Australian Bureau of Statistics

Information Paper

Experimental Estimates of Motor Vehicle Use

Australia

12 months ended 31 October 2008

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CONTENTS ....

ABBREVIATIONS ....

'000	thousand
ABS	Australian Bureau of Statistics
GCM	gross combination mass
GVM	gross vehicle mass
km	kilometre
mill.	million
MVC	Motor Vehicle Census
no.	number
RRMSE	relative root mean square error
RSE	relative standard error
SE	standard error
SMVU	ABS Survey of Motor Vehicle Use

CHAPTER **1**   **INTRODUCTION** ....

This publication contains experimental estimates of motor vehicle use for the 12 months ended 31 October 2008. It contains statistics on passenger vehicle, motor cycle, truck and bus use for selected usage measures of total distance travelled, laden business distance travelled, tonne-kilometres and fuel consumption.

The experimental estimates were modelled using historical data from the three previous Surveys of Motor Vehicle Use (SMVU) from 2005 to 2007 and Motor Vehicle Census (MVC) counts of vehicle registrations at 31 March 2008 (see Related Publications). The experimental estimates aim to be as comparable as possible with historical SMVU data.

The SMVU was conducted annually by the ABS from 1998 to 2007. In February 2008 the ABS announced the cancellation of the 2008 survey due to budget pressures. The experimental estimates in this publication were developed in lieu of conducting the survey.

In May 2009, the ABS announced the reinstatement of the SMVU on a biennial basis, with the next survey to be conducted in respect of the 12 months ended 31 October 2010. The ABS intends to produce modelled estimates similar to those contained in this publication for the 12 months ended 31 October 2009, and every second year thereafter.

The estimates in this publication are considered experimental and should be used with caution. The experimental estimates were produced by modelling vehicle usage from the three most recent SMVU and applying the resultant models to an estimated count of vehicles registered during the 12 months ended 31 October 2008. The modelling has primarily been designed to provide a measure of total distance travelled and tonne-kilometres for each state/territory of registration by type of vehicle. The results are based on the assumption that the average usage of motor vehicles with certain characteristics remains consistent over time (see *Assumptions* in Chapter 2).

In particular, the modelling did not take account of any impacts that might be caused by changes in the price of fuel, which were significant during the reference period. This issue will continue to be investigated and if possible, refinements will be made to future modelling exercises.

Comparisons have not been made between these modelled estimates and previous publications of the SMVU because of the difference in methods used. Also, care should be taken in drawing inferences from changes in data over time as estimates may be subject to high variability and the resulting estimates of movements may not be considered statistically significant.

INTRODUCTION
continued

The ABS is very interested in feedback from users of these statistics. Users are invited to provide comments to the ABS on any aspect of this release, including particular estimates contained within. Please contact Sally Pritchard on 07 3222 6310 to provide feedback or seek further information about the methodology used in these experimental estimates.

Additional information about the reliability of the level and movement estimates is given in Chapter 4.

ABS DATA AVAILABLE ON REQUEST

No further data is available from Experimental Estimates of Motor Vehicle Use, 12 months ended 31 October 2008.

RELATED PUBLICATIONS

Other ABS publications and products which may be of interest are outlined below. See these related publications on the ABS web site <www.abs.gov.au>.

Survey of Motor Vehicle Use, Australia (cat. no. 9208.0)
Motor Vehicle Census, Australia (cat. no. 9309.0)

CHAPTER **2**   CONCEPTS AND METHODS ....

SCOPE AND POPULATION

The scope of the 2008 modelled estimates is the same as the SMVU, i.e. all vehicles that were registered with a motor vehicle authority for road use at some stage during the 12 months ended 31 October 2008. Not included are caravans, trailers, tractors, plant and equipment, vehicles belonging to the defence services and vehicles with diplomatic or consular plates. Where they were registered as such, vintage and veteran cars were also excluded. Unregistered vehicles are out of scope.

The population was identified on 31 March 2008 using information obtained from the state and territory motor vehicle registration authorities, as part of the annual MVC. There were 15.3 million vehicles identified at this time. Adjustments have been made to align this population with the reference period.

METHODOLOGY

The experimental estimates were produced by modelling vehicle usage from the three most recent SMVU and applying the resultant models to an estimated count of vehicles registered during the 12 months ended 31 October 2008.

Separate models were developed for the following selected usage measures:
- total distance travelled
- laden business distance travelled
- tonne-kilometres travelled
- total fuel consumption.

