Cost of Civil Aviation Accidents and Incidents - Summary

Information Sheet

This information sheet contains aviation statistics calculated for 1996 using the methodology of a previous BTCE Report 79. Statistics cover accidents, property damage and property damage.

bte information sheet

COST OF CIVIL AVIATION ACCIDENTS AND INCIDENTS

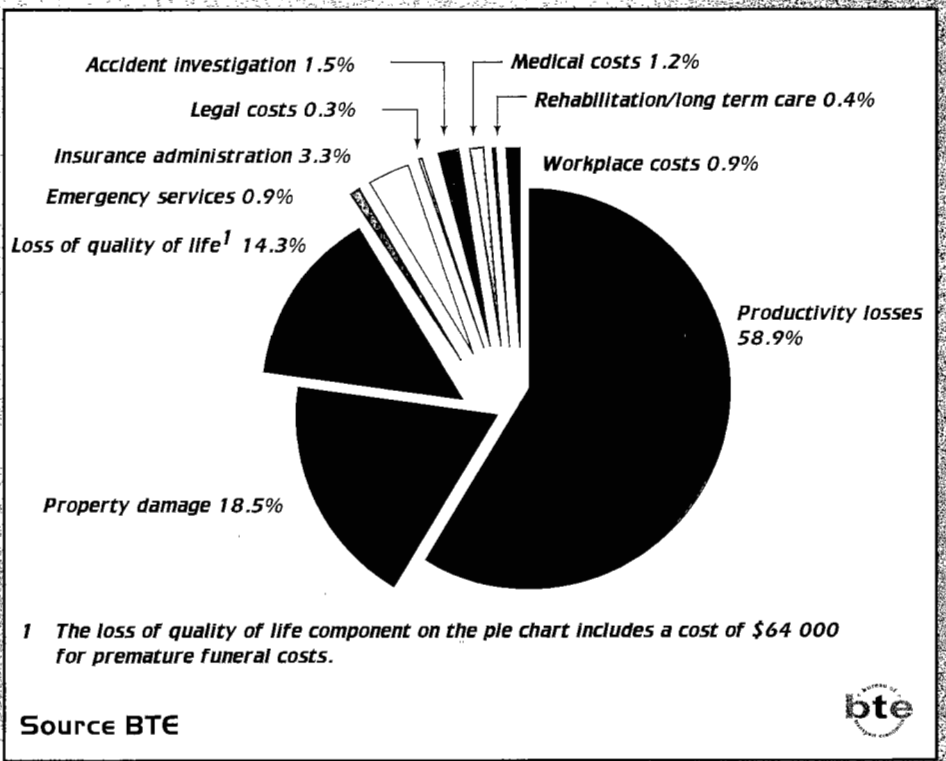
IN 1996

- AVIATION ACCIDENTS COST AUSTRALIA $112 MILLION
- PRODUCTIVITY LOSSES IN THE WORKPLACE WERE APPROXIMATELY $33.1 MILLION
- LOSSES IN HOUSEHOLD PRODUCTIVITY WERE $32.2 MILLION
- PROPERTY DAMAGE WAS $20.9 MILLION

THE *costs of aviation accidents for 1996 have been calculated using a refined methodology from the previous BTCE study, BTCE Report 79 (1992). Productivity losses were calculated using a discount rate of 4%, whereas Report 79 estimated costs using a 7% discount rate. A detailed explanation of the methodology used to produce accident costs is contained in the BTE Report 98 (1998).*

Workplace and household productivity losses alone were estimated to be $65.3 million. Property damage totalled $20.9 million; insurance administration costs were a further $3.7 million. Pain and suffering of those people directly affected by the accident was estimated to be at least $16 million. This figure does not quantify the impact on personal friends and community members who also suffer.

Figure 1 Total aviation accident costs in Australia for 1996 ($112 million) by category



1 *The loss of quality of life component on the pie chart includes a cost of $64 000 for premature funeral costs.*

