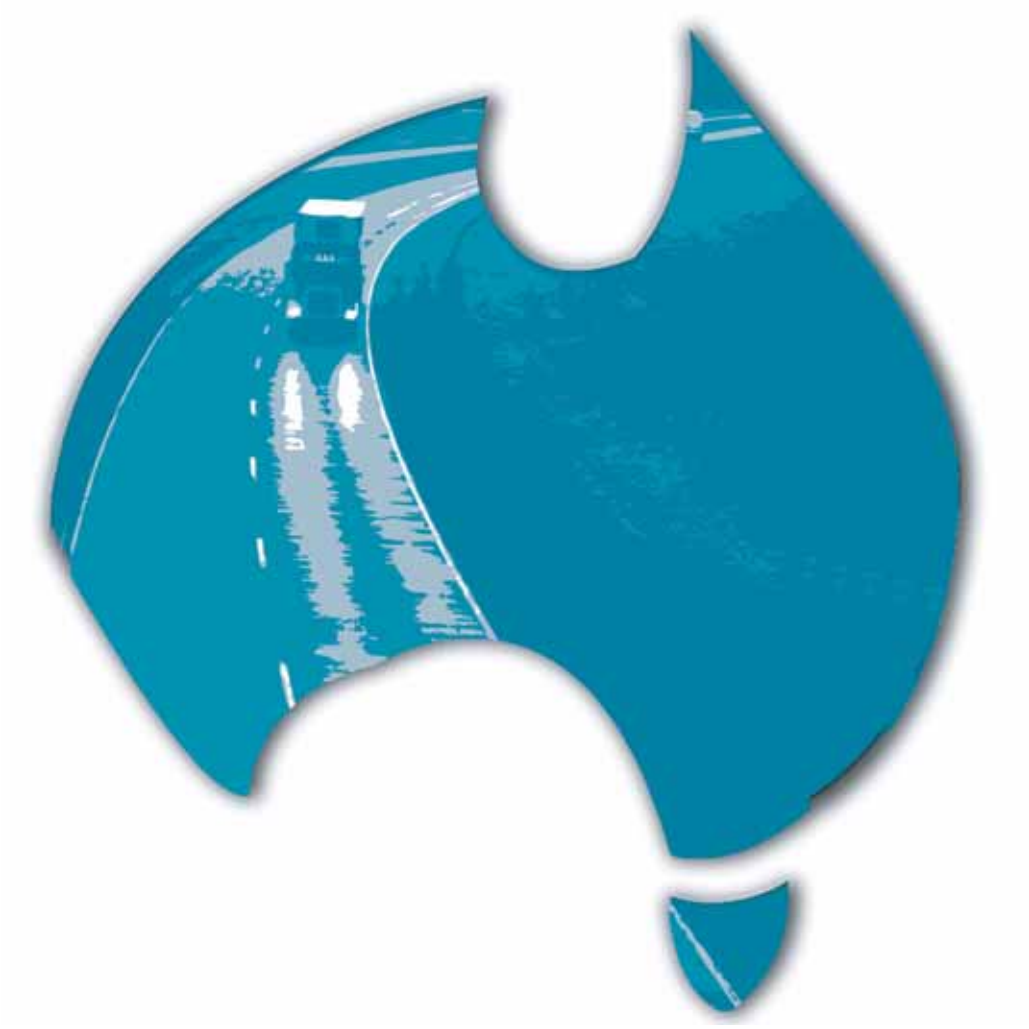
AN OVERVIEW OF THE AUSTRALIAN ROAD FREIGHT TRANSPORT INDUSTRY



Bureau of Transport and Regional Economics

WORKING PAPER 60

AN OVERVIEW OF THE AUSTRALIAN ROAD FREIGHT TRANSPORT INDUSTRY

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FOREWORD

This paper presents the results of a desk study of the road freight industry. The aim of the study is to update our knowledge of the Australian freight industry by bringing together and analysing information that is currently available.

The study is intended as a 'building block' for a future larger survey-based study of the road freight and logistics industries. It is now 20 years since comprehensive studies of the road freight industry were undertaken, by the Bureau of Transport Economics and the Australian Bureau of Statistics.

The BTRE wishes to thank Barry Moore from the National Road Transport Commission (NRTC) for his contribution to the shaping of ideas in the early stages of the project and his detailed comments on the draft. Thanks also go to Kerry Todero (NRTC) who provided assistance in compiling some of the data used in the report.

The research team comprised Dr William Lu (project leader) and Mark Cregan. Dr Mark Harvey and Phil Potterton provided comments on the draft.

Phil Potterton
Acting Executive Director

December 2003

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EXECUTIVE SUMMARY

This paper provides an overview of the Australian road freight transport industry by bringing together and making best use of information that is currently available.

Key findings are:

- Growth of the road freight task slowed down from 6.8 per cent per annum for 1980–1990 to 3.9 per cent per annum for 1990–2000);
- Freight vehicles have become larger, limiting the growth of the freight vehicle stock and easing the pressures of growing driver shortages;
- Take-up of ICT and e-commerce has varied with firm size, with small firms falling behind in their adoption;
- The trend toward out-sourcing by the ancillary transport sector is continuing, resulting in a larger hire & reward sector. The road freight industry as a whole should benefit from this trend to specialisation;
- Articulated trucks have played a key role in undertaking the road freight task and this is likely to continue to be so in the future;
- Competition remains the dominant feature of the industry (the largest four firms have a combined market share of only 15 per cent) and profit margins are becoming much tighter over time;
- Owner drivers/small freight operators account for less than 12 per cent of the industry's operating income, but they represent nearly two thirds of the total number of operating businesses. The financial situation of many owner drivers/small operators continues to be difficult due to intense competition;
- Greater integration is being observed within the road freight transport industry, with the road freight sector undertaking more forwarding activities and the road freight forwarding sector undertaking more freight tasks;
- There has been an increase in trucks running empty on the road since the early 1990s. While the recent trend shows that the total factor productivity may no longer be improving in the transport and storage industry, the situation for the road freight sector is not clear; and
- A looming driver shortage could have a significant impact on the road freight industry, unless solutions are implemented soon.

The study also points to a number of issues that need further research and ways in which these issues could be approached. Depending on the nature of the particular issue in question, data needs could be met via a comprehensive new survey of the freight industry, or an issue-oriented survey, or by piggy-backing onto existing ABS collections.

CHAPTER 1 INTRODUCTION

The purpose of this study is to provide an overview of the Australian road freight transport industry by bringing together and making best use of all information that is currently available. More specifically the study seeks to identify important trends and issues associated with the industry and to assess where the industry may be heading in the medium to longer term. The analysis is undertaken against a background of a slower, but still strong, rate of increase in the road freight task, greater integration of transport modes, increasing focus on productivity, safety and environmental performance, and deepening of regulatory reform.

The road freight transport industry is an important industry not only in its own right but also in terms of its role in the general economy. Australian road freight operations are estimated to generate 2.8 per cent[1] of GDP, employing 150 000 people directly and providing employment for a further 150 000 in supporting activities (ATA 2002a).

The last two comprehensive studies are BTE's *Survey of Trucking Operations 1982/83* (BTE 1986) and ABS's *Transport Industry Survey 1983/84* (ABS 1986a, 1986b, 1986c and 1987). These two surveys provided snapshots of the road freight industry in relation to its physical and economic characteristics at the times they were carried out. Since then, while the *Survey of Motor Vehicle Usage* (SMVU, ABS Cat. No. 9208.0) has continued to provide valuable information on the physical operations of vehicles, there has been no new comprehensive information about the structure and performance of the road freight transport industry.

The past two decades have seen tremendous changes in the road freight transport industry and in the economic and regulatory environments within which it operates. The industry has continued to grow, though at a reduced speed; technology available to the industry has changed profoundly, notably in relation to vehicle efficiency, information and communication technology (ICT) and e-commerce; long term road freight rates have trended downwards due to intense competition, technical change and possibly better management; and the

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[1] In 1999/2000, the gross value added of the hire & reward road freight and road freight forwarding is estimated to be $8.8 billion. Given that the hire & reward sector accounts for roughly half of the total kilometres delivered by the whole road freight industry (chapter 2), the true size of the gross value added for the road freight industry may be twice this, that is, around $17.6 billion. The GDP for 1999/2000 is $629.2 billion (ABS 2001a).

trend for out-sourcing appears to have continued resulting in a larger hire & reward sector of the industry. The continued expansion of the road freight transport industry has caused a growing concern about the externalities it generates — such as congestion, accidents, noise, pollution and greenhouse gas emissions. The focus of regulatory reforms has shifted towards achieving more flexible regulations (performance-based standards and fatigue management) and towards more economically efficient road pricing.

Reliable, up-to-date information on the freight sector should assist development and implementation of government policy in a number of areas. First, there is the on-going evolution of regulatory policy for the road freight transport industry. The study should help to inform consideration of changes to regulations in areas such as performance-based standards, heavy vehicle charging arrangements and operator accreditation. Second, greater emphasis is now being placed on freight logistics management within Australia with the aim of improving productivity and service quality. The study should contribute to a better understanding of the Australian freight logistics industry.

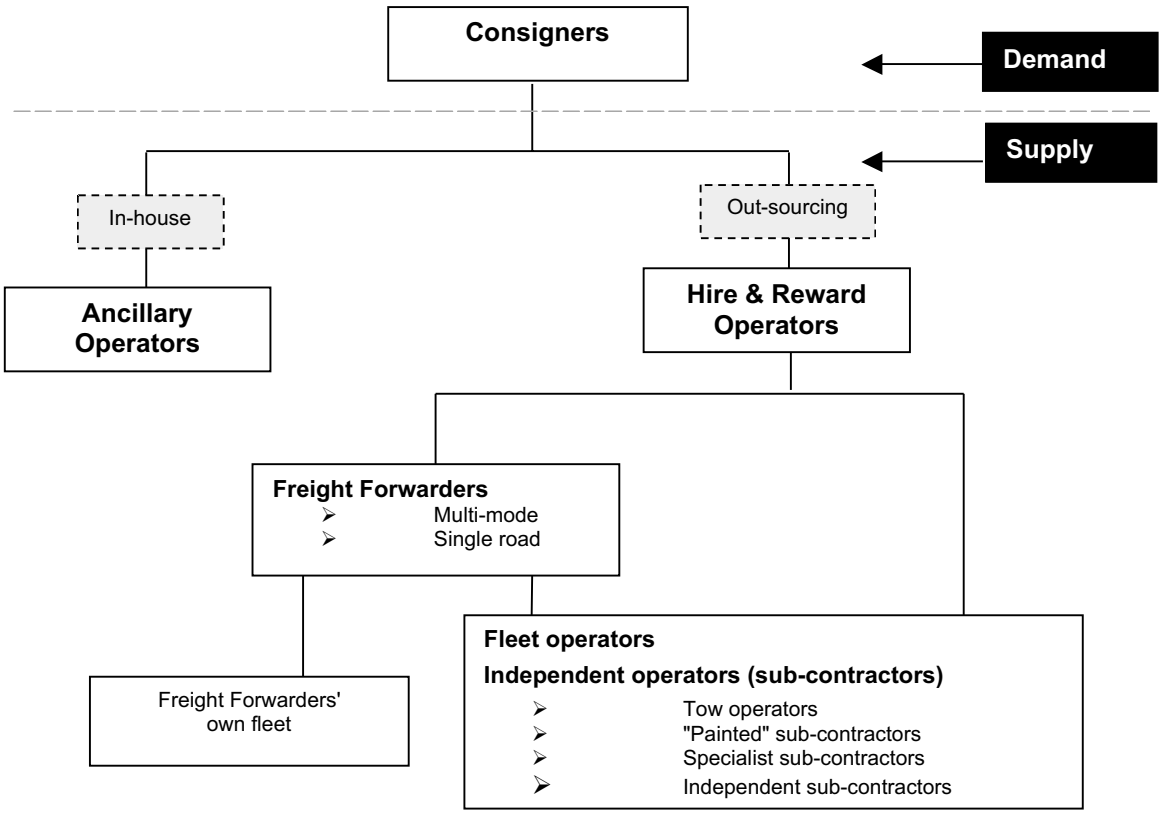
This paper, which is the output of stage 1 of the road freight study, is organised as follows. Chapter 2 defines the road freight transport industry and discusses major issues in regard to that industry. Chapter 3 provides a review of the most recent studies on the current and future domestic road freight task in Australia. Chapter 4 presents information on the physical characteristics of the truck fleet such as the number of road transport fleets by size, by industry sector (hire & reward versus ancillary) and by area of operation (local/intrastate/interstate), their usage pattern and technological developments. Chapter 5 examines the economic characteristics of road freight transport firms in terms of the number of business establishments and their concentration, employment, financial performance and productivity. The last chapter discusses emerging trends within the industry, points to directions for future research and evaluates future data needs.

CHAPTER 2 INDUSTRY STRUCTURE AND MAJOR ISSUES

INDUSTRY STRUCTURE

The structure of the road freight transport industry is highly complex. Figure 2.1 shows the key players in the market for road freight transport services. On the top of the diagram are consigners (predominantly industries) which generate demand for freight transport services.

FIGURE 2.1 STRUCTURE OF THE MARKET



Consigners' demand for road freight transport services can be met either through in-house provision of road freight services or through out-sourcing. This leads to the distinction between ancillary and "hire & reward" sections of

the road freight transport industry. Ancillary operations involve the carriage of freight by vehicles owned by firms whose main business is normally non-transport related. Hire & reward operations involve the carriage of freight for another firm on a contractual basis. Ancillary operations tend to be less cost-efficient than the hire & reward operations. But many companies are still willing to shoulder the extra cost in return for reliability and dedication of services. In the early 1980s, the ratio between ancillary and hire & reward operations was around 74:26 on a truck-number basis. More recent evidence suggests that this ratio has declined to 60:40 (chapter 4), reflecting the growing importance of the hire & reward part of the road freight industry. On a kilometre-travelled basis, it is estimated that the ancillary transport operators travel less than half of the total kilometres travelled by the road freight industry (NRTC 1998).

The hire & reward part of road freight transport industry consists of two distinct categories of operators, namely, freight forwarders (ANZSIC 6642) and freight operators (ANZSIC 611). Freight forwarders act as "middle men", or intermediaries between the clients (consigners) and those that physically carry out the task (sub-contractors). A major role of freight forwarders is to consolidate consignments of various densities in order to achieve optimum loads in terms of both maximum legal weights and volumetric capacities (BTE 1984). Freight forwarders may either provide a transport service nationally or concentrate on moving goods on specific routes. Most forwarders are not restricted to the use of a single transport mode and may operate on a multi-modal basis to minimise the cost of shipment. Freight forwarders may operate their own truck fleet and employ their own drivers, but more commonly they engage independent sub-contractors to provide haulage services. However, there has been a recent trend for freight forwarders to increase the sizes of their own fleets (chapter 5).

The other category of operators in the hire & reward part of the road freight industry is freight operators who could be either fleet or independent operators. Freight operators secure consignments on a contractual basis either directly from consigners or from freight forwarders. Depending on contractual arrangements, independent operators can be further classified under one of the following categories:

- a tow operator who supplies a prime mover and is sub-contracted to tow a trailer from terminal to terminal;
- a "painted" sub-contractor whose equipment bears the name of the forwarder or shipper to whom he or she is contracted on a permanent or semi-permanent basis;
- a specialist sub-contractor who supplies specialised equipment for the carriage of particular commodities such as cement, sand or beer; and
- an independent sub-contractor employed on an itinerant basis.

Road freight operators may also engage in freight forwarding activities. Since the early 1980s, freight forwarding activities undertaken by road freight

operators have tended to increase more relative to their core business (chapter 5).

The availability of a larger number of independent sub-contractors is important for many large freight carriers who use them to expand operations as required without adding to company equipment and company drivers. There are mutual benefits for owner drivers and smaller fleets operating under a larger corporate umbrella because they may not have to deal with many of the new services and technological requirements directly.

Within the hire & reward part of the road freight transport industry, road freight haulage appears to have been growing at a faster rate than the forwarding activities with its share of the total revenue rising from 72 per cent in 1983/84 to 89 per cent in 1999/2000 (chapter 5).

MAJOR ISSUES

Current and future road freight task

Growth of the road freight task has eased over the past decade to around 3.9 per cent per annum compared with 6.8 per cent per annum a decade earlier (chapter 3). Growth of the road freight task has been affected by the growth of economic activities, changes in real road freight rates, improvement in road infrastructure and the quality of road freight services, and competition from other modes. While the economic growth rate has remained at 3.5 per cent per annum over the past decade, the pace of change in other factors has slowed down significantly during the 1990s. For example, while the real road freight rate declined by 44.2 per cent between 1971 and 1990, it declined only by 0.2 per cent between 1990 and 2000. Furthermore, the real road freight rate relative to rail has been increasing significantly over the past decade (figure 2.2).

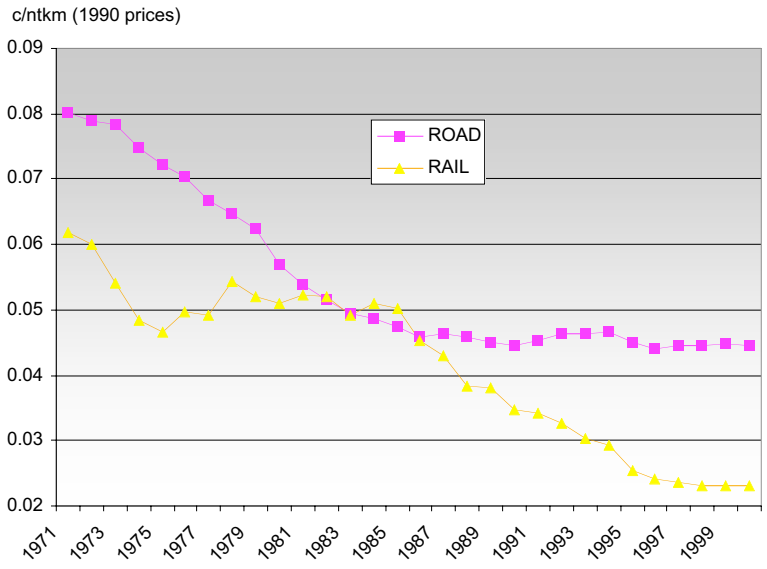
According to the BTRE's most recent projections, the growth of the road freight task will be around 3.6 per cent a year for the next 20 years (compared with 3.9 per cent per annum over the past 10 years), which means that the total road freight task will double by 2020 (chapter 3).

Competition

The road freight transport industry is generally believed to be highly competitive because of minimal entry barriers and the large number of participants in the industry due to lack of economies of scale (Ironfield 2001). Anyone holding a truck driver's licence and having a registered truck, whether obtained with collateral finance or emerging operating leases, can operate a road transport business on any route, with rates determined by the market. Competition works at each layer of the market such as between ancillary and hire & reward, and within the latter, between road freight forwarders' own fleets and independent sub-contractors (figure 2.1). The rail sector, which has become more competitive in terms of the real freight rates offered, is another source of competitive pressure.

Competition has allowed the benefits of the technical change and efficiency improvements to flow through to users of road freight services. Real road freight rates have fallen by over 44.4 per cent since 1971 (figure 2.2).

FIGURE 2.2 REAL ROAD AND RAIL FREIGHT RATES



Source: BTRE (2002a), *Information Sheet 19*.

Under the changing competitive environment, the road freight industry has undergone significant restructuring in recent years. The largest road transport operators in Australia used to be TNT, Mayne, Linfox and Finemore, but they have been overtaken by Toll Holdings and K & S Corporation Limited. TNT was taken over by the Dutch company KPN in 1996 following heavy losses on ill-conceived overseas ventures (Rennie 2002). Mayne group sold its logistics assets to Linfox[2] to concentrate on health care. Toll emerged from being a medium operator to become the industry leader. Since 1986, Toll has made 32 acquisitions including Finemore (Rennie 2002).

Despite these acquisitions, the concentration of the road freight industry remains low –– the top 4 firms have a market share of only 15 per cent (chapter 5).

Technological developments

The technology employed by the road freight transport industry is rapidly changing. Over the past decade, the trend toward larger trucks has continued (chapter 4). This has reduced the demand for labour and fuel per tonne-kilometres performed. Competition within the industry has ensured that the

[2] The move came into effect on February 1, 2003.

benefits of these technological developments have been passed onto users of road freight services.

The 1990s also saw significant proliferation of ITC and e-commerce within the road freight transport industry. The primary examples are:

- mobile phones;
- faxes;
- computers;
- the Internet; and
- global positioning system (GPS) or Satellite navigation.

Trucks Online, a study undertaken by the National Office of Information Economy (NOIE 1999), showed that almost all road freight operators surveyed use mobile phones and faxes. The rapid diffusion of the new telephone technologies, notably mobile phones, has greatly improved communications between customers and carriers (normally mobile) making it easier for customers to track goods in transport.

The NOIE study (1999) also found that the majority of the road freight operators surveyed had a computer. However, uptake of Internet technology was relatively slow, particularly among small operators. Furthermore, use of the Internet by road freight operators is predominantly for research and email, rather than for e-business. The major reason for the low level of the uptake was that the majority of road transport companies are small operators and they are mostly incapable of setting themselves up for e-commerce, particularly expensive and cumbersome electronic data interchange (EDI).

Diffusion of GPS or in-vehicle navigation is still in the early stage, with an adoption rate of less than 3 per cent in 1999 (NOIE 1999).

There are clear benefits from using ITC and e-commerce, including improved customer service, better product tracing, reductions in empty loading, timely delivery of goods, reduction in processing errors and lower administrative costs. The challenge is, particularly for small operators, whether they can develop a business case for adopting these latest technologies. Unlike the technological developments in vehicles and mobile phones, small operators may find it difficult to embrace the most recent technologies either because of costs or the high level of skills required.