The modelling method derived a relationship between each of the usage measures and one or more SMVU classificatory data items expected to be closely associated with usage patterns and available on the MVC.

Data items considered for further investigation as explanatory variables in the predictive regression models were:
- state/territory of registration
- type of vehicle
- age of vehicle (derived from year of registration)
- Gross Vehicle Mass (GVM)
- Gross Combination Mass (GCM)
- fuel type

The regression analysis consistently found that state of registration, type of vehicle and age of vehicle produced the best models within the bounds of acceptable cost and complexity. For total fuel consumption, type of fuel was also found to be applicable.

Three years of SMVU data were pooled in the regression analysis (2005-2007). It was found that there was no significant differences between the models produced from combining SMVU 2005 to 2007 data compared with combined 2006 and 2007, and 2007 on its own. While introducing some potential bias by including less recent years, the

METHODOLOGY
continued

additional data results in more confidence in the models produced and hence more reliable estimates.

Regression model

The regression results consistently demonstrated that a negative exponential relationship with respect to age performed best for the variables being modelled. The equation for this type of model takes the form of $y = ae^{-b*age}$ where y is the variable being modelled, *age* is the age of the vehicle with *a* and *b* being regression coefficients calculated via regression analysis and where *e* is the mathematical constant that is the base of the natural logarithm.

The only exception to this formula was for laden distance travelled for light commercial vehicles where an additional term was included based on a linear relationship with total distance travelled.

The extent to which separate models were necessary for each combination of state/territory of registration, type of vehicle and type of fuel was assessed with some amalgamation across state of registration or type of fuel occurring where there was not a significant difference between models.

The experimental estimates were generated by applying these formulae to adjusted population counts from the 2008 MVC (see *Adjusted population counts*).

Assumptions

The experimental estimates presented in this publication are based on usage patterns observed in SMVU conducted for 2005 to 2007.

The major assumption was that motor vehicle use for each vehicle, defined in terms of state/territory of registration, vehicle type and age of vehicle, did not change significantly across the term of the modelling exercise from 2005 to 2008. In other words, changes in aggregate motor vehicle use were driven by changes in the numbers and composition of the vehicle fleet.

The modelling method used to produce the experimental estimates did not take account of any impacts that might be caused by changes in the price of fuel, which were significant during the reference period. This issue will continue to be investigated and if possible refinements will be made to future modelling exercises.

Changes in the Australian economy that developed towards the very end of the reference period are assumed to have had a minor impact on motor vehicle use and are not included in the models.

It was also assumed that:
- the correlation between each usage measure and explanatory variables determined in the investigations remained applicable for 2008
- any change in the composition of the vehicle population for characteristics not included in the model would not have an impact on the results
- the quality of the MVC has remained constant since 2004

Adjusted population counts

To ensure that the experimental estimates represented use by all in-scope vehicles during the 12 months ended 31 October 2008 and that these estimates accurately reflected vehicle characteristics, two adjustments were made. These were:
- adjustments for differences between MVC and SMVU vehicle characteristics

Adjusted population counts continued

■ adjustment for MVC snapshot timing

For type of vehicle, state of registration and fuel type, adjustments were made in producing the experimental estimates to account for differences which can occur between registration (MVC) characteristics and those reported in SMVU. As SMVU estimates and all experimental estimate models were based on reported details, the MVC 2008 vehicle counts needed to be adjusted to ensure models were applied to appropriate MVC registration counts. This adjustment was done by identifying the proportion of registrations for which MVC data differed from SMVU characteristics in the last three SMVU collections and then adjusting the 2008 MVC counts for each cross-classification (classification grouping) by the appropriate factor.

The MVC 2008 snapshot on which the experimental estimates were based was taken at 31 March 2008. As this is one month before the midpoint of the reference year, an adjustment was made to account for the additional vehicles which would have been registered for the first time in this month.

Estimates for number of vehicles

Experimental estimates of the numbers of vehicles were derived to enable the calculation of average use. The number of vehicles estimates were not modelled using the same method as the usage measures. The total number of registered vehicles was calculated by excluding small numbers of out of scope (not registered or duplicated registrations), estimated from the previous three years of SMVU, from the 2008 adjusted population counts.

To estimate the number of registered vehicles which were driven during the reference period, these total registration estimates were further reduced by the proportion of nil-use vehicles recorded from the past three SMVU reference years.