Source BTE

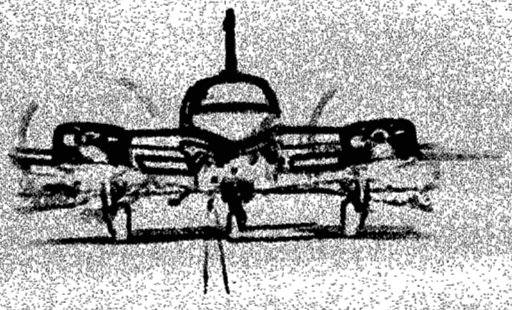
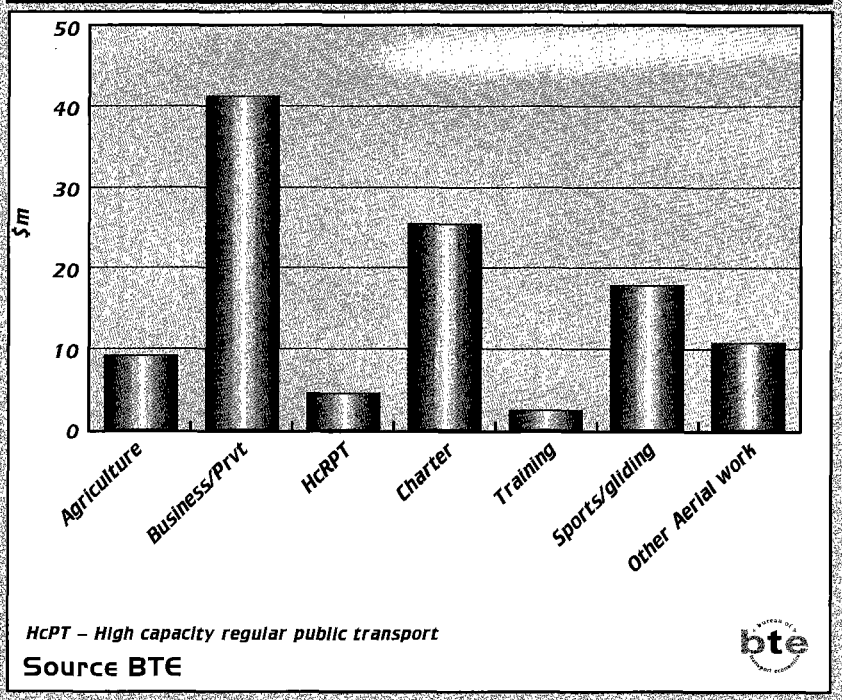


Figure 2 Accident and incident costs by industry



HcPT – High capacity regular public transport

Source BTE

INDUSTRY SEGMENT COSTS

The highest costs to society were from aviation accidents in the business/private aircraft sector—these costs were estimated to be approximately $41 million. Charter aircraft accounted for $25 million, and sports aviation/gliding accounted for $18 million. The total distribution of costs by industry can be seen in figure 2.

NUMBER OF ACCIDENTS

In 1996 there were 247 recorded civil aviation accidents, 4 of which involved regular public transport (RPT) with no fatality. Of the 247 aircraft involved, 41 were destroyed, 201 sustained substantial damage and 5 suffered no damage.

TABLE 1 SUMMARY OF 1996 ACCIDENTS BY AVIATION INDUSTRY SECTOR

Agriculture	Business	Charter	Training	Gliding	HcRPT	LcRPT	Sports aviation	Private	Other aerial
33	7	35	26	16	2	2	22	76	28

Source BTE

TABLE 2 MEDICAL OUTCOMES FOR PERSONS IN AVIATION ACCIDENTS

Year	Fatalities	Serious injuries	Minor injuries	Nil injuries	Total
1988	70	44	55	461	630
1993	67	57	64	438	626
1996	51	35	86	854	1026

Source BTE and Bureau of Air Safety Investigation

WE believe this latest evaluation of aviation accident costs provides an accurate assessment of the scale of costs involved based on available data. As sources of data collection improve so will our full appreciation of the costs to society. These figures demonstrate the enormous impact that accidents have on individuals, the community and industry. These costs will enable government, industry and agencies to formulate strategies to help reduce the cost of aviation accidents in the future.

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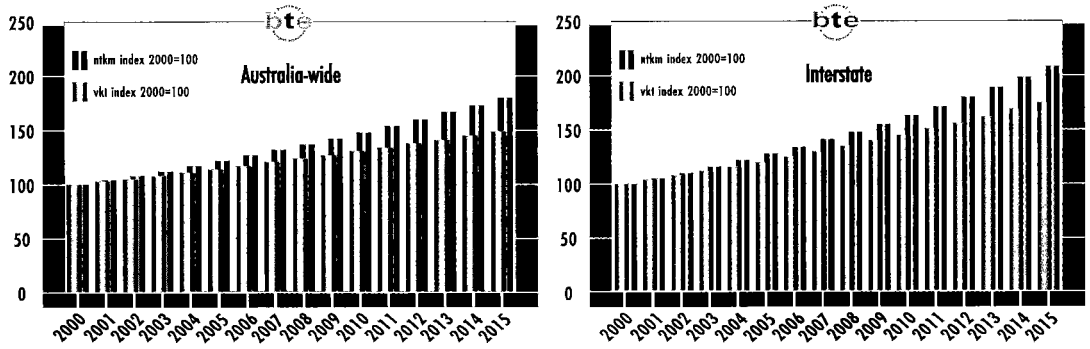
Trends in Trucks and Traffic