The impact of the most recent technological developments on the freight industry is complex and is worthy of a separate investigation.

Financial performance

The financial performance of the road freight industry has deteriorated in the past 15 years or so. Costs have been rising faster than revenue, leading to a squeeze of profits. Currently, the gross profit margin[3] is about 7 per cent for the

[3] Profit before tax divided by total operating income.

road freight sector and less than 4 per cent for the road freight forwarding sector (chapter 5). These margins appear to be much lower than they were 15 years ago.

Profitability varies across different sizes of firms. In general, the financial position of medium-sized firms is relatively better. Owner-drivers/small operators continue to face financial difficulties. Profitability for larger road freight and road freight forwarding firms is lower (Chapter 5).

Productivity

Improvements in productivity can result from technological change, but it can also come from efficiency improvement such as organisational innovations, learning by doing and managerial efforts (OECD 2001). From the economic viewpoint, efficiency improvement is relatively more important than technical change which is normally beyond the control of operators.

One indicator of improvements in efficiency is the ratio of laden to business trips. The indicator was rising up to 1991, but since then, it has fallen indicating an increase in empty running (chapter 6).

Information on the productivity performance of the road freight industry is very limited. ABS (2001d) and the Productivity Commission (2001) have provided estimates of changes in productivity since 1974/75, but only at the total transport and storage level. These estimates show historical improvements in both the labour and total factor productivity and the recent setback in the transport and storage industry (chapter 6), but it is not clear how the gains and losses were distributed within the industry. The productivity of the road freight transport component could have changed by a greater or less amount than the transport and storage industry as a whole. However, there is a possibility that improvement in the labour and total factor productivity in the road freight sector may have stalled in recent years.[4] Further analysis is needed before a conclusion can be made about this.

There have been so far no studies of firm-level productivity performance for the road freight industry due to lack of data. The advantage of firm-level analysis is that it would permit evaluation of technical efficiency gains (a movement towards 'best practice') and allocative efficiency gains (a movement towards equalisation of marginal revenue and marginal cost). While firm-level analysis is not possible in this paper, it should be taken into account when designing the next phase of the road freight study.

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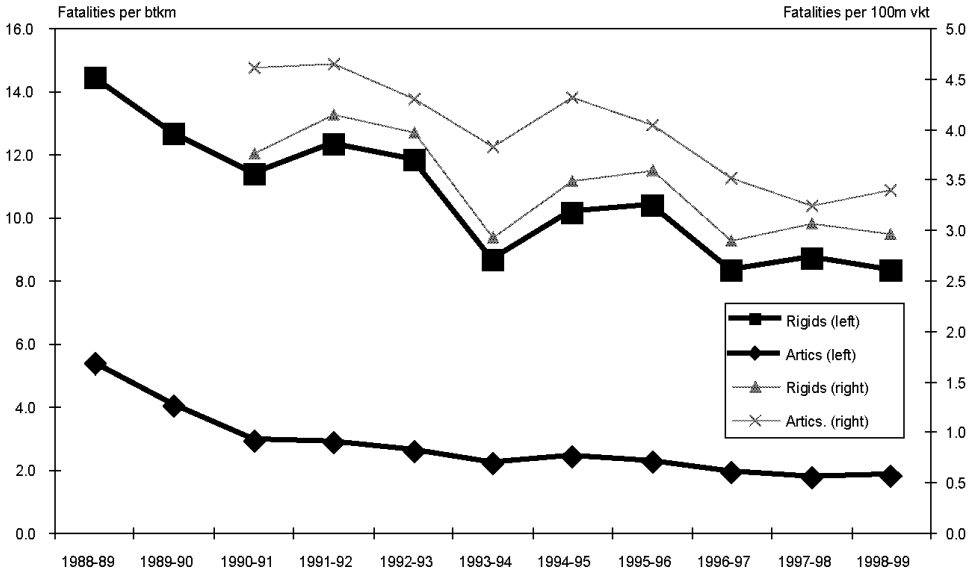
[4] The road freight sector accounted for 29.4 per cent of the total operating income of the transport and storage industry in 2000 (ABS 20001c).

Safety performance

Trucking externalities are not a major focus of this study.[5] However, one issue worthy of mention is the safety record of the road freight industry, because it has attracted considerable public and policy interest. According to the most recent ATSB data, the number of fatalities involving a truck has been generally downwards during the past ten years or so. In 1989, the number of fatal crashes was 525 and it declined to 369 in 1999 representing a 41 per cent reduction during the period.

The safety performance can be measured more meaningfully in terms of the number of fatalities per vehicle kilometre travelled (VKT) or per tonne-kilometre performed. As seen in figure 2.3, the trends for both these indicators have been downwards since 1988/89. While the difference in fatalities per 100 million VKT between rigid trucks and articulated trucks is relatively small, the difference in fatalities per billion tonne-kilometres between the two is substantial (8.4 versus 1.8). The decline in the fatality rate per billion tonne-kilometres for articulated trucks has been much faster than that for rigid trucks (–66 per cent versus –43 per cent for 1989–99).

FIGURE 2.3 FATALITY RATES INVOLVING A TRUCK (1989–99)



Source: Special request to ATSB; BTRE (2002b), *Report 107*.

NRTC (2002a) in its benchmarking study on truck safety compared truck safety in Australia with that in a number of advanced countries with good safety records using several criteria. The study found that the Australian truck fatality rate is considerably higher than that in the United States and some other

[5] BTRE is undertaking a separate study on externalities and road–rail competition in its 2003/04 research program.

countries, although lower than that in New Zealand and France. The higher fatality rates on Australian roads than in the US may be attributable to the lower proportion of truck travel on divided and limited access roads in Australia, and possibly to higher truck speed limits than other countries. The study also focused on a range of areas that have the potential for enhancing the safety performance of the trucking industry, including road standards, targeted low cost road safety treatments, single vehicle crashes, day and night time driving, measures to improve the safety of truck occupants, front and rear underrun protection, appropriate speed limits, and data collection.

Quinlan (2001) looked into the safety issue for the long-haul trucking industry in New South Wales in some detail. The study raised serious concerns about the safety performance of small fleet drivers and owner drivers. Quinlan's 2001 survey of drivers in NSW found that the proportions of owner drivers (20.2 per cent) and small fleet drivers (18.3 per cent) reporting at least one crash in the past five years are higher than the comparable proportion of large fleet drivers (15.3 per cent). However, significance testing of these proportions by ACIL Tasman (2003) indicates that one can not be confident that these proportions are statistically different from each other.

Regulatory environment

Regulatory reform in the Australian road freight industry, which has been spear-headed by the NRTC over the past ten years or so, is largely aimed at improving the overall efficiency and equity of the road transport system through maintaining an open competition policy, promoting performance-based regulations, and correcting externalities associated with trucking. Ironfield (2001) provides an excellent review of the regulatory reform in the road freight transport industry since the inception of the NRTC in 1991. This section highlights some key features of the regulatory environment within which the road freight transport industry operates.

Competition policy

Australia adopts a generic approach to competition in the road freight industry, using the Trade Practices Act as the key tool for endorsing competition (Ironfield and Moore 2002). Currently, there is no economic regulation governing entry/exit and rates, which is probably an important reason why the road freight transport industry has remained so resilient and competitive.

Calls for entry and/or rates regulation have been made from time to time over the past several decades. More recent calls have tended to be based on safety grounds (for example, Quinlan (2001)). Ironfield and Moore (2002) argued that other alternatives are available to address safety concerns without compromising the efficiency and competitiveness of the industry. These alternatives will be briefly reviewed when discussing regulations on externalities below.

Performance-based regulations

Australia's heavy vehicle road transport regulations have undergone staged reforms. Initial reforms undertaken during the 1990s focussed on developing a set of uniform national rules and regulations of a prescriptive nature, to replace the different State regulatory regimes. More recent reform has been focussed on the development of regulations which are more performance-based. Performance-based regulations can often achieve the desired objectives of a regulation while at the same time increasing opportunities for innovation and productivity improvements (Ironfield 2001). A typical example is the development of Performance-Based Standards (PBS) to regulate heavy vehicles in Australia. Traditionally, heavy vehicles have been regulated by tightly defined prescriptive limits (such as mass and size limits), leaving little scope for innovation. These arrangements evolved over a long period and often differed between States and Territories (NRTC 2002b). PBS is a national alternative being considered by NRTC to the current prescriptive regulations on mass, dimensions and configuration. Rather than a 'one size fits all' approach, PBS recognises the diversity of the industry and the need for flexibility. These standards will give heavy vehicle operators more flexibility to comply with regulations and create opportunities for innovations, resulting in fewer vehicles on roads for a given set of transport tasks, safer performance and the least possible effect on roads and bridges (NRTC 2002b).

NRTC (2002c) summarised the key findings about the fleet performance in Australia. These are that:

- a large number of existing vehicles already meet the performance standards proposed for unrestricted access to the entire road network;
- a greater number of existing vehicles meet the requirements proposed for operation on either major freight routes or remote area routes; and
- these vehicles may be able to take advantage of the flexibility offered by PBS to achieve increased productivity without making major design changes, while at the same time ensuring that safety and infrastructure are protected.

The NRTC (2002c) expects a number of existing vehicles to be able to operate in the PBS regime without modification, and many more should meet the performance standards with some design changes. The operators of these vehicles could have access to productivity gains without involving much cost.

PBS is currently under evaluation and, if implemented, should provide scope for further gains in vehicle productivity.

Externalities

Increasing attention is now being paid to externalities associated with the road freight transport industry. Issues of cost recovery for road damage caused by heavy vehicles, safety, congestion, ambient air and noise pollution, and greenhouse gas (GHG) emissions are likely to assume greater importance in future.

So far, reforms aimed at correcting the externalities associated with trucking have been largely concentrated on road infrastructure wear and safety.

Heavy vehicle charges

Uniform heavy vehicle charges under the NRTC system were first introduced in 1995 with the aim of recovering and reducing road wear costs. An additional rationale for such charges is to achieve competitive neutrality between different transport modes (Ironfield 2001). NRTC is currently considering a third determination of heavy vehicle charges, which would better reflect the road wear costs associated with trucking.

During the course of the third heavy vehicle charges determination, it has been argued that externality costs, such as congestion and pollution, should be included in heavy vehicle charges. In view of the fact that these externalities are not unique to heavy vehicles and are largely confined to urban areas, the introduction of charges for these externalities may have to wait until the introduction of congestion pricing, which would be location and time specific.[6]

Road safety

Road safety has been a central concern to regulators. More recent developments in safety regulations include the fatigue review, Chain of Responsibility (COR), new accreditation-based compliance arrangements and the National Heavy Vehicle Safety Strategy.

The fatigue review has led to a draft regulatory proposal on fatigue management (NRTC 2002d). The proposal was developed by the NRTC in close co-operation with transport and OHS agencies, and the road transport industry. The proposed regulations will apply to the operation of vehicles that have a GVM of 12 tonnes or over, as well as buses with 12 or more seats. The proposed regime will allow drivers and operators to choose between three options, namely, standard hours, limited flexibility and full fatigue management. These options were designed in recognition of the diversity of the road transport industry and the need for flexibility. Drivers and operators can adopt a staged approach to progress to more flexible options, depending on their operational requirements.

COR was developed as one of the key components of the Road Transport Reform (Compliance and Enforcement) Bill (NRTC 2002e). The COR provisions extend liability for offences relating to heavy vehicle mass and dimension limits and load restraint beyond vehicle operators and drivers to all those involved in the logistic chains where these parties have contributed to the offence. The Bill will apply to the operation of all heavy vehicles with GVM greater than 4.5 tonnes.

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[6] Some of these externalities have already been taken into account by the government through regulation or fuel taxation. For example, exclusion of heavy vehicles above 4.5 tonnes operating in urban areas from eligibility for fuel excise rebates under the Diesel and Alternative Fuels Grants Scheme reflects a pollution mitigation rationale.

Accreditation-based compliance provides an alternative avenue for compliance. It is a voluntary scheme aimed at achieving efficiency and safety improvements in road transport by placing the onus on operators to develop management and operating systems that can be audited to assure compliance with the relevant road transport regulations (Ironfield 2001). The current National Heavy Vehicle Accreditation Scheme (NHVAS) consists of the modules of Mass Management and Maintenance Management. The Fatigue Management module is also expected to be included into the scheme soon. Membership of different NHVAS modules allows reduced impact of conventional enforcement and access to regulatory limits (eg. higher mass limits). It will also enable transport operators to demonstrate to their customers that they have high levels of compliance with the regulatory requirements covered by NHVAS modules.

The National Heavy Vehicle Safety Strategy, recently endorsed by Transport Ministers, is designed to complement the National Road Safety Strategy and to focus on the factors which are critical in reducing the number of fatal and serious injury crashes involving heavy vehicles. Accompanying this strategy is the National Heavy Vehicle Safety Action Plan which has been structured to focus on a relatively small number of measures that can be pursued at the national level. Other measures may be designed separately by individual jurisdictions or organisations to complement the national measures.

The introduction of new fatigue management regulations, the COR provisions for heavy vehicles, new accreditation-based compliance arrangements and the national safety strategy and its associate plan should facilitate further improvements in Australia's heavy vehicle safety record.

CHAPTER 3 THE AUSTRALIAN DOMESTIC ROAD FREIGHT TASK

This chapter provides a review of demand for domestic freight services with particular emphasis on the road freight task. It draws primarily on the data available at the BTRE (BTRE 2002a and 2002b). A key message is that the relationship between the road freight task and economic activities appears to have changed over the past three decades, with the road freight intensity having become lower.

TOTAL DOMESTIC FREIGHT TASK

The freight task is usually measured in total tonne-kilometres which is the product of reported average load and total (business) kilometres for each vehicle type. Table 3.1 provides an overview of historical changes in the total domestic freight task based on the trend values estimated by BTRE.

A number of important observations can be made from the table. First, after a decade of slow growth in the 1980s, the total domestic freight task resumed to some extent its growth momentum in the 1990s, growing at 3.2 per cent per annum. Second, the road freight transport share increased from 19.3 per cent of the total in 1971 to 36.1 per cent in 2000. However, most of these gains were achieved prior to 1990. Third, the 1990s saw different growth trends for the road freight task compared with that of a decade earlier (3.9 per cent per annum compared with 6.8 per cent per annum).

TABLE 3.1 TOTAL DOMESTIC FREIGHT TASK (TREND VALUES 1971–2000)

	Road	*Rail*	*Sea*	*Air*	*Total*
Domestic freight task (btkm)					
1971	26.6	39.0	72.0	0.1	137.7
1980	48.1	63.2	105.1	0.1	216.6
1990	92.6	87.9	94.2	0.1	274.8
2000	135.5	126.7	112.9	0.2	375.3
Modal shares (%)					
1971	19.34	28.31	52.27	0.07	100.0
1980	22.23	29.18	48.53	0.06	100.0
1990	33.69	32.00	34.28	0.03	100.0
2000	36.09	33.76	30.09	0.06	100.0
Average annual growth rate (%)					
1971–80	6.8	5.5	4.3	2.3	5.2
1980–90	6.8	3.4	-1.1	-3.1	2.4
1990–2000	3.9	3.7	1.8	9.3	3.2

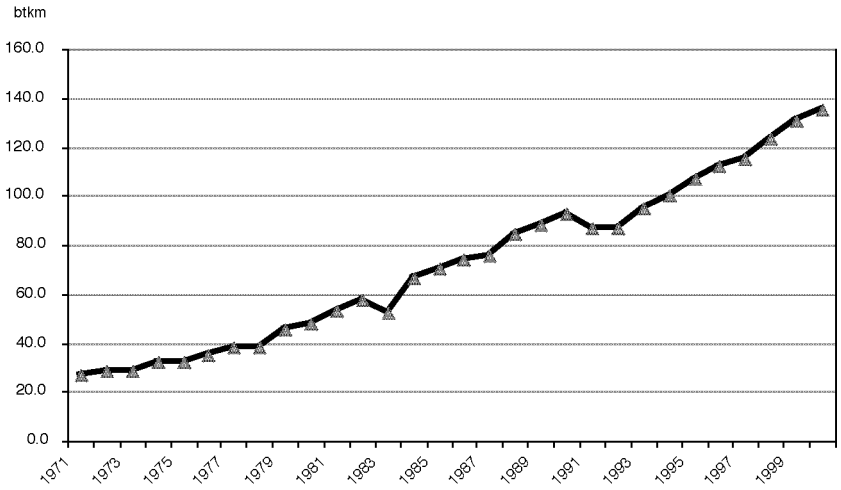
Source: BTRE (2002b), *Report 107*.

TOTAL ROAD FREIGHT TASK

Figure 3.1 shows the trend values of the total road freight task on a weight-distance basis for 1971–2000. The road freight task is defined to comprise that performed by light commercial vehicles (LCVs), rigid and articulated trucks. As shown in figure 3.1, after the recession in the early 1990s, the total road freight task grew continuously through to 2000.

Table 3.2 shows changes in the total road freight task by urban and non-urban areas. As shown, the non-urban road freight task has been growing faster than that of its urban counterpart in the past decade.

FIGURE 3.1 TOTAL ROAD FREIGHT TASK (TREND VALUES, 1971–2000)



Source: BTRE (2002b), *Report 107.*

TABLE 3.2 TOTAL ROAD FREIGHT TASK BY URBAN AND NON-URBAN (TREND VALUES 1971–2000)

	Urban	*Non-urban*	*Total*
Total road freight task (btkm)			
1971	8.9	17.7	26.6
1980	16.4	31.8	48.1
1990	31.1	61.5	92.6
2000	40.1	95.4	135.5
Urban and non-urban shares (%)			
1971	33.5	66.5	100.0
1980	34.0	66.0	100.0
1990	33.6	66.4	100.0
2000	29.6	70.4	100.0
Average annual growth rate (%)			
1971–80	7.0	6.7	6.8
1980–90	6.6	6.8	6.8
1990–2000	2.6	4.5	3.9

Source: BTRE estimates.

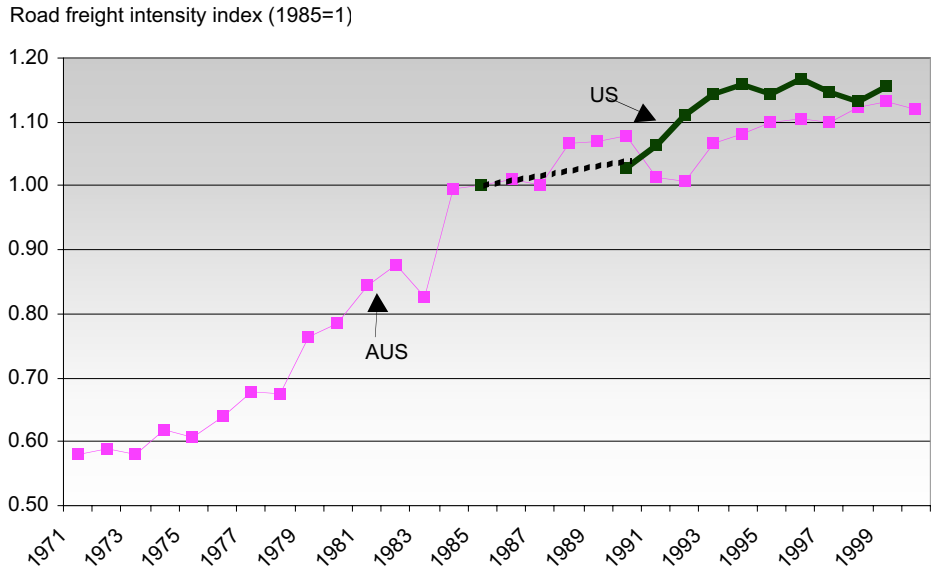
ROAD FREIGHT TASK AND GDP

The nature of the relationship between the road freight task and economic activities, called 'freight intensity', is complex. Two freight intensity indicators can be used for revealing such relationship: the ratio of tonne-kilometres to GDP and the ratio of their percentage changes. Both indicators are inherently related, but approach the problem from different angles. Australia's experience is compared with that of the US.

Ratio of road tonne-kilometres to GDP

The first indicator to be calculated is the ratio of the road freight task (tonne-kilometres/tonne-miles) to GDP (real A$/US$). In order to facilitate international comparison, this ratio is expressed as an index (1985=1 for both Australia and US). Figure 3.2 shows historical trends in the ratio of tonne-kilometres to real GDP for both Australia (since 1971) and the US (since 1985).

FIGURE 3.2 RATIO OF ROAD FREIGHT TONNE-KILOMETRES TO GDP (1985=1)



Source: BTRE (2002b), *Report 107*; Eno Transportation Foundation, Inc. (2001).

Care is needed in reading figure 3.2. The ratio itself for any given year does not have a particular meaning, because it has been indexed. However, when we look at the changes in this ratio over time, important information can be revealed about the relationships between road freight growth and real GDP growth. Generally, three rules apply:

- If the trend line is positively sloped, road freight grows faster than GDP;

- If the trend line is flat (regardless of the value of index number), road freight grows as fast as GDP; and
- If the trend line is negatively sloped, road freight grows slower than GDP.

As shown in figure 3.2, the relationship between the road freight task and economic activities in Australia has changed significantly over the past three decades. The ratio of road tonne-kilometres to GDP increased sharply up to the mid 1980s and since then it has started to level off. The Australian experience is not unique. In the US, the road freight intensity index has also tended to level off since the early 1990s.

Ratio of percentage change in road tonne-kilometres to percentage change in GDP

The second indicator to be calculated is the ratio of percentage change in the road freight task to percentage change in real GDP. This indicator is a crude measure of income elasticity of demand, but could be misleading if other factors are also affecting the growth of the road freight task (for instance, real road freight rates). A formal econometric model based on a sound economic theory is needed if we wish to know the exact empirical estimate of income elasticity of demand.