COMPARISON WITH MOTOR VEHICLE CENSUS DATA

The estimates of numbers of vehicles, by vehicle type are not fully comparable with the MVC data. The main differences are:
■ the experimental estimates of numbers of vehicles relate to the average number of vehicles registered for road use during the period 1 November 2007 to 31 October 2008, not to the number of vehicles registered at a specific date, as is the case for the MVC.
■ the characteristics of the type of vehicle identified from the SMVU information, and therefore the modelling, may differ from those recorded by the motor registries.

CONCEPT OF AVERAGES

Most tables in this publication include statistics presented as averages. Table A1.1 presents average kilometres travelled per vehicle for all registered vehicles in scope of the experimental estimates. This includes those vehicles that travelled zero kilometres during the reference period (also known as nil use vehicles). Other tables present information on actual vehicle use where the denominator used in calculating the average is limited to the estimated number of vehicles that contribute to the particular cell.

CHAPTER **3**   **MAIN FEATURES** ....

KILOMETRES TRAVELLED

There were an estimated 222,871 million kilometres travelled in the 12 months ending 31 October 2008. Passenger vehicles travelled 164,374 million kilometres or 73.8% of the total kilometres travelled during the period. In comparison, the second largest distance was travelled by light commercial vehicles with 37,959 million kilometres or 17% of the total. Combined, these two vehicle types travelled 90.8% of the kilometres travelled in 2008.

The average distance travelled per vehicle was 14,600 kilometres. Articulated trucks travelled well above the overall average with an average of 91,800 kilometres. Buses showed the second highest average with 29,600, while motor cycles had the lowest average, with 3,600 kilometres.

FUEL CONSUMPTION

The estimate of total fuel consumption was 31,524 million litres for the 12 months ending 31 October 2008. Over 60% of this fuel was consumed by passenger vehicles which used 19,157 million litres. The second largest consumer of fuel was light commercial vehicles using 5,014 million litres or 15.9%. Non-freight carrying trucks used the least fuel with 75 million litres or less than 1%.

Motor cycles had the lowest average rate of fuel consumption at 6.3 litres per 100 kilometres.

Articulated trucks had the highest average rate of fuel consumption at 55.1 litres per 100 kilometres, approximately double the average fuel rates for buses and non-freight carrying trucks at 28.8 and 26.1 litres per 100 kilometres, respectively.

BUSINESS KILOMETRES TRAVELLED BY FREIGHT VEHICLES

The total laden business kilometres travelled during the 12 months ending 31 October 2008 were 29,208 million. Of the total, 60.5% were business kilometres travelled by light commercial vehicles.

Queensland had the highest laden business kilometres travelled with 8,351 million, followed by New South Wales with 7,426 million and Victoria with 7,045 million.

The average laden business kilometres travelled was 17,500 kms. Articulated vehicles had an average of 74,600 laden business kilometres, over four times the overall average.

TONNE-KILOMETRES

In Australia, an estimated 192,935 million tonne-kilometres were travelled during the 12 months ended 31 October 2008. Articulated trucks accounted for 77.5% of the tonne-kilometres travelled.

The average tonne-kilometres travelled by articulated trucks was 2.1 million. The average tonne-kilometres travelled by rigid trucks was much less at 102,900 and light commercial vehicles travelled the least, at 6,300 tonne-kilometres.

CHAPTER **4**   RELIABILITY OF ESTIMATES   ....

DATA QUALITY

The experimental estimates of motor vehicle use are predictions. When interpreting the experimental estimates it is important to take into account factors that may affect the reliability of the estimates.

The quality of the experimental estimates is limited by:
- the accuracy of the assumptions underpinning the modelling;
- the accuracy of the data used in the modelling exercise; and
- the accuracy of the adjustments made.

The assumptions used and the adjustments made in the production of the experimental estimates were outlined in Chapter 2. Users should consider the suitability of these assumptions in using these experimental estimates.

Examination of the following quality indicators will also assist users in determining fitness for purpose of the experimental estimates of motor vehicle use.

DATA USED IN THE MODELLING EXERCISE

The experimental estimates in this publication are the result of applying modelling techniques to three years of data from the SMVU. The motor vehicle usage patterns produced were applied to estimated counts of vehicles registered during the 12 months ended 31 October 2008.