INCREASINGLY in Australia, trucking is an essential feature of economic activity, with road being the only mode possible for much freight traffic (eg in cities), and with rail tending to be less competitive than road on many intercity links. (See BTE Working Paper 40 *Competitive Neutrality Between Road and Rail*).

Even given an average rate of economic growth of about 3¼ % a year, road tonnages moved overall in Australia are increasing at 4%, while interstate road freight is increasing even faster at 5% per year. **At these rates of compound growth, tonnages moved by road Australia-wide would increase 80 per cent in the 15 years to 2015, while interstate road tonnages moved would more than double**. With some increase in sizes and loads of each truck, the growth in vehicle kilometres travelled would be less–50% Australia-wide and 75% interstate (see figure 1). These are large projected increases in truck traffic. The projections assume a 'business as usual' scenario that might not eventuate due to radical innovations in road and rail technology, pricing changes, differences in the economic growth that actually occurs, and many other factors. **Note, however, that even if rail non-bulk freight grows at twice its current rates, road freight tonnages Australia-wide would still increase by around 76% over the next 15 years.** Thus the basecase road freight projections are plausible outcomes, and they can form a basis for planning of transport systems.

Figure 1 Truck and freight projections, Australia



Sources *BTCE (1996), Perry and Gargett (1998).*

There are several trends in traffic that are common around the industrial world. These might be termed the 'stylised facts' of truck and traffic growth:

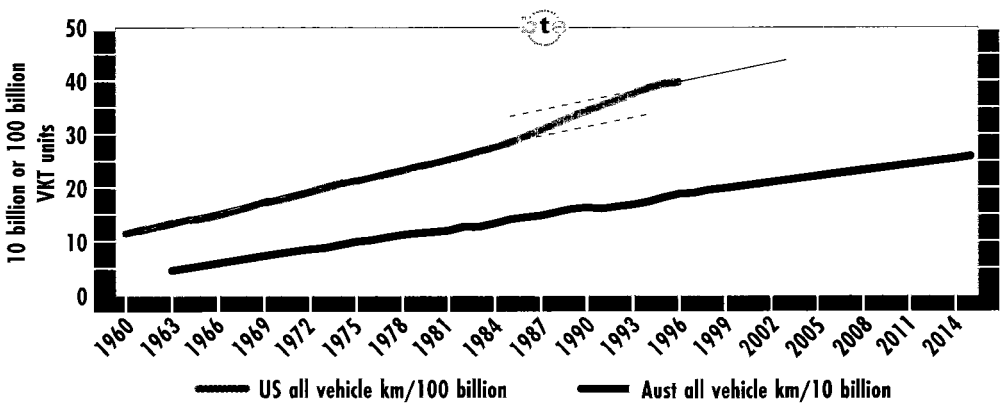
(1) Growth in *total* road traffic is often linear.
(2) This linear growth in *total* traffic is a result of decreasing car traffic growth, combined with increasing commercial vehicle traffic growth.
(3) Car traffic growth is slowing for a number of reasons
(4) Non-commodity truck traffic growth is not slowing. Rather, it is increasing.
(5) Growth in the non-commodity freight task is likely to be even more rapid than growth in truck traffic.
(6) The non-commodity freight task is driven by exponential economic growth
(7) Within an exponential growth of the total (all modes) non-commodity freight task, there is no set trend for any one mode.
(8) Commodity freight is not necessarily dependent on domestic economic growth.
(9) A trend toward freight saturation is not apparent.

These 'stylised facts' are discussed in more detail in the following sections.

GROWTH IN TOTAL TRAFFIC IS OFTEN LINEAR

Figure 2 shows the trends in *total* vehicle kilometres travelled (vkt) for both Australia and the United States. Both trends are linear, although the US appears to have gone through a phase shift in the late 1980s.