As seen in table 3.3, road freight intensity has fallen for both Australia and the US. However, it appears that the more recent decline in road freight intensity has been less dramatic in Australia (from 1.29 for 1985–1994 to 1.13 for 1994–2000) than the US (from 1.60 for 1985–1994 to 0.99 for 1994–1999).

TABLE 3.3 ROAD FREIGHT INTENSITY

	Road freight (% pa)	*GDP (% pa)*	*Freight intensity*
	(A)	(B)	(A/B)
Australia			
1971–1985	7.21	3.13	2.30
1985–1994	3.99	3.09	1.29
1985–2000	4.44	3.66	1.21
1994–2000	5.12	4.52	1.13
US			
1985–1994	4.52	2.83	1.60
1994–1999	3.78	3.81	0.99

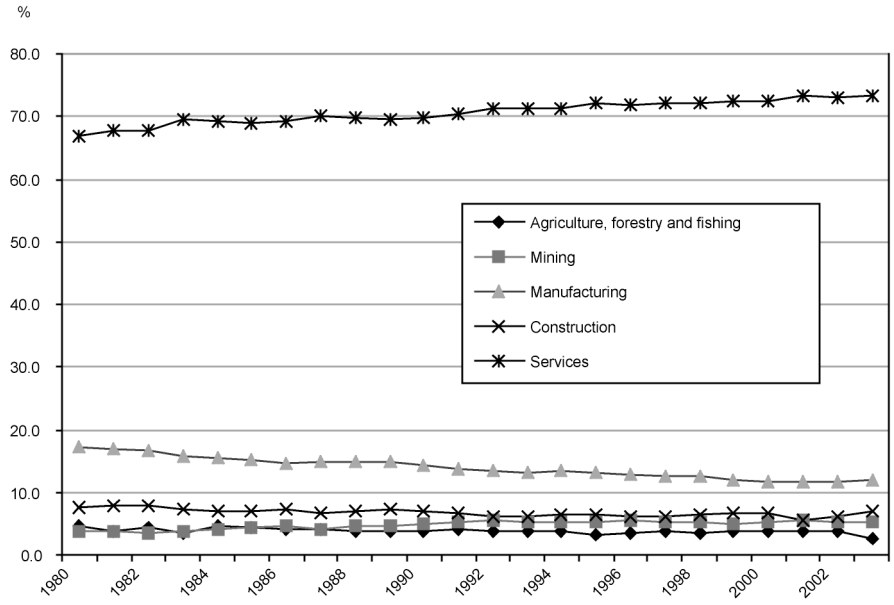
Source: BTRE (2002b), *Report 107*; Eno Transportation Foundation, Inc. (2001).

KEY DRIVERS TO CHANGES IN ROAD FREIGHT INTENSITY

There are many factors affecting the revealed road freight intensity. At the macro level, the structure of the economy has evolved more towards the services sector. In 1980, the services sector accounted for 66.9 per cent of GDP. This share rose to 73.4 per cent in 2002 (figure 3.3). Accordingly, the importance

of the industrial sector declined during the same period although the mining industry increased its share in GDP. The services sector is much less freight intensive. Also, the value density — the ratio of product value to weight — may have changed due to the development of the new lighter materials. Offsetting these trends is the globalisation of the Australian economy, which has led to increases in the distances between the locations of consumption and production.

FIGURE 3.3 SHARES OF GROSS INDUSTRY VALUE ADDED IN GDP AT BASIC PRICES



Source: ABS, Cat. No. 5206.0, table 47.

At the micro level, changes in both price and non-price factors have influenced the demand for road freight transport to a quite significant degree.

As for the price factor, the demand for road freight transport is quite responsive to changes in real road freight rates with the price elasticity of demand estimated to be around –0.9 (BTRE 2002b). The price impact would fall primarily on the average distance travelled. A fall in real road freight rates would generally increase the average distance travelled, leading to the sourcing of inputs from wider geographic areas for production and consumption, and centralisation of distribution logistics (Walker, et al. 2002).

Up to the mid 1980s, the sharp increases in road freight intensity appear to have been associated with falling real road freight rates. Between 1971 and 1990, real road freight rates dropped by 44.2 percent (figure 2.2).[7] This amounts to an

[7] The sharp decline in real road freight rates up to 1990 may reflect largely massive improvement in road infrastructure and technical developments within the road freight industry (larger trucks, improved fuel efficiency and associated labour cost savings).

increase in the demand for road freight transport of more than 40 per cent, other things being equal. However, between 1990 and 2000, real road freight rates fell by only 0.2 per cent in total. It is therefore not surprising to observe that growth in demand for road freight has declined significantly since 1990 (see table 2.1). The slower decline in real road freight rates in the 1990s may be related to higher input cost pressure faced by the freight industry, and slower rates of improvement in the road infrastructure and vehicle productivity.

Modal competition also affects the demand for road freight transport. Figure 2.2 shows that around the mid 1980s, freight rates for road relative to rail, in real terms, reversed their earlier trend and began to increase sharply. By 2000, relative road freight rates were more than 100 per cent higher than the level in the mid 1980s. This would have undermined the price-competitiveness of the road freight sector relative to rail.

Non-price factors that affect demand include time in transit, variance of time in transit, security of goods and accessibility to depots. Road is believed to have the advantage over rail in these areas. However, it is difficult to gauge their impacts because, at the aggregate level, they are difficult to be quantified. One conjecture is that improvement in the quality of road freight service has followed a logistic pattern with the rate of improvement slowing over time. This may be another reason for the reduced growth rate of the road freight transport observed in the past decade.

PROJECTIONS OF THE ROAD FREIGHT TASK

The road freight task is projected to grow at 3.6 per cent per annum between 2000 and 2020 (doubling over this period)[8], compared with an average economic growth rate over this period of 2.75 per cent per annum (Treasury 2002). Faster growth (4 per cent per annum) is projected for the inter-capital corridors (BTRE 2003).

[8] BTRE estimates. The BTRE (2002b) estimate of 4.0 per cent was based on an earlier economic growth assumption of 3.05 per cent a year.

CHAPTER 4 PHYSICAL CHARACTERISTICS OF THE AUSTRALIAN VEHICLE FLEET AND ITS USAGE PATTERN

This chapter provides information about physical characteristics of the Australian vehicle fleet and its usage pattern. While the analysis has to rely largely on SMVU data, other more reliable data (such as BTRE trend values for the road freight task) are used for analysing longer historical trends. Over the past few years, the BTRE has devoted considerable efforts to adding value to the SMVU data by adjusting for changes in the methodologies adopted over time (Mitchell and Cosgrove 2001). When providing more detailed snapshots for selected years (1991, 1995, 2000 and 2001)[9], raw data from SMVU would have to be used. Because of the greater variability of estimates caused by a continuous decline in the relative sample size for SMVU, care is needed to interpret these data, especially when drawing out trends for the first and the second halves of the 1990s.

FREIGHT VEHICLE STOCK

Number of freight vehicles by vehicle type

Table 4.1 presents data on the number of freight vehicles in operation in Australia from both the SMVU and the Motor Vehicle Census (MVC, ABS cat. no. 9309.0). The major difference between the two series is that the former is a period estimate and the latter a point estimate at the end of each measurement period. Because the stock of freight vehicles has been rising for most years in the past, the number of freight vehicles recorded in the SMVU is generally lower than that reported in MVC. Another difference is that, unlike the MVC, the SMVU estimates are sample-based and hence are subject to greater variability.

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[9] These years are chosen for analysis because SMVU data prior to 1991 are not consistent with those thereafter principally due to a change in vehicle classifications.

Freight-carrying vehicles are classified into the three broad categories of LCVs, rigid trucks and articulated trucks. The SMVU data dates back to the early 1970s, but because of definitional changes in vehicle classifications, only post-1991 data are presented in table 4.1 to ensure meaningful comparisons. Rigid trucks are defined as having GVM equal to or greater than 3.5 tonnes.

TABLE 4.1 NUMBER OF FREIGHT VEHICLES BY BROAD VEHICLE TYPE (1991–2001)

	SMVU				*MVC*			
Year[a]	*LCVs*	*Rigid trucks*	*Articulated trucks*	*Total*	*LCVs*	*Rigid trucks*	*Articulated trucks*	*Total*
Number of vehicles ('000)								
1991	1 346.4	330.8	52.1	1 729.3	1 479.2	333.2	51.7	1 864.2
1995	1 566.6	335.4	57.9	1 960.0	1 527.2	337.4	58.3	1 923.0
2000[b]	1 696.6	346.6	61.1	2 104.4	1 745.4	342.6	62.9	2 151.0
2001	1 719.7	332.1	61.5	2 113.3	1 769.6	338.4	62.6	2 170.6
Shares (%)								
1991	77.9	19.1	3.0	100.0	79.4	17.9	2.8	100.0
1995	79.9	17.1	3.0	100.0	79.4	17.5	3.0	100.0
2000	80.6	16.5	2.9	100.0	81.1	15.9	2.9	100.0
2001	81.4	15.7	2.9	100.0	81.5	15.6	2.9	100.0
Average annual growth rate (%)								
1991–95	3.9	0.3	2.7	3.2	0.8	0.3	3.1	0.8
1995–01	1.6	-0.2	1.0	1.3	2.5	0.0	1.2	2.0
1991-01	2.5	0.0	1.7	2.0	1.8	0.2	1.9	1.5

Notes: [a] Year ending on 31 July prior to 2000; and on 31 October for 2000 and 2001.
[b] Figures from the *Motor Vehicle Census* for 2000 are averages of 1999 and 2001 values.

Source: ABS, *Survey of Motor Vehicle Usage*, various issues; ABS, *Motor Vehicle Census*, various issues.

According to the MVC data, in 2001 there were around 2.17 million freight vehicles in Australia, of which LCVs accounted for 81.5 per cent, rigid trucks 15.6 per cent and articulated trucks 2.9 per cent. The SMVU data shows a lower total number of freight vehicles in 2001, but a similar pattern for the composition of the freight vehicle fleet.

LCVs belong to the fastest growing category of the freight vehicles for the second half of the 1990s. According to MVC data, the number of LCVs grew at 2.5 per cent per annum for 1995–2001 (compared with 0.8 per cent per annum for 1991–95)[10]. This relatively high growth rate of the LCV stock may be associated with changes in logistics practices and the emergence of on-line retailing with more frequent small deliveries.

[10] The SMVU data shows the opposite trend. This indicates the care that needs to be taken in drawing inferences from the SMVU data.

Both SMVU and MVC data show that the growth of the number of rigid trucks remained stagnant throughout the 1990s. In 2001, there was even an absolute decline in the stock of rigid trucks.

Both SMVU and MVC data show that growth in the number of articulated trucks is slower in the second half of the 1990s than in the first half. Nevertheless, the growth rate recorded in the MVC for articulated trucks is higher than that for rigid trucks. The slower growth of the stock of articulated trucks can be explained by a number of factors, including slower growth in the road freight task, increased size and power of modern articulated trucks and increased carrying capacity of semi-trailers (B–double).

Table 4.2 shows changes in the number of heavy vehicles by detailed vehicle configuration. It is clear that there has been outstanding growth in the number of articulated trucks with more than 6 axles (63.5 per cent per annum for 1991–2000) [11] and B-doubles (38.2 per cent per annum for 1991–2000).

TABLE 4.2 NUMBER OF HEAVY VEHICLES BY DETAILED VEHICLE CONFIGURATION (1991–2000)

	1991 ('000)	*1995* ('000)	*2000* ('000)	*1991–1995* % pa	*1995–2000* % per annum	*1991–2000* % per annum
Rigid:						
2-axle	228.7	203.7	246.3	-2.9	3.9	0.8
3-axle	31.8	37.0	44.8	3.9	3.9	3.9
4-axle	6.2	6.3	5.8	0.6	-1.7	-0.7
With trailer	18.7	22.7	25.8	5.0	2.6	3.6
Articulated:						
3-axle	3.3	3.0	2.0	-2.1	-8.2	-5.5
4-axle	8.3	7.6	7.4	-2.2	-0.5	-1.3
5-axle	9.1	8.8	9.0	-0.9	0.4	-0.1
6-axle	27.1	31.4	55.8	3.8	12.2	8.4
>6-axle	0.0	0.9	1.2	183.6	5.3	63.5
B-double	0.5	1.8	8.3	41.7	35.4	38.2
Road trains	2.8	3.1	7.7	2.8	19.9	12.0

Note: Heavy vehicles are defined as having GVM/GCM equal to or greater than 4.5 tonnes.

Source: Data for 1991 and 1995 are from NRTC (1998); data for 2000 were obtained from NRTC by request. The original source of the data is ABS's unrevised SMVU 2000.

[11] The enormous growth in the number of articulated trucks with more than 6 axles is starting from an extremely small base.

Number of freight vehicles by vehicle type and by State/Territory

Table 4.3 shows the number of freight vehicles on the register by broad vehicle type and by State/Territory. New South Wales had the largest number of freight vehicles on the register at 31 March 2001 with 620 200 (28.6 per cent of the Australian total). ACT has the lowest proportion of all State/Territories with 0.9 per cent. The proportion of the freight vehicle fleet is closely related to the size of the economy in each State and Territory.

Since 1995, the number of freight vehicles on the register has increased in all States/Territories except ACT where a decline was recorded (–3.3 per cent). Between 1995 and 2001, Queensland recorded the highest growth in the fleet size (17.8 per cent). Other States/Territories having double-digit growth include Western Australia (13.2 per cent), New South Wales (13.0 per cent), Northern Territory (11.7 per cent) and Victoria (11.6 per cent).

The growth of the number of freight vehicles was largely driven by the high growth of the number of LCVs (15.9 per cent for 1995–2001). Queensland recorded the largest increase in the LCV fleet size (over 20 per cent in the same period), followed by New South Wales (16.5 per cent), Western Australia (15.5 per cent), Victoria (14.8 per cent), Northern Territory (13.9 per cent) and South Australia (11.0 per cent). The size of the LCV fleet in ACT reduced slightly (–1.7 per cent) during the period of 1995 and 2001.

The picture for rigid and articulated trucks is more complex for the past 5 years or so. For rigid trucks, States or Territories that recorded a positive growth of their vehicle fleet for 1995–2001 were Northern Territory (13.1 per cent), Queensland (6.1 per cent), Western Australia (3.1 per cent) and New South Wales (0.2 per cent). All other States and Territories experienced a negative growth of between –1.8 to –14.9 per cent during the same period.

For articulated trucks, the fleet size in Victoria, Queensland, South Australia and Western Australia grew at a double-digit rate for 1995–2001. The fleet size in New South Wale grew marginally during the same period and that in the remaining States and Territories shrank significantly, notably Northern Territory (–37.8 per cent).

TABLE 4.3 NUMBER OF FREIGHT VEHICLES BY VEHICLE TYPE AND BY STATE/TERRITORY, 1995 AND 2001

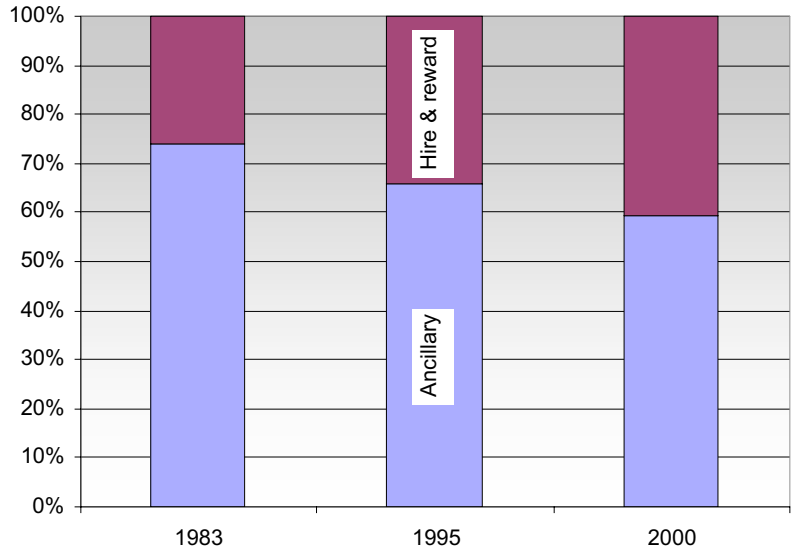
	Number of vehicles ('000)		*Shares (%)*		*% change*
	1995	2001	1995	2001	2001 over 1995
LCVs					
NSW	430.8	501.7	28.2	28.3	*16.5*
VIC	357.8	410.8	23.4	23.2	*14.8*
QLD	340.0	409.0	22.3	23.1	*20.3*
SA	115.3	127.9	7.5	7.2	*11.0*
WA	187.2	216.2	12.3	12.2	*15.5*
TAS	57.2	62.3	3.7	3.5	*8.9*
NT	21.5	24.5	1.4	1.4	*13.9*
ACT	17.5	17.2	1.1	1.0	*-1.7*
Australia	**1 527.2**	**1769.6**	**100.0**	**100.0**	***15.9***
Rigid trucks					
NSW	103.1	103.3	30.6	30.5	*0.2*
VIC	84.7	83.2	25.1	24.6	*-1.8*
QLD	63.6	67.5	18.8	19.9	*6.1*
SA	26.5	25.2	7.8	7.4	*-4.8*
WA	43.0	44.4	12.8	13.1	*3.1*
TAS	11.1	9.4	3.3	2.8	*-14.9*
NT	2.8	3.2	0.8	0.9	*13.1*
ACT	2.7	2.3	0.8	0.7	*-12.7*
Australia	**337.4**	**338.4**	**100.0**	**100.0**	***0.3***
Articulated trucks					
NSW	15.0	15.3	25.8	24.4	*1.5*
VIC	16.5	18.3	28.3	29.2	*10.6*
QLD	11.7	12.9	20.1	20.6	*10.3*
SA	5.3	6.1	9.1	9.7	*14.5*
WA	6.7	7.7	11.6	12.3	*13.7*
TAS	1.6	1.5	2.8	2.4	*-9.5*
NT	1.1	0.7	1.8	1.1	*-37.8*
ACT	0.3	0.3	0.5	0.4	*-12.8*
Australia	**58.3**	**62.6**	**100.0**	**100.0**	***7.3***
All freight vehicles					
NSW	548.9	620.2	28.5	28.6	*13.0*
VIC	458.9	512.2	23.9	23.6	*11.6*
QLD	415.3	489.3	21.6	22.5	*17.8*
SA	147.0	159.2	7.6	7.3	*8.3*
WA	237.0	268.3	12.3	12.4	*13.2*
TAS	69.9	73.2	3.6	3.4	*4.7*
NT	25.4	28.4	1.3	1.3	*11.7*
ACT	20.5	19.8	1.1	0.9	*-3.3*
Australia	**1 923.0**	**2 170.6**	**100.0**	**100.0**	***12.9***

Source: ABS, *Motor Vehicle Census*, 1997 and 2001.

Number of freight vehicles by business type

The distribution of the total number of trucks among industries is shown in figure 4.1. In 1983, hire & reward operation was estimated to account for 26 percent of the total number of trucks. This share rose to 40 percent in 2000. However, part of this increase was due to the different methods adopted in compiling the data. While the BTE 1983 estimates include all trucks over 2 tonnes, the TransEco (1996) and NRTC estimates include only trucks over 4.5 tonnes.

FIGURE 4.1 DISTRIBUTION OF TRUCKS BY TYPE OF OPERATIONS (PERCENT)



Source: 1983 estimates are from BTE (1986); 1995 estimates are from TransEco (1996); and 2000 estimates were from NRTC by request.

The growing importance of the hire & reward part of the road freight transport industry reflects a trend towards greater out-sourcing by the ancillary sector, notably the wholesaling and retailing industry. The road freight industry as a whole would gain from this specialisation.

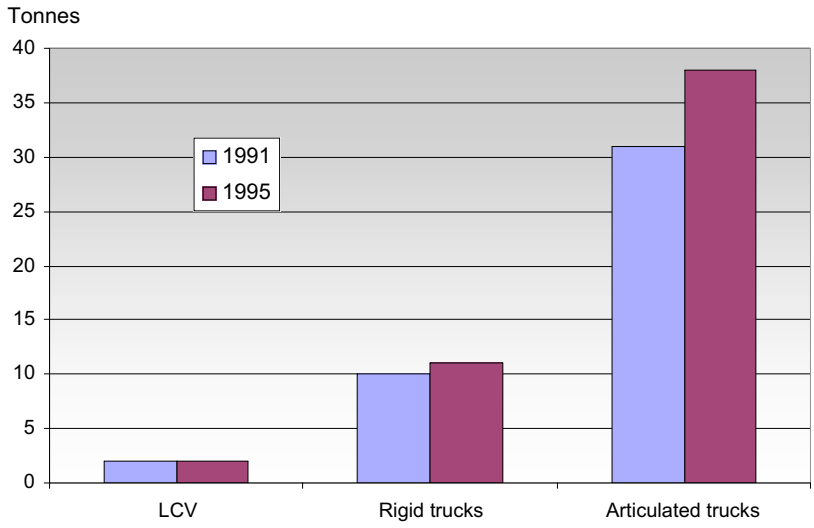
FREIGHT VEHICLE EFFICIENCY

Freight vehicle efficiency can be measured in terms of gross vehicle (or combination) mass[12] (GVM/GCM) and fuel efficiency. During the past decade, the trend towards larger vehicles continued, partly due to changes in regulations permitting higher GVM limits. Such a development has an important bearing on the number of trucks required for the road freight task and on the fuel efficiency of the freight vehicles.

