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VEHICLE CRASHWORTHINESS AND AGGRESSIVITY RATINGS AND CRASHWORTHINESS BY YEAR OF VEHICLE MANUFACTURE:

VICTORIA AND NSW CRASHES DURING 1987-2000 QUEENSLAND AND WESTERN AUSTRALIA CRASHES DURING 1991-2000

by

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Abstract:
Crashworthiness ratings measure the relative safety of vehicles in preventing severe injury to their own drivers in crashes whilst aggressivity ratings measure the serious injury risk vehicles pose to drivers of other vehicles with which they collide. Crashworthiness and aggressivity ratings for 1982-2000 model vehicles were developed based on data on crashes in Victoria and New South Wales during 1987-2000 and in Queensland and Western Australia during 1991-2000. Crashworthiness and aggressivity were measured by a combination of injury severity (of injured drivers) and injury risk (of drivers involved in crashes). The ratings were adjusted for the driver sex and age, the speed limit at the crash location, the number of vehicles involved, the state in which the crash occurred and the year in which the crash occurred. These factors were strongly related to injury risk and/or severity for both aggressivity and crashworthiness. Both ratings estimate, with the appropriate focus, the risk of a driver being killed or admitted to hospital when involved in a tow-away crash, to a degree of accuracy represented by the confidence limits of the rating in each case.

The crashworthiness estimates and their associated confidence limits were sufficiently sensitive that they were able to identify 95 models of passenger cars, four-wheel drive vehicles, passenger vans and light commercial vehicles that have superior or inferior crashworthiness characteristics compared with the average vehicle. Aggressivity rating estimates and their associated confidence limits were sufficiently sensitive that they were able to identify 48 models of passenger cars, four-wheel drive vehicles, passenger vans and light commercial vehicles that have superior or inferior aggressivity characteristics compared with the average vehicle. Also investigated was the relationship between vehicle crashworthiness and the year of manufacture of Australian passenger and light commercial vehicles manufactured from 1964 to 2000. Trends were examined by year of manufacture both for the fleet as a whole and by market group for vehicles manufactured from 1982 to 2000.

The results of this report are based on a number of assumptions and warrant a number of qualifications that should be noted.

Key Words: (IRRD except when marked*)
Injury, Vehicle Occupant, Collision, Passenger Car Unit, Passive Safety System, Statistics

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EXECUTIVE SUMMARY

This report describes the development of further updated crashworthiness ratings and aggressivity ratings for 1982-2000 model vehicles. Crashworthiness ratings measure the relative safety of vehicles in preventing severe injury to their own drivers in crashes whilst aggressivity ratings measure the serious injury risk vehicles pose to drivers of other vehicles with which they collide. Both measures are estimated from data on real crashes. The update is based on crash data from Victoria and New South Wales during 1987-2000 and from Queensland and Western Australia during 1991-2000. The rating of vehicle crashworthiness through analysis of real crash data, as carried out here, and through crash tests carried out by consumer groups such as the Australian New Car Assessment Program has encouraged manufacturers to improve vehicle safety.

Both crashworthiness and aggressivity were measured by a combination of injury severity (of injured drivers) and injury risk (of drivers involved in crashes). Crashworthiness injury severity was based on 199,676 drivers injured in crashes in Victoria during 1987-2000, in New South Wales during 1987-1998 and in Queensland and Western Australia during 1991-2000. Crashworthiness injury risk was based on 1,007,045 drivers involved in crashes in New South Wales during 1987-2000 and Western Australia and Queensland during 1991-2000 where a vehicle was towed away. Aggressivity injury risk was based on 447,730 drivers involved in crashes between two vehicles in New South Wales and Queensland and Western Australia where a vehicle was towed away. Aggressivity injury severity was based on 72,081 drivers injured in two-car crashes in Victoria during 1987-2000, in New South Wales during 1987-1998 and in Queensland and Western Australia during 1991-2000. This update of the ratings is the first time crash data form Western Australia has been included in the analysis.

The crashworthiness and aggressivity ratings were adjusted for the driver sex and age, the speed limit at the crash location, the year in which the crash occurred and the state in which the crash occurred. Crashworthiness ratings were also adjusted for the number of vehicles involved in the crash. These factors were found to be strongly associated with injury risk and injury severity. Adjustments were made with the aim of measuring the effects of vehicle factors alone, uncontaminated by other factors available in the data that affected crash severity and injury susceptibility.

The crashworthiness ratings estimate the risk of a driver of the focus vehicle being killed or admitted to hospital when involved in a tow-away crash, to a degree of accuracy represented by the confidence limits of the rating in each case. Statistically reliable crashworthiness ratings were calculated for 213 individual vehicle models manufactured between the years 1982-2000. The estimates and their associated confidence limits were sufficiently sensitive that they were able to identify 95 models of passenger cars, four-wheel drive vehicles, passenger vans and light commercial vehicles that have superior or inferior crashworthiness characteristics compared with the average crashworthiness across all vehicles in the data.

Aggressivity ratings were calculated for 152 models of Australian passenger vehicles manufactured between the years 1982-2000. Aggressivity ratings estimate the risk of a driver of a vehicle impacting with the focus vehicle model being killed or admitted to hospital when involved in a tow-away crash. The degree of accuracy of the aggressivity ratings is represented by the confidence limits of the rating in each case. The estimates and their associated confidence limits were sufficiently sensitive that they were able to identify 48

vehicle models that have superior or inferior aggressivity characteristics compared with the average aggressivity across all vehicle models in the data. Estimated vehicle aggressivity towards drivers of other vehicles was found to have a proportional relationship with vehicle mass. It was also found to have little or no relationship with ratings of vehicle crashworthiness, demonstrating the independence of the two complementary measures.

It is concluded that the additional crash data has enabled the crashworthiness and aggressivity ratings to be obtained for a larger range of car models than was previously possible. The expanded data set has been able to produce more up-to-date and reliable estimates of the crashworthiness of individual car models than those published previously. However, the results and conclusions are based on a number of assumptions and warrant a number of qualifications that should be noted.

The final stage of the project investigated the relationship between vehicle crashworthiness and year of vehicle manufacture for the years of manufacture 1964 to 2000. This study updated an earlier one that studied vehicles manufactured in the years 1964 to 1998. Similar to the previous study, this study showed improvements in crashworthiness over the period of study, with the greatest gains over the years 1970 to 1979 during which a number of new Australian Design Rules aimed at occupant protection took effect. Further trends to improving crashworthiness have also been observed from around 1986 through to 2000. Trends in crashworthiness by year of vehicle manufacture from 1982 to 2000 and market group were also estimated. Significantly different trends were observed between market groups, with small, commercial, and sports vehicles as well as passenger vans showing evidence of trends towards poorer crashworthiness from 1995 onwards in contrast to generally improving trends in other market groups. Possible reasons for these differences have been discussed.

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1. INTRODUCTION AND PROJECT HISTORY

For over a decade, the Monash University Accident Research Centre (MUARC) has been involved in a program of research examining issues relating to vehicle safety through the analysis of mass crash data. Data on which the research is based comes from reports compiled by Police in various states across Australia, augmented by data on injury compensation claims resulting from transportation crashes compiled by the Victorian Transport Accident Commission (TAC).

Work in the area initially commenced as two separate projects undertaken independently by different research groups. In response to recommendations in a report by the Victorian Parliamentary Social Development Committee (SDC 1990) on its inquiry into vehicle occupant protection, MUARC commenced a project in 1990 to develop consumer advice on vehicle safety performance from mass accident data. Independently in 1990, the NSW Roads and Traffic Authority (RTA) and the NRMA set out on a joint project to develop a 'car safety rating' system based on Police records of crash and injury involvement. The objective was to use vehicle crash records and injury data to develop ratings for the relative safety of vehicles. The NRMA and RTA entered into discussions with the CSIRO to conduct the necessary analysis, and by early 1991 had produced a relative ranking of vehicles.

In mid 1991, the NSW and Victorian groups became aware of each others activities and, following discussions, agreed to proceed jointly rather than have two competing vehicle safety rating systems: one based on Victorian data and the other on NSW data. Later, the NSW RTA and NRMA agreed that MUARC should undertake the analysis of the joint NSW and Victorian data sets. The NSW RTA and NRMA performed preliminary work on the NSW database to, as far as possible, provide a clean set of data with accurately inscribed models for each vehicle. The data were then handed over to MUARC for analysis.

1.1 Crashworthiness Ratings

Initially, development of vehicle safety ratings focussed on vehicle crashworthiness. Crashworthiness ratings rate the relative safety of vehicles by examining injury outcomes to drivers in real crashes. The crashworthiness rating of a vehicle is a measure of the risk of serious injury to a driver of that vehicle when it is involved in a crash. This risk is estimated from large numbers of records of injury to drivers of that vehicle type involved in real crashes on the road.

In 1994, MUARC produced vehicle crashworthiness ratings based on crash data from Victoria and New South Wales during 1987-92 (Cameron et al, 1994a,b). These ratings updated an earlier MUARC set produced by Cameron et al (1992b). Crashworthiness was measured in two components:

1. Rate of injury for drivers involved in tow-away crashes (injury risk)
2. Rate of serious injury (death or hospital admission) for injured drivers (injury severity).

Multiplying these two rates together formed the crashworthiness rating. This is a measure of the risk of serious injury for drivers involved in crashes. Measuring crashworthiness in two components reflecting risk and severity of injury was first developed by Folksam Insurance which publishes the well-known Swedish ratings (Gustafsson et al 1989).

The results of these ratings are summarised in Cameron et al (1994a) with a full technical description of the analysis methods appearing in Cameron et al (1994b). These ratings use an analysis method that was developed to maximise the reliability and sensitivity of the results from the available data. In addition to the speed zone and driver sex, the method of analysis adjusts for the effects of driver age and the number of vehicles involved, producing results with all those factors taken into account.

Subsequent to the ratings of Cameron et al (1994a,b), four further updated sets of crashworthiness ratings were produced during 1996, 1997, 1998, 1999 and 2000 (Newstead et al 1996, Newstead et al 1997, Newstead et al 1998, Newstead et al 1999, Newstead et al 2000). These covered vehicles manufactured over the period 1982-94, 1982-95, 1982-96, 1982-97 and 1982-98 respectively, and crashing during 1987-94, 1987-95, 1987-96, 1987-97 and 1987-98 respectively, incorporating some enhancements to the methods of statistical analysis. The 1999 and 2000 ratings incorporated police reported crash data from Queensland whereas previously only crash data from New South Wales and Victoria had been used. The crashworthiness ratings covered individual models of sedans, station wagons, four wheel drives, passenger vans and light commercial vehicles and were given as estimates of risk of severe injury for each model along with 90% and 95% confidence limits on each estimate. For each update, the rating figures were widely distributed in the form of a "Used Car Safety Ratings" brochure.

1.2 Aggressivity Ratings

When crashworthiness ratings were first presented internationally, at the 1992 IRCOBI Conference in Italy (Cameron et al 1992a), the authors were encouraged to expand the analysis to measure the risk of injury that each individual model represents to other road users, in addition to the occupants of the subject model. It was suggested that MUARC were in a unique position to consider this issue since its ratings were based on tow-away crashes.

A reviewer's comments on the paper presenting the first update of the ratings, to the 1995 IRCOBI Conference in Switzerland, emphasised the same issue. The reviewer wrote, "partner protection and collision compatibility are very important for overall road safety and they can no longer be omitted in the discussion about 'car safety'". He recommended that this "shortcoming" should be addressed in the introduction and conclusion of the paper, and this was done in the published version (Cameron et al 1995).

Together, these international reactions to MUARC's work in this area indicated that the crashworthiness ratings should be extended to add a measure of the "aggressivity" of individual car models when they crash. Aggressivity ratings measure the risk of injury that a vehicle poses to occupants of other vehicles it impacts, and to other unprotected road users such as pedestrians, bicyclists and motorcyclists. The addition of aggressivity ratings represents further consumer advice, which purchasers of cars could take into account when choosing a specific model.

Cameron, Newstead and Le (1998) completed an initial study that reviewed methods of rating vehicle aggressivity developed internationally, such as those by Broughton (1994, 1996) and Hollowell and Gabler (1996). Concepts from this review were then taken to develop a methodology for rating the aggressivity of Australian passenger vehicles making appropriate uses

of the real crash data available in Australia. The methods developed were then successfully applied to estimate aggressivity ratings for a selection of Australian passenger vehicles that had accumulated sufficient real crash history.

The original study of Cameron et al (1998) investigated the feasibility and methods of providing aggressivity ratings for Australian passenger vehicles in terms of the threat that each subject model represented to:

1. Occupants of other cars colliding with the subject model cars, and
2. Pedestrians, bicyclists and motorcyclists (if possible, separately) impacted by the subject model cars.