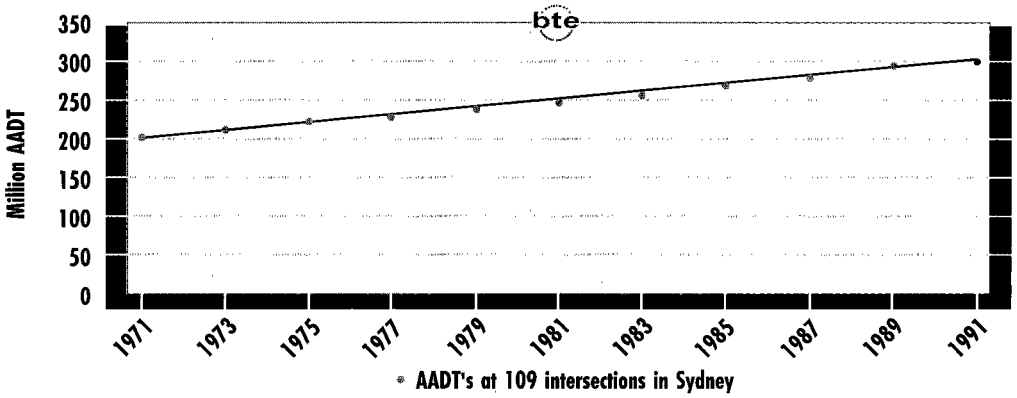
Figure 2 Comparison of Australian total vkt (10 billion km) with USA vkt (100 billion km)



Sources *BTCE (1996), US Department of Transportation (1999).*

Figure 3 shows that the same linear trend in *total* traffic holds in Australian cities.
It should be noted that linear growth implies a continually declining *rate* of growth.

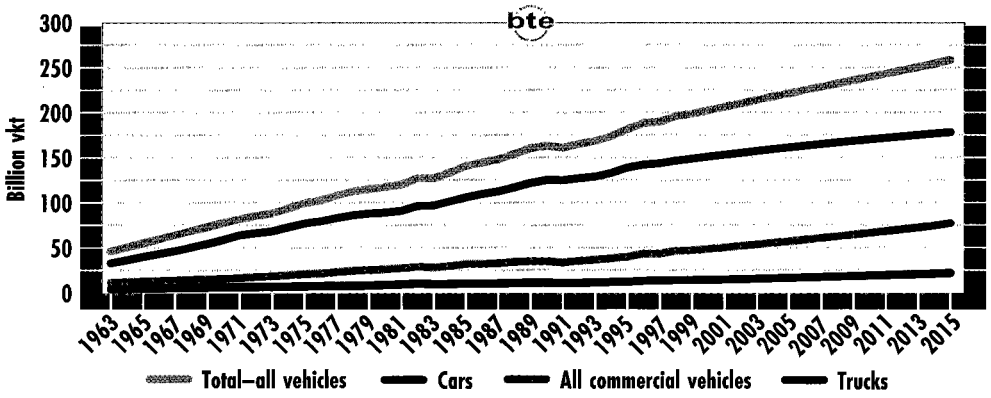
Figure 3 Sydney traffic levels (AADT's)



Note *AADT's = average annual daily traffic.*
Source *RTA (1993).*

LINEAR GROWTH IN *TOTAL* TRAFFIC IS A RESULT OF DECREASING CAR TRAFFIC GROWTH, COMBINED WITH INCREASING COMMERCIAL VEHICLE TRAFFIC GROWTH
As shown in figure 4, the concave growth path of cars is balanced by the convex growth path of commercial vehicles. The result is a linear growth path for total traffic. Light commercial vehicles (utes, panel vans, lighter rigid trucks) are important to these trends. They are numerous, and are subject to similar influences to those operating on trucks.