GVM/GCM

More recent information about GVM/GCM is not available. However, according to NRTC (1998), average GVM/GCM for rigid trucks and articulated trucks increased by 10 per cent and 23 per cent respectively during the first half of the 1990s (figure 4.2). This trend is likely to have continued due to the continuing increase in the average load of freight vehicles observed in the second half of the 1990s (table 4.9).

FIGURE 4.2 AVERAGE GROSS VEHICLE/COMBINATION MASS (TONNES, 1991–1995)



Source: NRTC (1998).

[12] Gross vehicle mass (GVM) is defined as the tare weight of the vehicle plus its maximum carrying capacity. Gross combination mass (GCM) is defined as tare weight of the vehicle and the attached trailers plus the maximum carrying capacity. This measure ignores gains from reductions in tare mass, which may have been significant with the adoption of lighter materials (eg, aluminium).

Fuel efficiency

The fuel efficiency of freight vehicles can be measured in litres per 100 kilometres (l/100km) or litres per net tonne-kilometre (l/ntkm). In the case where GVM or GCM (and hence average load) increases over time, a more relevant indicator for measuring fuel efficiency should be litres per net tonne-kilometres. Table 4.4 presents both of these fuel efficiency indicators.

Fuel consumed by LCVs fluctuated at between 13.4–13.8 litres per 100 kilometres during the past decade. However, because of the increases in GVM or GCM discussed earlier, fuel consumption per 100 kilometres for both rigid and articulated trucks has shown a slightly upward trend since 1991.

Fuel efficiency measured by l/ntkm has improved slightly in the past decade, notably for rigid and articulated trucks. More interesting is the fact that fuel consumption for articulated trucks is less than half of that for rigid trucks in terms of net tonne-kilometres delivered. This explains partly why the composition of the truck fleet has shifted more towards articulated trucks.

TABLE 4.4 FUEL EFFICIENCY OF FREIGHT VEHICLES

Year	*l/100km*			*l/ntkm*		
	LCVs	*Rigid trucks*	*Articulated trucks*	*LCVs*	*Rigid trucks*	*Articulated trucks*
1991	13.60	26.90	50.60	0.6530	0.0800	0.0318
1995	13.80	27.00	50.60	0.7667	0.0789	0.0287
2000	13.40	27.50	52.10	0.7443	0.0764	0.0271
2001	13.60	28.00	53.10	0.7516	0.0770	0.0271

Source: ABS, SMVU various issues; BTRE estimates.

FREIGHT VEHICLE USAGE

Freight vehicle usage (or the physical output of the road freight industry) is normally measured in total tonne-kilometres performed.[13] Other indicators for freight vehicle usage include tonnes of goods carried and distance travelled both in total and average. The discussion of vehicle use on a mass-distance basis relies on the BTRE trend values in order to reveal the long-term trends for changes in growth rates of tonne-kilometres by broad vehicle type. Analysis of goods carried and distance travelled has to be based on raw SMVU data with a focus on 1991–2001. Some inconsistency may occur as a result of using different sources of data.

[13] This also corresponds to the total road freight task discussed in chapter 3.

Total tonne-kilometres

Total tonne-kilometres by broad vehicle type

A total of 135.5 billion tonne-kilometres was performed by all freight vehicles in 2000 (table 4.5). Although articulated trucks account for only about 3 per cent of the total number of freight vehicles (table 4.1), they represent 78 per cent of the total tonne-kilometres delivered by the road freight transport industry in 2000. The share of total tonne-kilometres performed by articulated trucks has increased significantly over the past 30 years mainly at the expense of rigid trucks, though the rate of increase has slowed down to some extent over the past two decades.

Rigid trucks, which account for about 16 per cent of the total freight vehicles (table 4.1), performed 18 per cent of the total road freight task in 2000 and their share has continuously declined since 1971. Growth of the tonne-kilometres delivered by rigid trucks slowed down significantly to 0.6 per cent per annum for 1990–2000.

LCVs account for 81 per cent of the total freight vehicles (table 4.1), but the tonne-kilometres they delivered accounted for less than 4 per cent of the total road freight task in 2000. Growth of the tonne-kilometres travelled by LCVs has also slowed down significantly in the past decade (1.1 per cent per annum for 1990–2000 compared with 8.5 per cent per annum for 1980–90).

TABLE 4.5 FREIGHT VEHICLE USAGE BY BROAD VEHICLE TYPE (TREND VALUES 1971–2000)

	LCVs	*Rigid trucks*	*Articulated trucks*	*All vehicles*
Total tonne-kilometres delivered (btkm)				
1971	0.98	10.78	14.88	26.64
1980	2.07	13.80	32.26	48.13
1990	4.69	22.86	65.02	92.57
2000	5.21	24.21	106.04	135.46
Shares (%)				
1971	3.7	40.5	55.9	100.0
1980	4.3	28.7	67.0	100.0
1990	5.1	24.7	70.2	100.0
2000	3.8	17.9	78.3	100.0
Average annual growth rate (%)				
1971-1980	8.6	2.8	9.0	6.8
1980-1990	8.5	5.2	7.3	6.8
1990-2000	1.1	0.6	5.0	3.9

Source: BTRE (2002b), *Report 107*.

Total tonne-kilometres by broad vehicle type and by State/Territory

Table 4.6 shows shares of States/Territories in the total tonne-kilometres performed by different types of freight vehicles. Of the tonne-kilometres performed by all freight vehicles in 2001, Victoria had the highest share (29.4 per cent), followed by New South Wales (23.2 per cent), Queensland (21.8 per cent), Western Australia (11.5 per cent), South Australia (9.5 per cent) and others (4.6 per cent).

The last column of table 4.6 shows changes in the shares for 1991–2001. If the figure is positive, it means that the tonne-kilometres performed by a particular State/Territory grew faster than the national average. As seen in the table, there are three states (Victoria, Queensland and South Australia) for which total tonne-kilometres grew at a rate faster than the national average. Among those States/Territories whose tonne-kilometres grew at a rate slower than the national average, New South Wales recorded the largest drop in its share (from 26.3 per cent in 1991 to 23.2 per cent in 2001).

The trends for the tonne-kilometres performed by different types of freight vehicles in different States/Territories vary considerably. New South Wales assumed a much greater importance in the categories of LCVs and rigid trucks for 1991–2001, and Victoria and Queensland in the category of articulated trucks.

Goods (tonnes) carried

Table 4.7 shows the quantity (in tonnages) moved by the road freight industry. According to the ABS definition, tonnes carried is the total weight of goods and freight carried during the survey period. The estimate of annual tonnes carried relates to freight uplifted by vehicles and therefore will overstate the actual physical quantity of freight moved to the extent that transhipment occurs, that is, the transfer of freight from one vehicle to another (ABS 2000).

In 2001, the road freight industry moved a total of 1.5 billion tonnes of freight, of which LCVs accounted for 7.0 per cent, rigid trucks 46.1 per cent and articulated trucks 47.0 per cent. The share of total tonnes carried by articulated trucks increased for the period 1991–2001 mainly at the expense of LCVs and, to a lesser extent, rigid trucks. It is also important to note that there was an absolute decline in freight carried by LCVs in terms of tonnes.

TABLE 4.6 SHARES OF STATES/TERRITORIES IN THE TOTAL TONNE-KILOMETRES (1991, 1995 AND 2001)

	Shares (%)			*Changes in shares*		
	1991	*1995*	*2001*	*1991–1995*	*1995–2001*	*1991–2001*
			LCVs			
NSW	29.3	25.4	35.1	-3.9	9.8	5.9
VIC	23.0	25.0	19.4	2.0	-5.6	-3.6
QLD	21.0	26.0	23.4	4.9	-2.6	2.3
SA	7.9	6.9	5.8	-1.0	-1.1	-2.1
WA	12.8	12.1	11.3	-0.7	-0.9	-1.5
TAS	2.5	2.2	2.6	-0.3	0.4	0.1
NT	1.8	0.9	1.3	-0.9	0.4	-0.5
ACT	1.6	1.5	1.2	-0.1	-0.4	-0.5
Australia	100.0	100.0	100.0	0.0	0.0	0.0
			Rigid trucks			
NSW	27.2	30.9	33.7	3.7	2.8	6.5
VIC	24.4	22.4	25.2	-2.1	2.9	0.8
QLD	21.8	21.1	20.3	-0.6	-0.8	-1.4
SA	7.9	7.0	5.5	-0.9	-1.5	-2.5
WA	12.4	13.9	11.2	1.5	-2.7	-1.2
TAS	3.8	2.5	2.8	-1.3	0.2	-1.1
NT	1.1	1.2	0.6	0.1	-0.6	-0.5
ACT	1.3	1.0	0.7	-0.3	-0.3	-0.6
Australia	100.0	100.0	100.0	0.0	0.0	0.0
			Articulated trucks			
NSW	25.8	21.0	19.9	-4.8	-1.0	-5.8
VIC	26.6	26.6	31.0	0.0	4.4	4.4
QLD	18.2	21.4	22.1	3.2	0.7	3.9
SA	9.6	11.6	10.7	2.0	-0.9	1.1
WA	12.2	12.5	11.6	0.3	-0.9	-0.6
TAS	2.6	2.3	1.8	-0.2	-0.6	-0.8
NT	4.5	4.0	2.5	-0.5	-1.5	-2.0
ACT	0.6	0.6	0.4	-0.1	-0.2	-0.2
Australia	100.0	100.0	100.0	0.0	0.0	0.0
			All freight vehicles			
NSW	26.3	23.2	23.2	-3.1	-0.1	-3.1
VIC	25.9	25.6	29.4	-0.3	3.8	3.5
QLD	19.2	21.5	21.8	2.4	0.3	2.7
SA	9.1	10.4	9.5	1.3	-0.9	0.4
WA	12.3	12.8	11.5	0.5	-1.3	-0.8
TAS	2.9	2.4	2.0	-0.5	-0.4	-0.9
NT	3.6	3.3	2.1	-0.3	-1.2	-1.5
ACT	0.8	0.7	0.5	-0.1	-0.2	-0.4
Australia	100.0	100.0	100.0	0.0	0.0	0.0

Source: Shares were derived from SMVU 1991, 1995 and 2001.

TABLE 4.7 GOODS CARRIED BY VEHICLE TYPE (MILLION TONNES)

Year	*LCVs*	*Rigid trucks*	*Articulated trucks*	*All vehicles*
1991	133	506	391	1 030
1995	100	614	508	1 222
2000	103	711	655	1 469
2001	103	683	697	1 482
Shares (%)				
1991	12.9	49.1	38.0	100.0
1995	8.2	50.2	41.6	100.0
2000	7.0	48.4	44.6	100.0
2001	7.0	46.1	47.0	100.0
Average annual growth rate (%)				
1991-95	-6.9	5.0	6.8	4.4
1995-2001	0.5	1.8	5.4	3.3
1991-2001	-2.5	3.0	6.0	3.7

Source: ABS, SMVU, various issues.

Table 4.8 shows goods carried by vehicle type and by commodity for 1995 and 2001. The major commodity groups were fuel and non-fuel industrial materials, agricultural products, manufacturing goods, and machinery and transport equipment. Some of these commodity groups grew strongly during the second half of the 1990s.

Average load carried

According to the ABS definition, the average load carried is calculated by dividing the total weight of goods carried by the total number of trips while carrying a load. As shown in table 4.9, average load carried by rigid and articulated trucks increased by 3.3 and 2.1 per cent per annum respectively for 1991–2001. The decline in average load carried by LCVs is worth noting, because it reflect more smaller vehicles making deliveries in urban areas.

TABLE 4.8 GOODS CARRIED BY VEHICLE TYPE AND BY COMMODITY (MILLION TONNES)

Commodities	*LCV*	*Rigid trucks*	*Articulated trucks*	*All*
		1995		
Food and live animals	11	80	106	197
Beverages and tobacco	1	11	9	21
Crude materials, inedible, except fuels	5	267	150	422
Mineral fuels, lubricants and related materials	2	21	47	70
Animal and vegetable oils, fats and waxes	0	2	2	4
Chemicals and related products, nes	3	17	9	29
Manufactured goods	12	84	83	179
Machinery, transport equipment	9	26	34	69
Miscellaneous manufactured articles	3	11	6	20
Tools of trade	40	26	3	69
Other commodities, nes	13	69	59	141
Unspecified	0	0	0	0
Total	100	614	508	1 222
		2001		
Food and live animals	9	71	169	249
Beverages and tobacco	1	8	12	21
Crude materials, inedible, except fuels	6	295	191	492
Mineral fuels, lubricants and related materials	3	48	107	158
Animal and vegetable oils, fats and waxes	0	1	2	3
Chemicals and related products, nes	3	7	16	26
Manufactured goods	9	96	77	181
Machinery, transport equipment	11	30	42	82
Miscellaneous manufactured articles	3	10	7	19
Tools of trade	49	30	3	82
Other commodities, nes	7	85	58	150
Unspecified	3	3	11	18
Total	103	683	697	1 482
	Average annual growth rate (% 1995–2001)			
Food and live animals	-3.3	-2.0	8.1	4.0
Beverages and tobacco	0.0	-5.2	4.9	0.0
Crude materials, inedible, except fuels	3.1	1.7	4.1	2.6
Mineral fuels, lubricants and related materials	7.0	14.8	14.7	14.5
Animal and vegetable oils, fats and waxes	na	-10.9	0.0	-4.7
Chemicals and related products, nes	0.0	-13.7	10.1	-1.8
Manufactured goods	-4.7	2.3	-1.2	0.2
Machinery, transport equipment	3.4	2.4	3.6	2.9
Miscellaneous manufactured articles	0.0	-1.6	2.6	-0.9
Tools of trade	3.4	2.4	0.0	2.9
Other commodities, nes	-10.1	3.5	-0.3	1.0
Unspecified	na	na	na	na
Total	0.6	1.8	5.4	3.3

Note: nes: not else specified.

Source: ABS, SMVU 1995 and 2001.

TABLE 4.9 AVERAGE LOAD CARRIED BY VEHICLE TYPE (KILOGRAMS)

Year	*LCV*	*Rigid trucks*	*Articulated trucks*
1991	435	4 070	19 242
1995	391	4 307	20 969
2000	377	5 854	22 615
2001	326	5 632	23 639
Average annual growth rate (%)			
1991–95	-2.6	1.4	2.2
1995–2001	-3.0	4.6	2.0
1991–2001	-2.8	3.3	2.1

Source: ABS, SMVU, various issues.

Total distance travelled

The total distance travelled by all freight vehicles was 42.7 billion kilometres in 2001, which is 29.8 per cent higher than the level of 1991 (table 4.10). The average annual growth rate of the total distance travelled was 2.6 per cent for 1991–2000, with a substantial slowdown in the growth rate in the second half of the 1990s.[14] The growth of distance travelled is substantial for both LCV's and articulated trucks, reaching 3.0 per cent per annum over the period 1991–2001.

TABLE 4.10 TOTAL DISTANCE TRAVELLED BY VEHICLE TYPE (MILLION KILOMETRES)

Year	*LCVs*	*Rigid trucks*	*Articulated trucks*	*All vehicles*
1991	22 814	6 114	3 959	32 886
1995	27 751	6 725	5 094	39 570
2000	27 829	6 536	5 578	39 943
2001	30 728	6 627	5 321	42 676
Shares (%)				
1991	69.4	18.6	12.0	100.0
1995	70.1	17.0	12.9	100.0
2000	69.7	16.4	14.0	100.0
2001	72.0	15.5	12.5	100.0
Average annual growth rate (%)				
1991-95	5.0	2.4	6.5	4.7
1995-2001	1.7	-0.2	0.7	1.3
1991-2001	3.0	0.8	3.0	2.6

Source: ABS, SMVU, various issues.

[14] According to the BTRE's analysis of SMVU data (Mitchell and Cosgrove 2001), 1995 is a year for which there was an over-estimation of the true freight task and distance travelled. So the low growth rate recorded in 1995-2001 could be partly due to an over-estimation of the distance travelled for 1995.

Of the total distance travelled by all freight vehicles in 2001, LCVs accounted for 72.0 per cent, rigid trucks for 15.5 per cent and articulated trucks for 12.5 per cent. The shares of LCVs and articulated trucks increased slightly during the 1990s at the expense of rigid trucks.

Table 4.11 disaggregates the total distance travelled by vehicle type and by area of operation.[15] The overwhelming majority of the total kilometres travelled is performed intrastate. This is particularly true for LCVs (96.5 per cent in 2001) and rigid trucks (96.0 per cent in 2001). The share of intrastate travel in the total distance travelled by articulated trucks is much lower (73.7 per cent in 2001) and this share has declined since 1991. For LCVs it appears that the major area for the growth of distance travelled is provincial urban centres which recorded an average annual growth rate of 5.1 per cent for 1991–2001.[16] The picture for rigid trucks is more complex with the growth rate of distance travelled being higher for capital cities, provincial urban centres and interstate than the average growth rate of the rigid truck category. For articulated trucks, the growth of capital city and interstate travel is particularly strong, with an average annual growth rate of 3.8 per cent in the past decade.

Data presented in NRTC (1998) suggest that the distance travelled by rigid trucks is evenly spread between ancillary and hire & reward operations, while articulated truck travel is associated predominantly with hire & reward purposes.

Average distance travelled

The average distance travelled is calculated by dividing the total kilometres travelled by the average number of the registered vehicles (including registered vehicles that did not travel during the reference period). As seen in table 4.12, the growth of the average distance travelled is higher for articulated trucks than for LCVs and rigid trucks for 1991–2001. But that growth appears to have subdued in the second half of the 1990s.

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[15] The "area of operation" is defined as all trips occurring in an area, such as urban, or intrastate, or interstate.

[16] This could have been overstated due to a change in the SMVU definition of 'provincial urban areas'.

TABLE 4.11 TOTAL DISTANCE TRAVELLED BY VEHICLE TYPE AND BY AREA OF OPERATIONS (MILLION KILOMETRES)

	LCV					***Rigid***					***Articulated***					***All vehicles***				
	Intrastate			*Inter-state*	*Total*	*Intrastate*			*Inter-state*	*Total*	*Intrastate*			*Inter-state*	*Total*	*Intrastate*			*Inter-state*	*Total*
	Capital city	Provin-cial urban	Rest of state			Capital city	Provin-cial urban	Rest of state			Capital city	Provin-cial urban	Rest of state			Capital city	Provin-cial urban	Rest of state		
1991	10 010	2 794	9 237	773	22 814	3 008	755	2 146	205	6 114	736	334	1 919	970	3 959	13 753	3 884	13 302	1 948	32 886
1995	12 469	4 507	9 871	904	27 751	3 377	919	2 193	236	6 725	1 027	453	2 299	1 315	5 094	16 873	5 879	14 363	2 455	39 570
2000	12 619	4 515	9 841	855	27 829	3 569	741	1 984	242	6 536	1 025	363	2 638	1 552	5 578	17 213	5 619	14 463	2 649	39 943
2001	13 773	4 594	11 272	1 090	30 728	3 548	922	1 891	265	6 627	1 073	308	2 538	1 402	5 321	18 394	5 824	15 701	2 757	42 676
Shares (%)																				
1991	43.9	12.2	40.5	3.4	100.0	49.2	12.4	35.1	3.3	100.0	18.6	8.4	48.5	24.5	100.0	41.8	11.8	40.4	5.9	100.0
1995	44.9	16.2	35.6	3.3	100.0	50.2	13.7	32.6	3.5	100.0	20.2	8.9	45.1	25.8	100.0	42.6	14.9	36.3	6.2	100.0
2000	45.3	16.2	35.4	3.1	100.0	54.6	11.3	30.4	3.7	100.0	18.4	6.5	47.3	27.8	100.0	43.1	14.1	36.2	6.6	100.0
2001	44.8	15.0	36.7	3.5	100.0	53.5	13.9	28.5	4.0	100.0	20.2	5.8	47.7	26.3	100.0	43.1	13.6	36.8	6.5	100.0
Average annual growth rate (%)																				
1991–95	5.6	12.7	1.7	4.0	5.0	2.9	5.0	0.5	3.6	2.4	8.7	7.9	4.6	7.9	6.5	5.2	10.9	1.9	6.0	4.7
1995–01	1.7	0.3	2.2	3.2	1.7	0.8	0.1	-2.4	2.0	-0.2	0.7	-6.2	1.7	1.1	0.7	1.4	-0.2	1.5	2.0	1.3
1991–01	3.2	5.1	2.0	3.5	3.0	1.7	2.0	-1.3	2.6	0.8	3.8	-0.8	2.8	3.8	3.0	3.0	4.1	1.7	3.5	2.6

Note: There was a change in the definition of 'provincial urban area' in the SMVU since 1995, so the calculated shares and growth rates could be biased.

Source: ABS, SMVU, various issues.

TABLE 4.12 AVERAGE DISTANCE TRAVELLED BY VEHICLE TYPE (THOUSAND KILOMETRES PER ANNUM)

Year	*LCVs*	*Rigid trucks*	*Articulated trucks*
1991	16.9	18.5	76.0
1995	17.7	20.0	87.9
2000	16.4	18.9	91.3
2001	17.9	20.0	86.5
Average annual growth rate (%)			
1991–95	1.2	2.0	3.7
1995–2001	0.2	0.0	-0.3
1991–2001	0.6	0.8	1.3

Note: Calculated using average number of registered vehicles, including those that did not travel during the reference period.

Source: ABS, SMVU, various issues.

Table 4.13 shows the average distance travelled by vehicle type and by area of operation. Articulated trucks are mainly used to move freight over long distances such as non-urban intrastate and interstate travel (table 4.11). The average distance travelled in a year by articulated trucks in non-urban intrastate and interstate areas continued to increase during the 1990s, reaching 62 400 and 82 600 kilometres respectively in 2001. The average distance travelled in capital cities also increased quite significantly from 26 000 kilometres in 1991 to 32 300 kilometres in 2001.

