Introduction

Transport plays a large part in the national economy and in the everyday lives of almost all Australians. Decision making regarding transport policies — such as the provision of infrastructure, environmental standards for vehicles and transport fuels, or the management of existing transport systems — is strongly dependant on good transport data being available. It is generally crucial to know both the magnitude and the growth trends of the various transport tasks in order to sensibly analyse options put forward.

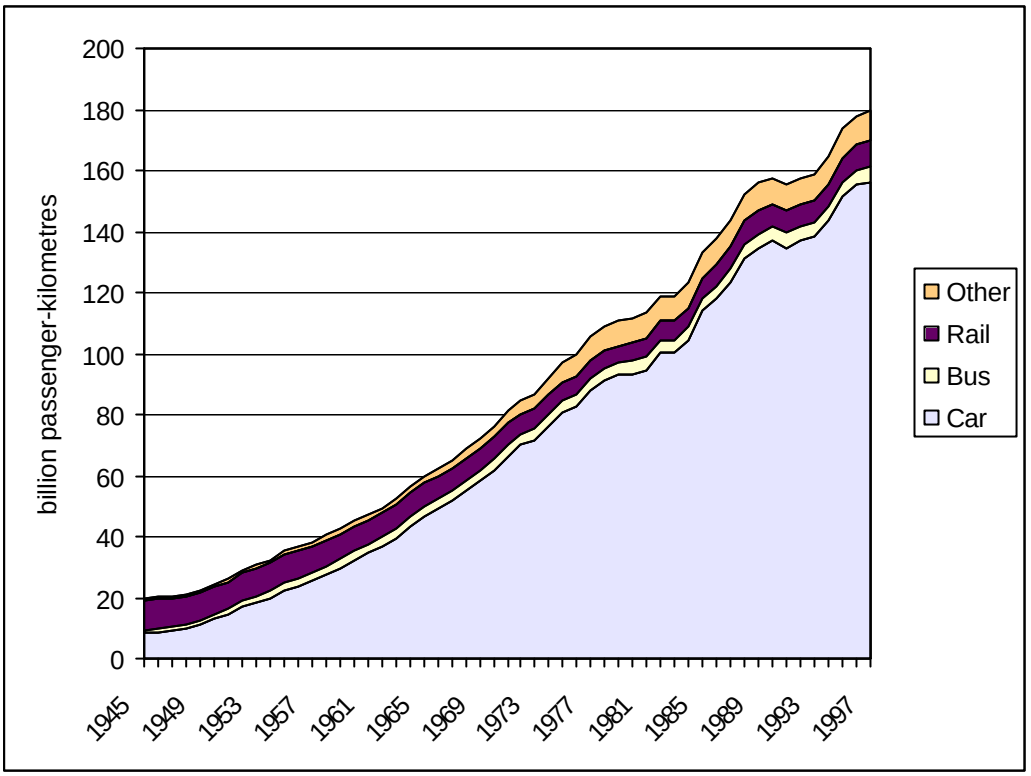
Whether the analyses or policy evaluations are economic, financial, technological or otherwise — they all need to be grounded in a sound understanding of the underlying demands for transport, and thus the actual task levels and the movements over time in those levels. In particular, for analysis of transport safety issues, reliable measures of accident exposure data typically require consistent estimates of transport activity.

Of the various transport modes, the current day-to-day movement of Australian passenger volumes is dominated by road transport, and has become increasingly so over the last few decades. Figure 1 shows this for urban passenger transport. Over the last 50 years, rail has declined from accounting for half of the total task to less than 5 per cent, while the road task has grown by a factor of 13. Assessment of the traffic accident levels associated with this growth, and plotting the directions forward to reduce the road toll, will often involve analysing the patterns of road vehicle use over time.

The Survey of Motor Vehicle Use (SMVU), conducted by the Australian Bureau of Statistics (ABS), is *the* major source of information on nation-wide utilisation of Australian road vehicles. Most transport analysts (the BTE included) rely on the SMVU both to provide data on the current volumes of road travel, and to allow the derivation of time-series data sets (for investigating trends over time in those travel volumes).

However, changes in survey procedures over the years have complicated the process of making long-term comparisons directly from the published figures for each individual survey. To be useful for time-series analysis, the 'raw' estimates from each survey have to be adjusted for a variety of inconsistencies (for example, to allow for changes over time in vehicle classifications, survey questions or data collection formats, sample sizes and coverage of the vehicle population).

This paper summarises our results of recent analyses of the SMVU (with particular emphasis on reconciling pre-1998 SMVUs with the 1998 and 1999 survey results) in conjunction with a variety of other sources of aggregate Australian transport data. We aim to adjust for as many biases and temporal incompatibilities as possible in the various data sets, in order to compile consistent (or 'standardised') time-series estimates of total passenger vehicle travel and road freight transport over the last 30 years.



Sources: BTE (1998), Authors' estimates.

Figure 1 Long-term trend in Australian urban passenger task

Data inconsistencies and standardisation between surveys

The SMVU is a sample-based survey, first undertaken in 1963, and held approximately triennially between 1971 and 1995. Recently the SMVU has switched format — data is now collected on a quarterly basis, with results issued annually (using a pooling of 4 quarters data). The ABS has so far issued two SMVU publications based on the new survey procedure; for the year ending July 31 1998 and the year ending July 31 1999. Practically every time the SMVU has been held, there have been variations in the underlying survey structure — for example, in survey sample size, in sample distribution and stratification, in survey scope, in the vehicle classifications, and in questionnaire design.