Figure 4 Billions of vehicle kilometres travelled by vehicle type, Australia



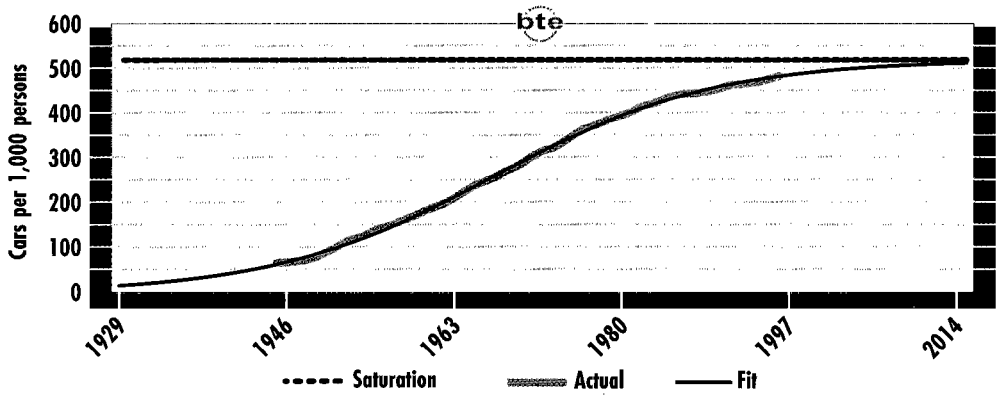
Sources *BTE estimates, BTCE Report 88, BTCE Report 94.*

CAR TRAFFIC GROWTH IS SLOWING FOR A NUMBER OF REASONS
Car usage can be understood as combining 3 factors:

Car usage = **cars per person** *times* **persons** *times* **distance per car**
= vehicle kilometres travelled

Car ownership per person is tending to saturate in all industrialised countries. Figure 5 shows the Australian experience.

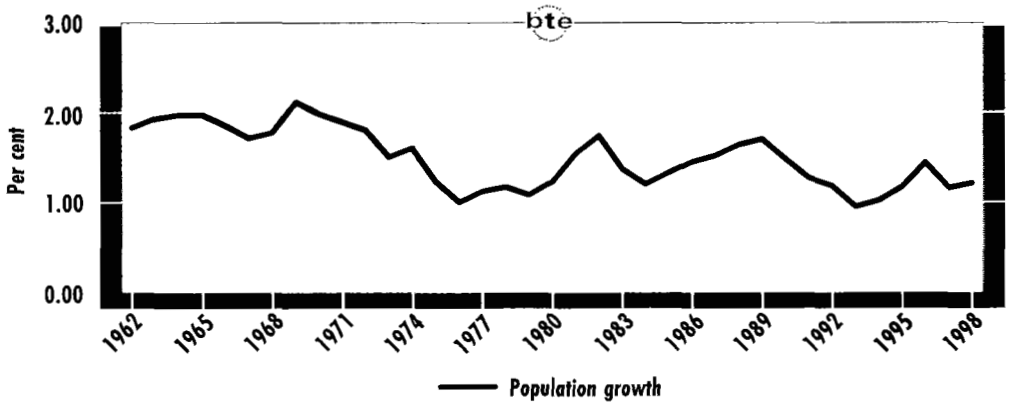
Figure 5 Saturation in Australian per person car ownership



Source *BTCE (1996).*

Population growth rates in most industrialised countries have also declined. Figure 6 shows how Australian population growth rates have fallen. Australian growth rates tend to fluctuate more than in other countries because of periodic restrictions on immigration intake. However rates have broadly settled at 1 to 1.5 per cent per year, as opposed to the nearly 2 per cent common in the 1950s and 60s.

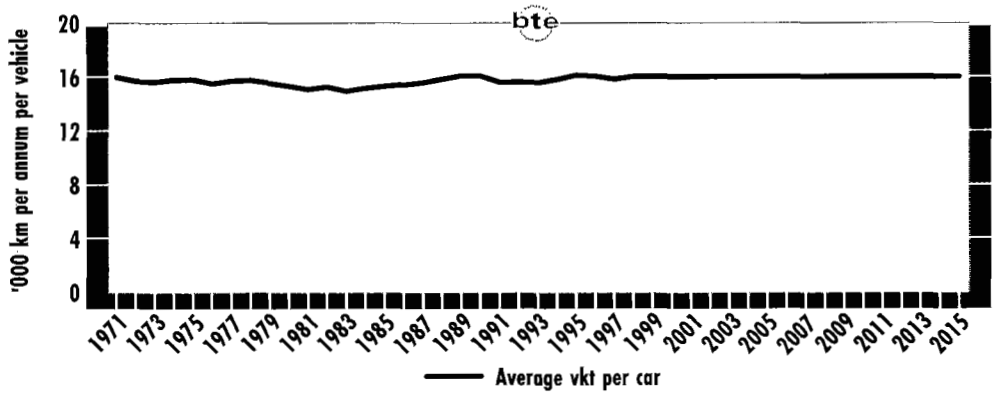
Figure 6 Annual resident population growth



Source *BTCE (1996).*

Average distance driven per car has remained steady in many countries. Figure 7 shows Australian estimates.