Rigid trucks operate mainly in capital cities and in other non-urban areas within the state (table 4.11). In both these two areas, the average distance travelled by rigid trucks continued to increase during the 1990s. The average distance travelled interstate also increased from 12 000 kilometres in 1991 to 15 500 kilometres in 2001, representing an average annual growth rate of 2.6 per cent during the period.

Similar to rigid trucks, LCVs operate mainly in capital cities and in other non-urban areas within the state (table 4.11). The average distance travelled by LCVs increased in all areas for 1991–2001, notably in interstate travel.

TABLE 4.13 AVERAGE DISTANCE TRAVELLED BY VEHICLE TYPE AND BY AREA OF OPERATIONS (THOUSAND KILOMETRES)

	LCV				***Rigid***				***Articulated***			
	Intrastate			*Inter-state*	*Intrastate*			*Inter-state*	*Intrastate*			*Inter-state*
	Capital city	Provincial urban	Rest of state		Capital city	Provincial urban	Rest of state		Capital city	Provincial urban	Rest of state	
1991	14.6	8.9	11.2	6.6	19.6	13.0	11.5	12.0	26.0	24.1	47.1	68.1
1995	14.7	11.1	11.7	5.8	21.5	14.8	12.1	10.6	30.6	24.2	52.3	70.9
2000	15.8	10.1	13.0	7.8	22.4	11.3	14.1	14.3	29.8	19.4	65.8	88.3
2001	16.7	10.1	14.4	9.2	22.4	14.3	13.9	15.5	32.3	17.0	62.4	82.6
Average annual growth rate (%)												
1991–95	0.2	5.7	1.1	-3.2	2.3	3.3	1.3	-3.1	4.2	0.1	2.7	1.0
1995–01	2.1	-1.6	3.5	8.0	0.7	-0.6	2.3	6.5	0.9	-5.7	3.0	2.6
1991–0	1.4	1.3	2.5	3.4	1.3	1.0	1.9	2.6	2.2	-3.4	2.9	1.9

Note: Average distance travelled for registered vehicles which were used.

Source: ABS, SMVU, various issues.

SUMMARY

- In 2001, there were around 2.17 million freight vehicles in Australia representing an increase of 16.4 per cent over 1991. The largest growth recorded for the period was for the articulated trucks which increased by 21.1 per cent, compared with 19.6 per cent for LCVs and 1.6 per cent for rigid trucks.
- Growth in the number of articulated trucks occurred mostly in South Australia, Western Australia, Victoria and Queensland. Proliferation of LCVs is most evident in Queensland, New South Wales and Victoria. The relatively high growth of the number of rigid trucks in Queensland is in sharp contrast with the sluggish national trend.
- Sixty per cent of the total number of freight vehicles belonged to the ancillary sector in 2000, compared with 74 per cent in 1983, reflecting the growing importance of the hire & reward sector.
- The average GVM or GCM for heavy vehicles continued to increase in the past decade. The fuel intensity (measured by litres per net tonne-kilometres) for each class of vehicles remained fairly stable over the period. The overall improvement in fuel efficiency has been achieved by greater usage of articulated trucks, which are much more fuel efficient than rigid trucks.
- Although articulated trucks accounted for only 3 per cent of all freight vehicles, they represented 78 per cent of all tonne-kilometres delivered in 2000. Use of articulated trucks for freight movement increased by 5 per cent per annum for 1990–2000, compared with 0.6 per cent per annum for rigid trucks.
- On a weight basis, rigid trucks was responsible for nearly half of the total tonnes carried at the beginning of the 1990s. However, this share has since declined to the benefit of articulated trucks.
- The average load carried by rigid and articulated trucks increased by 3.3 and 2.1 per cent per annum respectively for 1991–2001.
- During 1991–2001, the total distance travelled by all freight vehicles increased by 2.6 per cent per annum. The total distance travelled by LCVs grew at an average annual rate of 3.0 per cent, principally driven by travel in regional urban centres (5.1 per cent per annum). Total travel by articulated trucks increased by 3.0 per cent per annum on average and by 3.8 per cent per annum for capital cities.
- In terms of distance travelled in 2001, 56.7 per cent of all freight vehicle trips were in capital cities or provincial urban areas, 36.8 per cent in other intrastate journeys and 6.5 per cent in interstate journeys.
- The average distance travelled by articulated trucks continued to increase in the past decade (1.3 per cent per annum for 1991–2001), compared with a 0.8 per cent per annum increase for rigid trucks.

CHAPTER 5 ECONOMIC CHARACTERISTICS OF THE AUSTRALIAN VEHICLE FLEET

This chapter provides information on the economic characteristics of the Australian vehicle fleet. These include the number of business establishments in the road freight transport industry and their concentration, the number of workers and drivers employed, and trends for changes in revenue and cost structure, in profitability and in productivity. Due to lack of data, the analysis has to focus largely on the hire & reward part of the road freight industry.

NUMBER OF BUSINESS ESTABLISHMENTS

Information on the number and composition of businesses operating trucks is limited, especially for more recent years. The study has to rely on data from a number of sources, including BTE (1986), ABS (1986a, 1986b, 1986c and 1987), NRTC (1998) and ABS unpublished data. Because of differences in scope, definitions and collection methodologies, it is important to note that historical comparisons may not be meaningful.

Table 5.1 attempts to draw a picture of the number of business establishments by type of operation on the basis of available data. Several qualifications have to be made before commenting on the table. First, the term "establishment" is used interchangeably with business unit/management unit/fleet, although there are slight differences in the definitions of these terms used in the various publications or studies. Second, the estimated number of trucking establishments is influenced by the definitions of trucks adopted in different data sources (see notes in table 5.1). Third, the data for 1994/95 were estimated by NRTC (1998) using information from ABS's Business Register, BTE's *Survey of Trucking Operations 1982/83* (BTE 1986) and ABS's *Transport Industry Survey 1983/84* (ABS 1986a, 1986b, 1986c and 1987). While these data provide reasonable estimates of the totals, they shed little light on the compositions of trucking fleets because these estimates merely reflect the patterns of the early 1980s. For these reasons, the figures presented in table 5.1 should not be viewed as precise estimates; instead they should be regarded as a broad-brush description of the number and composition of businesses operating in the road freight industry.

As shown in table 5.1, there were about 47 000 businesses operating in the hire & reward part of the road freight transport industry as at 30 March 2002. This represents a more than 40 per cent increase in the number of trucking businesses over 1983/84.[17] The overwhelming majority (98.5 per cent) of these establishments were engaged in road freight operations (ANZSIC 611) with the remainder in the road freight forwarding sector (ANZSIC 6642). It appears that the distribution of trucking establishments within the hire & reward sector has changed little since 1983/84. No information is available on the ancillary sector for 2002.

TABLE 5.1 NUMBER OF BUSINESS ESTABLISHMENTS: HIRE & REWARD AND ANCILLARY

Industry	*1982/83*[a] *(As at 30 June)*	*1983/84*[b] *(As at 30 June)*	*1994/95*[c] *(Unknown)*	*2002*[d] *(As at 30 March)*
Ancillary				
Agriculture, forestry, fishing and hunting	81 910		108 370	
Building and construction	16 880		15 970	
Electricity, gas and water	880		0	
Manufacturing	6 350		10 290	
Mining and quarrying	2 620		630	
Wholesale and retail trade	14 950		24 770	
Other	8 240		5 660	
Total ancillary	**131 830**		**165 690**	
Hire & reward				
Owner operators	16 110			
Other	16 570			
Total Hire & reward	**32 680**	**32 943**	**44 310**	**47 021**
Road freight (ANZSIC 611)		32 368	43 526	46 317
Road freight forwarding (ANZSIC 6642)		575	786	704
Grand total	***164 510***		***210 000***	

Notes: [a] Establishments operating trucks with tare weight of 2 tonnes and over;

[b] Establishments operating trucks with GVM equal to or greater than 2.7 tonnes;

[c] Establishments operating trucks with GVM equal to or greater than 4.5 tonnes; and

[d] Business counts in road freight (ANZSIC 611) and road freight forwarding (ANZSIC 6642).

Figures may not add to totals due to rounding.

Source: Data for 1982/3 are from BTE (1986, pp. 21-2); Data for 1983/4 from ABS (1986a, p7); Data for 1994/5 from NRTC (1998, pp. 9-10); and data for 2002 from ABS unpublished data.

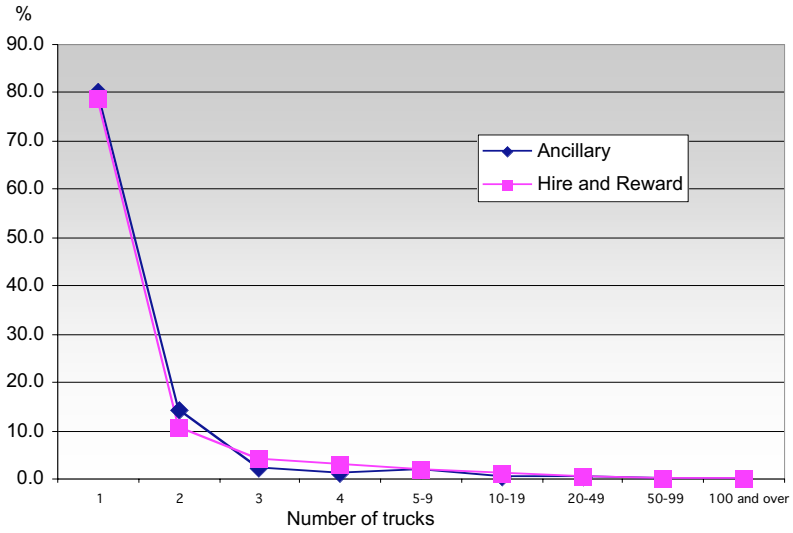
[17] Due to differences in scope, definitions and collection methodologies, the estimate of the percentage change is indicative only.

NRTC (1998) provided estimates of the total number of establishments in the ancillary and hire & reward sectors of the road freight industry for 1994/95. Altogether there were about 210 000 trucking establishments in existence, of which 21 per cent belonged to the hire & reward sector and 79 per cent to the ancillary sector.[18]

Estimation by NRTC (1998) of the distribution of trucking businesses within the ancillary sector for 1994/95 was largely based on the proportions derived from BTE's 1982/83 survey results. Nearly two-thirds of the ancillary operators were in the agricultural sector.

The road freight industry is dominated by small establishments with one or two trucks (over 90 per cent in 1995). This is true for both hire & reward and ancillary sectors (figure 5.1). Within the hire & reward sector, most of the small establishments were specialised in short-distance freight operations (figure 5.2), although there were a quite significant number of small establishments also concentrating on either intrastate or interstate long-distance freight movement.

FIGURE 5.1 PROPORTION OF BUSINESS ESTABLISHMENTS BY FLEET SIZE (1995): HIRE & REWARD AND ANCILLARY

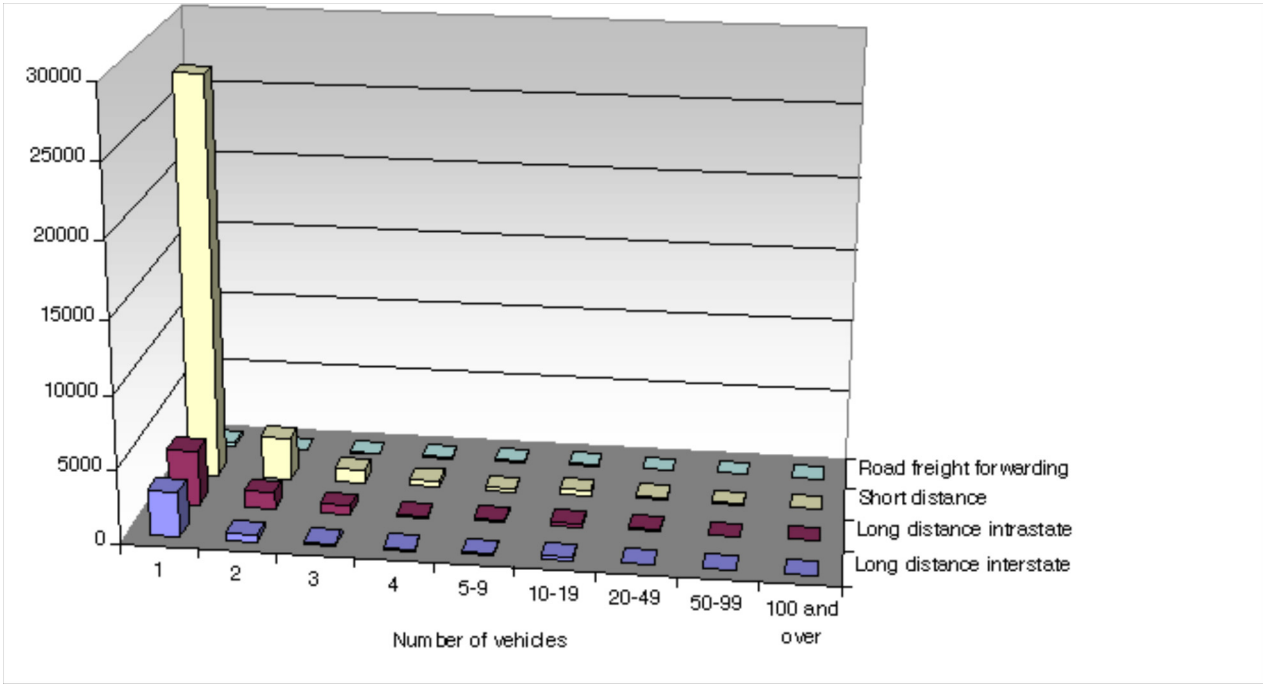


Source: Chart created based on the data from NRTC (1998).

The distribution of trucking businesses can be also classified according to the size of employment. About 85 per cent of the business establishments in the hire & reward sector had less than 5 employees in 1995 (figure 5.3).

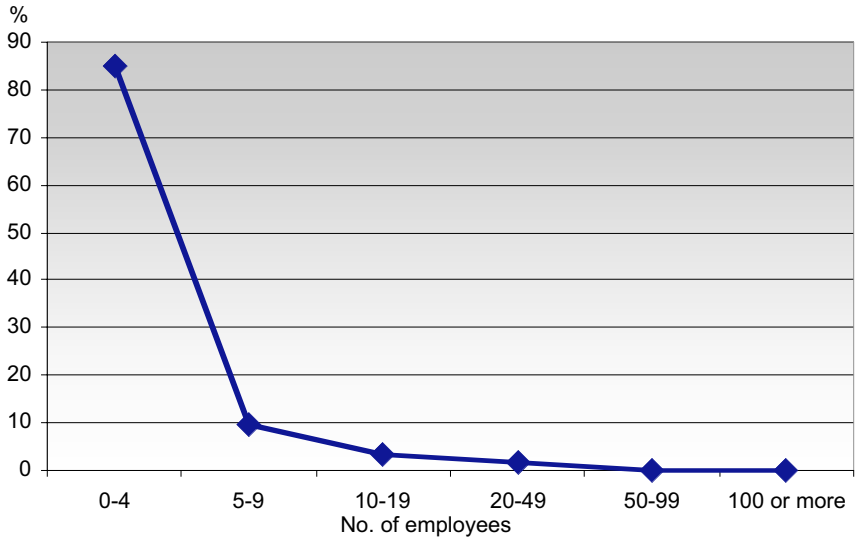
[18] These proportions reflect largely the results of the BTE's survey of trucking operations in 1982/83.

FIGURE 5.2 NUMBER OF BUSINESS ESTABLISHMENTS BY FLEET SIZE AND BY TYPE OF OPERATION (1995): HIRE & REWARD



Source: Chart created based on the data from NRTC (1998).

FIGURE 5.3 PROPORTIONS OF BUSINESS ESTABLISHMENTS BY NUMBER OF EMPLOYEES (1995): HIRE & REWARD



Source: Chart created based on the data from NRTC (1998).

A further distinction can be made between owner operators and other businesses within the hire & reward sector. Although there is no recent information available on this, data from BTE (1986) shows that about half of the trucking businesses could be owner operators (table 5.1).

INDUSTRY CONCENTRATION

The common variable used to measure the market structure of an industry is the four- or eight-firm concentration ratio, which measures the share of the industry accounted for by the top four/eight firms. If this share is large, the industry is said to be concentrated and is thought to be less competitive than an industry in which the concentration index is low.

Table 5.2 presents the estimated concentration ratios for the road freight industry on the basis of sales and turnovers.[19] As expected, the concentration of the Australian road freight industry is low: the top 4 firms account for only 15 per cent of the market share (based on sales)[20] and the top 8 firms for 21 per cent.

TABLE 5.2 INDUSTRY CONCENTRATION RATIOS (%), 1999/2000

ANZSIC 611 + 6642	*Sales of goods and services*	*Turnovers*
Four- firm concentration ratios	14.8	13.4
Eight- firm concentration ratios	20.8	18.9
Twelve- firm concentration ratios	23.9	21.7
Sixteen- firm concentration ratios	25.6	23.2

Notes: Estimates based on ABS unpublished data.

Source: ABS (2001b), Cat. 6423.0, *Industry Concentration Statistics,* unpublished data; and ABS (2001c), Cat. No. 8155.0, *Australian Industry* unpublished data.

The industry concentration index appears to have increased over the past few years due to acquisitions made by large transport companies such as Toll Holdings and Linfox. Given the fact that the industry is still very fragmented, it is expected that the trend for concentration will continue as a part of rationalisation process. However, given the very large number of small independent operators, it is unlikely that this will change the competitive nature of the industry.

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[19] Ideally, this could be done for both the road freight and road freight forwarding sectors, but due to the confidentiality constraint, only the aggregated ratio is estimated.

[20] Compared with 32.3 per cent for retail trade and 94.2 per cent for communication services in 1999/2000 (ABS 2001b).

EMPLOYMENT

The number of employees in the road freight transport industry reached 153 000 in 2002, accounting for 65.4 per cent of the total employed in the road transport industry.[21] Growth of employment in the road freight sector (ANSZIC 611 and 6642) for 1990–2002 was 1.5 per cent per annum. This rate is much lower than the growth rate of the tonne-kilometre task, reflecting increased labour productivity.

TABLE 5.3 EMPLOYMENT IN THE HIRE & REWARD ROAD FREIGHT TRANSPORT INDUSTRY ('000)

Year	*Road freight (ANZSIC 611+6642)*	*Total road (ANZSIC 61+6642)*	*Share of road freight (%)*
1985	100	152.3	65.9
1986	111	163.6	67.6
1987	111	173.7	63.7
1988	120	183.7	65.2
1989	121	181.0	66.9
1990	128	191.0	67.0
1991	135	192.7	69.9
1992	124	189.8	65.2
1993	122	185.9	65.6
1994	129	192.9	66.8
1995	121	185.7	65.0
1996	133	201.5	66.2
1997	132	197.9	66.7
1998	142	213.2	66.7
1999	151	219.4	69.0
2000	147	223.3	66.0
2001	152	229.2	66.4
2002	153	234.3	65.4

Note: Employment as at May, including both full-time and part-time employment.

Source: ABS Cat. 6203.0, *Labour Force, Australia,* unpublished data.

[21] In addition to road freight, road transport (ANZSIC 61) also includes long-distance bus transport, short-distance bus transport (including Tramway), Taxi and other road passenger transport.

Looming driver shortage

The possibility of a serious shortage of truck drivers was first identified in 2000 when an APS Freight Business Australia *Quarterly Industry Survey* (APS 2000) revealed that 62 per cent of the freight company heads surveyed[22] saw a shortage of skilled truck drivers as one of the biggest issues facing the industry. Since then, the issue of a looming driver shortage has been widely debated including possible causes.

An ageing workforce is believed to be one of the important contributing factors. Census data from ABS illustrates the case in point. As shown in figure 5.4, the age profile of workers who classify themselves as "Truck Drivers" is rapidly increasing. Between 1996–2001, both the number and the proportion of truck drivers aged between 15 and 35 years of age fell significantly. This trend is apparent at both national and state levels. Continuation of this trend would mean that by 2011 nearly 70 per cent of truck drivers will be aged over 45, and only about 10 per cent will be under 35 years of age.

Looking at the road freight industry at a finer level, a stark difference can be observed between "hire & reward" and "ancillary" truck drivers (figure 5.5). First, hire & reward drivers have increased between 1996 and 2001 in every age group except for the 15-24 year-old group. This increase has been substantial in all but the 25-34 year-old group. Secondly the ancillary drivers have shown a decrease in all but the oldest age groups over 55 years of age. The overall decrease amounts to a loss of 8 731 ancillary truck drivers over the period 1996–2001. These changes have occurred within an industry where total truck driver numbers have increased by 6 569 workers. The fact that the 15-24 year old age group is the only age group to show a decrease within both industry categories further emphasises the fact that younger people are less inclined to enter into the truck driver profession than formerly.

Some States/Territories appear to be affected more than others. Data shows that Queensland and Western Australia have experienced decreases in the numbers of drivers relative to the number of trucks for 1996–2001.

It appears that an increasing driver shortage is more acute in the long-distance section of the industry and in rural Australia (ATA 2002b, p. 54; Lawson 2002).