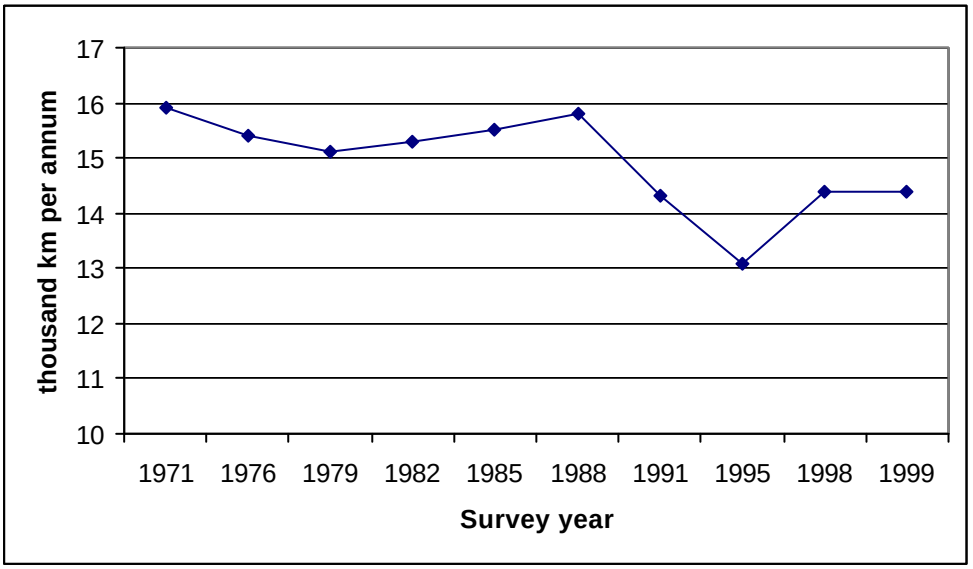
Though every change to the survey design complicates comparisons between different survey years, by far the largest methodological changes have occurred to the SMVU with the release of the recent new collection format (for 1998 and onwards). The 1995 and earlier SMVUs were 'recall based' — that is, they asked respondents to provide estimates of their vehicle use over the preceding year. Since the ABS had grown increasingly concerned about poor data quality for recall-based surveys (due to generally poor record keeping by motorists of their travel patterns), the SMVU was reviewed during 1995 and 1996. Following this review, the SMVU was re-designed and introduced from August 1997 as a 'pre-advice-based' survey. The pre-advice

approach relies on issuing early advice to vehicle owners about their inclusion in the survey and encouraging record keeping during the survey period.

The recent changes to the survey methodology appear to have had a significant effect on the estimates produced by the SMVU, and thus comparability with previous surveys. Also, because the SMVU is a sample-based survey, the estimates are subject to normal sampling variability. The variability of many of the SMVU estimates, as measured by the estimated standard errors, has increased in recent issues. Since the 1988 survey, the sample sizes (especially for passenger cars) have been substantially reduced — possibly affecting the estimates of vehicle utilisation obtained by the SMVU.

Average vehicle utilisation

All the SMVUs since 1988 report substantially lower average vehicle kilometres travelled (VKT) for passenger cars than for previous years (see figure 2). Since figures on petrol sales tend to imply that there has been no such decline in actual on-road travel, it appears that the SMVU published estimates are not fully suitable for transport trend analysis. Though the ABS cautions users "against making detailed direct comparisons between the 1998 survey results and those from previous surveys" (ABS 2000a, p.23), analysis of road transport trends requires such comparisons. Our investigations have identified the need for significant adjustments to be made to SMVU estimates (particularly for VKT and total fuel consumption by the car fleet and for the road freight task) if consistent time-series of motor vehicle activity are to be constructed.



Source: ABS Survey of Motor Vehicle Use (Cat. No. 9208.0).

Figure 2 Average vehicle kilometres travelled by passenger vehicles - SMVU

By simply displaying the published averages for national VKT, figure 2 glosses over a variety of incompatibilities between the different SMVU years, since the various

surveys have calculated 'average kilometres travelled' according to a range of different definitions. The principal differences relate to:

- the inclusion of zero-use vehicles (that is, vehicles which are registered for road use, but which travelled zero kilometres during the survey period) in SMVU results for the 1991 and later surveys; and

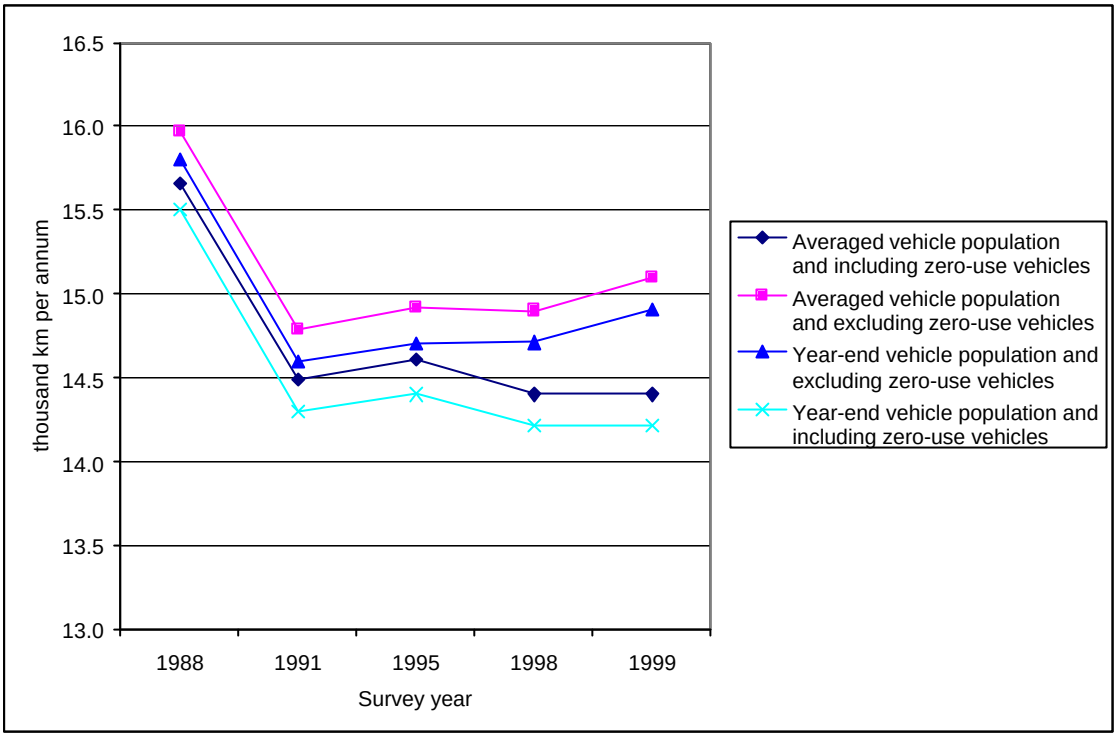
- the vehicle population measures used for the older surveys versus the new pre-advice format (1998 and later).