Although the second type of aggressivity rating was considered by Cameron et al (1998), ratings of this type are problematic. In general, crashes involving pedestrians, bicyclists and motorcyclists are seldom reported to the Police unless someone is killed or injured (usually the unprotected road user). This means that an estimate of the risk of injury cannot be calculated for the unprotected road users for inclusion in the second type of aggressivity rating. Consequently, the measure of aggressivity towards unprotected road users, described by Cameron et al (1998), is a measure of injury severity only (ie the risk of serious injury given some injury was sustained). As such, this aggressivity measure is less able to discriminate between the performances of individual vehicle models as it is based on relatively small quantities of data. These problems made the measure of aggressivity towards unprotected road users of limited practical value and it has not been further considered after the initial work.

This problem described in estimating aggressivity for unprotected road users did not occur for measuring aggressivity towards drivers of other cars, for whom the available data allowed estimates of both the risk of injury and of their injury severity in a manner analogous to the crashworthiness rating described above. As in Europe and the United States, the aggressivity rating towards drivers of other vehicles (Cameron et al, 1998) considered in this study has been based on two-car crashes between light vehicles (ie. heavy vehicle collisions have been excluded). The NSW, Western Australia and Queensland data on two-car crashes used in this study covers all Police reported crashes where at least one vehicle was towed or a pre-defined minimum damage level was attained. Consequently, the number of crashes in which neither driver was injured was available, at least so far as tow-away crashes are concerned. The measure of the aggressivity risk of injury (RO) of the other drivers colliding with the subject model, unadjusted for any other factors, is defined as:

Injury risk of other drivers = RO = proportion of drivers involved in crashes of tow away or greater severity who were injured

The injury severity of other drivers could be measured in a number of ways from the information on injury recorded on NSW, Western Australia and Queensland Police reports and TAC claims (viz. killed; admitted to hospital; or injury requiring medical treatment). The measure of aggressivity injury severity (SO), used here is:

Injury severity of other drivers = SO = proportion of injured drivers who were killed or admitted to hospital.

Based on the definition of RO and SO above, an aggressivity measure for each subject car model was then calculated as:

Aggressivity to other car occupants = AO = RO x SO.

This measures the risk of the driver of other cars being killed or admitted to hospital when involved in collisions with the subject model cars.

Before this aggressivity measure was calculated, consideration was given to taking into account likely differences between the crash circumstances of the subject car models, which may result in a distorted view of its aggressivity only partly related to the characteristics of the subject cars. Factors available in the data to consider such differences include:

- speed limit at the crash location
- subject vehicle driver age (younger drivers may be driving at relatively fast speeds not fully represented by the speed limit)
- subject vehicle driver sex (male drivers may be driving at relatively fast speeds or more aggressively)
- other car occupant age (older occupants are more susceptible to injury)
- other car occupant sex (female occupants are more susceptible to injury, but males appear to be associated with relatively high injury severities)

Logistic regression techniques have been used to adjust RO and SO, separately, for any major differences that emerge between models of the subject cars regarding these factors. The adjusted RO and SO have been multiplied together for each subject car model to provide the final measure of aggressivity, AO.

Cameron et al (1998) also considered adjusting the aggressivity ratings for the injury outcome of the drivers of the focus model vehicles, hence providing an indication of the crash severity. This was found to make little difference to the relative aggressivity ratings between vehicle models and has not been further considered here. Cameron et al (1998) also considered using the injury outcome of the most severely injured occupant of the vehicle colliding with the focus vehicle model in estimating the aggressivity index. Again, little difference was found in the estimated aggressivity ratings when considering all vehicle occupants than when considering drivers only so this method was not pursued here.

1.3 Crashworthiness by Year of Vehicle Manufacture and Market Group

Another focus of the vehicle crashworthiness ratings study has been to track historical improvements in the average crashworthiness of the vehicle fleet since 1964. In 1994, the Royal Automobile Club of Victoria (RACV) commissioned a study to investigate the effects of the year of manufacture of vehicles (vehicle year) on their road safety (Cameron et al 1994c). This project focused on investigating the relationship between crashworthiness and vehicle year of manufacture for the years 1964 to 1992. The aim of the original study of Cameron et al (1994c) was, to the extent possible, to measure the crashworthiness of vehicles of different years of manufacture. The method employed was designed to eliminate the influence of other key factors affecting the risk of injury that might also be associated with vehicle year (eg. driver age and sex, use on high speed roads, etc.).

The original study of Cameron et al (1994c) showed that the crashworthiness of passenger vehicles in Australia has improved over the years of manufacture 1964 to 1992 with rapid improvement over the years from about 1970 to 1979. Drivers of vehicles manufactured during 1970 to 1979 could be expected to have benefited from the implementation of a number of Australian Design Rules (ADRs) for motor vehicle safety which previous research has shown to

be effective in providing occupant protection. The study has been updated with each vehicle crashworthiness ratings update. The most recent analysis included vehicles with years of manufacture from 1964 to 1998 (Newstead et al 2000).

More recently, Newstead and Cameron (2001) have examined trends in vehicle crashworthiness by year of manufacture within specific vehicle market groups. In this study, only years of manufacture from 1982 to 1998 were examined because of the need to have vehicle model information on the data to be able to classify vehicles appropriately into market groups. Vehicles were grouped into 4 market categories: small cars (<1100kg), medium cars (1100-1400kg), large cars (>1400kg) and 4 wheel drive vehicles (Sports Utility Vehicles). Results of analysis found statistically significant differences in the trends in crashworthiness by year of manufacture between different market groups in both the injury risk and injury severity components of the crashworthiness measure. Results showed that whilst vehicles in the 4wd and large car groups had shown improvement in crashworthiness over time, vehicles in the medium and, particularly, the small car classes had shown deterioration in their crashworthiness performance as a class, especially in recent years. Reasons for the declining average crashworthiness of the small car classes in Australia were discussed and appeared to be explained by a shift in preference of small car buyers towards cheap small vehicles with relatively poor safety performance. These shifts in small vehicle buyer preference have occurred despite the introduction of Australian vehicle design rules and consumer vehicle safety information programs aimed at improving the safety of the Australian fleet, suggesting the urgent need for further action in these two areas.

1.4 Project Aims

The aim of this project was to update the previously published crashworthiness ratings and aggressivity ratings towards drivers of other vehicles of Newstead et al (2000). The update included additional crash data from the years 1999 and 2000 for Victoria and NSW, the years 1999 and 2000 for Queensland and the years 1991-2000 for Western Australia. The updated ratings cover the drivers of cars, station wagons, four-wheel drive vehicles, passenger vans, and light commercial vehicles manufactured during 1982-2000 and crashing in Victoria or NSW during 1987-2000 or Queensland and Western Australia during 1991-2000.

This project also aimed to update the results of the study of crashworthiness by vehicle year of manufacture to include vehicles manufactured over the years 1964 to 2000. This component of this project also used the same methods and data sources as the crashworthiness ratings project, the exception being that pre-1982 vehicles were also included. For vehicle models from 1982 to 2000 that could be classified into a market grouping, the project also aimed to further investigate trends in crashworthiness by year of vehicle manufacture within each market group.

2. CRASH DATA

Data from Victoria, NSW and Queensland used to produce the crashworthiness ratings of Newstead et al (2000) covering vehicles manufactured over the period 1982-98 and crashing during the years 1987-98 was again used here. In addition, data for 1999 and 2000 for NSW, Victoria and Queensland and data for 1991 to 2000 for Western Australia were obtained and integrated bringing the total period of crash data covered to 1987-2000. Subsets of these data were taken in order to estimate the aggressivity measures. Similarly, data from Victoria, NSW and Queensland used to produce the crashworthiness by year of manufacture estimates of Newstead et al (2000) covering vehicles manufactured over the period 1964-98 and crashing during the years 1987-98 was again used here. As for the crashworthiness ratings, data for 1999 and 2000 for NSW, Victoria and Queensland and data for 1991 to 2000 for Western Australia were also

integrated for this analysis. The methods of selecting appropriate cases from each data source will be detailed here.

2.1 Victorian Crashes

The Transport Accident Commission (TAC) and its predecessor, the Motor Accidents Board, as part of their responsibilities to provide road transport injury compensation, have collected detailed injury data. For each claimant, a description of the injuries was recorded, as well as whether the person was admitted to hospital. TAC obtained some details of the occupied vehicle (but not its model) from the VicRoads registration system. When the TAC was established in 1987, it introduced a requirement that the crashes resulting in an injury claim should be reported to the Police, and started adding Police accident numbers (if and when available) to the claims records.

TAC injury claims from all types of road users who were involved in crashes in the period 1987 to 1998 had been merged with Police crash reports for the previous crashworthiness ratings (see Cameron et al (1994a,b) for a description of the method of matching). The Police reports were for all persons involved in crashes regardless of the Police officer recording the person as injured or uninjured. This procedure was followed because it was possible for an injury claim to be made in circumstances where injury was not apparent at the time of the crash. Crashes are reported to the Police in Victoria if a person is killed or injured, if property is damaged but names and addresses are not exchanged, or if a possible breach of the Road Traffic Regulations has occurred (Green 1990).

The levels of matching of TAC claims with persons recorded on Police reports for each year during 1987-98, achieved by Newstead et al (2000) for the last crashworthiness ratings, are shown in Table 1. Files on TAC claims during 1999 and 2000 were obtained for this project. These were merged with the Police reports on crashes in Victoria during 1999 and 2000, achieving the match rates also shown in Table 1. The methods of matching for the 1999 and 2000 data were the same as used previously and detailed in Cameron et al (1994b).

Table 1 shows that the rate of matching between the TAC claims data and police reported crash data for 1999 and 2000 was less than for most of the previous years. Closer investigation of the reasons for the poor match rate for these two years showed it was due to inconsistencies in the accident numbers attached to crashes in each file. Accident number is a key field used in matching the two data sources and is intended to be consistent for the same crash documented in each data system. In both 1999 and 2000, 30% and 35% respectively of the accident numbers in the TAC claims data were outside the range of accident numbers found in the police report data. Discussion with the TAC revealed that if a crash report is not available at the time of the claim, a TAC generated accident number is assigned to the crash. In the past, police accident numbers were assigned to the claims database retrospectively once they became available. However this practice was reported to have ceased during 1999 leading to the large number of TAC generated accident numbers remaining in the claims data supplied.

Due to the poor match rate between the 1999 and 2000 police data and TAC claims, it was decided to use the 1999 and 2000 police crash data unmatched with TAC claims, although matched data prior to 1999 was still used. This decision was further necessitated because of problems in the 1999 and 2000 New South Wales crash data concerning injury severity coding that are described below. Victorian police reported crash data had been matched with the TAC claims data for use in the crashworthiness ratings project in the past in an attempt to improve the accuracy of the injury severity recorded by the police. The decision not to use matched data for 1999 and

2000 in this study was not thought to compromise the study greatly, bearing in mind that only the injury severity level coded by police is considered in the data from any of the other Australian states used in the study. Any inconsistencies in injury severity coding introduced by changing from matched to unmatched data have been controlled for in the analysis methodology described below.

Table 1: TAC claims for injury compensation from crashes during 1987-2000

Year	TAC claims (all types of injured road users)	TAC claims matched with Police reports	Match rate (%)
1987	30,892	17,509	56.7
1988	28,427	16,672	58.6
1989	25,399	17,494	66.3
1990	19,633	13,886	70.7
1991	19,538	12,774	65.4
1992	19,251	13,118	68.1
1993	18,590	12,618	67.8
1994	19,341	11,927	61.6
1995	20,189	12,452	61.7
1996	19,954	14,034	70.3
1997	18,754	13,036	69.5
1998	18,561	12,395	66.8
1999	18,936	11,206	59.2
2000	18,881	10,525	55.7
Total	296,346	189,646	

The unmatched Victorian crash data for 1999 and 2000 represented 18,731 injured drivers of 1982-2000 model vehicles involved in a crash where the driver was injured. These records were combined with the merged files of TAC claims with Police reports for 1987-1998, which represented 37,554 accepted TAC claims for injury of drivers of 1982-1998 model vehicles during 1987-98. The resulting file covered 56,281 injured drivers of 1982-2000 model cars. The information on these drivers was combined with data on drivers injured in NSW and Queensland and Western Australia ? (see Section 2.4) to produce the updated crashworthiness ratings.

For the study of crashworthiness by year of vehicle manufacture, of the merged TAC claims for driver injury during 1987-98 and injured drivers in police crash records during 1999 and 2000, 99,484 were injured drivers of cars, station wagons or taxis manufactured over the years 1964-2000. Again, the information on these drivers was combined with data on drivers injured in NSW and Queensland and Western Australia (see Section 2.4).