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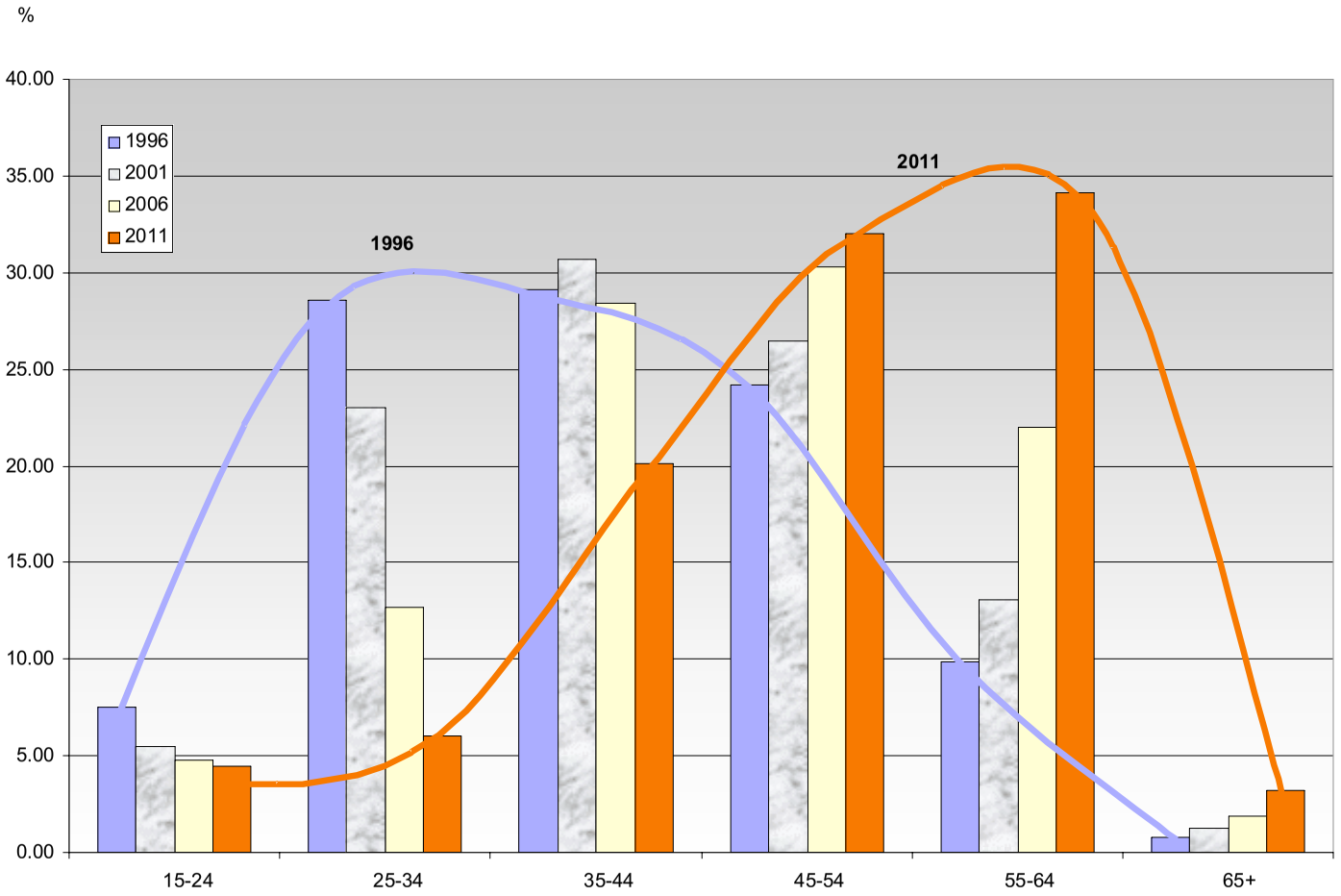
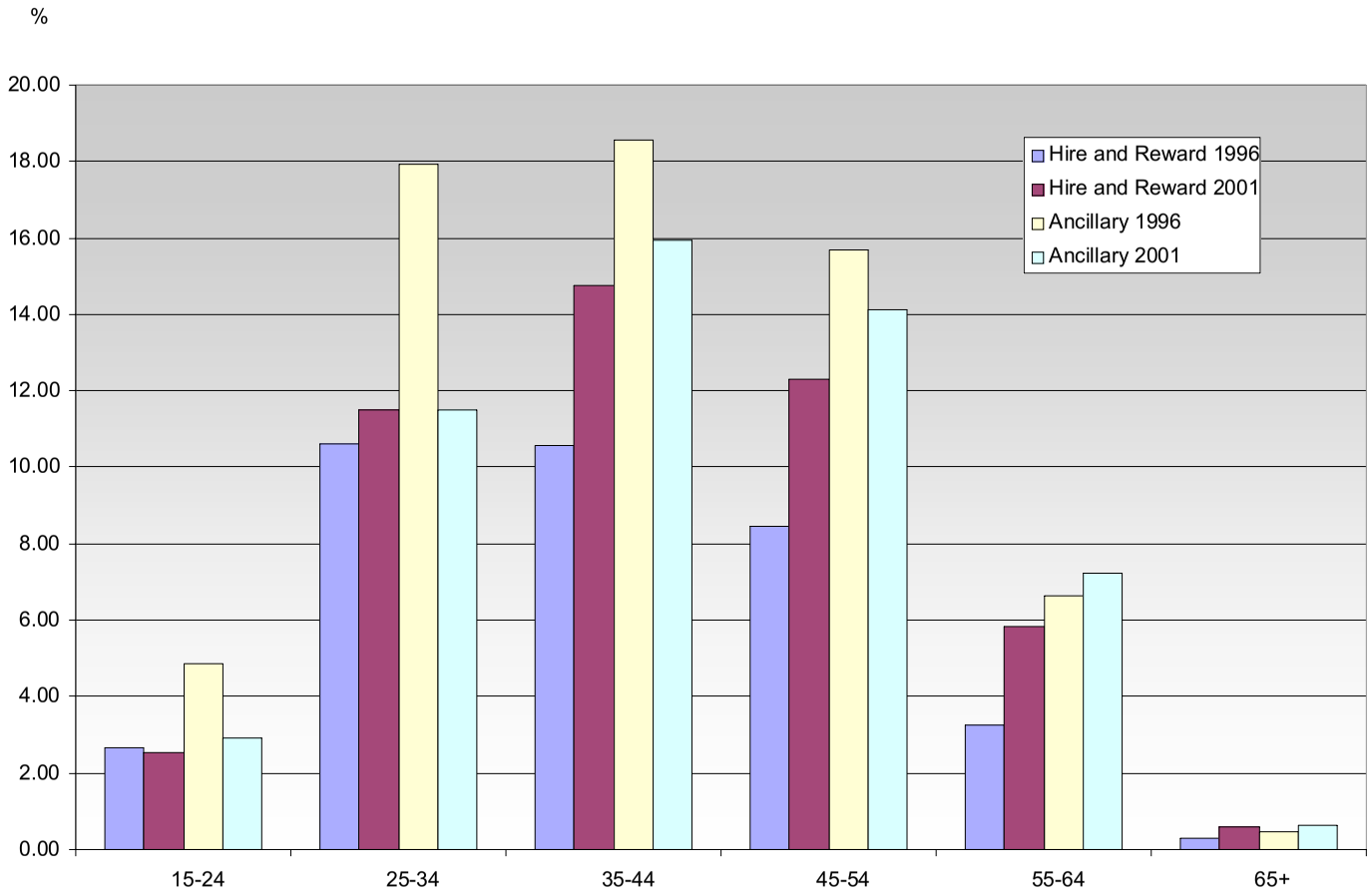
[22] The APS Freight Business Australia *Quarterly Industry Survey* was a closed survey directly mailed to 1,500 heads of transport and distribution companies throughout Victoria and New South Wales.

FIGURE 5.4 FREQUENCY DISTRIBUTION BY AGE GROUP: ACTUAL AND PROJECTED



Source: ABS, Census data for 1996 and 2001; BTRE estimates.

FIGURE 5.5 FREQUENCY DISTRIBUTION BY AGE GROUP: HIRE & REWARD AND ANCILLARY



Source: ABS, Census data for 1996 and 2001; BTRE estimates.

Industry representatives have expressed concerned about the steep decline in the uptake of the truck driving profession by young people. The decline is believed to be associated with falling margins of the freight industry, changing life style of the younger generation, high insurance cost for young drivers (under 25 years old) and lack of formal training programs.

To date, the effects of the looming shortage have been delayed by improvement in vehicle productivity, requiring fewer numbers of vehicles to undertake a given freight movement task. It could be further delayed, if efficiency gains could be obtained in the integration of the transport system, notably between road and rail. Reform of regulatory regimes such as PBS and improved driver testing procedures may also assist the situation to some extent. But in view of the magnitude of shifts in the age profile of truck drivers, the road freight transport industry will face a challenge in the task of having its demand for qualified truck drivers met at the current wage rates.

FINANCIAL PERFORMANCE

Discussion of the financial performance of the road freight transport industry is based on results from ABS's *Transport Industry Survey 1983/84* and *Economic Activity Survey 1999/2000 (EAS)*. The former is a one-off survey and the latter is an annual business survey since 1993/94 (employing business only). 1999/2000 is the first year for which information on both employing and non-employing business (owner operators) became available[23]. This has made it possible to draw out historical trends for changes in revenue and cost structure, and in the profitability of the industry.

Revenue structure

Table 5.4 provides an overview of the revenues for both the road freight and road freight forwarding sectors by employing and non-employing businesses for 1999/2000. The corresponding information on total revenues is also included for 1983/84, but it would not be appropriate to make direct historical comparisons because of the price effects and differences in scope, definitions and methodologies between the two data collections.

In 1999/2000, the total operating income (or turnover) of the hire & reward road freight industry (ANZSIC 611+6642) reached A$20.4 billion, of which nearly 90 per cent came from the road freight sector (ANZSIC 611) and the balance from the road freight forwarding sector (ANZSIC 6642). The relative size of the road freight/road freight forwarding sector appears to have increased/decreased since 1983/84.

Employing businesses account for a large portion of the total operating income (90 per cent). Non-employing businesses (owner-operators) are relatively more important in the road freight than in the road freight forwarding sector.

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[23] These data are based on ATO and ABS's Economic Activity Survey. Estimates are experimental, so care is needed in interpreting the data.

The major source of revenue is income from services (around 90 per cent), with the remaining mainly coming from sales of goods.

TABLE 5.4 REVENUE OF THE HIRE & REWARD FREIGHT TRANSPORT SECTOR

Income items ($'000)	*1983/84*	*1999/2000*		
	Total	*Employing businesses*	*Non-employing businesses*	*Total*
Road freight	*(ASIC 5111-3)*		*(ANZSIC 6110)*	
Sales of goods		1 285 043	189 598	1 474 641
Income from services		14 453 496	1 832 903	16 286 399
Rent, leasing and hiring income		104 730	16 993	121 723
Interest income		31 971	4 618	36 590
Royalties income		137	21	158
Government funding		62 822	10 046	72 869
Other operating income		218 101	26 019	244 120
Total operating income	**3 754 700**	**16 156 301**	**2 080 197**	**18 236 499**
Road freight forwarding	*(ASIC 5114)*		*(ANZSIC 6642)*	
Sales of goods		105 711	8 778	114 488
Income from services		1 960 312	45 981	2 006 292
Rent, leasing and hiring income		17 328	1 280	18 608
Interest income		6 926	544	7 470
Royalties income		405	21	426
Government funding		2 270	165	2 434
Other operating income		13 463	894	14 357
Total operating income	**1 432 600**	**2 106 414**	**57 662**	**2 164 076**
Road freight total	*(ASIC 5111-4)*		*(ANZSIC 611+6642)*	
Sales of goods		1 390 754	198 376	1 589 129
Income from services		16 413 808	1 878 884	18 292 691
Rent, leasing and hiring income		122 058	18 273	140 331
Interest income		38 897	5 162	44 060
Royalties income		542	42	584
Government funding		65 092	10 211	75 303
Other operating income		231 564	26 913	258 477
Total operating income	**5 187 300**	**18 262 715**	**2 137 859**	**20 400 575**

Source: ABS (1986b, p. 7); ABS, Cat. No. 8155.0, unpublished data.

Cost structure

Table 5.5 provides a detailed snapshot of the cost structure for the hire & reward freight transport industry for 1999/2000. In regard to the road freight sector, labour costs, purchases, sub-contracting costs (freight expenses and sub-contracting and commission work), motor vehicle running expenses, rental

expenses and depreciation constitute the major expense items, accounting for 86 per cent of the total costs.

For labour costs, earnings to working proprietors are excluded. Hence the share of labour costs for the total selected businesses (22.2 per cent) is slightly under-estimated.

Petrol products and other fuel expenses listed under the "purchases" category are mainly for off-road uses and account for 18 per cent of the total cost of the "purchases" and nearly 4 per cent of the total expenses. On-road fuel costs are included in the category of motor vehicle running expenses. The "purchases" category accounts for 21.5 per cent in the total expenses.

Sub-contracting costs, which are defined as being a combination of total freight expenses and sub-contracting and commission work, comprise a share of 15.4 per cent.

Motor vehicle running expenses is another major expense item, accounting for 11.5 per cent of the total costs. According to ABS, the category includes the following expenses:

- registration fees and compulsory third party insurance premiums;
- repair and maintenance expenses;
- parking fees (not fines);
- bridge or road tolls;
- fees for membership of motorists' organisations (e.g. NRMA, RACV, etc.)
- fuel and oil expenses; and
- costs of preparing, registering, stamping, assigning or surrendering a car operating lease.

The share of fuel costs in total motor vehicle running expenses is unknown. However, data from ABS's *Transport Industry Survey 1983/84* shows that this could comprise nearly half of total motor vehicle running expenses.

Rental expenses and depreciation account for 8.8 and 6.6 per cent of total costs respectively. Motor vehicle rental expense, as a proportion, appears to have increased over time, reflecting the increasing popularity of operating leases within the hire & reward part of the road freight transport industry.

TABLE 5.5 COST STRUCTURE, 1999/2000 (HIRE & REWARD FREIGHT TRANSPORT)

Road freight (ANZSIC 611)	*Employing businesses*	*Non-employing businesses*	*Total selected businesses*	*Employing businesses*	*Non-employing businesses*	*Total selected businesses*
	($m)	($m)	($m)	%	%	%
Labour costs	3 775.7	0.0	3 775.7	24.3	0.0	22.2
Wages and salaries	3 373.2	0.0	3 373.2	21.7	0.0	19.9
Employer contributions to superannuation	254.5	0.0	254.5	1.6	0.0	1.5
Workers compensation costs	148.1	0.0	148.1	1.0	0.0	0.9
Insurance premiums	185.5	19.1	204.6	1.2	1.3	1.2
Interest expenses	263.0	48.4	311.4	1.7	3.3	1.8
Depreciation	932.2	180.9	1 113.1	6.0	12.3	6.6
Bad or doubtful debts	30.9	1.5	32.4	0.2	0.1	0.2
Purchases	3 303.9	344.5	3 648.4	21.3	23.5	21.5
Purchases of finished goods for resale	1 524.9	169.0	1 693.8	9.8	11.5	10.0
Purchases of materials and components	1 056.6	110.3	1 166.8	6.8	7.5	6.9
Electricity and gas expenses	108.7	9.9	118.6	0.7	0.7	0.7
Petrol products & other fuel expenses	613.8	55.4	669.1	4.0	3.8	3.9
Computer software expensed	17.9	1.6	19.5	0.1	0.1	0.1
Fringe benefits tax	17.4	0.0	17.4	0.1	0.0	0.1
Payroll tax	127.2	0.0	127.2	0.8	0.0	0.7
Land tax and land rates	27.0	2.2	29.3	0.2	0.2	0.2
Other bank charges	36.1	3.7	39.8	0.2	0.3	0.2
Royalties expenses	7.4	0.4	7.8	0.0	0.0	0.0
Freight expenses	595.0	40.4	635.3	3.8	2.8	3.7
Freight expenses, directly invoiced	160.8	10.9	171.8	1.0	0.7	1.0
Freight expenses, other	434.1	29.5	463.6	2.8	2.0	2.7
Postal and mailing expenses	13.5	1.0	14.5	0.1	0.1	0.1
Telecommunication service expenses	134.7	12.1	146.8	0.9	0.8	0.9
Repair and maintenance expenses	410.8	69.4	480.2	2.6	4.7	2.8
Rental expenses	1 366.1	131.1	1 497.2	8.8	8.9	8.8
Rental of land expenses	349.7	29.7	379.4	2.3	2.0	2.2
Rental of motor vehicle expenses	578.7	58.0	636.8	3.7	4.0	3.7
Other rental expenses	437.7	43.3	481.0	2.8	3.0	2.8
Motor vehicle running expenses	1 556.3	404.4	1 960.7	10.0	27.6	11.5
Audit expenses	48.8	5.2	54.0	0.3	0.4	0.3
Legal expenses	10.5	0.7	11.2	0.1	0.0	0.1
Advertising expenses	28.8	2.5	31.3	0.2	0.2	0.2
Advertising, advertising agencies	13.0	1.1	14.1	0.1	0.1	0.1
Advertising, television	1.9	0.2	2.1	0.0	0.0	0.0
Advertising, Press	3.2	0.3	3.4	0.0	0.0	0.0
Advertising, other advertising	10.7	0.9	11.6	0.1	0.1	0.1
Paper and printing expenses	45.5	3.8	49.3	0.3	0.3	0.3
Staff training expenses	16.5	1.3	17.9	0.1	0.1	0.1
Travel and accommodation expenses	47.3	3.8	51.1	0.3	0.3	0.3
Other management expenses	218.2	21.6	239.8	1.4	1.5	1.4
Cleaning expenses	22.1	1.5	23.6	0.1	0.1	0.1
Subcontracting & commission work	1 848.6	137.7	1 986.3	11.9	9.4	11.7
Sales commission expenses	23.5	1.5	25.0	0.2	0.1	0.1
Commission expenses on own materials	2.2	0.1	2.3	0.0	0.0	0.0
Other contract, sub-contract expenses	1 822.8	136.1	1 959.0	11.7	9.3	11.5
Other expenses	436.7	28.4	465.2	2.8	1.9	2.7
Total operating expenses	**15 523.7**	**1 467.2**	**16 990.9**	**100.0**	**100.0**	**100.0**

(continued over page)

TABLE 5.5 (CONT.) COST STRUCTURE, 1999/2000 (HIRE & REWARD FREIGHT TRANSPORT)

Road freight forwarding (ANZSIC 6642)	*Employing businesses*	*Non-employing businesses*	*Total selected businesses*	*Employing businesses*	*Non-employing businesses*	*Total selected businesses*
	($m)	($m)	($m)	%	%	%
Labour costs	398.9	0.0	398.9	19.5	0.0	19.2
Wages and salaries	361.4	0.0	361.4	17.7	0.0	17.4
Employer contributions to superannuation	20.5	0.0	20.5	1.0	0.0	1.0
Workers compensation costs	17.0	0.0	17.0	0.8	0.0	0.8
Insurance premiums	11.1	0.2	11.3	0.5	0.5	0.5
Interest expenses	6.8	1.1	7.8	0.3	2.8	0.4
Depreciation	47.6	4.4	52.0	2.3	11.5	2.5
Bad or doubtful debts	1.3	0.0	1.3	0.1	0.0	0.1
Purchases	62.8	0.9	63.7	3.1	2.4	3.1
Purchases of finished goods for resale	5.1	0.1	5.2	0.3	0.2	0.3
Purchases of materials and components	27.2	0.3	27.6	1.3	0.8	1.3
Electricity and gas expenses	16.5	0.3	16.7	0.8	0.7	0.8
Petrol products & other fuel expenses	14.0	0.2	14.3	0.7	0.6	0.7
Computer software expensed	7.5	0.1	7.6	0.4	0.3	0.4
Fringe benefits tax	5.0	0.0	5.0	0.2	0.0	0.2
Payroll tax	19.5	0.0	19.5	1.0	0.0	0.9
Land tax and land rates	12.8	0.2	13.0	0.6	0.6	0.6
Other bank charges	5.0	0.1	5.1	0.2	0.2	0.2
Royalties expenses	0.5	0.0	0.5	0.0	0.0	0.0
Freight expenses	354.8	6.3	361.1	17.4	16.6	17.4
Freight expenses, directly invoiced	352.7	6.3	359.0	17.3	16.5	17.3
Freight expenses, other	2.0	0.0	2.1	0.1	0.1	0.1
Postal and mailing expenses	74.0	1.3	75.4	3.6	3.5	3.6
Telecommunication service expenses	56.0	1.0	57.0	2.7	2.5	2.7
Repair and maintenance expenses	101.7	1.7	103.3	5.0	4.4	5.0
Rental expenses	132.7	2.2	134.9	6.5	5.7	6.5
Rental of land expenses	70.1	1.1	71.2	3.4	3.0	3.4
Rental of motor vehicle expenses	12.8	0.2	13.0	0.6	0.5	0.6
Other rental expenses	49.8	0.9	50.6	2.4	2.3	2.4
Motor vehicle running expenses	51.2	9.3	60.5	2.5	24.4	2.9
Audit expenses	4.3	0.1	4.4	0.2	0.2	0.2
Legal expenses	4.1	0.1	4.1	0.2	0.2	0.2
Advertising expenses	13.2	0.2	13.4	0.6	0.6	0.6
Advertising, advertising agencies	0.4	0.0	0.4	0.0	0.0	0.0
Advertising, television	4.6	0.1	4.7	0.2	0.2	0.2
Advertising, Press	2.8	0.1	2.9	0.1	0.1	0.1
Advertising, other advertising	5.3	0.1	5.4	0.3	0.2	0.3
Paper and printing expenses	11.8	0.2	12.0	0.6	0.5	0.6
Staff training expenses	5.3	0.1	5.4	0.3	0.2	0.3
Travel and accommodation expenses	21.9	0.4	22.2	1.1	1.0	1.1
Other management expenses	36.4	0.6	37.0	1.8	1.5	1.8
Cleaning expenses	7.8	0.1	8.0	0.4	0.3	0.4
Subcontracting & commission work	541.0	7.3	548.3	26.5	19.2	26.4
Sales commission expenses	0.4	0.0	0.4	0.0	0.0	0.0
Commission expenses on own materials	0.0	0.0	0.0	0.0	0.0	0.0
Other contract, sub-contract expenses	540.6	7.3	547.9	26.5	19.2	26.4
Other expenses	46.0	0.3	46.4	2.3	0.8	2.2
Total operating expenses	**2 041.1**	**37.9**	**2 079.0**	**100.0**	**100.0**	**100.0**

Source: ABS, Cat. No. 8155.0, unpublished data.