The vehicle population for the 1995 and earlier SMVUs included all vehicles registered for road use as at the end of the survey period, whereas the vehicle population for the current SMVU methodology relates to the average number of vehicles registered for road use during the year covered by the survey (that is, for the 4 quarters of pooled survey responses). The other ABS publication of primary relevance to motor vehicle trends, the Motor Vehicle Census, Australia (ABS Cat. no. 9309.0), still quotes vehicle stock figures as the number of vehicles registered at a specific date. This paper will (unless specifically noted otherwise) follow the convention of the Motor Vehicle Census (MVC) — that is, vehicle data given for a particular financial year will generally apply to the number of vehicles registered as at 30 June.

It should be noted that the figure of 13.1 thousand kilometres, plotted in figure 2, as the average VKT for cars during 1995, was revised down by the ABS from their originally published estimate of 14.4 thousand kilometres. This adjustment was an attempt by the ABS to remove estimated recall bias from the 1995 survey results. However, in our analyses the original estimate of 14.4 has been used, since we remain unconvinced that the method used by the ABS for this re-estimation was totally sound. Figure 3 makes a rough allowance for the effects of changing the treatment of zero-use vehicles (discussed below) and the vehicle population estimation procedure, to plot values using consistent definitions of VKT. It is apparent that the SMVU results still exhibit a decline in average VKT even after allowing for these definitional effects.

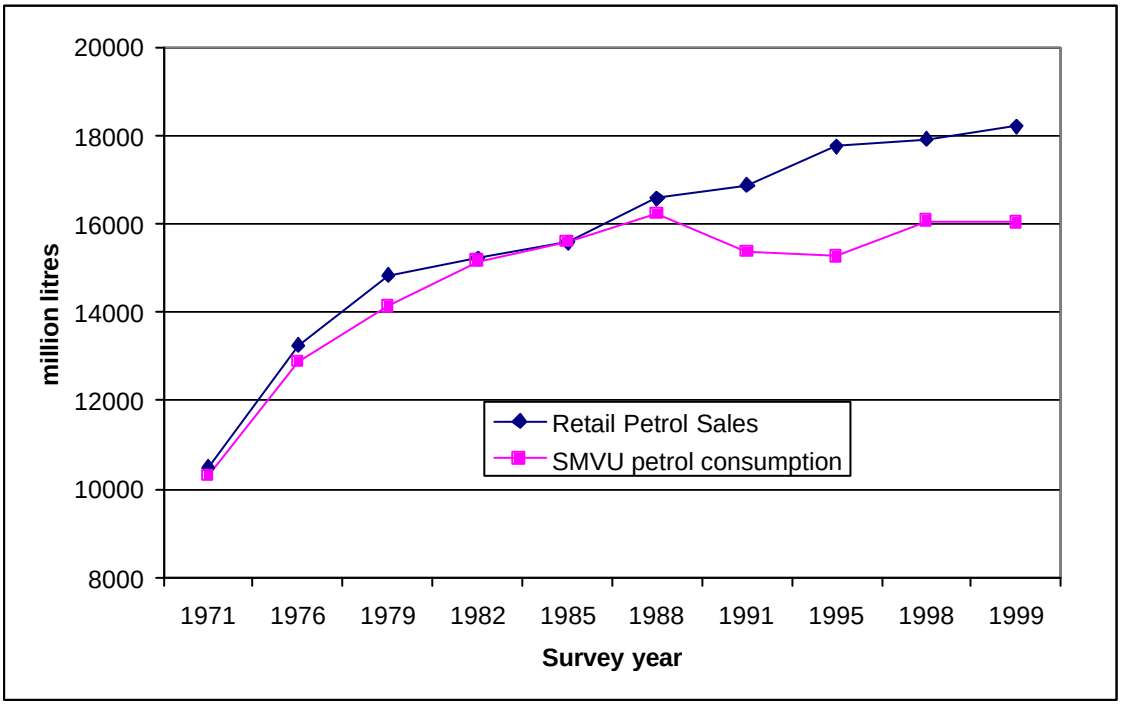
Yet, it is useful to look at what has happened to fuel sales over the same period. Sales of petrol in Australia are a fairly good proxy for light vehicle activity and fuel sales are known quite accurately. Since 1991, retail petrol sales have exhibited a reasonably steady rise, yet SMVU estimates for petrol use show a shortfall of over 2 billion litres (a difference of about 13 per cent for 1999) after the 1988 survey (see figure 4). This substantial divergence tends to imply that the SMVU has underestimated either the average VKT for petrol vehicles or their average rate of fuel consumption (or even a combination of both factors) for the past four surveys.

The gap in the two curves in figure 4 is unlikely to be explained by off-road use of petrol, since this is fairly minor. We estimate that petrol use in such additional applications (such as outboard motors of pleasure craft, lawnmowers, chain-saws and other utility engines, military vehicles, and off-road vehicles such as trail-bikes) accounts for only around 2 per cent of total petrol consumption (BTCE 1994). As to the question of where the shortfall resides — in the SMVU estimates of average VKT or in



Sources: ABS Survey of Motor Vehicle Use (Cat. No. 9208.0), Authors' estimates.

Figure 3 Estimated travel by passenger vehicles – adjusted SMVU values



Sources: ABS SMVU (Cat. No. 9208.0), Australian Institute of Petroleum (AIP 1999), BTE estimates.

Figure 4 Comparison of SMVU fuel estimates with retail sales of petrol

average fuel use (L/100km) — there are a variety of indicators that point towards the VKT estimates being the greater source of inaccuracy.

Average fuel efficiency seems accurate

In a 1995–96 study for the then Department of Primary Industries and Energy (Dynamic Transport Management 1996), average fuel consumption was surveyed using tank-fill and odometer reading data from a sample of around 1900 in-service cars. This study quotes average fuel consumption estimates of 11.9 L/100km for the leaded petrol car fleet and 10.7 for the unleaded petrol car fleet. This agreed quite well with the results from the 1995 SMVU, which obtained 11.7 L/100km for leaded petrol cars and 10.9 for unleaded petrol cars. An earlier tank-fill study (similar to the DTM methodology) was conducted in 1986 by the Society of Engineers (SAE-Australasia 1986), obtaining an estimate for the 1985 Australian car fleet of 12.04 L/100km. This also agreed well with the 1985 SMVU result of 12.1 L/100km.

Using the rated fuel consumption for the various car models (combined with scale factors for the difference between test cycle and real-world driving conditions), estimates can be made of the average on-road L/100km for the Australian car fleet. Our calculations with the car fleet model CARMOD (see BTCE 1996) give a central estimate of 11.74 L/100km for 1999 (weighted average across all fuel types), which compares very favourably with the 1999 SMVU average result of 11.7 L/100km.