The SMVU uses a sample of registered motor vehicles, rather than full enumeration and is subject to sampling error. The resultant models obtained from the regression analysis may have been different if usage information had been available for all registered vehicles for the three years of historical data.

Measurement of sampling error

The sampling error associated with an estimate from a sample survey such as the SMVU can be estimated from the sample results. One measure of sampling error is given by the SE, which indicates the extent to which an estimate might have varied by chance because only a sample of vehicles was included. There are about two chances in three that a sample estimate will differ by less than one standard error from the data that would have been obtained if all vehicles had been included, and about 19 chances in 20 that the difference will be less than two standard errors.

Another measure of sampling variability for a sample survey is the relative standard error (RSE) which is obtained by expressing the standard error as a percentage of the estimate to which it refers. The RSE is a useful measure in that it provides an immediate measure of the percentage error likely to have occurred due to sampling.

Estimate of RSE for numbers of vehicles estimate

The estimates of numbers of vehicles used in this publication are the result of taking the 2008 frame and making adjustments for reported state/territory of registration, reported vehicle type and new motor vehicles. These adjustments were made based on historical evidence from the 2005, 2006 and 2007 SMVU. RSE have been produced for the estimates of number of vehicles in Table A1.1.

The RSE relating to the 2008 experimental estimates of numbers of vehicles contained in Table A1.1 of this publication are shown in the following table:

1 RSE OF NUMBER OF VEHICLES(a), State/territory of registration—Type of vehicle

	Passenger vehicles	Motor cycles	Light commercial vehicles	Rigid trucks	Articulated trucks	Non-freight carrying trucks	Buses	Total
	%	%	%	%	%	%	%	%
New South Wales	1.7	4.3	2.5	1.4	2.6	17.1	4.0	1.4
Victoria	1.8	3.0	2.3	2.4	1.9	11.7	4.2	1.4
Queensland	2.0	3.7	2.3	1.6	2.2	9.3	3.2	1.5
South Australia	1.6	3.5	2.3	1.6	2.3	11.6	4.0	1.3
Western Australia	1.8	2.5	2.6	1.4	2.2	10.4	5.9	1.4
Tasmania	1.9	4.3	2.2	2.5	2.9	11.0	3.9	1.4
Northern Territory	2.1	4.1	2.9	8.1	3.6	12.3	7.0	1.4
Australian Capital Territory	2.4	5.3	3.3	1.9	6.8	11.9	5.5	2.1
Australia	**0.8**	**1.7**	**1.1**	**0.8**	**1.0**	**5.5**	**1.8**	**0.6**

(a) These RSEs relate to the estimates of number of vehicles in Table A1.1

Measurement of non-sampling error

There are a range of other potential errors that are not caused by sampling and can occur in any statistical collection whether it is modelled, based on full enumeration or a sample. If these errors are systematic (not random) then the estimates will be distorted in one direction and therefore will be unrepresentative of the target population. Systematic errors result in bias.

Relative Root Mean Square Errors of modelled estimates

An estimation of the expected error, including a component of the bias in the experimental estimates as a result of the modelling, is provided through the Relative Root Mean Square Errors (RRMSE).

The RRMSE will not reflect any bias due to the model losing validity over time. On the basis that the assumptions (as previously outlined) of the modelling hold, the RRMSE will be similar, though not completely comparable, to the usual RSE provided for a sample survey.

Relative Root Mean Square Errors of modelled estimates continued

The RRMSE relating to the 2008 experimental estimates of kilometres travelled contained in Table A1.1 of this publication are shown in the following table:

2 RRMSE OF TOTAL KILOMETRES TRAVELLED(a), State/territory of registration—Type of vehicle

	Passenger vehicles	Motor cycles	Light commercial vehicles	Rigid trucks	Articulated trucks	Non-freight carrying trucks	Buses	Total
	%	%	%	%	%	%	%	%
New South Wales	3.3	20.5	7.6	7.4	5.1	22.4	5.6	2.8
Victoria	3.5	23.1	8.4	7.3	4.1	28.6	5.4	2.9
Queensland	4.5	24.4	8.8	7.6	4.7	26.0	5.1	3.6
South Australia	9.4	15.5	9.5	8.2	5.2	41.2	12.3	7.4
Western Australia	3.3	20.7	9.4	7.6	6.1	36.0	5.3	3.0
Tasmania	2.9	29.2	12.7	9.3	5.7	31.6	13.8	3.5
Northern Territory	9.6	23.1	11.1	10.2	10.7	27.8	18.5	6.5
Australian Capital Territory	4.8	18.7	11.0	10.0	11.6	32.2	33.0	4.2
Australia	**1.8**	**10.5**	**3.9**	**3.5**	**2.2**	**13.1**	**2.7**	**1.5**