The cost structure of the road freight forwarding sector is different, with sub-contracting expenses comprising a much higher share (43.8 per cent).

Table 5.6 groups the listed expense items in table 5.5 into major categories that are roughly consistent with those adopted in ABS's *Transport Industry Survey 1983/84* (TIS). The reason for grouping them thus is to shed light on how the cost structure has changed over time. Several important trends can be seen in table 5.6.

First, the share of labour costs in the total selected costs (TIS) decreased in the road freight sector for 1983/84–1999/2000 and increased in the road freight forwarding sector.

Second, the share of vehicle running expenses in the total selected costs (TIS) decreased in the road freight sector for 1983/84–1999/2000 and increased in the road freight forwarding sector.

Third, the share of sub-contracting costs increased in the road freight sector for 1983/84–1999/2000 and decreased in the road freight forwarding sector. This shows a trend towards vertical integration for both road freight and road freight forwarding activities.

Fourth, fuel cost as a proportion of the total selected costs decreased for the road freight industry, particularly the road freight sector. This result could be partly due to the assumption made in estimating fuel costs.[24] But in view of the magnitude of the decline (from 27 per cent in 1983/84 to 22 per cent in 1999/2000), it is possible that fuel really has become a less significant expense item compared with 15 years ago. Further information is needed to confirm this.

The cost structure varies with firm size (table 5.7). For example, larger firms tend to rely more on out-sourcing than smaller firms; the cost share for labour tends to be smaller for larger firms than for smaller firms; and the cost share for fuels tends to be higher for smaller firms than for larger firms.

[24] Due to lack of detailed information, it was assumed that the share of fuel costs in the total motor vehicle running expenses has remained unchanged since 1983-84.

TABLE 5.6 COMPARISONS OF THE COST STRUCTURE, 1983/84 AND 1999/2000 (HIRE & REWARD)

Road freight (ASIC 5111–5113 or ANZSIC 611)	*1983-84 (ASIC 5111–5113)*				*1999-2000 (ANZSIC 611)*		
	Long distance interstate 5111	*Long distance intrastate 5112*	*Short distance 5113*	*Road freight total*	*Employing businesses*	*Non-employing businesses*	*Total selected businesses*
Expense items ($m)							
Wage and salaries	151.1	162.5	381.9	695.5	3 627.6	0.0	3 627.6
Motor vehicle running expenses	331.4	331.5	618.5	1281.4	5 210.4	768.8	5 979.2
Fuels	206.0	187.5	307.3	700.8	2 849.7	420.5	3 270.2
Repairs and maintenance	2.8	4.1	11.6	18.5	410.8	69.4	480.2
Subcontracting & commission work	77.2	62.9	106.4	246.5	2 443.5	178.1	2 621.6
Rent, leasing and hiring	73.0	84.2	132.7	289.9	1 366.1	131.1	1 497.2
Electricity, fuels, packing and other materials	14.1	19.4	31.4	64.9	722.4	65.3	787.7
Total (excluding wages & salaries)	498.5	502.1	900.6	1 901.2	10 153.3	1 212.6	11 365.9
Total (TIS)	**649.6**	**664.6**	**1 282.5**	**2 596.7**	**13 781.0**	**1 212.6**	**14 993.5**
Other expenses (for 1999-00 only)	na	na	Na	na	1 742.7	254.7	1 997.4
Grand Total (EAS)					**15 523.7**	**1 467.2**	**16 990.9**
Cost shares (%)				.			
Wage and salaries	23.3	24.5	29.8	26.8	26.3	0.0	24.2
Motor vehicle running expenses	51.0	49.9	48.2	49.3	37.8	63.4	39.9
Fuels	31.7	28.2	24.0	27.0	20.7	34.7	21.8
Repairs and maintenance	0.4	0.6	0.9	0.7	3.0	5.7	3.2
Subcontracting & commission work	11.9	9.5	8.3	9.5	17.7	14.7	17.5
Rent, leasing and hiring	11.2	12.7	10.3	11.2	9.9	10.8	10.0
Electricity, fuels, packing and other materials	2.2	2.9	2.4	2.5	5.2	5.4	5.3
Total (excluding wages & salaries)	76.7	75.5	70.2	73.2	73.7	100.0	75.8
Total (TIS)	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(continued over page)

TABLE 5.6 (CONT.) COMPARISONS OF THE COST STRUCTURE, 1983/84 AND 1999/2000 (HIRE & REWARD)

Road freight forwarding (ASIC 5114 or ANZSIC 6642)	*1983-84 (ASIC 5114)*	*1999-2000 (ANZSIC 6642)*		
		Employing businesses	*Non-employing businesses*	*Total selected businesses*
Expense items ($m)				
Wage and salaries	207.1	381.9	0.0	381.9
Motor vehicle running expenses	86.9	369.3	13.9	383.2
Fuels	42.0	178.5	6.7	185.3
Repairs and maintenance	6.8	101.7	1.7	103.3
Subcontracting & commission work	840.1	895.8	13.6	909.3
Rent, leasing and hiring	49.7	132.7	2.2	134.9
Electricity, fuels, packing and other materials	37.2	30.5	0.5	31.0
Total (excluding wages & salaries)	1 020.7	1 529.8	31.9	1 561.7
Total (TIS)	**1 227.8**	**1 911.7**	**31.9**	**1 943.6**
Other expenses (for 1999-00 only)	na	129.4	6.0	135.5
Grand Total (EAS)		**2 041.1**	**37.9**	**2 079.0**
Cost shares (%)				
Wage and salaries	16.9	20.0	0.0	19.6
Motor vehicle running expenses	7.1	19.3	43.7	19.7
Fuels	3.4	9.3	21.1	9.5
Repairs and maintenance	0.6	5.3	5.3	5.3
Subcontracting & commission work	68.4	46.9	42.6	46.8
Rent, leasing and hiring	4.0	6.9	6.8	6.9
Electricity, fuels, packing and other materials	3.0	1.6	1.6	1.6
Total (excluding wages & salaries)	83.1	80.0	100.0	80.4
Total (TIS)	**100.0**	**100.0**	**100.0**	**100.0**

Note: While every effort has been made to make the broad expense categories as consistent as possible between the two selected years, minor differences could still remains. So caution is needed in interpreting the data, especially when the differences are small.

Source: ABS (1986b), Cat. No. 9104.0, p. 6 and p. 11; ABS, Cat. No. 8155.0, unpublished data.

Industry profitability

A rough measure of profitability is gross profit margin which is the percentage of operating income available as operating profits before tax. Table 5.8 provides a detailed snapshot of industry profitability by turnover size for both the road freight and road freight forwarding sectors.

Road freight

The average gross profit margin for the road freight sector was 6.8 per cent[25] in 1999/2000, which is broadly consistent with what one would expect for a competitive industry such as trucking. The profit margin appears to have remained at this level for a number of years now.[26]

Profitability varies between employing and non-employing businesses (owner operated) and between businesses with different turnover sizes within the employing business category. For employing businesses, firms whose turnover is between $100 000–500 000 achieve the highest profit margins (9.3 per cent). The profit margins for businesses with turnovers greater than half a million dollars are much lower, particularly for the highest turnover group. The profit margin for the lowest turnover group is negative (–62 per cent). There are 2 686 businesses in this group, but they account for less than 0.3 per cent of the sector's total operating income.

The profit margin for non-employing businesses needs explanation. In general, the operating profit before tax is over-estimated due to inclusion of the returns to labour of working proprietors. Therefore, the calculated profit margins for non-employing businesses are not valid. However, inferences can be drawn about the financial performance of owner operators by comparing average operating income and expenses. As shown in table 5.8, the average operating income is $70 000 (per business) in 1999/2000. More than 70 per cent of this income ($49 000) is needed to pay non-wage expenses. What remains is slightly over $20 000 per business per year.

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[25] The gross profit margin is defined as: $\frac{Operating\ profits\ before\ tax}{Operating\ income} * 100$. The average profit margin is slightly over-estimated because the operating profit before tax for non-employing businesses includes the returns to labour of working proprietors. The average gross profit margin for all industries in 1999/2000 was 7.0 per cent (ABS 2001c).

[26] Comparable data prior to 1999/2000 are not available. But according to ABS data presented in Ironfield (2001, p. 7) for the total road transport industry (ANZSIC 61), the profit margins for the employing-business varied between 4.5 and 6.3 per cent during 1993/4 and 1998/99. Because road freight accounts for around 80 per cent of the total road transport industry, these data may largely reflect changes in the profit margins in the road freight transport sector.

TABLE 5.7 COST STRUCTURE BY TURNOVER SIZE 1999/2000

Road freight (ANZSIC 611)	*Non-employing businesses*	*Less than or equal to $50 000*	*Greater than $50 000 and less than or equal to $100 000*	*Greater than $100 000 and less than or equal to $500 000*	*Greater than $500 000 and less than or equal to $1m*	*Greater than $1m and less than or equal to $10m*	*Greater than $10m and less than or equal to $20m*	*Greater than $20m*	*Total*
Expense items ($m)									
Wage and salaries	0	20 065	101 433	455 897	250 965	1 159 198	305 570	1 334 502	3 627 630
Motor vehicle running expenses	768 789	30 893	96 417	669 397	443 860	2 117 421	567 898	1 284 542	5 979 218
Fuels	420 471	16 896	52 733	366 111	242 759	1 158 074	310 598	702 550	3 270 195
Repairs and maintenance	69 352	2 807	7 777	64 589	41 533	149 448	36 436	108 241	480 182
Subcontracting & commission work	178 123	8 125	17 923	150 987	115 332	614 329	175 316	1 361 511	2 621 645
Rent, leasing and hiring	131 056	5 981	14 027	119 991	98 925	532 342	154 142	440 715	1 497 179
Electricity, fuels, packing and other materials	65 261	2 979	6 902	58 883	47 888	257 246	74 302	274 216	787 677
Total (excluding wages & salaries)	1 212 581	50 785	143 046	1 063 847	747 538	3 670 786	1 008 094	3 469 225	11 365 901
Total (TIS)	1 212 581	70 850	244 479	1 519 744	998 503	4 829 984	1 313 664	4 803 727	14 993 531
Other expenses	254 654	10 377	35 255	288 777	160 629	562 547	172 912	512 217	1 997 369
Grand Total (EAS)	1 467 235	81 227	279 734	1 808 521	1 159 132	5 392 531	1 486 576	5 315 944	16 990 900
Cost shares (%)									
Wage and salaries	0.0	28.3	41.5	30.0	25.1	24.0	23.3	27.8	24.2
Motor vehicle running expenses	63.4	43.6	39.4	44.0	44.5	43.8	43.2	26.7	39.9
Fuels	34.7	23.8	21.6	24.1	24.3	24.0	23.6	14.6	21.8
Repairs and maintenance	5.7	4.0	3.2	4.2	4.2	3.1	2.8	2.3	3.2
Subcontracting & commission work	14.7	11.5	7.3	9.9	11.6	12.7	13.3	28.3	17.5
Rent, leasing and hiring	10.8	8.4	5.7	7.9	9.9	11.0	11.7	9.2	10.0
Electricity, fuels, packing and other materials	5.4	4.2	2.8	3.9	4.8	5.3	5.7	5.7	5.3
Total (excluding wages & salaries)	100.0	71.7	58.5	70.0	74.9	76.0	76.7	72.2	75.8
Total (TIS)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total (TIS)	82.6	87.2	87.4	84.0	86.1	89.6	88.4	90.4	88.2
Other expenses	17.4	12.8	12.6	16.0	13.9	10.4	11.6	9.6	11.8
Grand Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(to be continued)

TABLE 5.7 (CONT.) COST STRUCTURE BY TURNOVER SIZE 1999/2000

Road freight forwarding (ANZSIC 6642)	*Non-employing businesses*	*Less than or equal to $50 000*	*Greater than $50 000 and less than or equal to $100 000*	*Greater than $100 000 and less than or equal to $500 000*	*Greater than $500 000 and less than or equal to $1m*	*Greater than $1m and less than or equal to $10m*	*Greater than $10m and less than or equal to $20m*	*Greater than $20m*	*Total*
Expenses items ($m)									
Wage and salaries	0	59	1 188	4 691	5 345	n.p.	n.p.	326 239	381 850
Motor vehicle running expenses	13 934	56	631	3 840	4 122	n.p.	n.p.	313 966	383 189
Fuels	6 738	27	305	1 857	1 993	n.p.	n.p.	151 813	185 284
Repairs and maintenance	1 684	5	66	493	514	n.p.	n.p.	96 357	103 349
Subcontracting & commission work	13 590	51	291	5 564	8 728	n.p.	n.p.	758 817	909 347
Rent, leasing and hiring	2 155	8	46	881	1 384	n.p.	n.p.	111 600	134 854
Electricity, fuels, packing and other materials	517	2	11	212	332	n.p.	n.p.	25 496	30 986
Total (excluding wages & salaries)	31 880	122	1 045	10 990	15 080	n.p.	n.p.	1 306 236	1 561 725
Total (TIS)	31 880	181	2 233	15 681	20 425	n.p.	n.p.	1 632 475	1 943 575
Other expenses	6 044	5	232	1 786	1 484	n.p.	n.p.	108 387	135 474
Grand Total (EAS)	37 924	186	2 465	17 467	21 909	n.p.	n.p.	1 740 862	2 079 049
Cost shares (%)									
Wage and salaries	0.0	32.6	53.2	29.9	26.2	n.p.	n.p.	20.0	19.6
Motor vehicle running expenses	43.7	30.9	28.3	24.5	20.2	n.p.	n.p.	19.2	19.7
Fuels	21.1	15.0	13.7	11.8	9.8	n.p.	n.p.	9.3	9.5
Repairs and maintenance	5.3	2.8	3.0	3.1	2.5	n.p.	n.p.	5.9	5.3
Subcontracting & commission work	42.6	28.2	13.0	35.5	42.7	n.p.	n.p.	46.5	46.8
Rent, leasing and hiring	6.8	4.4	2.1	5.6	6.8	n.p.	n.p.	6.8	6.9
Electricity, fuels, packing and other materials	1.6	1.1	0.5	1.4	1.6	n.p.	n.p.	1.6	1.6
Total (excluding wages & salaries)	100.0	67.4	46.8	70.1	73.8	n.p.	n.p.	80.0	80.4
Total (TIS)	100.0	100.0	100.0	100.0	100.0	n.p.	n.p.	100.0	100.0
Total (TIS)	84.1	97.3	90.6	89.8	93.2	n.p.	n.p.	93.8	93.5
Other expenses	15.9	2.7	9.4	10.2	6.8	n.p.	n.p.	6.2	6.5
Grand Total	100.0	100.0	100.0	100.0	100.0	n.p.	n.p.	100.0	100.0

Source: ABS, Cat. No. 8155.0, unpublished data.

TABLE 5.8 PROFIT MARGINS BY TURNOVER SIZE AND BY INDUSTRY, 1999/2000

$'000	*Non-employing businesses*	*Less than or equal to $50 000*	*Greater than $50 000 and less than or equal to $100 000*	*Greater than $100 000 and less than or equal to $500 000*	*Greater than $500 000 and less than or equal to $1m*	*Greater than $1m and less than or equal to $10m*	*Greater than $10m and less than or equal to $20m*	*Greater than $20m*	*Total*
ANZSIC 611 Road freight									
No. of operating businesses	**29 701**	**2 686**	**3 920**	**8 959**	**1 672**	**2 199**	**104**	**68**	**49 309**
Frequency distribution (%)	(60.23)	(5.45)	(7.95)	(18.17)	(3.39)	(4.46)	(0.21)	(0.14)	(100.00)
Total operating income	2 080 197	50 058	297 835	1 994 242	1 218 432	5 579 238	1 548 348	5 468 150	18 236 500
Frequency distribution (%)	(11.41)	(0.27)	(1.63)	(10.94)	(6.68)	(30.59)	(8.49)	(29.98)	(100.00)
Total operating expenses	1 467 235	81 227	279 734	1 808 521	1 159 132	5 392 531	1 486 576	5 315 944	16 990 900
Operating profit before tax	612 963	-31 170.0	18 101.0	185 644.0	59 300.0	187 201.0	61 355.0	149 731.0	1 243 125
Average operating income	70.0	18.6	76.0	222.6	728.8	2 537.5	14 823.2	80 120.3	369.8
Average operating expenses	49.4	30.2	71.4	201.9	693.3	2 452.5	14 231.9	77 890.1	344.6
Profit margins	**29.47***	**-62.27**	**6.08**	**9.31**	**4.87**	**3.36**	**3.96**	**2.74**	**6.82**
ANZSIC 6642 Road freight forwarding									
No. of operating businesses	**897**	**38**	**33**	**69**	**29**	**n.p.**	**n.p.**	**24**	**1 162**
Frequency distribution (%)	(77.19)	(3.26)	(2.86)	(5.98)	(2.53)	n.p.	n.p.	(2.06)	(100.00)
Total operating income	57 662	202	2 689	18 256	22 449	n.p.	n.p.	1 797 820	2 164 076
Frequency distribution (%)	(2.66)	(0.01)	(0.12)	(0.84)	(1.04)	n.p.	n.p.	(83.08)	(100.00)
Total operating expenses	37 924	186	2 465	17 467	21 909	n.p.	n.p.	1 740 862	2 079 049
Operating profit before tax	19 738	16	224	789	540	n.p.	n.p.	57 073	85 143
Average operating income	64.3	5.3	80.8	262.9	762.9	n.p.	n.p.	74 994.7	1 862.4
Average operating expenses	42.3	4.9	74.1	251.5	744.6	n.p.	n.p.	72 618.8	1 789.2
Profit margins	**34.23***	**7.92**	**8.33**	**4.32**	**2.41**	**n.p.**	**n.p.**	**3.17**	**3.93**

Note: n.p.: not available due to confidentiality. * Not valid due to omission of labour costs in estimating the total operating costs.

Source: ABS, Cat. No. 8155.0, unpublished data.

Road freight forwarding

The profit margin in the road freight forwarding sector as a whole was 3.9 per cent in 1999/2000, lower than that in the road freight sector. The level of the profit margin for this sector is largely determined by businesses with turnovers greater that $20 million, because these businesses account for 83 per cent of the sector's total operating revenues.

The highest profit margin is observed in the $50 000-100 000 turnover group, reaching 8.3 per cent[27]. Profitability for larger freight forwarding businesses is generally much lower.

The profit margin for the two lowest turnover groups within the employing business category is highly likely to be over-estimated (see footnote 26). Also, in view of the size of the average operating income, these businesses are unlikely to be running freight forwarding as their main operation.

The financial performance for non-employing businesses in the road freight forwarding sector is very similar to that for the road freight sector, with little revenue left as owner operators' net income.

Trends in industry profitability

Direct comparison of the data on industry profitability between 1983/84 and 1999/2000 is not meaningful because, as mentioned earlier, the total operating expenses are under-estimated for 1983/84. In order to make a valid comparison, a concordance was developed for the expense items between 1983/84 and 1999/2000. This leads to a set of adjusted profit margins for 1999/2000 that are comparable to those for 1983/84.

As shown in table 5.9, the road freight industry today appears to have become much less profitable than it was in the early 1980s. For the road freight sector as a whole, the adjusted profit margin declined from 30.8 per cent in 1983/84 to 17.8 per cent in 1999/2000.[28] The decline of profitability in the road freight forwarding sector was less dramatic. Profit margins for 1983/84 were already relatively low.[29]

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[27] Profit margins for this turnover group and the one below it within the employing-business category could be over-estimated due to the fact that many smaller operators could have included the return to their labour in operating profit.

[28] The decline was partly explained by the fact that 1999/2000 data included non-employing businesses whose profit margins were generally lower than the industry average.

[29] Adjusted profit margins do not reflect the true industry profitability because of exclusion of some input costs.