VKT estimates probably suspect

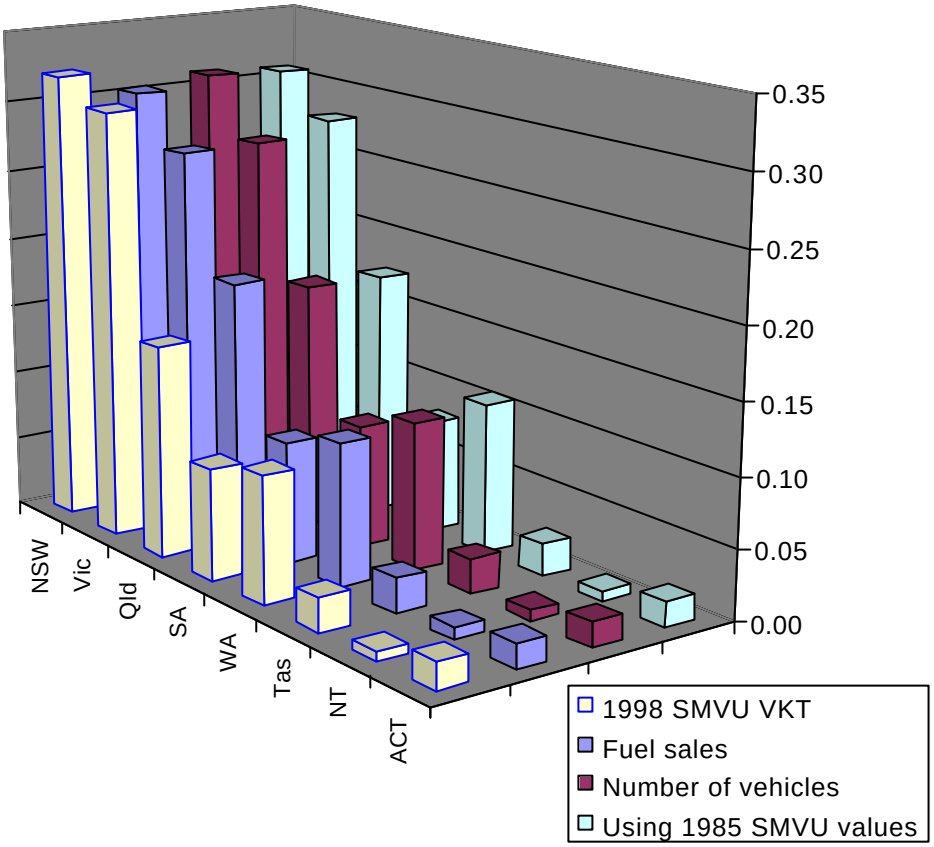
However, the SMVU estimates of VKT, especially if inspected across the different states and territories, do not appear as robust. From 1991 onwards, the SMVU values for average VKT on a State by State basis vary noticeably from survey to survey. Such discontinuous movements in the trends (for example an anomalously low value for Queensland in 1998) seem very unlikely. State-wide travel patterns could generally be expected to change only gradually, a hypothesis supported by fuel sales data by State.

Disregarding boundary issues, figure 5 shows that the VKT pattern by State from the 1998 SMVU is reasonably different from the pattern of fuel use. Yet comparisons between the fuel sales pattern and two other aggregate measures yield virtually identical curves. The two other measures in figure 5 are the proportions of vehicles registered in each state (calculated from the ABS Motor Vehicle Census), and a re-estimation of total VKT for 1998 using the average VKT values by state reported in the 1985 SMVU.

Possible sources of inconsistencies

Transport activity data from one year to the next will often vary according to:

- time period covered. Some data sets use calendar year; some use the standard financial year; some use a variety of others. For example, at different times the SMVU has used year ending 30 September and year ending 31 July, while the Motor Vehicle Census has used years ending 30 September, 30 June, 31 May and 31 October.



Sources: ABS (Cat. No. 9208.0, Cat. No. 9209.0), AIP (1999), BTE estimates.

Figure 5 Proportion of estimated national car activity by each State for 1998

- scope or coverage. For example, SMVUs prior to 1985 excluded vehicles owned by the Australian government, and buses were not included in the survey until 1988.
- type of vehicle classification. Vehicle class definitions tend to be modified quite often, and were substantially revised within ABS statistics in 1991.
- treatment of missing values and survey non-response (especially for methods used for any imputation or interpolation of data items), and survey processing (such as data scaling and averaging).
- survey form design, survey stratification and other data collection procedures.
- treatment of nonstandard vehicle use (especially with regard to the contributions of seasonal-use vehicles and other vehicles used for only part of the year, and high utilisation vehicles such as taxis).

Regarding the last point, in the pre-1998 SMVUs, vehicles used for only part of the survey year had their utilisation scaled to give a 12-month equivalent, which would tend to overestimate the average VKT of the fleet by a couple of per cent. Under the data pooling used in the recent SMVUs, any vehicle recording use during the quarter it is sampled is effectively scaled to give a full year's use. Correspondingly, any seasonal

vehicle having no travel in the quarter becomes a zero-use record, even if its travel in other quarters would be far from zero. This treatment of partial use vehicles in the new survey format should still give reasonable estimates of overall average travel provided the distribution of seasonal vehicles is uniform enough. It will, however, substantially inflate estimates of the proportion of the fleet that does zero travel.

Examining the accuracy of the recent SMVU results (1998 and 1999) is further complicated by these surveys not including any new vehicles directly in the sample. The ABS has had to make adjustments to the survey results for a lag between the survey population identification date and the actual data collection. (The ABS intends that surveys published from 2001 onwards will include a sample of newly registered vehicles, reducing the need for such adjustments in the future.)

Furthermore, estimates of numbers of vehicles produced by the SMVU and the Motor Vehicle Census (MVC) in any particular year will often be different. This is because SMVU estimates of the numbers of the various vehicle types are based on whatever survey respondents report as their vehicle type, as opposed to the class the vehicle is registered as. An additional complication arises from the lag in the time between when a vehicle is scrapped or deregistered and its removal from the registry statistics. MVC results may thus overestimate the actual number of vehicles *registered* by one to two per cent. Yet since there are a substantial numbers of unregistered vehicles using Australian roads (possibly of the order of 2 per cent), the MVC values may be very close to the actual number of vehicles *on-road*.