Calculation of aggressivity ratings towards drivers of other vehicles required selecting vehicles involved in two car crashes followed by matching of the vehicle and occupant injury details for the two cars involved in the crash. For those vehicles manufactured over the period 1982 to 2000 injury details for the driver of the other vehicle in the crash were matched by returning to the full Victorian Police reported crash data files for 1987-2000. The data matching process identified 23,889 vehicles manufactured between 1982 and 2000 that had been involved in a crash with one other vehicle where the other vehicle had no restriction on its year of manufacture. Of the drivers of these other vehicles, 13,622 were injured and 10,277 were uninjured. It was not possible to use the uninjured records from the Victorian data, as they are incomplete due to the fact that only

crashes involving injury are reliably reported in Victoria. Hence only the 13,622 records of other driver injury were used for calculation of the injury severity component of the vehicle aggressivity ratings toward drivers of other vehicles. Of the 13,622 injured drivers, 2,937 were severely injured.

2.2 New South Wales Crashes

The Roads and Traffic Authority (RTA) in New South Wales supplied files covering 652,267 light passenger vehicles manufactured from 1982 to 2000 involved in Police reported crashes during 1987-2000 that resulted in death or injury or a vehicle being towed away. Model and year of manufacture have been added to each vehicle after matching with the NSW vehicle register via registration number and vehicle make. This was achieved using a procedure developed by the NRMA. The total crash files covered four-wheel drive, passenger vans, and light commercial vehicles as well as cars and station wagons of all years of manufacture crashing in 1987 to 2000. The method of assembly of this data is given in Cameron et al (1994b).

NSW crash data files from 1987 to 1998 had injury severity of people involved in crashes coded using a four level scale. Levels used were fatality, hospital admission, other injury and not injured. From 1998 onwards, the RTA identified inaccuracies by the Police in reporting injury severity that could not be rectified. In response, the RTA changed the injury severity coding in the NSW crash data to give only three levels: fatality; injury; and not injured. For the purpose of computing crashworthiness ratings, this meant the NSW data for 1999 and 2000 could not be used to estimate the injury severity measure in the same manner as previous rating updates.

Another field available in the NSW crash data that it was hoped might serve to distinguish between severe and minor injuries was one that indicated transportation to hospital. In order to assess the efficacy of using this variable to define injury severity in the NSW crash data, the hospital transportation variable was obtained for all the crash data for NSW from 1987 to 2000. Comparison was made between the four level injury severity field and the hospital transportation field from 1987 to 1998. Comparing the two fields showed little relationship between the two. Analysis of the hospital transportation field alone showed 85% of people coded as injured in crashes were also coded as transported to hospital. This compared with only around 20% of injured people being coded as seriously injured or killed.

Re-calculating the injury severity index of the ratings of Newstead et al (2000) further assessed the possibility of using the hospital transportation field as a proxy for injury severity in the NSW crash data. The injury severity information used in the ratings of Newstead et al (2000) for the NSW data was substituted by the injury severity computed from the hospital transportation variable in the re-calculation. Comparison of the original and re-calculated ratings showed significant change in estimated injury severity for a large number of vehicles. This result showed the hospital transportation variable defines an injury severity dichotomy different to that defined by serious and other injury using the original NSW injury severity variable. Because of this difference, it was decided that it was not appropriate to use the hospital transportation variable to define injury severity in the NSW crash data. Consequently, it was not possible to use NSW crash data from 1999 and 2000 in the computation of the crashworthiness or aggressivity injury severity indexes.

Preparation of the NSW data for final analysis involved merging the vehicle files (which also contained driver age and sex) with files supplied by NSW RTA covering details of the person casualties (killed and injured persons) and the reported crashes for the same years. Each vehicle/driver matched uniquely with the corresponding crash information, but only injured

drivers could match with persons in the casualty files. A driver who did not match was considered to be uninjured. Of the 652,267 drivers involved in tow-away crashes, 93,103 were injured. Of the injured drivers, 72,678 were injured in crashes from 1987 to 1998 and had a valid injury severity level coded (serious or other injury).

Of the 652,267 1982-2000 model year vehicles involved in crashes in NSW, 444,512 were coded as being involved in crashes with one other traffic unit (ie. the crash involved a total of two traffic units). In order to compare occupant injury levels in crashes involving two vehicles, it was necessary to match the crash and occupant injury information for each of the two vehicles involved in the crash.

The data used for calculation of the crashworthiness ratings covered only vehicles manufactured from 1982 to 2000. Consequently, initial matching of only the crashworthiness data to determine pairs of vehicles involved in a crash identified both the vehicles in the crash when both vehicles were manufactured from 1982 to 2000. A second matching stage was then required to identify the details of drivers of vehicles manufactured before 1982 that had collided with the unmatched 1982-2000 model year vehicles in the crashworthiness file. This required retrieval of the remaining crash records in the 1987-2000 NSW crash files not used for crashworthiness ratings in order to match vehicles manufactured prior to 1982. The two stage data matching process identified 225,102 matched records of vehicles manufactured between 1982 and 2000 that had been involved in a crash with one other vehicle where the other vehicle had no restriction on its year of manufacture. Of the drivers of these other vehicles, 28,069 were injured. Of the injured drivers, 19,922 were injured in crashes from 1987 to 1998 and had a valid injury severity level coded (serious or other injury). These records were used for calculation of vehicle aggressivity ratings toward drivers of other vehicles.

For the study of crashworthiness by vehicle year of manufacture, the NSW data represented 989,468 drivers of cars, station wagons or taxis manufactured from 1964 to 2000 who were involved in tow-away crashes. Of these drivers, 154,648 were injured, 119,503 of these during 1987-1998 and with a valid injury severity code.

The presence of uninjured drivers in the merged data file meant that it was suitable for measuring the risk of driver injury (in cars sufficiently damaged to require towing). This contrasted with the Victorian data file, which could not be used to measure injury risk directly because not all uninjured drivers were included.

2.3 Queensland Crashes

Queensland Transport supplied files covering 178,286 light passenger vehicles involved in Police reported crashes during 1991-2000 that resulted in death or injury or a vehicle being towed away. The files supplied covered years of vehicle manufacture from 1982-2000 including models of four-wheel drive vehicles, passenger vans, and light commercial vehicles as well as cars and station wagons for which a model could be identified.

The vehicle files (which also contained links to separate files with driver age and sex) were merged with files supplied by Queensland Transport covering details of the person casualties (killed and injured persons) and the reported crashes for the same years. Each vehicle/driver matched uniquely with the corresponding crash information, but only injured drivers could match with persons in the casualty files. As for NSW, a driver who did not match was considered to be uninjured. Out of the 178,286 drivers involved in tow-away crashes, 43,108 were injured.

Of the 178,286 vehicles reported as crashed in Queensland and used in estimation of crashworthiness ratings, 118,265 were coded as being involved in crashes with one other traffic unit (ie. the crash involved a total of two traffic units). In order to compare occupant injury levels between two vehicles involved in a crash, it was necessary to match the crash and occupant injury information for each of the two vehicles involved in the crash in the same manner as for NSW. Using the same two stage data matching process as used for NSW and described above, the process identified 59,285 vehicles manufactured between 1982 and 2000 that had been involved in a crash with one other vehicle where the other vehicle had no restriction on its year of manufacture. Of the drivers of these other vehicles, 13,708 were injured. These records were used for calculation of vehicle aggressivity ratings toward drivers of other vehicles.

For the study of crashworthiness by vehicle year of manufacture, the Queensland data represented 177,416 drivers of cars, station wagons or taxis manufactured from 1964 to 2000 who were involved in tow-away crashes. Of these drivers, 40,702 were injured. The number of vehicles crashing in Queensland and available for the year of manufacture analysis was less than for the estimation of crashworthiness ratings by model. This is because a large proportion of the vehicles in the Queensland data had year of manufacture missing. Many of the vehicles with missing year of manufacture could, however, be assigned an accurate model code though the VIN decoding process described below despite the missing field.

As with the data from NSW, the presence of uninjured drivers in the data file meant that it was also suitable for measuring the risk of driver injury (in cars sufficiently damaged to require towing). This contrasted with the Victorian data file, which could not be used to measure injury risk directly because not all uninjured drivers were included.

2.4 Western Australia Crashes

The Western Australian Department of Main Roads maintains a database of all crashes in Western Australia reported to the police. Crashes in Western Australia must be reported to police if anyone involved is killed or injured or the crash results in property damage greater than $1,000 (Road Safety Council of Western Australia, 2001). This means that, like NSW and Queensland, both injury and non-injury crashes are reported making the data suitable for inclusion in estimating both the injury risk and injury severity components of the crashworthiness ratings. Although the WA crash data is held as a relational database, WA Department of Main Roads supplied the data in a single flat file with a record for each person involved in a reported crash. Data covered the period 1991 to 2000.

WA Department of Main Roads supplied files covering 386,309 light passenger vehicles manufactured between 1982 and 2000 involved in Police reported crashes during 1991-2000 that resulted in death or injury or a vehicle being towed away. The files supplied covered models of four-wheel drive vehicles, passenger vans, and light commercial vehicles as well as cars and station wagons. Out of the 386,309 drivers involved in tow-away crashes, 45,435 were injured.

Of the 386,309 vehicles reported as crashed in WA and used in estimation of crashworthiness ratings, 301,010 were involved in crashes with one other traffic unit that could also be identified in the data. Of the drivers of the matching vehicles, 30,845 were injured. These records were used for calculation of vehicle aggressivity ratings toward drivers of other vehicles.

For the study of crashworthiness by vehicle year of manufacture, the WA data represented 665,302 drivers of cars, station wagons or taxis manufactured from 1964 to 2000 who were involved in tow-away crashes. Of these drivers, 82,893 were injured.

2.5 Combined Data from the Four States

When the data on the injured drivers was combined for analysis, it covered 237,927 drivers of 1982-2000 model vehicles who were injured in crashes in Victoria or NSW during 1987-2000 or in Western Australia and Queensland during 1991-2000. Of these 217,502 had a valid injury severity code, with 20,425 drivers injured in crashes in NSW during 1999 and 2000 excluded because of missing injury severity. Information on the 217,502 injured drivers was used to assess the injury severity of the injured drivers of the different makes and models when computing crashworthiness ratings. The information on the 1,216,862 drivers involved in tow-away crashes in NSW during 1987-2000 or Western Australia and Queensland during 1991-2000 was used to assess the injury rate of drivers of the different makes and models for computing crashworthiness ratings.

The combined data for estimation of vehicle aggressivity ratings covered 86,244 drivers of vehicles colliding with 1982-2000 model vehicles who were injured in two car crashes in Victoria or NSW during 1987-2000 or in Western Australia and Queensland during 1991-2000. Excluding the 8,147 injured drivers from NSW during 1999 and 2000 without a valid injury severity code left 78,097 cases for analysis. This information was used to assess the injury severity of the injured drivers colliding with the different makes and models when computing aggressivity ratings. The aggressivity injury risk component was estimated from information on the 585,397 drivers involved in two-car tow-away crashes in NSW during 1987-2000 or Western Australia and Queensland during 1991-2000.

For the study of crashworthiness by year of vehicle manufacture, the combined data covered 377,727 drivers of vehicles manufactured between 1964 and 2000 who were injured in crashes in Victoria or NSW during 1987-2000 or Western Australia and Queensland during 1991-2000. Excluding 1999 and 2000 cases from NSW left 342,582 cases for the assessment of injury severity by year of vehicle manufacture. For the assessment of injury risk by year of vehicle manufacture, the combined data covered 1,832,186 drivers involved in tow-away crashes in NSW during 1987-2000 or Western Australia and Queensland during 1991-2000.

3. MODELS OF VEHICLES

A procedure developed by the NRMA located the crashed vehicles in NSW vehicle registration records after matching by registration number and vehicle make. The Vehicle Identification Number (VIN) or chassis number obtained from the register was decoded to determine the models of light passenger vehicles. The decoding identified some light truck and unusual commercial models that were not considered further. Of the vehicles manufactured during 1982-2000, all but around 4% had their model identified. Further details are given by Pappas (1993). The same VIN decoding procedure was used to identify vehicle models in the Queensland data, achieving a similar level of decoding accuracy to NSW.

The Victorian vehicle register provided the make and year of manufacture of the crashed vehicle but not the model. Models were initially derived for cars manufactured during 1982-88 using logic developed and supplied by the Royal Automobile Club of Victoria (RACV) based on the make, year and power-mass units. Power-mass units (PMU) are the sum of RAC horsepower units (PU) and the vehicle mass in units of 50kg (MU). Refined logic was developed by MUARC based on make, year, PMU, PU, MU and body type, and extended to cover 1989-93 models. The MUARC

logic was applied to the combined Victorian data in conjunction with the RACV logic to derive passenger car models for the model years 1982-93.