(a)   These RRMSEs relate to the experimental estimates of total kilometres travelled in Table A1.1

As an example of the use of an RRMSE, the 2008 experimental estimate for total kilometres travelled by all passenger vehicles registered in Australia is 164,374 million kilometres (Table A1.1 of the publication). The rounded RRMSE for this estimate is 1.8% as shown above. Therefore, the root mean square error for the 2008 kilometres travelled by passenger vehicles experimental estimate is 2,959 million kilometres (1.8% of 164,374 million kilometres).

There are about two chances in three that the figure obtained if all vehicles had been included and the assumptions of the modelling hold true, would have been in the range 161,415 million kilometres to 167,333 million kilometres (a range of one root mean square error above and below the experimental estimate). There are about 19 chances in 20 that the figure would have been in the range 158,456 million kilometres to 170,292 million kilometres (a range of two root mean square errors above and below the experimental estimate).

Relative Root Mean Square Errors of modelled estimates continued

RRMSE for other usage measures are shown in the following tables.

3 RRMSE OF FUEL CONSUMPTION(a), State/territory of registration—Type of vehicle

	Passenger vehicles	Motor cycles	Light commercial vehicles	Rigid trucks	Articulated trucks	Non-freight carrying trucks	Buses	Total
	%	%	%	%	%	%	%	%
TOTAL FUEL CONSUMPTION								
New South Wales	4.4	21.5	8.9	9.8	5.5	17.9	14.9	3.4
Victoria	9.8	23.9	9.3	8.8	4.3	31.6	21.2	6.3
Queensland	5.8	27.8	10.1	10.7	5.1	28.5	18.6	3.9
South Australia	6.0	15.4	11.3	9.3	5.2	34.6	30.3	4.2
Western Australia	5.9	21.6	12.2	9.9	7.1	33.4	13.4	4.2
Tasmania	3.9	30.6	13.1	12.7	6.1	34.2	23.7	3.9
Northern Territory	5.5	26.8	13.7	13.5	11.7	45.8	37.5	5.6
Australian Capital Territory	6.6	19.4	12.0	13.3	11.9	39.5	36.5	5.5
Australia	**3.3**	**11.4**	**4.5**	**4.7**	**2.4**	**13.9**	**8.1**	**2.2**
AVERAGE RATE OF FUEL CONSUMPTION								
New South Wales	5.5	29.7	11.7	12.3	7.5	18.5	15.9	4.4
Victoria	10.4	33.3	12.5	11.5	5.9	42.4	21.9	7.0
Queensland	7.4	37.0	13.4	13.1	7.0	38.5	19.3	5.4
South Australia	11.1	21.9	14.8	12.4	7.4	53.8	32.7	8.5
Western Australia	6.8	29.9	15.4	12.5	9.3	48.0	14.4	5.1
Tasmania	4.8	42.3	18.2	15.7	8.3	46.2	27.4	5.3
Northern Territory	11.0	35.4	17.7	16.9	15.9	53.6	41.8	8.5
Australian Capital Territory	8.2	27.0	16.3	16.7	16.6	50.7	49.3	6.9
Australia	**3.7**	**15.5**	**5.9**	**5.8**	**3.2**	**19.0**	**8.5**	**2.6**

(a) These RRMSEs relate to the experimental estimates in Table A1.3

4 RRMSE OF TONNE-KILOMETRES TRAVELLED(a), State/territory of registration—Freight vehicles

	Light commercial vehicles	Rigid trucks	Articulated trucks	Total
	%	%	%	%
New South Wales	20.9	20.0	7.4	7.4
Victoria	19.4	17.4	5.9	5.5
Queensland	17.0	19.3	7.7	7.0
South Australia	27.0	24.1	7.8	7.3
Western Australia	19.7	23.2	10.6	9.4
Tasmania	30.6	23.5	8.8	8.9
Northern Territory	26.4	34.4	16.1	14.4
Australian Capital Territory	24.5	26.0	16.0	12.8
Australia	**9.1**	**9.2**	**3.4**	**3.2**

(a) These RRMSEs relate to the experimental estimates of tonne-kilometres in Table A1.5

TABLES OF ESTIMATES ....