In the following tables of time-series, we have, wherever practicable, suitably adjusted or interpolated existing aggregate data sets to allow for types of discrepancies and inaccuracies discussed in the above sections. It is, of course, impossible to adjust for all such sources of estimation error. For example, with many of the non-sampling errors it is typically not even known if they increase or decrease the survey estimates obtained. Therefore, our estimates for transport activity within any particular year could still differ from the actual value for that year by several per cent, even after the standardisation process. However, we feel that reasonable confidence can be placed in the overall shape and gradient of the resulting trend curves.

Passenger vehicle trends

Note that the results in this section relate to all passenger vehicles with up to 9 seats, including four-wheel drive All Terrain Wagons (ATWs). Though ATWs accounted for less than 2 per cent of new car sales in 1980, they have grown to be over 15 per cent of current sales. The average gross vehicle mass of new passenger cars has grown by around 8 per cent over the last 20 years (to be currently about 2150 kg), with consumers trading advances in technical fuel efficiency for greater vehicle performance, size and comfort. Thus the on-road fuel consumption rate shows little improvement over the last decade.

Table 1 Standardised time-series for Australian passenger vehicles – totals

Year ending June 30	Size of car fleet (thousand vehicles)	Fuel consumption		Vehicle kilometres travelled (billion)	New vehicle sales (thousand)	Task (billion passenger – kilometres)
		(million litres)	(million litres of petrol equivalent)[a]			
1971	3997.4	7836	7837	62.7	417.2	106.5
1972	4222.3	8148	8149	64.9	412.5	109.8
1973	4361.6	8460	8459	67.1	429.7	113.2
1974	4604.0	9029	9027	71.7	465.0	120.5
1975	4868.5	9559	9555	75.9	502.7	127.2
1976	5107.8	9936	9931	78.1	454.6	130.4
1977	5278.0	10416	10410	81.6	447.1	135.8
1978	5462.2	10803	10796	84.5	432.4	140.1
1979	5652.1	11140	11128	86.9	463.5	143.7
1980	5800.6	11212	11195	88.1	447.7	145.2
1981	6021.6	11402	11377	90.0	456.2	148.0
1982	6308.1	11934	11902	94.7	469.9	155.3
1983	6479.5	11893	11855	95.1	458.4	155.5
1984	6683.2	12356	12313	99.6	457.4	162.4
1985	6926.0	12814	12772	104.2	511.7	168.7
1986	7106.1	13204	13146	107.8	484.1	174.5
1987	7227.2	13469	13397	110.4	377.4	177.9
1988	7381.6	13897	13811	114.5	384.2	183.4
1989	7573.7	14604	14500	120.4	447.9	192.6
1990	7797.3	15075	14951	124.4	492.2	198.5
1991	8011.8	15112	14956	124.9	440.7	198.9
1992	8143.0	15324	15149	127.0	437.0	201.6
1993	8280.2	15632	15451	130.0	449.8	205.9
1994	8404.2	15849	15662	132.6	476.0	209.1
1995	8629.0	16449	16233	138.2	528.5	217.1
1996	8880.0	16856	16592	142.0	531.8	222.4
1997	9100.0	16970	16682	143.3	558.0	223.7
1998	9420.0	17226	16915	146.0	654.7	226.3
1999	9690.0	17582	17247	149.8	671.5	232.1
2000	9840.0	17880	17531	152.8	596.4	236.9

a. Sum of all fuel types expressed as an equivalent volume, in energy terms, of automotive gasoline.
Sources: ABS Survey of Motor Vehicle Use (Cat. No. 9208.0), BTE estimates.

Table 2 Standardised time-series for Australian passenger vehicles – averages

Year ending June 30	Average VKT (thousand km per annum)	On-road fuel consumption rate (L/100km)		
		Fleet (average across all fuels	Fleet (petrol equivalent)	New cars (petrol equivalent)
1971	15.68	12.50	12.50	12.60
1972	15.38	12.55	12.55	12.50
1973	15.39	12.60	12.60	12.60
1974	15.56	12.60	12.60	12.49
1975	15.58	12.60	12.60	12.28
1976	15.28	12.73	12.72	13.00
1977	15.47	12.76	12.75	12.95
1978	15.46	12.79	12.78	12.90
1979	15.37	12.82	12.81	12.67
1980	15.18	12.73	12.71	12.20
1981	14.95	12.67	12.64	12.03
1982	15.02	12.60	12.57	11.86
1983	14.68	12.50	12.46	11.35
1984	14.91	12.40	12.36	11.31
1985	15.04	12.30	12.26	11.28
1986	15.17	12.25	12.20	11.42
1987	15.28	12.20	12.13	11.51
1988	15.51	12.14	12.06	11.12
1989	15.90	12.13	12.04	11.19
1990	15.95	12.12	12.02	10.95
1991	15.59	12.10	11.97	10.81
1992	15.59	12.07	11.93	10.89
1993	15.71	12.02	11.88	10.92
1994	15.78	11.95	11.81	10.97
1995	16.02	11.90	11.74	10.78
1996	15.99	11.87	11.68	10.66
1997	15.75	11.84	11.64	10.49
1998	15.50	11.80	11.59	10.36
1999	15.45	11.74	11.52	10.25
2000	15.53	11.70	11.47	10.17

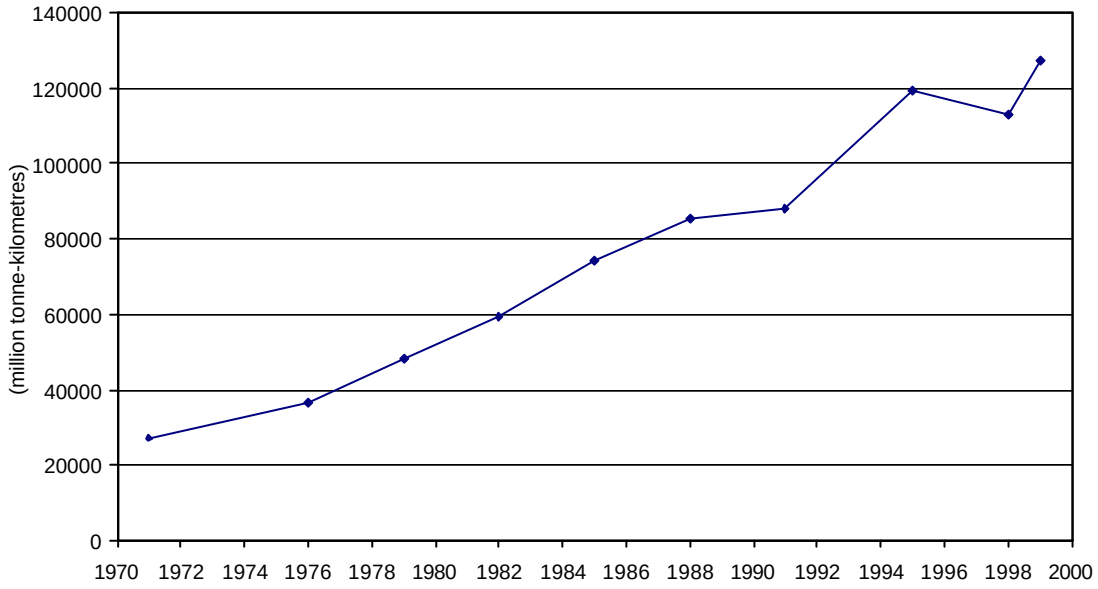
Sources: ABS Survey of Motor Vehicle Use (Cat. No. 9208.0), BTE estimates.