For vehicles crashing in the years 1994 to 2000, where available, the Victorian vehicle register provided the VIN of each crashed vehicle along with the information described above. VINs are recorded on the Victorian vehicle register for most vehicles from 1989 year of manufacture onwards. Where a VIN was available for a vehicle appearing in the 1994 to 2000 crash data, the model information was decoded from the VIN using the methods of Pappas (1993). Where the VIN was not available, the RACV and MUARC logic, described above, was used to obtain model details.

Attempts were made to obtain VINs from the Western Australian vehicle register, managed by the WA Department of Transport, for vehicles appearing in the Western Australian crash data. Due to an upgrade of the WA registration data system, however, VINs could not be obtained for this update of the vehicle safety ratings although it is possible they may become available for future updates. This meant the VIN decoding system used on data from the other three states to identify vehicle model details could not be used for WA.

Detailed vehicle make and model information along with year of manufacture have been merged onto the WA crash data by Main Roads WA as part of a regular interrogation of the WA vehicle register. The make and model codes proved to be of sufficient detail to be used, along with the year of manufacture, to assign vehicle model groupings to vehicles crashed in WA consistent with the vehicle model groupings that are derived from the VIN decoding system. Only a small number of vehicles, typically in model change over years, could not be accurately assigned a sufficiently accurate model code for use in the study.

RACV, NRMA and the Australian Transport Safety Bureau (ATSB, formerly FORS) provided advice on the particular models that had experienced substantial changes in design (and hence potential crashworthiness) during model years 1982-2000 and in which years the design was relatively constant. This resulted in certain models being split into ranges of years of manufacture. Where the new model was introduced near the beginning or end of a year (up to two months either way), this process was relatively straightforward (accepting a small mis-classification in some circumstances). However, when the model changed near the middle of the year, the model for that year was kept separate and potentially treated as a "mixed" model (eg. the Daihatsu Charade 1987 models). Where exact model decoding was possible from the VIN, without using year of vehicle manufacture, this was used.

VicRoads previously provided advice on vehicle models that could be combined with each other (sometimes only for specific years) because they were essentially the same design or construction but registered as having different manufacturers. This information was used in the analysis to combine some models, otherwise one or both members of each such pair of models would have been excluded and a crashworthiness rating figure would not have been produced (Section 4.1.3). Model sharing in the automotive industry has declined in recent years alleviating this as an ongoing problem to a large degree.

As in previous crashworthiness ratings, models were excluded with fewer than 20 injured drivers and/or fewer than 100 involved drivers appearing in the crash data. The same selection criteria were also used for aggressivity ratings except exclusion was based on the number of injured drivers in the vehicles colliding with the focus vehicle model. These selection criteria were used to ensure stability in fitting the logistic regression models along with suitably small confidence limits on the estimated crashworthiness ratings.

For the purpose of publication, the models were also categorised in market groups as follows:

- Passenger cars and station wagons: Large, Medium, Small, Sports, Luxury
- Four-wheel drive vehicles
- Passenger vans
- Commercial vehicles (less than 3000 kg GVM)

It should be noted that some of the vehicle models identified in the Victorian, NSW, Western Australia and Queensland crash data have optional safety equipment, such as air bags, which could significantly alter the crashworthiness rating of the vehicle model when fitted. Notable examples in local manufacture include the Holden Commodore VR/VS, Toyota Camry 1993-97 and Mitsubishi Magna TR/TS, and TE/TF/TH, all of which have optional air bag fitment. It is, however, generally not possible to identify which particular vehicles of a model series do and do not have such optional safety equipment installed using the model decoding procedures described above. Consequently, for those vehicle models with optional safety equipment, the estimated crashworthiness rating represents an average of the safety performance for vehicles with and without the optional safety equipment weighted by the number of each in the crash data.

4. ANALYSIS

4.1 Overview of Analysis Methods: Crashworthiness

The crashworthiness rating (C) is a measure of the risk of serious injury to a driver of a car when it is involved in a crash. It is defined to be the product of two probabilities (Cameron et al, 1992):

i) the probability that a driver involved in a crash is injured (injury risk), denoted by R;

and

ii) the probability that an injured driver is hospitalised or killed (injury severity), denoted by S.

That is

$$C = R \times S.$$

Folksam Insurance, who publishes the well-known Swedish ratings, first measured crashworthiness in this way (Gustafsson et al, 1989).

In the present report, each of the two components of the crashworthiness rating was obtained by logistic regression modelling techniques. Such techniques are able to simultaneously adjust for the effect of a number of factors (such as driver age and sex, number of vehicles involved, etc.) on probabilities such as the injury risk and injury severity.

The Logistic Model

The logistic model of a probability, P, is of the form:

$$\text{logit}(P) = \ln\left(\frac{P}{1-P}\right) = \beta_o + \beta_1 X_1 + \ldots + \beta_k X_k = f(X).$$

That is, the log of the odds ratio is expressed as a linear function of k associated variables or their interactions, $X_i, i = 1, \ldots, k$. Estimates of the parameter coefficients of the logit function, ie the $\hat{\beta}_i$ can be obtained by maximum likelihood estimation (Hosmer & Lemeshow, 1989).

Logistic Confidence Limits for the Vehicle Models or Year of Manufacture

Whilst it is possible to calculate the variance of $\hat{f}(X)$, in the context of crashworthiness ratings we are only interested in the component of variance due to one factor in $\hat{f}(X)$ with the variance due to the other factors in the model being of no interest. In practice, the component of variance due to the factor representing the vehicle model or year of manufacture is of interest, whilst the variance due to the remaining factors such as driver age and sex is common to all vehicle models or years of manufacture and hence of no interest.

To isolate the component of variance in the logistic model due to only one factor, say factor X_i, the remaining factors were fixed at a predetermined level (their mean value). The variance of $\hat{f}(X)$, considering all factors apart from X_i to be fixed, is then given by

$$Var\left(\hat{f}(X_i)\right) = X_i^2 Var\left(\hat{\beta}_i\right)$$

In the logistic models of injury risk or injury severity, X_i was a [0,1] indicator function of either a particular vehicle model or market group or year of manufacture, depending on the analysis being performed. Hence the variance function given above equalled the variance of the coefficient $\hat{\beta}_i$.

A 95% confidence interval for the logit function with respect to component X_i is given by

$$\hat{f}(X) \pm 1.96\sqrt{Var\left(\hat{f}(X_i)\right)}\ .$$

Point estimates and confidence limits in the logistic space were transformed into probability estimates using the inverse logistic transform given by

$$\hat{P} = \frac{e^{\hat{f}(X)}}{1 + e^{\hat{f}(X)}}.$$

4.1.1 Logistic Models for Each Component

Obtaining the Covariate Models

Before adjusted crashworthiness ratings could be obtained it was necessary to consider logistic models of each of the crashworthiness components separately to identify possible factors, other than vehicle design, that might have influenced the crash outcomes in terms of driver injury severity. A stepwise procedure was used to identify which factors had an important influence.

This was done without considering the type of car or year of manufacture in the model, as the aim was to determine which other factors were most likely to have had an influence across a broad spectrum of crashes. Furthermore, the car model variable had to be excluded from the logistic modelling process at this stage because of analysis convergence problems when the car model was competing against the other factors in the stepwise procedure. It was also not considered appropriate to interact vehicle model with other factors in the logistic model as this would imply that relative vehicle crashworthiness varied between models depending on the crash circumstance and occupant characteristics.

Logistic models were obtained separately for injury risk and injury severity because it was likely that the various factors would have different levels of influence on these two probabilities.

The factors considered during this stage of the analysis for both injury risk and injury severity were

- **sex:** driver sex (male, female)
- **age:** driver age (≤25 years; 26-59 years; ≥60 years)
- **speedzone:** speed limit at the crash location (≤75 km/h; ≥80 km/h)
- **nveh:** the number of vehicles involved (one vehicle; >1 vehicle)
- **state:** state of crash (Victoria, NSW, Queensland or Western Australia)
- **year:** year of crash (1987, 1988, … ,2000)

These variables were chosen for consideration because they were part of the Victorian, Queensland, New South Wales and Western Australia databases. Other variables were only available from one source and their inclusion would have drastically reduced the number of cases that could have been included in the analysis.

State of crash was a necessary inclusion in the logistic model because, in comparison to Victoria, Western Australia and NSW, which have similar proportions of crashes at each severity level, Queensland has a higher proportion of severe crashes in their reported data. Including the state factor in the covariate model is necessary to adjust for rating bias towards those vehicle models that are sold and driven more in Queensland. Whether the noted severity difference is because crashes in Queensland are actually more severe on average than in the other three states or because of some reporting bias towards higher severity crashes in Queensland is unclear. Inclusion of a year of crash indicator in the model is necessary to adjust for the different trends in crash severity noted between each of the states (see section 4.1.5 below).

All data was analysed using the Logistic Regression procedure of the SAS statistical package (SAS, 1989). Estimates of the coefficients of the logit function, $\hat{\beta}_i, i = 1, \ldots, k$, together with their associated standard errors, were obtained by maximum likelihood estimation. In the modelling process, design variables for the various factors were chosen in such a way that the estimated coefficients represented deviations of each of the variable levels from the mean. Each factor in the model, including year of crash, was treated as categorical to allow maximum flexibility in the relationship between each and the outcome measure.

For both injury risk and injury severity, a stepwise procedure was used to identify which factors and their interactions made a significant contribution to these probabilities. All possible first and higher order interactions were considered between all factors in the model. A hierarchical structure was imposed so that interaction between two variables was included in the model only when the corresponding main effects were also included. The resultant logistic regression models were referred to as the "covariate" models or equations.

The average value of the injury risk or injury severity was obtained directly from the outcome variable of interest averaging across all cases in the analysis.

Assessing Car Model or Year of Manufacture Differences

Injury risk and injury severity for individual cars were estimated after adding a variable representing car model or year of manufacture to the respective logistic "covariate" models. That is, car model or year of manufacture variable was included in the logistic model along with those factors and their interactions that were found to be statistically significantly related to the outcome variable in the stepwise modelling procedure and the model re-estimated in a single step process. Coefficients for individual car models or years of manufacture were computed to represent deviations of that car or year from the average. As mentioned earlier, this was to avoid non-convergence problems in the analysis when car model or year of manufacture was allowed to compete with the other factors in the stepwise selection process.

It was important to ensure that the logistic model adequately described the data and did not yield individual car model coefficients that were imprecise or unstable. For this reason, individual car models with small frequencies were pooled with similar car models in the rare cases where this was appropriate (see Section 4.1.3) or, more typically, they were excluded from the analysis. Car models were excluded if, after pooling models, there were either:

i) less than 100 involved drivers; or
ii) less than 20 injured drivers.

Some further model exclusions were made for vehicle model classifications that had no practical interpretation. This included models in a particular year where there was a change from one series to the next and year of manufacture was necessary to determine the series break (such as Mitsubishi Pajero 1991). It also included some groups of highly aggregated models that would be of no intrinsic interest to consumers using the ratings (such as Jeep Others or Mazda Commercials).

After exclusion, the regression analyses were performed on 253 individual car models (or pooled similar models). A list of all vehicle models considered, with those with sufficient data for analysis indicated, is given in Appendix 1. The variable representing car model was therefore categorical with 253 nominal levels. The choice of the design for the logistic model allowed the injury risk and injury severity estimates for each individual car model to be compared with the overall (average) rating for all cars. No such criteria were necessary for the year of manufacture analysis.

For each car model or year of manufacture, a 95% confidence interval for the logit functions of injury risk and injury severity was obtained after first adjusting for the average value in the data and then allowing for the deviation from average for that particular car model.

Estimates of injury risk and injury severity were obtained by de-transforming the logit functions as described above. A 95% confidence interval was determined after adjusting for the average values of the significant factors and their interactions. The precision of the estimates of injury risk and injury severity is measured by the width of these 95% confidence intervals.

Assessing Market Group Averages

A similar approach to that for individual car models was used to assess car market group averages. A variable with 8 nominal levels representing the different market groups (large, medium, small, luxury, sports, 4-wheel drive, passenger vans and commercial vehicles with GVM $\leq$ 3000 kg) was added to each of the "covariate" models. Deviations of each market group from the average were also assessed. Ninety-five percent confidence intervals for the estimates of both injury severity and injury risk were also obtained for each of the market groups.