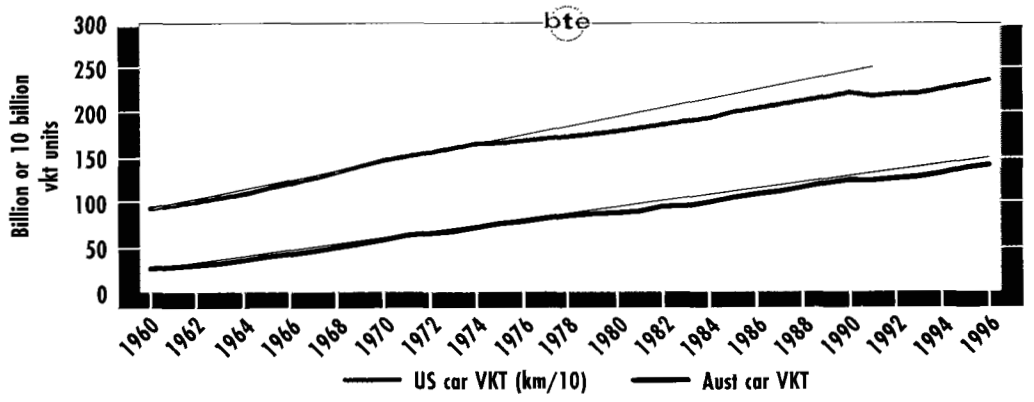
Figure 7 Average vehicle kilometres per car, Australia



Source *BTCE (1996).*

The result of multiplying these 3 factors together is that growth rates in car traffic have tended ever lower. Figure 8 shows Australian and American trends.

Figure 8 Comparison of Australian car vkt (billion km) with USA car vkt (10 billion km)



Sources *BTCE (1996), US Department of Transportation (1999).*

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Abbreviations

ABS	Australian Bureau of Statistics
USDOT	United States Department of Transportation
RTA	New South Wales Roads and Traffic Authority
BTCE	Bureau of Transport and Communications Economics (note BTCE is now BTE)
BTE	Bureau of Transport Economics
AGPS	Australian Government Publishing Service
ntkm	net tonne kilometre (one tonne moved one kilometre)
vkt	vehicle kilometre travelled
AADT	average annual daily traffic at a point on a road
ute	a light half to one tonne utility vehicle
GDP	gross domestic product

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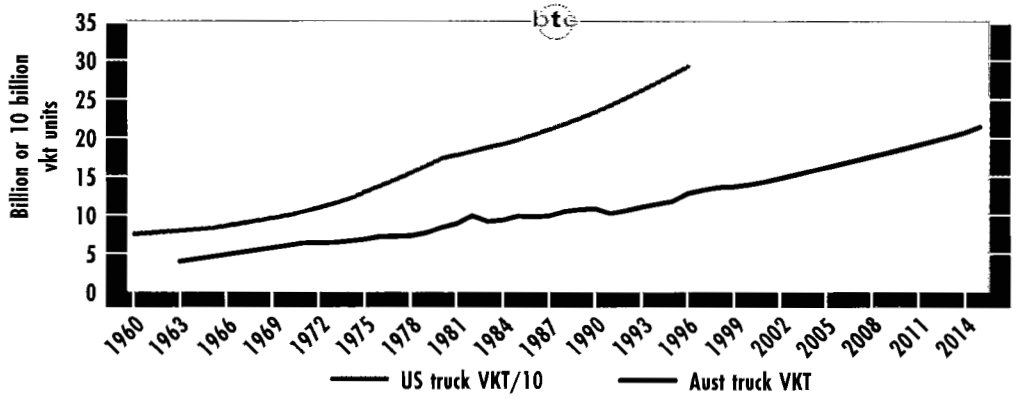
NON-COMMODITY TRUCK TRAFFIC GROWTH IS NOT SLOWING, BUT RATHER INCREASING
Figure 9 shows the concave growth paths of truck traffic in Australia and the United States.