Freight

Data inconsistency is not just limited to passenger transport. The SMVU estimates of the road freight task also require standardisation if they are to be used for trend analysis. The unadjusted SMVU estimates, illustrated in figure 6, imply that the aggregate road

task declined by 5.4 per cent between 1995 and 1998, only to increase by 13 per cent the following year. It is highly unlikely that road freight transport actually declined between 1995 and 1998, and the apparently large increase in road freight between 1998 and 1999 has no recent historical precedent. These movements appear to be largely attributable to increased between-sample variation arising from the reduced survey sample size.

Although the ABS has made adjustments to its estimates to correct for the exclusion of new vehicles from the recent surveys, we remain doubtful about the level of the aggregate freight task reported in the SMVU. Consequently, all adjustments to the road freight task estimates have been made to fit with the pre-1998 trend levels. While the move to the 'pre-advice' collection method, from a 'recall-based' approach will increase the reliability of the SMVU, it is not yet clear whether the 1998 and 1999 SMVUs have accurately measured the level of road freight activity. The 2000 and 2001 SMVU results, which will include new vehicles in the sample, will provide better evidence as to the actual level of road freight transport.



Sources: ABS SMVU (1978, 1981a, 1983, 1986, 1990, 1993, 1996, 2000a and 2000c), CBCS (1973).

Figure 6 SMVU estimates of the total road freight task

The SMVU is the main source of aggregate road freight data in Australia. But unlike the relationship between passenger car use and petrol sales, there is no suitable proxy data source available that may be used to assess the accuracy of the SMVU estimates of road freight. We have instead, used a mix of analytical techniques and data comparison to assess trends in the SMVU road freight task and to standardise the series. Three methods have been used, which we refer to as:

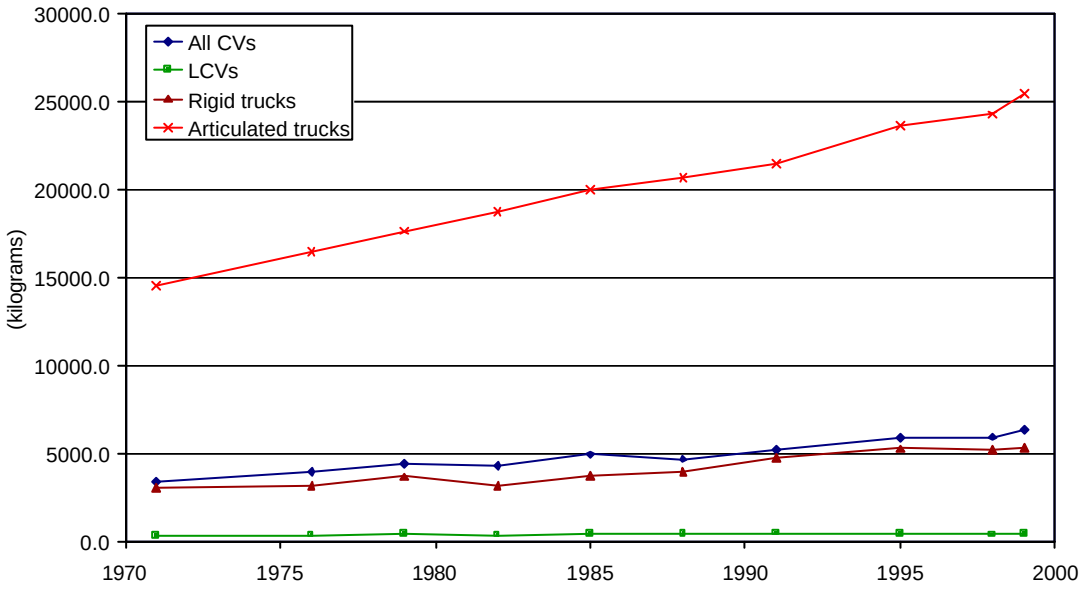
- growth decomposition approach;
- model-based forecast approach; and

- diesel fuel sales approach.

Using some reasonable assumptions, all three methods imply continuing trend growth in the road freight task, with the level significantly above the 1998 and 1999 SMVU estimates. For much of the discussion that follows we largely ignore light commercial vehicles (LCVs) as they contribute less than 4 per cent of the aggregate freight task.

Growth decomposition approach

Growth in the road freight task - in tonne-kilometres (tkm) - may be separated into three components: growth in average vehicle loads, growth in average vehicle use, and growth in the number of vehicles (with laden business kilometres). Figures 7 and 8 and table 3 show the trends in average load, average laden business kilometres, and number of vehicles with laden business kilometres. The low freight task estimate reported in the 1998 SMVU appears to be partly attributable to all three components – average load and average VKT appear to be below trend, and the number of vehicles reported as undertaking carriage of freight fell due to the change in survey methodology. The 1999 SMVU shows average loads and average laden business kilometres returning towards long-term trend growth. However, the number of rigid and articulated trucks with laden business kilometres in 1999 was still below 1995 levels.