Assessing Market Group by Year of Manufacture Differences

Assessing year of manufacture by market group effects was carried out in the same was as for assessing year of manufacture effects alone. Instead of using a variable representing year of manufacture alone, however, a variable representing the interaction between year of manufacture and market group was used. This variable had 152 levels representing the 8 market groups by the 19 years of manufacture from 1982 to 2000 inclusive. Unlike the original study of Newstead and Cameron (2001) that only considered trends in crashworthiness by year of manufacture for four market groups, this study has considered all 8 market groups defined in the main crashworthiness ratings analysis.

4.1.2 Combining the Injury Risk and Injury Severity Components

The final combined ratings of vehicle crashworthiness are given by:

Crashworthiness Rating = Injury risk x Injury severity.

For a given model of car or year of manufacture, j, the crashworthiness rating, C_j, was therefore calculated as:

$$C_j = R_j \times S_j$$

where

R_j denotes the injury risk for car model or year of manufacture j, and
S_j denotes the injury severity for car model or year of manufacture j.

Noting the form of the logistic inverse transformation in section 4.1 above, we have

$$R_j = \frac{e^{a_j}}{1+e^{a_j}}, \qquad S_j = \frac{e^{b_j}}{1+e^{b_j}}$$

where α_j and β_j are the values of the logistic regression function $\hat{f}(X)$ for injury risk and injury severity respectively for vehicle model or year of manufacture j.

Taking the natural log of the crashworthiness rating and using asymptotic statistical theory, the asymptotic variance of the log of the crashworthiness rating is

$$Var(\log_e C_j) \approx \frac{Var(\alpha_j)}{(1+e^{a_j})^2} + \frac{Var(\beta_j)}{(1+e^{b_j})^2}$$

where the variances of a_j and b_j are as given in section 4.1 and the estimates of a_j and b_j are considered independent.

The 95% confidence interval for the natural log of the crashworthiness rating is then

$$\log_e(C_j) \pm 1.96 \cdot \sqrt{Var\left(\log_e(C_j)\right)}.$$

The 95% confidence limit for the crashworthiness rating is obtained by taking the exponent of the confidence limit of the logged crashworthiness rating shown above.

Because each of the two estimated crashworthiness components have been adjusted for the effect of other factors by logistic regression prior to their incorporation into the combined ratings, the resultant crashworthiness rating is also adjusted for the influence of these factors. It should be noted that the confidence interval for the combined rate reflects the variability in the car model only and not the variability in the other factors included in the logistic models.

The same procedure was used to obtain crashworthiness ratings of each distinct market group and for each year of vehicle manufacture.

4.1.3 Pooled Car Models

Vehicle model sharing amongst manufacturers retailing in the Australian market has been relatively common. Because shared models are generally identical, particularly with respect to safety performance, it is possible to pool such models for safety rating, allowing a more precise estimate of the safety of models for which data is pooled rather than considering each separately. There are also some Ford Falcon models that expert advice has indicated did not change significantly from one series to the next that can also be pooled for the same reasons as the shared models. Both the pooled models and Falcon models combined are indicated in Table 2.

Table 2: Pooled Models of Cars

Ford Laser 82-89	with	Mazda 323 82-88
Ford Laser 99-00	with	Mazda 323 99-00
Ford Telstar 83-87	with	Mazda 626 / MX6 83-86
Ford Telstar 88-91	with	Mazda 626 / MX6 88-91
Ford Telstar 92-97	with	Mazda 626 / MX6 92-97
Ford Falcon EA	with	Ford Falcon EB Series I
Ford Falcon ED	with	Ford Falcon EB Series II
Ford Corsair 89-92	with	Nissan Pintara 89-92
Holden Commodore VR/VS	with	Toyota Lexcen 93-97
Holden Commodore VN-VP	with	Toyota Lexcen 89-93
Holden Nova 89-93	with	Toyota Corolla 89-93
Holden Nova 94-96	with	Toyota Corolla 94-98
Holden Astra 84-86	with	Nissan Pulsar/Vector 84-86
Holden Astra 88-90	with	Nissan Pulsar/Vector 88-90
Holden Barina 85-88	with	Suzuki Swift 85-88
Holden Barina 89-93	with	Suzuki Swift 89-99
Holden Apollo JK/JL 89-92	with	Toyota Camry 88-92
Holden Apollo JM/JP 93-97	with	Toyota Camry 93-97
Ford Maverick 88-97	with	Nissan Patrol 88-97
Suzuki Scurry 85-87	with	Holden Carry 85-90
Suzuki Sierra 82-2000	with	Holden Drover 85-87
Nissan XFN Utility	with	Ford Falcon Utility
Ford Festiva WA 91-93	with	Mazda 121 87-90

4.1.4 Market Group Analyses

In addition to the individual car model analyses, logistic regression analyses were performed based on broad market groups as defined in Section 4.1.1. The market group analyses provided reference ratings for models in each group.

4.1.5 Trends in the Rating Criteria

In each of the four states contributing crash data for analysis in this project, there have been changes in road safety during the late 1980s and 1990s that may have produced a change in both the risk of serious injury in crashes as well as the number of crashes occurring. Furthermore, trends in road safety have not been the same in each state. There was therefore some concern that there may have been a bias in the crashworthiness ratings given that a large number of vehicle models were not on sale, and hence involved in crashes, for the entire period covered by the crash data. If, for example, there had been a general reduction in crash severity over time, the crashworthiness rating of the later model cars would tend to be lower, irrespective of design improvements, than would be expected if the general improvements in road safety had not occurred. Sales profile of vehicle models also differs significantly between states. Consequently, if a vehicle model is crashed more in a state with poor safety record it may appear to be less crashworthy if state effects are not adjusted for in the analysis.

This concern led to a need to investigate whether there were in fact, different trends in the risk of driver injury and/or driver injury severity between states over time. If changes were found these would need to be taken into account in the crashworthiness ratings.

The file of drivers involved in crashes in NSW, Queensland and Western Australia used to measure the driver injury rate, the first component of the crashworthiness rating, was analysed by the year and state in which the crash occurred to assess any trends. Results are shown in Table 3.

Table 3 shows clear evidence of differential trends in injury rate between each of the three states whose data is used in this analysis component. It is also evident that the trends in injury rate are non-linear in each of the three states. These observations made it necessary to adjust the injury risk component of the crashworthiness ratings by both state of crash and year of crash as well as the interaction between the two to reflect differential trends across states. The non-linear nature of the trend also made it necessary to treat year as a categorical variable rather than a continuous measure.

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Table 3: Numbers of drivers of light passenger vehicles manufactured in 1982-2000 and involved and injured in tow-away crashes in NSW during each of the years 1987-2000 and in Queensland and Western Australia during each of the years 1991-2000.

YEAR	NSW			QLD			WA		
	Total Injured	Total Involved	Injury rate (%)	Total Injured	Total Involved	Injury rate (%)	Total Injured	Total Involved	Injury rate (%)
1987	4212	32980	**12.8**						
1988	4788	32584	**14.7**						
1989	5310	37018	**14.3**						
1990	5596	40125	**13.9**						
1991	5402	39231	**13.8**	1184	7069	**16.7**	2159	19429	**11.1**
1992	5819	40033	**14.5**	2171	9905	**21.9**	2509	20846	**12.0**
1993	5843	40859	**14.3**	2688	11323	**23.7**	2774	26341	**10.5**
1994	6135	42433	**14.5**	3464	13128	**26.4**	3652	33446	**10.9**
1995	6490	45477	**14.3**	4087	13797	**29.6**	4536	38934	**11.7**
1996	6971	51931	**13.4**	4329	14441	**30.0**	5380	45778	**11.8**
1997	7535	54550	**13.8**	6052	14778	**41.0**	6012	47915	**12.5**
1998	8577	60603	**14.2**	7131	16642	**42.8**	6413	51192	**12.5**
1999	9573	67180	**14.2**	5862	17807	**32.9**	5738	50613	**11.3**
2000	10852	66515	**16.3**	6140	17472	**35.1**	6262	50799	**12.3**

Table 4 shows analogous information to Table 3 for trends in injury severity across the four states contributing data to this component of the analysis. Table 4 shows there are also clear differential trends in injury severity between each of the four states. This meant that adjustments for state and year of crash, as well as their interaction was also necessary for the injury severity analysis, with year of crash again treated as a categorical variable.

A further point illustrated by Tables 3 is the difference in average injury risk between crashes in NSW and WA and crashes in Queensland. The raw injury rate observed in Queensland is of the order of two to three times higher than that observed in NSW and WA. As mentioned, whether this is because crashes in Queensland are actually more severe or because of a reporting bias towards

more severe crashes in Queensland is unclear. Similarly, Table 4 shows average injury severity in WA is much lower than the other three states. This is possibly due to a different definition of severe injury in WA compared to the other states although the definition given in the WA crash data coding manual does not reflect this. Regardless, neither of these differences is considered problematic in computing the ratings provided adjustment for state of crash is made in the covariate models of injury risk and severity. The important point for ratings computation is that relative injury risk or severity between vehicle models is consistent across states, regardless of the average risk or severity in each state. Interrogation of the data suggested this was the case.

Table 4: Numbers of drivers of light passenger vehicles manufactured in 1982-2000 and injured in crashes in NSW and Victoria during each of the years 1987-2000 and in Western Australia and Queensland during each of the years 1991-2000.

Year	NSW			VIC			QLD			WA		
	Killed or Seriously Injured	Injured	Severe Injury Rate (%)	Killed or Seriously Injured	Injured	Severe Injury Rate (%)	Killed or Seriously Injured	Injured	Severe Injury Rate (%)	Killed or Seriously Injured	Injured	Severe Injury Rate (%)
1987	920	4212	**21.8**	519	2119	**24.5**						
1988	1047	4788	**21.9**	508	2513	**20.2**						
1989	1099	5310	**20.7**	629	2999	**21.0**						
1990	1211	5596	**21.6**	511	2334	**21.9**						
1991	1195	5402	**22.1**	528	2315	**22.8**	380	1184	**32.1**	202	2159	**9.4**
1992	1297	5819	**22.3**	518	2537	**20.4**	640	2171	**29.5**	179	2509	**7.1**
1993	1254	5843	**21.5**	792	2772	**28.6**	739	2688	**27.5**	196	2774	**7.1**
1994	1263	6135	**20.6**	956	3225	**29.6**	1010	3464	**29.2**	356	3652	**9.7**
1995	1380	6490	**21.3**	1165	3878	**30.0**	1153	4087	**28.2**	690	4536	**15.2**
1996	1470	6971	**21.1**	1228	4327	**28.4**	1108	4329	**25.6**	713	5380	**13.3**
1997	1798	7535	**23.9**	1203	4215	**28.5**	1491	6052	**24.6**	954	6012	**15.9**
1998	2404	8577	**28.0**	403	1339	**30.1**	1905	7131	**26.7**	1011	6413	**15.8**
1999				2351	10473	**22.4**	1627	5862	**27.8**	599	5738	**10.4**
2000				2682	11235	**23.9**	1653	6140	**26.9**	651	6262	**10.4**

4.2 Overview of the Analysis Methods: Aggressivity

As described above, the measure of aggressivity to drivers of other cars (AO) being considered here is:

$$AO = RO \times SO$$

where

$$RO = \text{Injury risk of other drivers}$$

that is, the probability that the other driver sustains some injury given their vehicle is involved in a crash of tow-away severity or greater with the subject vehicle type, and

$$SO = \text{Injury severity of other drivers}$$

where SO is the probability that the other driver is killed or seriously injured given they sustain some injury in the crash where their vehicle is impacted by a vehicle of the subject vehicle type. The subject vehicle, described by its make and model or market group, is the specific type of

vehicle whose aggressivity is being measured in terms of its threat of injury to the driver of the other vehicle with which it impacts.

Each of the two components of the aggressivity rating, RO and SO, were obtained by logistic regression modelling techniques. In the same manner as for the crashworthiness ratings, such techniques are able to simultaneously adjust for the effect of a number of factors, which will be discussed below, on the aggressivity injury risk and injury severity probabilities.

4.2.1 Logistic Models, Confidence Limits and Assessment of Aggressivity of Specific Vehicle Models and Market Groups

A logistic model of the same form used for estimation of vehicle crashworthiness ratings was used for estimation of vehicle aggressivity ratings. The key difference in the logistic models for vehicle aggressivity was that the response variables being modelled were not the injury risk or injury severity of the driver of the focus vehicle, as for crashworthiness. Rather, the injury risk and injury severity of the driver of the other vehicle with which the focus vehicle model collided were modelled as the response variables. Given the similarity of the structure of the aggressivity injury risk, RO, and injury severity, SO, with their crashworthiness parallels, the method of computing confidence limits on each RO and SO was the same as given for the corresponding crashworthiness measures above.