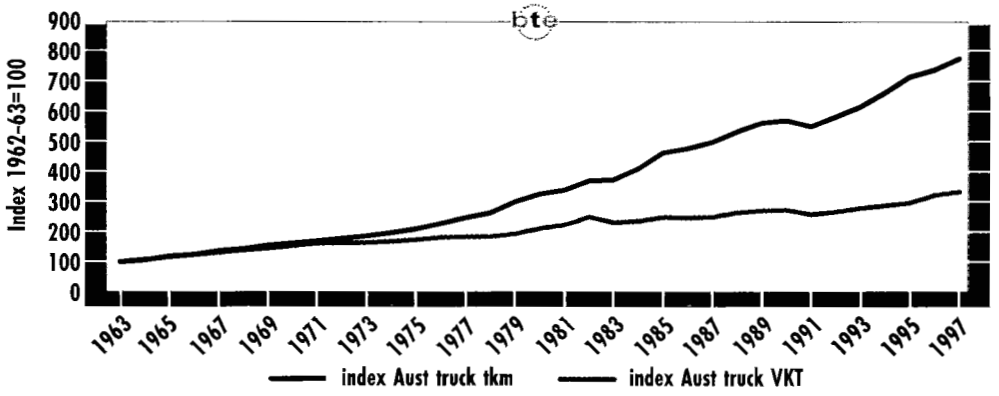
Figure 9 Vehicle kilometres travelled by freight vehicles in Australia (billions of vkt) and USA (10 billion vkt)



Sources BTCE (1996), US Department of Transportation (1999).

GROWTH IN THE NON-COMMODITY FREIGHT TASK IS LIKELY TO BE EVEN MORE RAPID THAN GROWTH IN TRUCK TRAFFIC
Where there is growth in average loads, growth in truck traffic will necessarily be less than growth in tonnes carried. Growth in loads can arise from either a switch from smaller vehicle types to larger ones (such as occurred in Australia, with articulated trucks replacing rigid trucks to a large degree), or through lifting of mass limits within particular vehicle types. Both of these factors have been in operation in Australia, resulting in a marked divergence between truck traffic and freight growth (see figure 10). In the United States, the switch to articulated trucks occurred much earlier than in Australia, resulting in much less divergence between the two growth rates (and a higher growth rate for traffic–see figure 9).

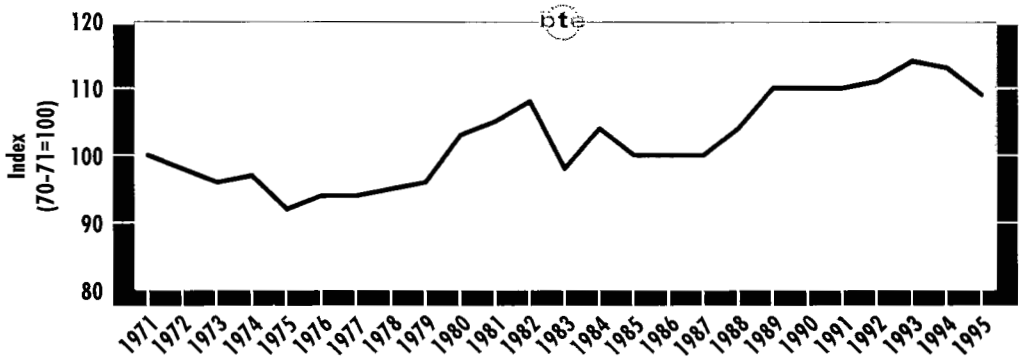
Figure 10 Australian road freight growth: index of tonne kilometres by trucks and vehicle kilometres by trucks, 1963-1997



Sources BTCE estimates, BTCE Report 94, BTCE Report 88.

THE NON-COMMODITY FREIGHT TASK IS DRIVEN BY EXPONENTIAL ECONOMIC GROWTH
For Australia, there is a slightly increasing linear relationship between the total (all modes) non-commodity interstate freight task and Gross Domestic Product (GDP) –see figure 11. As GDP is growing exponentially, this implies that the interstate freight task is also growing exponentially–at a slightly higher rate in fact.