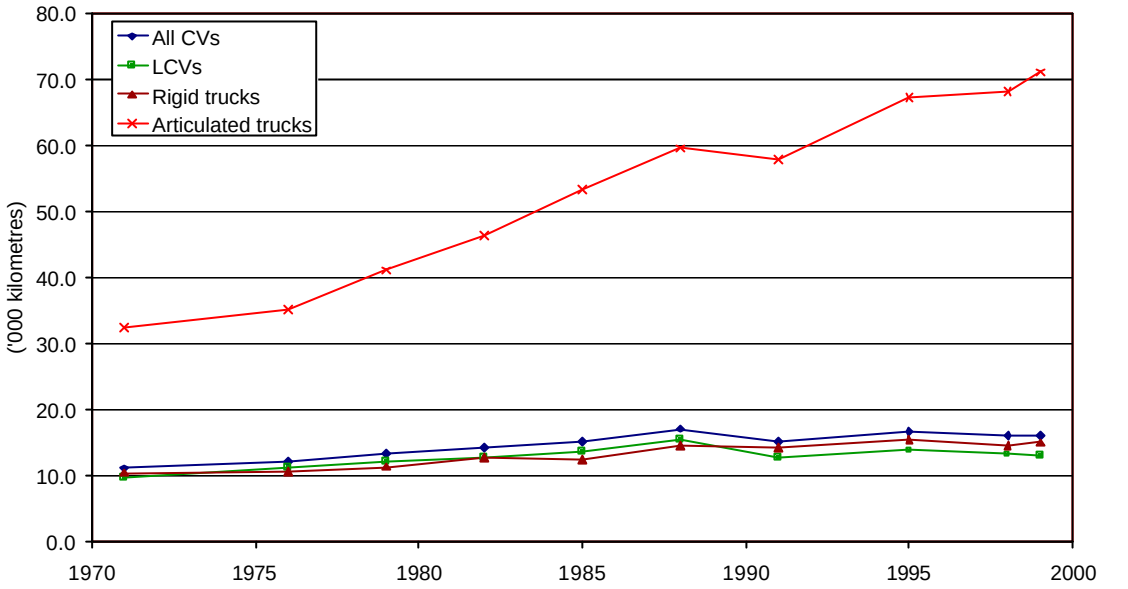


Sources: ABS SMVU, CBCS (1973).

Figure 7 Average load for commercial vehicles (CVs)

The ABS (pers. comm. 28 Nov. 2000) attributes the reduction in the number of vehicles with laden business kilometres to the change in survey methodology. The move to four quarterly collections, from a single annual survey, will increase the proportion of vehicles reporting nil use, because there is a higher probability of a vehicle having nil use over one quarter than over a full year. However, because reported utilisation will be higher, the change in methodology should have no systematic effect on totals.

Therefore, we should expect to observe a consequent increase in average utilisation (loads and VKT) for vehicles that reported undertaking laden use. However, as already noted above, and illustrated in figures 7 and 8, the survey results show that average load and average VKT were significantly below long-term average growth rates in 1998 and appeared to return to trend in the 1999 survey.



Sources: ABS SMVU, CBCS (1973).

Figure 8 Average laden business kilometres for commercial vehicles (CVs)

Table 3 Estimated numbers of commercial vehicles with laden business kilometres

(thousand vehicles)

	Vehicle type		
Date	LCVs	Rigid trucks	Articulated trucks
30-Sep-71	340304	347141	32238
30-Sep-76	363805	359863	39761
30-Sep-79	440393	335197	43944
30-Sep-82	490457	419960	46179
30-Sep-85	540365	398880	49412
30-Sep-88	638571	375276	48530
30-Sep-91	778476	301782	50682
30-Sep-95	837536	305806	56137
31-Jul-98	854545	283379	52478
31-Jul-99	906047	288600	54684

Sources: ABS SMVU, CBCS (1973).

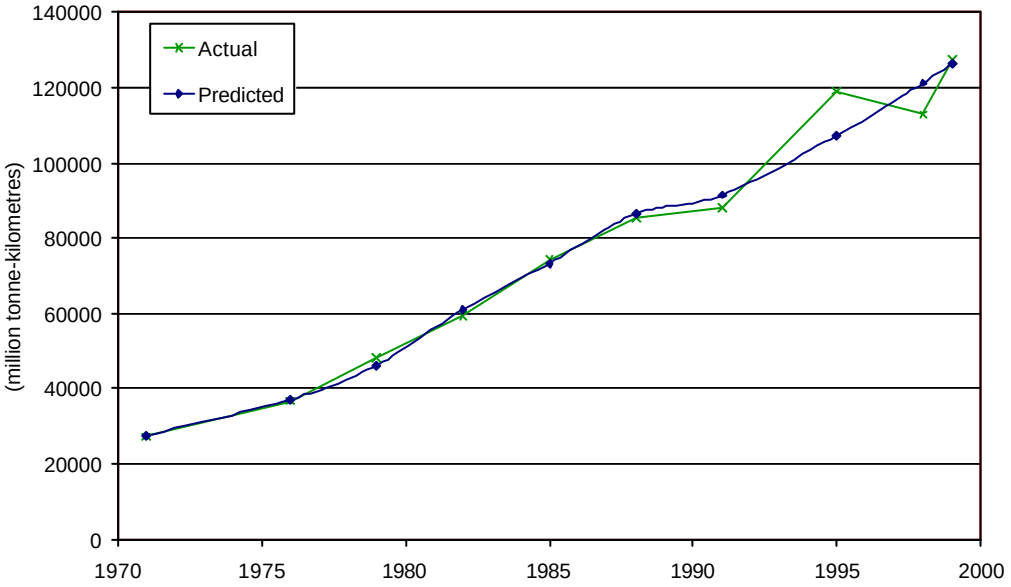
The decomposition approach implies two separate adjustments are necessary to bridge the gap between the pre-1998 SMVU results and the more recent results. Firstly, adjust the average load and average laden VKT results for the 1998 SMVU (accepting the 1999 SMVU results for these variables as correct), and secondly adjust the total number of vehicles estimated as undertaking laden business use (to be consistent with the vehicle population definition used for pre-1998 surveys).

To adjust the 1998 SMVU results, we use a linear weighted average of the 1995 and 1999 results for average load and average laden VKT. To adjust the 1999 SMVU results, we scaled up the 1995 SMVU estimates by the growth in the number of vehicles on register, as reported in the Motor Vehicle Census. These methods imply a road freight task of around 126.5 billion tkm for 1998 and 131.5 billion tkm for 1999, compared to the SMVU estimates of 112.8 and 127.3 billion tkm.

Model-based forecast approach

The model-based forecast approach involved estimating an economic model of road freight activity (based on road freight activity prior to 1998) and then using the model to 'forecast' the 1998 and 1999 freight task. The model-based forecasts give estimates of the current freight task that are in-line with the results of the 'growth decomposition' approach.