Before adjusted aggressivity ratings could be obtained it was necessary to consider logistic models of each of the aggressivity components, RO or SO separately, to identify possible factors, other than vehicle design, that might have influenced injury outcome to the other driver. As for crashworthiness rating estimation, a stepwise procedure was used to identify which factors had an important influence. This was done without considering the type of car (make/model or market group) in the model, as the aim was to determine which other factors were most likely to have an influence across a broad spectrum of crashes. Logistic models were obtained separately for injury risk, RO, and injury severity, SO, because it was likely that the various factors would have different levels of influence on these two component probabilities of the aggressivity measure.

The factors considered in the covariate models for both aggressivity injury risk and injury severity were

- **speedzone** : speed limit at the crash location (<80km/h, >= 80 km/h)
- **agefcd** : age of driver of subject car (<=25 years, 26-59 years, >=60 years)
- **sexfcd** : sex of driver of subject car
- **ageoo** : other car driver age (<=25 years, 26-59 years, >=60 years)
- **sexoo** : other car driver sex (male, female)
- **state** : state in which the vehicle crashed (Vic, NSW, WA, QLD)
- **year** : year in which the vehicle crashed (1987, ..,2000)

These variables were chosen for consideration because they were available in each of the New South Wales, Victorian, Western Australia and Queensland crash databases. Logistic regressions were again carried out using the Logistic Regression procedure of the SAS statistical package (SAS, 1989) using maximum likelihood estimation, the marginal method for forming design variables and a hierarchical structure considering all possible interactions in a stepwise procedure.

Aggressivity injury risk and injury severity for individual vehicle models was estimated after adding a variable representing the subject car model to the respective logistic "covariate" models.

The car model variable was forced into the logistic equation and individual car model coefficients were computed to represent deviations of that car from the average. In a similar manner to the calculation of crashworthiness ratings, car models were excluded for the calculation of the aggressivity ratings if there were less than 100 vehicles with which they had crashed or there were less than 20 injured drivers in other vehicles with which they had crashed.

After exclusion, the regression analyses were performed on 194 individual car models for calculation of aggressivity ratings. The variable representing car model was therefore categorical with 194 nominal levels. The choice of the design for the logistic model allowed the injury risk and injury severity estimates for each individual car model to be compared with the overall (average) rating for all cars. For each car model in each aggressivity measure, a 95% confidence interval for the logit functions of aggressivity injury risk, and injury severity was obtained after first adjusting for the average value of the "covariate" model and then allowing for the deviation from average for that particular car model. Estimates of injury risk and injury severity were obtained by the reverse logistic transform. A 95% confidence interval was determined after adjusting for the average values of the significant factors and their interactions. Aggressivity by 8 broad market groups, as defined for crashworthiness ratings, was also computed along with 95% confidence limits.

The final combined aggressivity ratings for occupants of other vehicles are given by:

$$AO = RO \times SO$$

For a given model of focus car, j, the aggressivity rating, AO_j, was therefore calculated as:

$$AO_j = RO_j \times SO_j$$

where RO_j denotes the aggressivity injury risk for car model j and SO_j denotes the aggressivity injury severity for car model j. Computation of the variance and hence confidence limits on the quantity AO are carried out in the same way as for the crashworthiness measure, C.

5. RESULTS

5.1 Vehicle Crashworthiness Ratings

5.1.1 Injury Risk

Injury risk was estimated from the data on 1,216,862 drivers involved in tow-away crashes in NSW and Queensland (as described in Section 2.4). This data set is referred to as the "involved drivers". Because of missing values in one or more of the covariates driver sex and age, speedzone and number of vehicles involved in the crash amongst the 1,216,862 involved drivers, the final file used for analysis consisted of the 1,007,045 drivers for which all the covariate data was complete. The "covariate" model for injury risk was determined from the variables described in Section 4.1.1.

The following terms were significantly associated with injury risk and were included in the logistic model:

Base effect terms	First order interactions	Second order interactions
Sex	Sex*Speedzone	Sex*Speedzone*Nveh
Speedzone	Speedzone*Nveh	Age*Speedzone*Nveh
Age	Sex*Nveh	
Nveh	Sex*Age	
State	Age*Nveh	
Year	Speedzone*Age	
	State*Year	

No other term significantly improved the fit of the logistic model.

The overall (average) injury risk for involved drivers in tow-away crashes in NSW, Western Australia and Queensland was 16.24 per 100 drivers. In other words, the probability that a driver involved in a tow-away crash in NSW, Western Australia or Queensland was injured was 16.24%.

Appendix 2 gives the estimates of injury risk derived by logistic regression for 214 individual car models that had a sufficiently accurate crashworthiness rating after post analysis exclusions for wide confidence limits or high co-efficient of variation (see below). Injury risk ranged from 9.6 % for the Jeep Cherokee to 34.56% for the Subaru Sherpa/Fiori.

An estimate of the variability in the injury risk estimates was calculated from the width of the corresponding 95% confidence intervals. Individual confidence interval widths ranged from 0.75% (Falcon XE-XF) to 10.55% for the 1982-86 Rover Quintet. The small variability for the Falcon X series Sedan is not surprising since there were more cars of this model than any other in the data set and precision is known to improve with increasing sample size.

The estimated injury risk for each market group is also given in Appendix 2. The luxury vehicles had the lowest injury risk (13.36%) and the passenger vans market group had the highest (19.09%).

5.1.2 Injury Severity

The data on "injured drivers" covered 217,502 drivers of 1982-2000 model vehicles who were injured in crashes in Victoria, NSW, Western Australia or Queensland during 1987-2000 (as described in Section 2.4). Because of missing values in one or more of the covariates amongst the 217,502 injured drivers, the final file used for analysis consisted of the 199,676 drivers for which all the covariate data was complete. The "covariate" model for injury severity was determined from the variables described in Section 4.1.1.

The following terms were significantly associated with injury severity and were included in the logistic model:

Base effect terms	First order interactions	Second order interaction
Sex	Sex*State	Speedzone*Nveh*State
Speedzone	Speedzone*Nveh	
Age	Age*Sex	
Nveh	Nveh*State	
State	State*Speedzone	
Year	Speedzone*Age	
	Age*State	
	Age*Nveh	
	State*Year	
	Speedzone*Year	
	Nveh*Year	

No other term significantly improved the fit of the logistic model.

The overall (average) injury severity for injured drivers in the data analysed was 22.27 per 100 drivers. In other words, the probability that a driver injured in a crash was severely injured was 22.27 %.

Appendix 3 gives the estimates of injury severity derived by logistic regression for 213 individual car models, or sets of combined models. One vehicle model, the Kia Ceres, had to be excluded from the injury severity analysis, although it met the criteria for minimum case numbers. This was because there were no killed or seriously injured drivers in the data, which caused a problem with convergence of the logistic model. Of the cars analysed, injury severity ranged from 11.93% for the 1999-2000 Holden Rodeo to 45.35% for the 1982-85 Holden Statesman/Caprice WB.

An estimate of the variability in the estimates of injury severity was calculated from the width of the corresponding 95% confidence intervals. Individual confidence interval widths ranged from 2.19% 1982-88 Ford Falcon XE/XF to 36.79% for the 1982-86 Jaguar XJ6.

The estimated injury severity for each market group is also given in Appendix 3. Luxury vehicles performed best with respect to injury severity, having the lowest average injury severity of 21.03%. The passenger vans market group had the highest average injury severity of 22.73%).

5.1.3 Crashworthiness Ratings

The crashworthiness ratings for each car model and market group were obtained by multiplying the individual injury risk and injury severity estimates. Because each of the two components had been adjusted for the confounding factors, the resultant crashworthiness rating was also adjusted for the influence of these factors.

Crashworthiness ratings were obtained for each individual model and market group after adjusting for the confounding factors.

Appendix 4 gives the crashworthiness ratings and the associated 95% confidence intervals for each of the 213 car models included in the analyses. Appendix 4 also gives the crashworthiness

ratings with 90% confidence limits for each of the 213 vehicle models. Each rating is expressed as a percentage, representing the number of drivers killed or admitted to hospital per 100 drivers involved in a tow-away crash. Overall ratings for the market groups are also given.

Each crashworthiness rating is an *estimate* of the true risk of a driver being killed or admitted to hospital in a tow-away crash and, as such, each estimate has a level of uncertainty about it. This uncertainty is indicated by the confidence limits in Appendix 4. There is 95% probability that the confidence interval will cover the true risk of serious injury (death or hospital admission) to the driver of the particular model of vehicle.

The ratings in Appendix 4 exclude those models where:

- the width of the confidence interval exceeded 7, or

- the ratio of the confidence interval width to the rating score exceeded 1.6 (this criterion was also necessary because smaller confidence intervals tended to occur for the lower rating scores, but the confidence intervals were relatively wide in proportionate terms). This exclusion criterion is more stringent than that used by Cameron et al (1994a,b) reflecting the greater accuracy afforded in the current ratings as a result of larger quantities of data.

5.1.4 Comparisons with the All Model Average Rating

Based on the average injury risk and injury severity values in the data used to compute the ratings estimate, the average crashworthiness of all vehicles appearing in the data was 3.62% (3.62 serious driver injuries per 100 crash involvements). Computing the all model average in this way gives more weight to vehicles with greater representation in the crash data. Another way of computing the all model average rating is to simply take an unweighted numerical average of the 213 vehicles with a sufficiently accurate crashworthiness rating to be published. This method gives equal weight to each vehicle in the average. For the 213 vehicles rated in this study, the unweighted numerical average crashworthiness is 3.93 (3.93 serious driver injuries per 100 crash involvements).

Ultimately the point against which ratings for individual vehicles are compared is arbitrary, whether it is either of the averages described above or some other point. For the purpose of comparing the crashworthiness ratings to an average value in this study, the unweighted numerical average (3.93) was used. This was chosen as it gave better distribution of the vehicles into the five rating categories used for presentation of the ratings for consumer information (see Section 5.3). Any other comparison value could be used with equal legitimacy.

Confidence limits were used to judge whether the true risk of death or hospitalisation for a driver of a specific model car involved in a tow-away crash is really different from the defined average for all models, ie. 3.93 per 100 involved drivers. An upper limit below the average is indicative of superior crashworthiness, whereas a lower limit above the average suggests inferior crashworthiness. Other models also have crashworthiness ratings at the low or high end of the scale, but their confidence limits overlap the all model average. Although such models may also have superior or inferior crashworthiness characteristics, the database did not contain sufficient numbers of these models for the data to represent scientific evidence that this is the case.

In terms of statistical significance, it should be noted that classifying vehicles as having inferior or superior crashworthiness compared to the defined average means only that vehicle models with 'superior' crashworthiness have statistically significantly better crashworthiness than vehicles in

the defined 'inferior' group. It is possible that vehicles within the inferior and superior crashworthiness categories also had statistically significant differences in crashworthiness. This could be assessed by examining overlap in the statistical confidence limits for any pair wise comparison of two vehicles. One of the main points in defining groups of vehicles with inferior and superior crashworthiness is to show that the analysis can differentiate with statistical precision crashworthiness between groups of vehicles within the rated vehicle population.