A1.1 MOTOR VEHICLE USE, State/territory of registration—Type of vehicle

	Passenger vehicles	Motor cycles	Light commercial vehicles	Rigid trucks	Articulated trucks	Non-freight carrying trucks	Buses	Total
TOTAL KILOMETRES TRAVELLED *(mill.)*								
New South Wales	50 339	566	10 215	2 635	1 444	63	536	65 798
Victoria	43 249	479	8 219	2 074	2 239	91	428	56 779
Queensland	32 538	531	10 296	2 371	1 805	73	495	48 110
South Australia	12 422	117	2 415	509	590	12	119	16 184
Western Australia	18 271	226	4 710	1 141	836	34	265	25 484
Tasmania	3 684	40	1 227	210	134	8	55	5 359
Northern Territory	1 091	22	530	73	70	4	83	1 871
Australian Capital Territory	2 779	41	347	63	27	1	26	3 284
Australia	**164 374**	**2 022**	**37 959**	**9 077**	**7 145**	**288**	**2 006**	**222 871**
NUMBER OF VEHICLES(a) *(no.)*								
New South Wales	3 575 414	148 637	618 461	116 467	16 436	4 290	18 437	4 498 141
Victoria	3 156 722	135 229	489 554	97 978	23 227	5 534	14 448	3 922 690
Queensland	2 317 431	139 515	585 521	94 364	17 919	4 220	16 211	3 175 182
South Australia	944 598	38 474	149 729	27 358	6 715	1 781	4 097	1 172 754
Western Australia	1 318 485	76 073	281 986	56 195	10 872	3 968	8 913	1 756 492
Tasmania	284 666	12 144	76 666	10 604	1 549	1 043	2 086	388 759
Northern Territory	75 088	4 704	31 113	4 506	909	275	2 635	119 230
Australian Capital Territory	198 856	9 382	20 838	2 280	219	81	893	232 548
Australia	**11 871 260**	**564 159**	**2 253 869**	**409 752**	**77 845**	**21 192**	**67 721**	**15 265 797**
AVERAGE KILOMETRES TRAVELLED(b) *('000)*								
New South Wales	14.1	3.8	16.5	22.6	87.9	14.8	29.1	14.6
Victoria	13.7	3.5	16.8	21.2	96.4	16.5	29.7	14.5
Queensland	14.0	3.8	17.6	25.1	100.8	17.4	30.5	15.2
South Australia	13.2	3.0	16.1	18.6	87.8	6.9	28.9	13.8
Western Australia	13.9	3.0	16.7	20.3	76.9	8.5	29.7	14.5
Tasmania	12.9	3.3	16.0	19.8	86.6	7.9	26.3	13.8
Northern Territory	14.5	4.6	17.0	16.1	76.8	15.6	31.4	15.7
Australian Capital Territory	14.0	4.4	16.6	27.8	122.2	18.5	28.8	14.1
Australia	**13.8**	**3.6**	**16.8**	**22.2**	**91.8**	**13.6**	**29.6**	**14.6**

(a) The average number of vehicles registered for the 12 months. Includes registered vehicles that did not travel during the reference period.

(b) Calculated using the total kilometres travelled divided by the average number of registered vehicles. Includes registered vehicles that did not travel during the reference period.

A1.2 AVERAGE KILOMETRES TRAVELLED(a), State/territory of registration—Type of vehicle

	Passenger vehicles	Motor cycles	Light commercial vehicles	Rigid trucks	Articulated trucks	Non-freight carrying trucks	Buses	Total
	'000	'000	'000	'000	'000	'000	'000	'000
New South Wales	14.5	4.6	17.1	24.1	92.4	15.7	29.4	15.2
Victoria	14.2	4.8	17.9	24.2	102.2	17.3	30.2	15.2
Queensland	14.7	4.7	18.4	27.1	106.2	18.2	31.5	16.0
South Australia	13.8	3.9	16.9	20.5	94.2	7.8	29.5	14.6
Western Australia	14.7	4.4	18.9	23.9	85.8	9.8	30.8	15.8
Tasmania	13.7	4.5	17.4	22.2	93.5	8.4	27.5	14.7
Northern Territory	15.0	5.8	18.4	17.5	84.2	17.4	33.8	16.6
Australian Capital Territory	14.3	5.6	17.7	29.7	126.9	21.0	29.4	14.7
Australia	**14.4**	**4.6**	**17.9**	**24.5**	**97.9**	**14.7**	**30.4**	**15.4**

(a) Average distance travelled for registered vehicles which were used. Excludes registered vehicles that did not travel during the reference period.