Before turning to the results of the forecasting model, it is useful to consider the fit of a simple model for aggregate road freight demand estimated over all available SMVU data, 1971 to 1999. The simple model relates road freight to real road and rail freight rates and GDP growth. Figure 9 illustrates the predicted values from the model versus the actual SMVU estimates.



Sources: ABS SMVU, CBCS (1973), BTE estimates.

Figure 9 Aggregate freight task: actual SMVU values and predicted

It is apparent from figure 9 that the simple model fits the pre-1991 SMVU data almost perfectly. From 1991 onwards, however, the simple model is a poor description of the SMVU data. In particular, the simple model significantly underestimates the 1995 and overestimates the 1998 SMVU estimates.

The results from the 'growth decomposition' approach, discussed above, suggested that the 1998 SMVU results have to be adjusted to fit the pre-1998 SMVUs. The results illustrated in figure 9 also accord with the belief of some transport analysts that the 1995 SMVU overestimated the trend freight task. Apelbaum (1997) suggests that the 1995 SMVU over-estimated diesel fuel use by road transport by approximately 5 per cent. Assuming the over-estimate of fuel use is reflected in activity levels, the 1995 SMVU estimate of aggregate road freight should also be adjusted downwards by 5 per cent. We have used an adjusted estimate of 114 billion tkm for the 1995 road freight task for forecasting the 1998 and 1999 road freight task.

A simple dynamic model of road freight activity was used for forecasting purposes. The model, specified in equation (1), relates aggregate road freight to road and rail freight rates, real GDP growth and the current change in economic activity. Such a specification captures the reduction in freight activity (associated with the economic recession in 1991) that is apparent in the 1991 SMVU results.

$$\ln F_t = b_0 + b_1 \ln p_t^{Rd} - b_2 \ln p_t^{Rl} + b_3 \ln y_t + b_4 \hat{y}_t + e_t \qquad (1)$$

where

F_t = aggregate freight task at time *t*, as reported in the SMVU (ABS 2000 and earlier issues);
p_t^{Rd} = road freight rate at time *t*;
p_t^{Rl} = rail freight rate at time *t*;
y_t = real GDP at time *t*; and
$\hat{y}_t$ = annual percentage change in real GDP between periods *t-1* and *t*.

Space constraints prevent the inclusion of the full model results here, but they will be available in a forthcoming BTE Working Paper.

Due to the small number of observations, additional data points can significantly influence the parameter estimates. The forecasts of road freight activity in 1998 and 1999 vary significantly depending on the period used to estimate the model. Table 4 shows the forecasts generated by estimating the model over three different observation periods. Our preferred estimates are for the model estimated over the period 1971-1991, largely because these results most closely agree with the growth decomposition approach. Even if the Apelbaum (1997) adjusted estimate for 1995 is used instead of the raw SMVU estimate, the model predicts an inordinately high level of road freight activity in 1998 and 1999. Forecasts based on the model estimated using data from 1971–1988 also implies much higher levels of road freight in 1998 and 1999.

Table 4 Forecast road freight task, 1998 and 1999

(thousand tonne-kilometres)

	Estimation period		
Year	1971-1995	1971-1991	1971-1988
1991	na	na	90214
1995	na	108542	110587
1998	138544	128601	131959
1999	148818	136612	140706

na not applicable.

Source: BTE estimates.

Standardised freight estimates

The results of the two methods discussed above imply that the change in the SMVU survey methodology has produced lower freight task estimates than might otherwise have been produced using the pre-1998 methodology. The results suggest a standardised road freight task of around 126 to 128 billion tkm for 1998 and 131 to 136 billion tkm for 1999. There is, though, a significant difference between 131 and 136 billion tkm, and there are few objective means of determining, with greater certainty, the 'real' level of the road freight task. Table 5 provides preliminary standardised road freight estimates, derived from the model-based forecasting method.

Conclusions

The SMVU is the major source of vehicle use and road transport activity statistics in Australia. Although the SMVU was probably not intended to be a time-series of road transport activity, trends in Australian vehicle use can only be obtained from the SMVU. It is important that transport practitioners are aware that the SMVU data requires standardisation, to account for the impact of methodological and definitional changes, prior to being used in trend analysis. The standardisation processes, for road transport data sets, summarised in this paper will be presented in more detail and depth in a forthcoming BTE Working Paper.

While infrequent methodological and definitional changes can be adjusted for, changes in overall data accuracy cannot. In addition to methodological and definitional changes, the SMVU has also been subject to tighter budget constraints, which has resulted in continual reductions in the survey sample size. Smaller samples increase the variability of the estimates and make it difficult for analysts to distinguish between changes in vehicle use over time and the within sample variation, especially for subsets of the vehicle fleet. While up to now this has been a problem only for transport researchers, the reduced data quality will be increasingly felt by transport policy makers forced to make decisions without a clear picture of current transport activity.

Table 5 Standardised freight task estimates

(million tonne-kilometres)

Year	Standardised road freight task	Raw SMVU road freight task
1970-71	26840.5	27303.9
1971-72	28703.1	
1972-73	29422.9	
1973-74	31914.4	
1974-75	32588.4	
1975-76	36181.0	36702.3
1976-77	39518.6	
1977-78	41607.4	
1978-79	47818.3	48127.0
1979-80	50480.1	
1980-81	56001.5	
1981-82	60447.6	59366.5
1982-83	55054.6	
1983-84	66279.4	
1984-85	72868.7	74300.2
1985-86	76030.5	
1986-87	78028.3	
1987-88	84071.1	85528.8
1988-89	90638.9	
1989-90	93732.8	
1990-91	89880.6	88204.5
1991-92	88357.7	
1992-93	94130.0	
1993-94	98965.8	
1994-95	107061.0	119227
1995-96	114884.4	
1996-97	120922.8	
1997-98	128701.0	112832
1998-99	136736.2	127311

Note: Standardised estimates based on financial year basis.
SMVU estimates based on sample period, generally October – September, except for the 1998 and 1999 SMVU sample periods, which range August – July.

Sources: ABS (1978, 1981a, 1983, 1986, 1990, 1993, 1996, 2000a and 2000c), CBCS (1973), BTE estimates.

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ABS Australian Bureau of Statistics
BTCE Bureau of Transport and Communications Economics
BTE Bureau of Transport Economics
CBCS Commonwealth Bureau of Census and Statistics
SAE Society of Automotive Engineers

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