Figure 11 Ratio of interstate non-bulk freight to real GDP, Australia



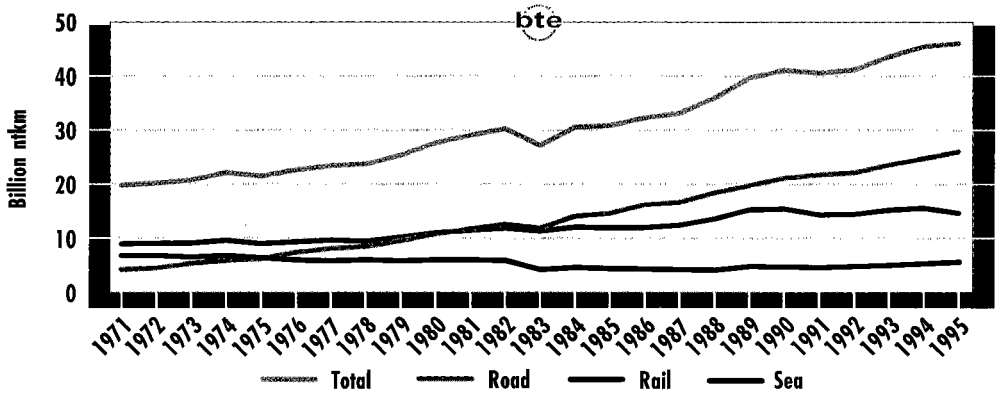
Sources Perry and Gargett (1998), ABS (1999).

WITHIN AN EXPONENTIAL GROWTH OF THE TOTAL (ALL MODES) NON-COMMODITY FREIGHT TASK, THERE IS NO SET TREND FOR ANY ONE MODE

Even given an exponential growth in freight task, the trend for any one mode can be any shape, depending on what is happening in the other modes. For example, in Australia, the decline of interstate non-commodity coastal shipping in the 1970s and early 1980s meant that road and rail growth in that period was especially rapid, as they captured that traffic. After the mid-1980s, the growth rates of the two modes declined, as they were no longer drawing on coastal shipping. This pattern of mode substitution gave rise to a 'pseudo-linear' trend in road freight (see Figure 12), ie, in terms of the absolute increment per year in the road freight task,

a large growth rate * a small base = a smaller growth rate * a large base

Figure 12 The interstate non-bulk freight task, Australia



Sources Perry and Gargett (1998).

COMMODITY FREIGHT IS NOT NECESSARILY DEPENDENT ON DOMESTIC ECONOMIC GROWTH

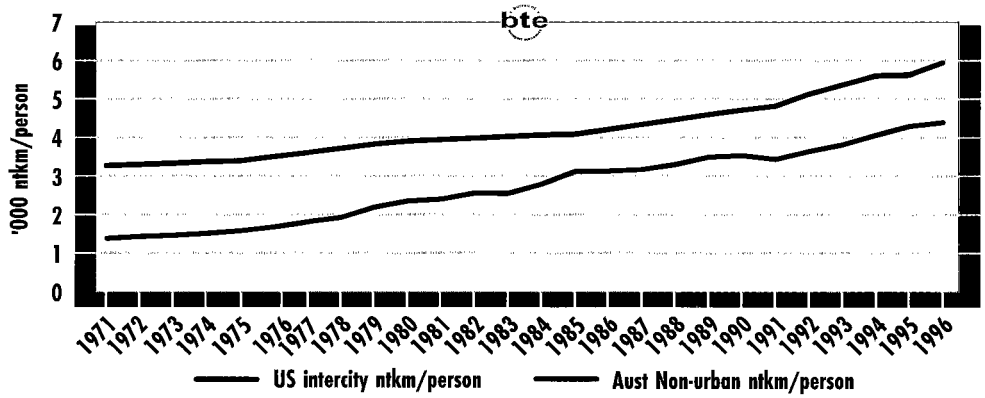
In countries like Australia that have significant commodity exports, the growth in commodity freight traffic is not linked to domestic economic growth. Rather commodity traffics are related to domestic supply considerations and overseas economic growth. This means that measures of freight that include the bulk commodity traffics are not necessarily linked to economic growth, and are not necessarily non-linear in their growth paths.

A TREND TOWARD FREIGHT SATURATION IS NOT APPARENT

A trend toward car ownership saturation has been noted. However, there is as yet no evidence in industrialised counties of any saturation in the freight task. The United States is perhaps the leader in this regard, and shows no sign of slowing. Figure 13 shows the per capita intercity freight task in the U.S. compared with the total non-urban freight task per capita in Australia. Note that the definition is wider for Australia, and so should overstate our freight if anything.

There is no evidence of saturation in the American trend. Australia, even on the wider definition of freight, is still significantly below U.S. levels of freight per capita.

Figure 13 Comparison of Australian non-urban road freight per unit population (thousand tonne-kilometres / person) and USA intercity road freight (thousand tonne-kilometres / person)



Sources BTCE (1996), US Department of Transportation (1999).