A1.3 FUEL CONSUMPTION, State/territory of registration—Type of vehicle

	Passenger vehicles	Motor cycles	Light commercial vehicles	Rigid trucks	Articulated trucks	Non-freight carrying trucks	Buses	Total
TOTAL FUEL CONSUMPTION *(Million Litres)*								
New South Wales	5 793	35	1 355	752	754	15	150	8 854
Victoria	5 160	31	1 083	624	1 176	23	111	8 208
Queensland	3 764	33	1 336	676	990	21	153	6 973
South Australia	1 418	7	325	152	336	3	32	2 273
Western Australia	2 156	14	632	329	545	9	84	3 768
Tasmania	419	3	164	62	73	2	15	738
Northern Territory	126	1	73	20	53	1	24	299
Australian Capital Territory	320	3	46	20	14	—	8	411
Australia	**19 157**	**127**	**5 014**	**2 635**	**3 939**	**75**	**577**	**31 524**
AVERAGE RATE OF FUEL CONSUMPTION(a) *(Litres/100 km)*								
New South Wales	11.5	6.2	13.3	28.5	52.2	22.9	28.1	13.5
Victoria	11.9	6.5	13.2	30.1	52.5	25.6	25.9	14.5
Queensland	11.6	6.3	13.0	28.5	54.8	28.8	30.9	14.5
South Australia	11.4	6.0	13.4	29.9	57.0	28.1	26.9	14.0
Western Australia	11.8	6.1	13.4	28.9	65.1	26.4	31.6	14.8
Tasmania	11.4	6.5	13.3	29.7	54.5	27.7	27.9	13.8
Northern Territory	11.6	6.7	13.9	28.2	75.5	25.2	29.0	16.0
Australian Capital Territory	11.5	6.1	13.2	31.3	51.6	26.2	32.2	12.5
Australia	**11.7**	**6.3**	**13.2**	**29.0**	**55.1**	**26.1**	**28.8**	**14.1**

— nil or rounded to zero (including null cells)

(a) Calculated using the total fuel consumption divided by the total kilometres travelled.

A1.4 BUSINESS KILOMETRES TRAVELLED BY FREIGHT VEHICLES, State/territory of registration

	Light commercial vehicles	Rigid trucks	Articulated trucks	Total freight vehicles
TOTAL LADEN BUSINESS KILOMETRES TRAVELLED *(mill.)*				
New South Wales	4 591	1 782	1 053	7 426
Victoria	3 857	1 431	1 757	7 045
Queensland	5 372	1 629	1 350	8 351
South Australia	1 060	347	450	1 858
Western Australia	1 949	802	568	3 318
Tasmania	448	130	87	665
Northern Territory	206	48	45	299
Australian Capital Territory	180	45	20	245
Australia	**17 664**	**6 214**	**5 330**	**29 208**
AVERAGE LADEN BUSINESS KILOMETRES TRAVELLED(a) *('000)*				
New South Wales	12.6	17.5	68.5	15.5
Victoria	14.1	17.8	81.8	18.8
Queensland	16.6	19.9	81.5	19.8
South Australia	11.9	14.7	73.0	15.6
Western Australia	14.2	18.2	59.9	17.4
Tasmania	14.1	15.2	61.8	15.9
Northern Territory	12.8	12.1	55.2	14.3
Australian Capital Territory	14.7	21.6	98.0	16.9
Australia	**14.2**	**17.9**	**74.6**	**17.5**

(a) Calculated using the total laden business kilometres travelled divided by the number of vehicles that travelled laden business kilometres.