TABLE 5.9 COMPARISON OF PROFIT MARGINS (%), 1983/84 AND 1999/2000

1999/2000	*Non-employing businesses*	*Less than or equal to $50 000*	*Greater than $50 000 and less than or equal to $100 000*	*Greater than $100 000 and less than or equal to $500 000*	*Greater than $500 000 and less than or equal to $1m*	*Greater than $1m and less than or equal to $10m*	*Greater than $10m and less than or equal to $20m*	*Greater than $20m*	*Total*
ANZSIC 611 Road freight									
No. of operating businesses	29 701	2 686	3 920	8 959	1 672	2 199	104	68	49 309
Profit margins	29.47	-62.27	6.08	9.31	4.87	3.36	3.96	2.74	6.82
Profit margins (adjusted)	41.7	-41.5	17.9	23.8	18.1	13.4	15.1	12.1	17.8
ANZSIC 6642 Road freight forwarding									
No. of operating businesses	897	38	33	69	29	n.p.	n.p.	24	1 162
Profit margins	34.23	7.92	8.33	4.32	2.41	n.p.	n.p.	3.17	3.93
Profit margins (adjusted)	44.7	10.4	17.0	14.1	9.0	n.p.	n.p.	9.2	10.2

1983/84	*less than $10 000*	*$10 000 but less than $50 000*	*$50 000 but less than $100 000*	*$100 000 but less than $500 000*	*$500 000 but less than $1m*	*$1m and over*	*Total*
ASIC 5111-3 Road freight							
No. of operating businesses	674	18 111	8 186	4 562	428	407	32 368
Profit margins	28.9	53.0	38.6	27.1	20.3	23.0	30.8
ASIC 5114 Road freight forwarding							
No. of operating businesses	na	na	37	206	163	170	575
Profit margins	na	na	34.3	15.2	13.8	15.2	14.4

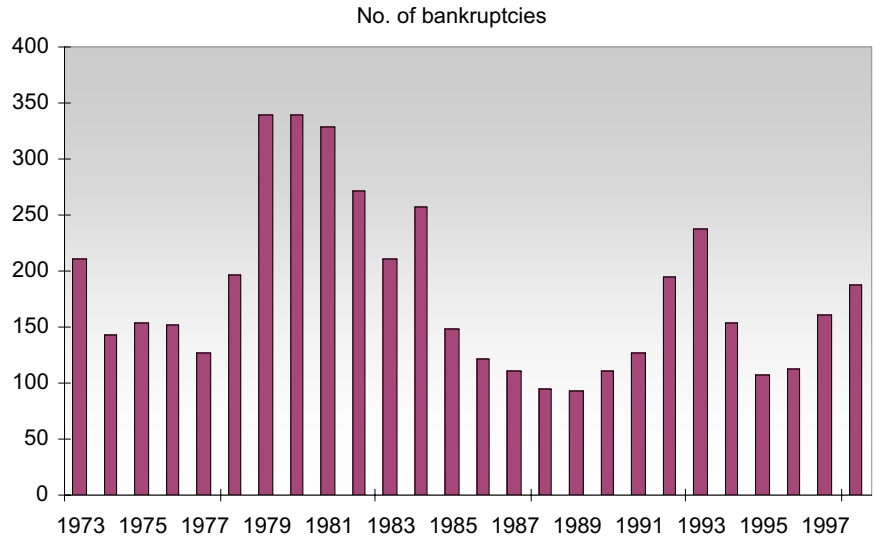
Note: The categories defined over the turnover size are not directly comparable between the two years due to price effects.

Source: ABS Cat. No. 9105.0, pp.14-15; ABS, Cat. No. 8155.0, unpublished data.

Bankruptcies

Published data on company insolvency from Australian Securities & Investment Commission (ASIC) does not contain detailed information at the industry level. An alternative is to use business bankruptcy data available from Insolvency and Trustee Service Australia (ITSA). These data are classified by occupations. One of the occupations is drivers working in road transport, which includes passenger transport as well. A major drawback of the ITSA data is that the number of business bankruptcies does not indicate the number of businesses that have been bankrupt; instead, they indicate the number of individuals who have become bankrupt as a result of a proprietary interest in a business. Care is therefore needed in interpreting the data presented in figure 5.6.

FIGURE 5.6 BUSINESS BANKRUPTCIES IN ROAD TRANSPORT (1973–1998)



Note: Business bankruptcy refers to an individual's bankruptcy which is directly related to his or her proprietary interest in a business.

Source: ITSA (2001).

In general, business bankruptcies in the road transport sector have trended downwards since 1980, though there have been cyclical fluctuations. The decline in the number of business bankruptcies occurred against a background of a significant increase in the number of small road freight businesses. The peak in business bankruptcies in 1993 appears to have been a result of the severe recession Australia had in the early 1990s. The reason for an upward trend in the most recent years is unknown[30] and needs further investigation.

[30] Since 1999, ITSA data no longer make a distinction between truck/bus and train drivers.

PRODUCTIVITY

Changes in productivity reflect changes in technology and efficiency. Chapter 4 discussed changes in vehicle technology such as larger vehicles and related fuel efficiency improvement. This section provides data on total and business laden trips, which serve as a partial indicator showing efficiency gains that do not depend on the use of larger vehicles for their attainment.

Changes in overall productivity (arising from both technical change and efficiency improvement) can be measured either at the industry level or at the firm level, depending on the availability of data.

Data on changes in the productivity of the road freight transport industry are not readily available. There are, however, a few studies, which show productivity gains for the 'transport and storage' industry as a whole (ABS 2001d and PC 2001). Because the road freight transport industry accounts for less than 30 per cent of the total transport and storage sector, the results from aggregate analysis should be viewed with caution. Further research is needed if we wish to have a better understanding of changes in the productivity in the road freight transport industry.

Total, business and laden business kilometres

Total kilometres travelled comprise business travel and non-business travel. Business travel, in turn, comprises laden and unladen travel. The proportion of laden to business travel and that of business to total travel provides a partial measure of productivity resulting mainly from improvement in management practices.[31]

As shown in table 5.10, the general trend of the proportion of laden to business kilometres has been downwards since 1991. This is particularly true for LCVs (from 77.4 per cent in 1991 to 72.0 per cent in 2001) and rigid trucks (from 75.6 per cent to 72.6 per cent). The increase in the incidence of empty running is a reverse of the earlier trend where an appreciable increase in the ratio was observed for 1975–1991 (BTE, 1993).[32]

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[31] A change in patterns of freight flows could also influence these indicators.

[32] According to BTE (1993), the proportion of laden to business travel for both rigid and articulated trucks rose from about 69 per cent in 1975 to about 75 per cent in 1991.

TABLE 5.10 TOTAL, BUSINESS AND LADEN KILOMETRES (MILLION KM)

	Laden				*All business use*				*Total*			
	LCV	*Rigid trucks*	*Articulated trucks*	*Total*	*LCV*	*Rigid trucks*	*Articulated trucks*	*Total*	*LCV*	*Rigid trucks*	*Articulated trucks*	*Total*
1991	9 809	4 285	2 929	17 024	12 674	5 667	3 929	22 270	22 814	6 114	3 959	32 886
1995	11 558	4 740	3 778	20 076	15 900	6 390	5 063	27 353	27 751	6 725	5 094	39 570
2000	13 120	4 537	4 071	21 728	18 085	6 367	5 569	30 021	27 829	6 536	5 578	39 943
2001	13 889	4 690	3 933	22 512	19 301	6 463	5 317	31 081	30 728	6 627	5 321	42 676

Shares (%)

	Proportion of laden to all business use				*Proportion of all business use to total*			
	LCV	*Rigid trucks*	*Articulated trucks*	*Total*	*LCV*	*Rigid trucks*	*Articulated trucks*	*Total*
1991	77.4	75.6	74.6	76.4	55.6	92.7	99.2	67.7
1995	72.7	74.2	74.6	73.4	57.3	95.0	99.4	69.1
2000	72.5	71.3	73.1	72.4	65.0	97.4	99.8	75.2
2001	72.0	72.6	74.0	72.4	62.8	97.5	99.9	72.8

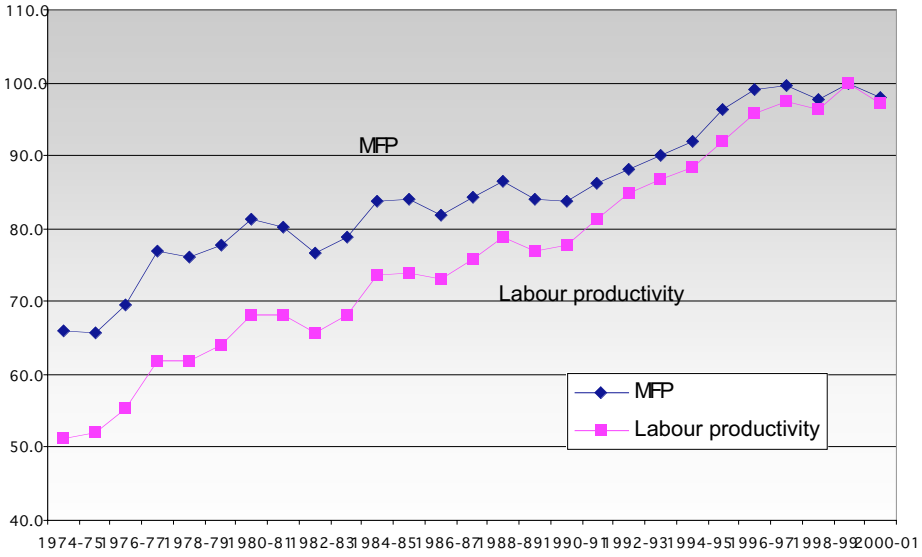
Source: ABS, SMVU, various issues

In contrast, the proportion of business kilometres to total kilometres has increased since 1991 for LCVs and rigid trucks, and to a lesser extent for articulated trucks.

Industry level productivity

Figure 5.7 presents the productivity estimates for the transport and storage industry for 1973/74–2000/01, which were derived by the Productivity Commission (2001) based on unpublished data from ABS. Both labour and multi-factor productivity have improved quite significantly since 1974/75. The average annual growth rates for labour and multi-factor productivity[33] were 3.17 per cent and 2.41 per cent respectively for 1989/90–1996/97, compared with 1.85 per cent and 0.78 per cent for 1979/80–1989/90. Since 1996/97, growth in productivity appears to have levelled off.

FIGURE 5.7 LABOUR AND MULTI-FACTOR PRODUCTIVITY: TRANSPORT AND STORAGE (1973/74–2000/01)



Notes: Labour productivity is estimated by dividing an index of real output of the transport and storage industry by an index of labour input. Multi-factor productivity is estimated by dividing an index of real output of the transport and storage industry by an index of labour and capital combined.

Source: Productivity Commission (2001).

[33] Total factor productivity is a broader measure of the industry productivity compared with the vehicle productivity, normally measured in GVM or GCM.

Whether the productivity performance of the road freight industry is in line with the general industry trend is not clear. No firm conclusion can be made about this until a dis-aggregated analysis is undertaken for the road freight transport industry.[34]

Firm level productivity performance

There is little or no information on firm-level productivity performance. Differences could be expected to be large in productivity performance between individual firms due to differences in where, what and for whom they carry and in their management practices. Analysis of such differences would enhance our understanding of the drivers of productivity performance and would have useful policy implications.

SUMMARY

- In 2002, there were around 47 000 business establishments in the road freight transport industry, compared with 33 000 in 1983/84.
- The structure of the road freight industry is very diverse with a large number of small firms. The emergence of operating leases has further facilitated new entries into the industry. The low level of industry concentration suggests that competition is a dominant feature of the industry.
- The age profile of truck drivers is rapidly increasing. This reflects in part changes in the age profile of the general population. Unless actions are taken to encourage more young people to take up truck driving as their profession, the industry is bound to face an increasing constraint in the supply of qualified truck drivers in the years ahead.
- Data on changes in cost shares suggest that the road freight transport sector has tended to outsource their freight movement task to a greater extent (performing relatively more of a freight forwarding function). At the same time, the road freight forwarding sector has tended to outsource less (performing relatively more trucking business). This is possibly a sign of a new trend towards vertical integration, albeit at a slow pace.
- Industry profitability has declined to the level of what appears to be a competitive equilibrium in road freight transport. Profitability in the road freight forwarding sector has been lower than that for the road freight sector and may be boosted by on-going restructuring by larger road transport firms. In general, the financial performance of medium-sized firms is relatively better. Owner-drivers/small operators have continued to endure a difficult financial situation, the reasons for which need further investigation.

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[34] In view of the importance of issue, it is certainly desirable to explore in the next stage the possibility of using unpublished ABS data to derive a productivity performance indicator for the road freight transport industry.

- There has been an increasing amount of empty-running by freight vehicles since the early 1990s. While the recent trend shows that the total factor productivity may no longer be improving in the transport and storage industry, the situation for the road freight sector is not clear.

CHAPTER 6 WHERE IS THE ROAD FREIGHT INDUSTRY HEADING?

This final chapter first draws out the emerging trends associated with the road freight industry. It then provides recommendations about directions for future research. The final section presents possible options for a second stage of the road freight transport study.

EMERGING TRENDS

A number of new trends have been highlighted by this overview. Many of these trends are likely to continue, thereby providing a basis for assessing where the road freight transport industry would be heading.

Growth of road freight slows

Growth of the road freight task slowed significantly in the past decade (3.9 per cent per annum for 1990–2000 compared with very fast growth of 6.8 per cent per annum for 1971–1990). Road freight intensity (percentage growth of the road freight task over percentage growth of GDP) has become lower since the mid 1980s, signalling that the growth of the road freight task may be more in line with the growth of GDP in future.

Many of the factors that led to a sharp increase in road freight intensity during the 1970s and 1980s have moderated or disappeared. For example, real road freight rates relative to rail have increased substantially since the mid 1980s, reversing the earlier trend (figure 2.2). In addition, the Australian economy has continued to become more services-oriented. The services sector could be expected to be much less freight intensive.

Growth of heavy vehicles slows

The average annual growth rate of the number of rigid trucks (used mainly for short-haul freight) was 0.2 per cent for 1991–2001. Growth of the number of articulated trucks (used mainly in long-haul freight) was higher (1.9 per cent per annum for the same period), but the growth rate for 1995–2001 was less than half of that for 1991–1995. Slower growth in the number of heavier vehicles reflects in part the larger sizes of freight vehicles, and in part, the slower growth in the road freight task.

Vehicles become larger

The trend toward larger trucks has continued, reducing the growth of the number of heavy vehicles, as previously noted. Not only GVM or GCM in each class of heavy vehicles has continued to increase, but also there has been a trend for shifting from rigid trucks to articulated trucks. Articulated trucks have a number of advantages such as higher fuel efficiency, a better safety record and savings in labour. Implementation of PBS should allow further efficiency gains in vehicle productivity.

Hire & reward becomes larger

The hire & reward part of the road freight transport industry has become larger as a result of growing out-sourcing of activities by the ancillary sector. The freight industry as a whole may have gained from this specialisation in the form of greater vehicle utilisation and better logistics management. It is likely that the trend towards out-sourcing by the ancillary sector will continue.

ICT and e-commerce provide opportunities as well as challenge

Diffusion of ICT (such as mobile phones, faxes, computers and Internet) is more widespread, benefiting both small and large operators. Take-up of e–business appears to be more popular among large businesses, which see e–business as an important component in their integrated logistics solutions. Owner drivers/small road freight operators may face a challenge in positioning themselves to take advantage of e-business because of costs or the high level skills required.

Articulated trucks becomes predominant in delivering road tonne-kilometres

The share of articulated trucks in the total road tonne-kilometres has increased by more than 20 percentage points since 1971, reaching 78 per cent in 2000. The growth of load carried and distance travelled (both in total and in average) by articulated trucks has been faster than that by rigid trucks, though it has slowed down in recent years. The growth of kilometres travelled by articulated trucks in capital cities is also fastest among the three broad types of freight vehicles.

Competition remains the dominant feature of the industry

Despite rationalisation — mergers at the top end — that has occurred in recent years, the industry is still dominated by a large number of players. The emergence of leasing finance has made entry into the industry easier. The slower growth in the demand for road freight transport services and increased competition from rail may further intensify competition within the road freight transport industry.

Road freight grows faster than road freight forwarding

Within the hire & reward sector, the road freight sector has been growing faster than the road freight forwarding sector. Part of the reason for this may be

associated with the greater importance attached by the road freight sector to the road freight forwarding activities, which has the effect of adding value to the trucking business.

Road freight outsources more and road freight forwarding outsources less

There has been a trend towards vertical integration within the hire & reward part of the road freight industry. The road freight sector has tended to engage more in freight forwarding activities and the road freight forwarding sector more in direct trucking businesses. These trends reflect the road freight industry's desire to lower the cost and to provide better logistics services to its clients.

Profit margins become tighter

Falling road freight rates and higher costs have led to a tightening of profit margins of the road freight industry. In general, the financial performance of medium-sized firms is better than that of small and large firms. Larger firms have suffered from falling profitability for a number of years now, but the situation is expected to improve as a result of on-going restructuring. The financial position for owner drivers/small operators has been difficult for a long time and there is no sign of improvement.

More trucks running empty on the road

The 1990s saw an increase in trucks running empty on the road. This is particularly true for LCVs and rigid trucks. The reason for such an increase is not clear.

Productivity improvement may have slowed down

There is no data directly available to show changes in the productivity of the road freight industry. The limited evidence available suggests that there is a possibility that improvement in the total factor productivity in the road freight sector may have slowed down. Further detailed analysis is needed before this can be confirmed.

Driver shortage is looming

The age profile of truck drivers is increasing. Falling profitability and hence financial reward, changes in life styles and high insurance costs have discouraged young people from taking up truck driving as a profession. If the current trend continues, the road freight industry will soon face serious difficulty in finding qualified truck drivers.

DIRECTIONS FOR FUTURE RESEARCH

While this paper has sought to describe many aspects of the current state of the road freight industry, a number of issues remain that would be productive areas for future research.

First, data on the road freight transport industry is outdated, sketchy and inconsistent between different sources and over time. Many updates of data such as those undertaken by NRTC (1998) and this study have had to rely on BTE and ABS survey results from the early 1980s. These updates could be misleading because much is likely to have changed over the past 15 years or so. It is therefore necessary to consider another comprehensive survey as soon as feasible.

Second, this study has necessarily focused on the hire & reward part of the road freight industry due to lack of data on the ancillary sector. The latter accounts for 60 per cent of the total number of heavy vehicles and our knowledge of the sector is limited. It would be useful to undertake a separate study of the ancillary sector due to its unique features.

Third, the impact of technological developments on the road freight transport industry needs to be further investigated. ICT and e-commerce provide a vehicle for attaining better integrated logistics solutions. Slow uptake by owner drivers/small operators of these technologies would mean that some opportunities to increase productivity are being lost. It would appear that there is a need to extend and update NOIE's study (1999).

Fourth, owner drivers/small operators have continued to suffer financial stress. Although owner drivers/small freight operators account for less than 12 per cent of the industry's operating income, they represent nearly two thirds of the total number of operating businesses (Table 5.8). Large numbers of owner drivers/small operators present a problem for monitoring and compliance. A thorough understanding of this section of the road freight industry would help to develop better policy responses.

Fifth, productivity analysis has not received adequate attention to date. The measurement of productivity has remained at the transport and storage level, making it difficult to gauge the productivity performance of the freight sector. The detailed ABS data may be readily available for undertaking a study of the productivity performance of the road freight transport industry.

So far, there has been no study of productivity at the firm level for the road freight industry. Firm-level analysis would provide a much richer insight into differences in productivity performance between firms and the reasons why these differences might occur. The methodology for measuring firm-level productivity is well established. For example, Bruning (1992) applied the stochastic frontier approach to measure firm-specific productivity of the US trucking industry. Data could be sourced either from extending the existing ABS Economic Activity Survey or from a new BTRE survey.

Finally, the driver shortage will become an increasingly important issue as time goes on. It would be useful to consider an independent study to assess the

extent of the looming driver shortage and its possible impact on the industry. Such a study would provide a basis for designing measures to mitigate the impact.

OPTIONS FOR THE SECOND STAGE STUDY

There are a number of options that can be pursued for the next stage of the freight study. These are presented in terms of the way in which the data would be collected and the order of costs that could incur.

A comprehensive new survey

If resources are available, it would be desirable to undertake a comprehensive new survey, providing the latest snapshot of the road freight industry. The earlier work by BTE (1986) and ABS (1986a, 1986b and 1987) provides a good starting point for designing a new survey. The new questionnaire should incorporate questions that shed light on the issues outlined in the previous section.

Key tasks in undertaking a nationwide survey include:

- questionnaire design;
- sample design;
- survey implementation;
- database set-up;
- data analysis; and
- report writing.

Estimation of the cost of such a survey is difficult at this stage because the exact scope of the survey has yet to be defined. However, total cost to the BTRE could be around $1 million, with the industry also incurring costs in time required for completing survey forms.

Issue-oriented survey

If the resources are not available for a large scale survey, an alternative approach would be to target particular sections of the road freight industry with clearly defined issues in mind. For example, Quinlan (2001) raises important concerns about the financial and safety performance of the long-haul trucking industry in New South Wales. Such a study could be extended into other States with an improved methodological framework. The approach could be incremental (say state by state), spreading the demand for resources. The cost for an issue-oriented survey is expected to be less than that for a full new survey.

Making better use of existing ABS collections

In recent years, ABS has extended its collections about the road freight transport industry. Existing ABS collections may contain information that could

be used to address some of the issues of interest. For example, data from the EAS could be improved for use in measuring the productivity performance of the hire & reward part of the road freight transport industry over time. EAS and ATO data could also be pulled together to provide a snapshot of firm-level productivity performance. The cost associated with piggy-backing on existing ABS collections could be least among the three data collection methods.

ABBREVIATIONS

ABS	Australian Bureau of Statistics
ASIC	Australian Securities & Investment Commission
ATA	Australian Trucking Association
BTCE	Bureau of Transport and Communication Economics
BTE	Bureau of Transport Economics
BTRE	Bureau of Transport and Regional Economics
CES	Constant Elasticity of Substitution
COR	Chain of Responsibility
EAS	Economic Activity Survey
EDI	Electronic Data Interchange
GCM	Gross Combination Mass
GDP	Gross Domestic Product
GHG	Greenhouse gas
GPS	Global Positioning System
GVM	Gross Vehicle Mass
ICT	Information & Communication Technology
ITSA	Insolvency and Trustee Services Australia
LCV	Light commercial vehicle
MFP	Multi-factor productivity
MVC	Motor Vehicle Census
NHVAS	National Heavy Vehicle Accreditation Scheme
NOIE	National Office of Information Economy
NRTC	National Road Transport Commission
OECD	Organisation for Economic Co-operation and Development
OHS	Occupational Health and Safety
PBS	Performance-Based Standards
PC	Productivity Commission
SMVU	Survey of Motor Vehicle Usage
TFP	Total factor productivity
TIS	Transport Industry Survey
VKT	Vehicle kilometres travelled

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