A1.5 TONNE-KILOMETRES TRAVELLED BY FREIGHT VEHICLES, State/territory of registration

	Light commercial vehicles	Rigid trucks	Articulated trucks	Total freight vehicles
TOTAL TONNE-KILOMETRES TRAVELLED *(mill.)*				
New South Wales	2 047	9 765	25 585	37 398
Victoria	1 877	8 523	45 193	55 593
Queensland	2 177	9 375	36 501	48 053
South Australia	538	2 106	13 599	16 243
Western Australia	845	4 451	23 725	29 021
Tasmania	188	913	2 221	3 322
Northern Territory	82	230	2 190	2 502
Australian Capital Territory	72	253	477	803
Australia	**7 827**	**35 616**	**149 492**	**192 935**
AVERAGE TONNE-KILOMETRES TRAVELLED (a) *('000)*				
New South Wales	5.6	96.1	1 664.6	77.8
Victoria	6.9	106.1	2 104.2	148.3
Queensland	6.7	114.2	2 203.8	113.8
South Australia	6.0	89.0	2 205.7	136.2
Western Australia	6.2	101.2	2 503.6	152.3
Tasmania	5.9	106.7	1 584.7	79.6
Northern Territory	5.1	57.6	2 713.1	119.3
Australian Capital Territory	5.9	121.4	2 299.5	55.3
Australia	**6.3**	**102.9**	**2 091.7**	**115.9**

(a)   Calculated using the total tonne-kilometres travelled divided by the number of vehicles that travelled tonne-kilometres.

Articulated trucks	Motor vehicles constructed primarily for load carrying, consisting of a prime mover which has no significant load carrying area, but with a turntable device which is linked to a semitrailer.
Buses	Motor vehicles constructed for the carriage of passengers. Included are all motor vehicles with 10 or more seats, including the driver's seat.
Business kilometres	Distance travelled for hire and reward, or charged to a business expense, or for which an allowance was received. All distances travelled for business purposes, irrespective of actual use, and irrespective of vehicle type, are included in total business kilometres. The laden-unladen dissection of distance travelled for business purposes relates only to freight vehicles, i.e. light commercial vehicles, rigid trucks and articulated trucks.
Freight vehicles	Consists of light commercial vehicles, rigid trucks and articulated trucks.
Fuel consumption	Fuel consumption is calculated by aggregating the total kilometres travelled multiplied by reported average rate of fuel consumption for each vehicle.
Fuel consumption (average)	The average rate of fuel consumption is calculated by dividing the total fuel consumption by total kilometres travelled for each type of vehicle.
Gross Combination Mass (GCM)	Tare weight (i.e. unladen weight) of the motor vehicle and attached trailers, plus their maximum carrying capacity.
Gross Vehicle Mass (GVM)	Tare weight (i.e. unladen weight) of the motor vehicle, plus its maximum carrying capacity. In the survey, this was obtained for buses and rigid trucks not usually towing trailers.
Laden Business kilometres	Distance travelled by light commercial vehicles, rigid trucks and articulated trucks from one destination to another when carrying freight for hire and reward, or charged to a business expense, or for which an allowance was received.
Light commercial vehicles	Motor vehicles constructed for the carriage of goods and which are less than or equal to 3.5 tonnes GVM. Included are utilities, panel vans, cab-chassis and goods carrying vans (whether four-wheel drive or not).
Mean Square Error (MSE)	Indicates the extent to which an estimate might have varied by chance based on the modelling methodology employed to produce the experimental estimates. It accounts for the variability associated with the models used in producing the estimates as well as any bias which may have been introduced due to collapsing of classes. It does not take into account the fact that the data used in the models was originally from a sample of the population or any bias associated with the fact that the models are based on historical data and used to predict future estimates.
Non-freight carrying trucks	Specialist motor vehicles or motor vehicles fitted with special purpose equipment, and having little or no goods carrying capacity, e.g. ambulances, cherry pickers, fire trucks and tow trucks.
Passenger vehicles	Motor vehicles constructed primarily for the carriage of persons and containing up to nine seats (including the driver's seat). Included are cars, station wagons, four-wheel drive passenger vehicles, passenger vans or mini buses with fewer than 10 seats and camper vans.
Relative root mean square error (RRMSE)	The square root of the mean square error expressed as a percentage of the estimate to which it refers.

Relative standard error (RSE)	The standard error expressed as a percentage of the estimate to which it refers.
Rigid trucks	Motor vehicles exceeding 3.5 tonnes GVM, constructed with a load carrying area. Included are normal rigid trucks with a tow bar, draw bar or other non-articulated coupling on the rear of the vehicle.
Standard error (SE)	Indicates the extent to which an estimate might have varied by chance because only a sample of vehicles was included.
Tonne-kilometres	Total tonne-kilometres is the aggregation of the number of tonnes moved multiplied by the distance travelled in kilometres for each individual vehicle carrying freight. Note that it is not the aggregation of the total number of tonnes moved by total kilometres travelled by all vehicles carrying freight.

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