Fifty-one models had ratings representing evidence of superior crashworthiness because their upper confidence limits were less than the average rating. Twelve of these were large cars, thirteen were luxury models, six were classified as medium cars, ten were four-wheel drives, seven were commercial vehicles and the last one a passenger van. The specific models were (in order of estimated risk of serious driver injury in a crash, from lowest to highest):

- Saab 9000 (1986-98)
- Land Rover Discovery (1991-2000)
- Honda Legend (1986-95)
- Toyota Corolla (1998-2000)
- Volkswagon Caravelle / Transporter (1988-2000)
- Volvo 700/900 Series (1984-92)
- Land Rover Range Rover (1982-94)
- Jeep Cherokee (1982-2000)
- Ford Falcon AU (1998-2000)
- BMW 5 Series (1982-88)
- Holden Rodeo (99-2000)
- Volvo 850/S70/V70/C70 (1992-2000)
- Holden Astra TR (1996-98)
- Mitsubishi Pajero (1992-99)
- Nissan Bluebird (1993-97)
- Toyota RAV4 (1994-2000)
- Nissan Patrol (1988-97) / Ford Maverick (1988-97)
- Mercedes Benz E-Class W124 (1986-95)
- Honda Accord (1991-93)
- Nissan Navara (1992-96)
- Holden Jackaroo (1982-91)
- Ford Mondeo (1995-2000)
- Toyota Cressida (1989-93)
- Honda Accord (1986-90)
- Peugeot 505 (1982-93)
- BMW 3 Series (1992-98)
- Volvo 200 Series (1982-93)
- Toyota Tarago (1991-99)
- Ford Fairlane N & LTD D (1988-94)
- Ford Falcon Ute (1996-99)
- Holden Commodore VT/VX (1997-2000)
- Mitsubishi Verada KR/KS (1991-96) / Magna TR/TS (1991-96)
- Holden Rodeo (1996-98)
- Holden Commodore VR/VS (1993-97) / Toyota Lexcen (1993-97)
- Ford Falcon EF/EL (1994-98)
- Toyota Landcruiser (1990-97)

- Ford Fairlane N & LTD D (1995-98)
- Toyota Landcruiser (1998-2000)
- Subaru Liberty (1989-94)
- Ford Falcon EB Series II / Falcon ED (Apr 1992-94)
- Ford Falcon EA / Falcon EB Series I (1988 -Mar 1992)
- Ford Falcon Panel Van (1982-95)
- Mitsubishi Magna TE/TF/TH/TJ (1996-2000) / Mitsubishi Verada KE/KF/KH/KJ (1996-2000)
- Holden Apollo JM/JP (1993-97) / Toyota Camry (1993-97)
- Ford / Mazda Telstar / 626/MX6 (1988-91)
- Toyota Hilux (1989-97)
- Ford Falcon Ute (1982-95) / Nissan XFN Ute (1988-90)
- Holden Commodore VN/VP (1989-93) / Toyota Lexcen (1989-93)
- Ford Falcon XE/XF (1982-88)
- Mitsubishi Magna TM/TN/TP (1985-90)
- Holden Apollo JK/JL (1989-92) / Toyota Camry (1988-92)

Forty-four models had ratings representing evidence of inferior crashworthiness because their lower confidence limits were greater than the average rating. Twenty-six were small cars, seven were light commercial vehicles, three were passenger vans, two were medium cars, four were sports cars and two were four-wheel drives. The specific models were (in order of estimated risk of serious driver injury in a crash, from highest to lowest):

- Subaru Sherpa/Fiori (1989-92
- Holden Scurry (1985-87) / Suzuki Carry (1982-2000)
- Daihatsu Mira (1990-96)
- Suzuki Hatch (1982-85)
- Suzuki Mighty Boy (1985-88)
- Nissan NX/NX-R (1991-96)
- Daihatsu Handivan (1982-90)
- Daihatsu Charade (1982-86)
- Honda City (1983-86)
- Holden Barina (1985-88) / Suzuki Swift (1985-88)
- Honda CRX (1987-91)
- Mitsubishi Starwagon/L300 (1982-86)
- Subaru Brumby (1982-93)
- Daihatsu Rocky (1984-99)
- Hyundai Coupe (1996-00)
- Nissan Exa (1983-86)
- Honda Civic (1984-87)
- Nissan Micra (1995-97)
- Hyundai Excel (1982-89)
- Daihatsu Charade (1988-92)
- Daihatsu Charade (1993-2000)
- Holden Shuttle (1982-87)
- Ford Festiva WA (1991-93) / Mazda 121 (1987-90)
- Ford Festiva WD/WD/WH/WF (1994-2000)
- Toyota Hiace/Liteace (1982-86)

- Holden Gemini RB (1986-87)
- Holden Astra (1984-86) / Nissan / Pulsar/Vector (1984-86)
- Mitsubishi Colt (1982-88)
- Holden Drover (1985-87) / Suzuki Sierra (1982-2000)
- Holden WB Series (1982-85)
- Holden Barina (1989-93) / Suzuki Swift (1989-99)
- Toyota Tarago (1983-89)
- Mitsubishi Starwagon (1987-94)
- Ford Laser (1982-88) / Mazda 323 (1982-88)
- Hyundai Excel (1990-94)
- Honda Civic (1988-91)
- Nissan Pulsar (1996-99)
- Holden Camira (1982-89)
- Holden Gemini (1982-84)
- Hyundai Excel (1995-2000)
- Toyota Corolla (1986-88)
- Nissan Bluebird (1982-86)
- Holden Astra (1988-90) / Nissan / Pulsar/Vector (1988-90)
- Toyota Corolla (1982-84)

5.2 Aggressivity Towards Other Car Drivers

Using the methods described above, logistic regression models of the injury risk and injury severity of the subject driver (ie. the driver of the "other" vehicle) were built separately as functions of both vehicle model and market group of the vehicle colliding with the vehicle of the focus driver. Variations in the other factors listed in Section 4.2.1 were adjusted in the model by including them as predictors of the injury risk or injury severity of the focus driver, along with the subject vehicle model or market group.

The logistic regression models of the injury risk of focus drivers showed a number of factors to statistically significant predict injury risk. These were focus driver age and sex, state, year and speed zone of crash, along with the interactions between focus driver age and sex. In addition, the make and model of the subject vehicle was also a statistically significant predictor of focus driver injury risk when added to the logistic model. This indicated that there is differential performance between vehicle models in terms of their aggressivity towards drivers of other vehicles so far as injury risk is concerned. In the same manner, when vehicle market group was substituted for vehicle model in the logistic regression equation, it was also a significant predictor of focus driver injury risk. The average aggressivity injury risk in the data was 14.7%.

The logistic regression models of the injury severity of focus drivers showed the factors focus driver age, state and year, along with the interactions between focus driver age and speed zone of the crash site, state and year of crash and focus driver sex and speed zone of the crash site to be statistically significant predictors. The model of the subject vehicle was also a statistically significant predictor of injury severity, as was the vehicle market group when substituted for vehicle model in the logistic regression equation. The average aggressivity injury severity in the data was 16.2%.

Final estimates of vehicle aggressivity towards the drivers of other vehicles were obtained by multiplying the estimated injury risk and injury severity components, described above, for each

vehicle. Confidence limits on each of the estimated aggressivity ratings were calculated using the methods described in Section 4.2.1 above. The average aggressivity rating in the data, used for comparisons against aggressivity of individual vehicle models was 2.4%.

Accurate aggressivity ratings were obtained for 152 of the 194 different vehicle models that satisfied the inclusion criteria described above. Of the 194 vehicle models satisfying the inclusion criteria for analysis described above, 42 vehicle models were excluded from presentation because of the criteria described immediately below. The estimated aggressivity ratings and their injury risk and injury severity components for individual vehicle models are given in Appendix 5 along with 95% confidence limits on the estimated aggressivity ratings.

The ratings in Appendix 5 exclude those models where:

- the width of the confidence interval exceeded 7, or
- the ratio of the confidence interval width to the rating score exceeded 1.6 (this criterion was also necessary because smaller confidence intervals tended to occur for the lower rating scores, but the confidence intervals were relatively wide in proportionate terms).
- But not those satisfying the above criteria where the aggressivity rating confidence interval did not overlap the average aggressivity value (only one vehicle model fell into this category and had an aggressivity rating statistically significantly worse than the overall average).

These exclusion criteria, apart from the third one, are the same as that used in calculating crashworthiness ratings to ensure a minimum level of accuracy in the published aggressivity ratings. The third criterion was introduced as it allowed identification of vehicle models with aggressivity significantly worse than average, even though the confidence limits may be wide. It was considered to be worth identifying such vehicles.

5.2.1 Analysis by Market Groups

Table 6 summarises the estimated injury risk, injury severity and aggressivity ratings by the 8 broad market groups along with the estimated confidence limits on the aggressivity ratings. The estimated aggressivity rating is the expected number of vehicle drivers killed or seriously injured per 100 involved in two-car tow-away collisions where their vehicle impacts with one of the designated models or market groups. Table 6 shows four-wheel-drive vehicles to be the most aggressive towards drivers of other vehicles, with an average of 3.21 drivers being killed or seriously injured for every 100 tow-away crashes with a four-wheel-drive. Similarly, Table 6 shows small cars to be the least aggressive towards drivers of other vehicles, with an average aggressivity rating of 1.79.

Table 6: Estimated Vehicle Aggressivity Towards Other Drivers by Market Grouping

Market Group	Other Driver Injury Risk (%)	Other Driver Injury Severity (%)	Aggressivity Rating *	Overall rank order	Lower 95% Confidence limit	Upper 95% Confidence limit	Width of Confidence interval
Overall Average	**14.67**	**16.18**	**2.37**				
4 WHEEL DRIVE	17.43	18.40	3.21	8	3.00	3.43	0.43
COMMERCIAL	16.32	17.33	2.83	7	2.62	3.05	0.43
LARGE	14.42	16.76	2.42	5	2.31	2.52	0.21
LUXURY	13.34	16.85	2.25	4	2.05	2.46	0.41
MEDIUM	13.72	15.06	2.07	2	1.94	2.20	0.26
PASSENGER VANS	16.55	15.01	2.48	6	2.13	2.90	0.77
SMALL	12.57	14.21	1.79	1	1.70	1.88	0.18
SPORTS	13.80	16.21	2.24	3	1.93	2.59	0.66

* Serious injury rate per 100 drivers of other vehicles involved in collisions with vehicles from the given market group

5.2.2 Statistically Significant Makes and Models

Appendix 5 shows the estimated aggressivity ratings towards drivers of other vehicles for the 152 individual vehicle models rated. Ratings ranged from a minimum of 0.88 serious injuries per 100 tow-away crashes for the 1990-93 Mazda 323 to a maximum of 6.25 serious injuries per 100 tow-away crashes for the 1982-92 Ford F-series. Of the 152 individual vehicle models for which an aggressivity rating was calculated, 22 models had an aggressivity rating which was significantly less (better) than the overall average of 2.37 serious driver injuries per 100 tow-away crashes. These twenty-two vehicle models comprised seventeen small car models, three medium car models, one sports car model and one four-wheel drive vehicle. The models were, in order of increasing aggressivity:

- Mazda 323 (1990-93)
- Honda Civic (1996-2000)
- Honda Prelude (1983-91)
- Subaru 1800/ Leone (1982-95)
- Holden Drover (1985-87) / Suzuki Sierra (1982-2000)
- Toyota Corolla (1982-84)
- Daihatsu Charade (1988-92)
- Holden Barina (1989-93) / Suzuki Swift (1989-99)
- Mitsubishi Lancer CC (1993-95)
- Holden Gemini (1982-84)
- Daihatsu Charade (1993-2000)
- Ford Laser (1882-88) / Mazda 323 (1982-88)
- Holden Astra (1984-86) / Nissan Pulsar/Vector (1984-86)
- Mitsubishi Lancer CA (1988-90)
- Hyundai Excel (1990-94)
- Ford Festiva WA (1991-93) / Mazda 121 (1987-90)
- Toyota Corolla (1986-88)
- Mitsubishi Colt (1982-88)
- Toyota Corolla (1994-98) / Holden Nova (1994-96)
- Holden Camira (1982-89)

- Mitsubishi Sigma/Scorpion (1982-86)
- Toyota Corolla (1989-93) / Holden Nova (1989-93)

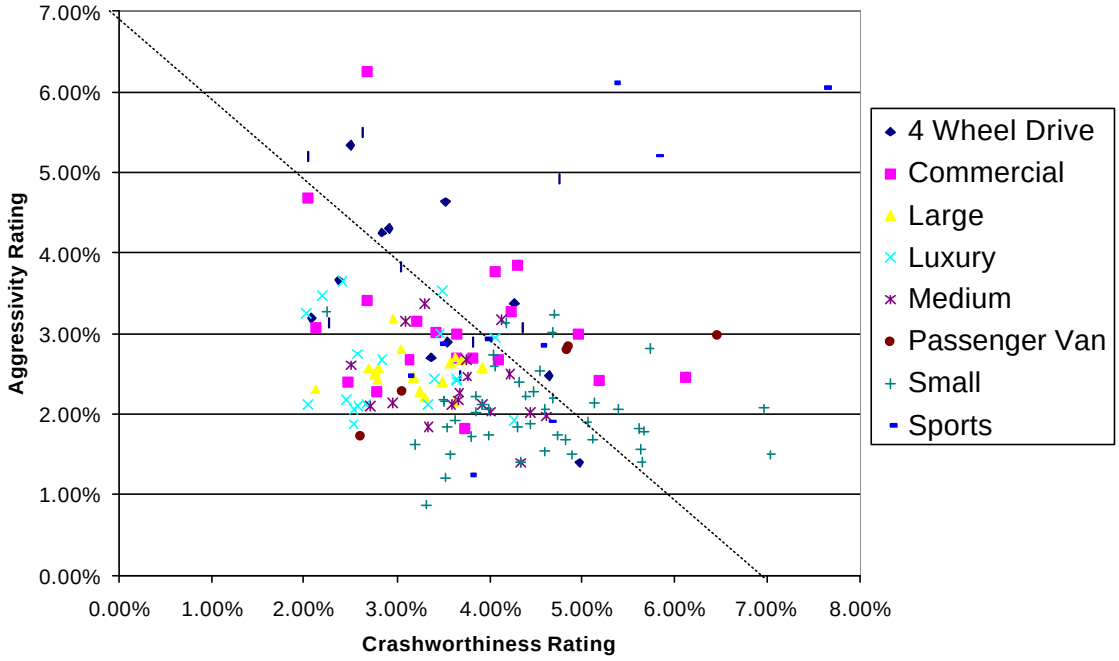
Similarly 26 models had an aggressivity rating which was significantly greater (worse) than the overall average of 2.37 serious driver injuries per 100 tow away crashes. These twenty-six vehicle models comprised four large car models, eleven four-wheel drives models, six commercial vehicle models, one medium car model, three sports car models and one luxury car model. The models were, in order of decreasing aggressivity:

- Ford F-Series (1982-92)
- Toyota Supra (1982-90)
- Nissan NX/NX-R (1991-96)
- Nissan Patrol (1998-2000)
- Holden Jackaroo (1982-91)
- Nissan Exa (1983-86)
- Land Rover Range Rover (1982-94)
- Nissan Pathfinder (1995-2000)
- Volkswagon Caravelle / Transporter (1988-2000)
- Toyota Landcruiser (1982-89)
- Toyota Landcruiser (1998-2000)
- Toyota Landcruiser (1990-97)
- Nissan Patrol (1982-87)
- Holden Rodeo (1989-95)
- Nissan Patrol (1988-97) / Ford Maverick (1988-97)
- Toyota Crown/Cressida (1982-85)
- Ford Falcon Ute (1996-99)
- Mitsubishi Pajero (1982-90)
- Ford Telstar (1988-91) / Mazda 626/MX6 (1988-91)
- Ford Falcon EB Series II / Falcon ED (Apr 1992-94)
- Toyota 4Runner/Hilux (1982-85)
- Ford Falcon Ute (1982-95) / Nissan XFN Ute (1988-90)
- Holden Commodore Ute VR/VS (1994-2000)
- Ford Falcon EA / Falcon EB Series I (1988-Mar 92)
- Ford Falcon XE/XF (1982-88)
- Holden Commodore VB-VL (1982-88)

5.2.3 Relationships Between Aggressivity and Crashworthiness

In assessing the British vehicle safety indices, Broughton (1996) found a strong inverse relationship between the indices for crashworthiness and aggressivity. Figure 1 shows aggressivity plotted against crashworthiness for those vehicle models with both ratings. As Figure 1 shows, the inverse relationship between the two measures is not particularly strong. The dotted line in Figure 4 represents the nominal inverse relationship between aggressivity and crashworthiness ratings. Points above the line represent vehicles with relatively high aggressivity for their level of crashworthiness and points below the line represent vehicles with relatively low aggressivity for their crashworthiness performance. Four-wheel-drives, passenger vans and commercial vehicles are the groups of vehicles that generally show relatively high levels of aggressivity for their level of crashworthiness.

Figure 1: Estimated Vehicle Aggressivity Towards Other Drivers vs. Crashworthiness Rating



Absence of a strong relationship between the measures of aggressivity and crashworthiness suggests that the two quantities considered here are measuring two different aspects of a vehicle's safety performance. Whilst one would expect some relationship between the two measures given their common but opposite relationships with mass (Broughton, 1996; Cameron et al 1998), the lack of a strong relationship suggests vehicle mass is only playing a small part in aggressivity rating relative to vehicle total safety design. The independence of these two measures does not seem to have been achieved to the same degree under other systems (UK Department of Transport 1995, Broughton 1996).

5.2.4 Discussion on Aggressivity Ratings

The methods applied in this report have allowed estimation of updated vehicle aggressivity ratings for Australian passenger vehicles with respect to drivers of other vehicles. Aggressivity is an important measure as, in conjunction with crashworthiness ratings, it enables assessment of the total safety of the vehicle fleet from the perspective of the vehicle protecting not only its own occupants in a crash but also the occupants of other vehicles with which it may collide.

Whilst similar in concept to the aggressivity ratings developed overseas, the ratings estimated here appear to be superior in a number of areas. One of the major advantages of the aggressivity ratings developed here, particularly in comparison to those described in Broughton (1994, 1996) is their apparent independence from the crashworthiness ratings. A high level of inverse correlation between crashworthiness and aggressivity ratings would diminish the additional information on safety provided by the aggressivity measure. The aggressivity ratings developed here, however, appear to provide largely independent information on vehicle safety. The reason for the independence of the two measures found in this study is possibly linked to the availability of non-injury crash data due to the tow-away crash reporting criteria in NSW, Western Australia and Queensland. Non-injury crash data allows the estimation of the injury risk components of crashworthiness and aggressivity, a measure not available from the data on injury crashes only, as used by Broughton (1994, 1996). Detailed examination of the crashworthiness and aggressivity

analysis results here shows the injury risk measure to be a more powerful discriminator of relative vehicle safety than the injury severity measure based on injury crash data alone.

One slight drawback aggressivity ratings have in comparison to the crashworthiness ratings is that they cover fewer individual vehicle models. Aggressivity ratings estimated here cover only 152 vehicle models, whilst crashworthiness ratings based on the same data cover 213 individual vehicle models. The reason for the reduced model coverage in comparison to crashworthiness ratings stems from the fact that the aggressivity ratings, for reasons described above, are calculated from subsets of the total data used for crashworthiness calculation, namely crashes between two passenger vehicles. To a certain degree, smaller quantities of data also compromise the precision of the aggressivity measures resulting in fewer vehicles that can be differentiated as better or worse than the overall average in comparison to crashworthiness ratings. In comparison to the crashworthiness ratings where 95 of the 213 vehicle models rated (45%) were significantly better or worse than average, of the 152 vehicle models with an aggressivity rating, only 48 (32%) had a rating significantly better or worse than average. This is a substantial improvement over the original ratings of Cameron et al (1998) where only 11 of the 56 vehicles rated for aggressivity towards other drivers (20%) had a rating significantly better or worse than average. It also improves on the ratings of Newstead et al (2000) where only 23 of the 96 vehicles rated for aggressivity towards other drivers (24%) had a rating significantly better or worse than average. The improved power of differentiation of the aggressivity ratings of Newstead et al (2000), compared with those of Cameron et al (1998) was a result of the inclusion of Victorian and Queensland data for estimation of the ratings. The improved power of differentiation of the aggressivity ratings presented here, compared with those of Newstead et al (2000) is a result of the inclusion of Western Australia data and two extra years of data from Queensland, NSW and Victoria for estimation of the ratings.

As with crashworthiness ratings, there is an ongoing need for further updates of the aggressivity ratings with additional years' data as it becomes available. This will enable a greater number of individual vehicle models to be covered with increased accuracy of estimation, thus allowing greater differentiation of safety performance between vehicle models. Updates of aggressivity ratings can parallel those of crashworthiness ratings that are estimated from the same data.

This report has considered only the measure of aggressivity towards drivers of other vehicles. Whilst a measure of aggressivity towards unprotected road users has been developed and estimated in previous work, it was not used here because it was based only on an injury severity index that was felt not to offer sufficient discrimination between the performances of different vehicle models. It may be possible to develop an aggressivity severity index that estimates simultaneously the combined aggressivity of a vehicle towards both unprotected road users and the drivers of other vehicles. Combined with the aggressivity injury risk measure for drivers of other vehicles only, this would give a single aggressivity measure for a vehicle towards both drivers of other vehicles and unprotected road users. Further research is planned to develop this combined measure of aggressivity towards all other road users.

5.3 Presentation of Crashworthiness and Aggressivity Ratings for Consumer Information

Discussion in the previous work of Cameron et al (1998) noted, for simplicity of presentation and interpretation, particularly in the area of consumer safety advice, effort needed to be made to find a method of simultaneously using the information on vehicle crashworthiness and aggressivity. Possible solutions discussed included development of a single measure of total vehicle safety or, alternatively, development of some other cohesive method of summary presentation that reflects

overall vehicle safety. In Newstead et al (2000), a method of presentation of the estimated crashworthiness ratings for Australian vehicles was devised that is similar in philosophy to the presentation method devised by Folksam Insurance for presentation of Swedish ratings. The method takes into account both the rating point estimate and confidence limits, but removes the emphasis from the point estimate.

An identical approach to presenting ratings has been taken here. Rated vehicles have been classified into five categories based on the range in which the confidence limits on the estimated ratings lie. The five categories are defined as follows.

- At least 20% safer than average: if the upper confidence limit on the estimated rating is less than 0.8 times the average crashworthiness rating for the vehicle fleet.
- At least safer than average: if the upper confidence limit on the estimated rating is less than the average crashworthiness rating for the vehicle fleet.
- Average: if the confidence interval on the estimated rating overlaps the average crashworthiness rating for the vehicle fleet.
- At least less safe than average: if the lower confidence limit on the estimated rating is greater than the average crashworthiness rating for the vehicle fleet.
- At least 20% less safe than average: if the lower confidence limit on the estimated rating is greater than 1.2 times the average crashworthiness rating for the vehicle fleet.

Presentation of the estimated crashworthiness ratings in this way is shown in Appendix 6. This presentation style has the advantage that it combines information about both the rating point estimate and confidence limit to classify the safety performance of the vehicle. This method of presentation takes the potential emphasis of the consumer off comparison of only the point estimate ratings, an emphasis that can be potentially misleading from the point of view of statistical confidence. Rather, the presentation method categorises vehicles according to the statistical significance of the difference of their estimated safety rating from defined points. Colour coding of the categories would typically be used with green depicting the safest category through blue, yellow and brown to red depicting the least safe category. 90% two-sided confidence limits have been used to categorise the crashworthiness ratings in Appendix 6. These are equivalent to 95% one-sided confidence limits if a directional hypothesis of crashworthiness greater or less than the average is being assumed.

A single column at the right of the table in Appendix 6 summarises the aggressivity ratings for each vehicle. In a manner similar to the classification of crashworthiness ratings, the estimated aggressivity ratings have been classified into five categories with each represented by a symbol in the final column of the table. These are:

- xx: Much more aggressive than average – if the lower confidence limit on the estimated rating is less than 0.8 times the average aggressivity rating for the vehicle fleet.
- x: More aggressive than average - if the lower confidence limit on the estimated aggressivity rating is greater than the average aggressivity rating for the vehicle fleet.
- **o**: Average - if the confidence interval on the estimated rating overlaps the average aggressivity rating for the vehicle fleet.
- ✓: Less aggressive than average - if the upper confidence limit on the estimated rating is less than the average aggressivity rating for the vehicle fleet.
- ✓✓: At least 20% less aggressive than average – if the upper confidence limit on the estimated rating is greater than 1.2 times the average aggressivity rating for the vehicle fleet.

Some vehicle models in Appendix 6 have no symbol in the aggressivity rating column. These vehicles have been involved in an insufficient number of two-car crashes to have an aggressivity rating estimated for them. Assignment of vehicle aggressivity ratings to categories in Appendix 6 is based on the 90% two-sided (95% one-sided) confidence limits on the ratings to be consistent with the assignment of crashworthiness ratings to categories.

5.4 Crashworthiness by Year of Manufacture

5.4.1 Injury Risk

Injury risk was estimated from the data on 1,832,186 drivers involved in tow-away crashes in NSW, Western Australia and Queensland during 1987 to 2000 (as described in Section 2.4). This data set is referred to as the "involved drivers". Because of missing values of some of the factors to be included in the logistic regression, and the exclusion of pre-1964 vehicles and unknown years, analysis was performed on data relating to 1,567,554 involved drivers, 264,617 of who were injured.

The "covariate" model for injury risk was determined from the variables described in Section 4.1.1. The following covariates and interactions were statistically significantly associated with injury risk and were included in the logistic regression model.

Base effect terms	First order interactions	Second order interactions
Sex	Sex*Speedzone	Sex*Speedzone*Nveh
Nveh	Speedzone*Nveh	Age*Speedzone*Nveh
Speedzone	Sex*Nveh	
Age	Speedzone*Age	
State	Age*Sex	
Year (of crash)	Year*State	
	Age*Nveh	

No other variable or interaction term significantly improved the fit of the logistic model.

The overall (average) injury risk for involved drivers in tow-away crashes in NSW, Western Australia and Queensland was 16.88%. In other words, the estimated probability that a driver involved in a tow-away crash in NSW was injured was 16.88%.

Appendix 7 gives the estimates of injury risk derived by logistic regression for the individual years of manufacture. The variability in the injury risk estimates relative to the year of manufacture can be seen from the width of the corresponding 95% confidence intervals.

5.4.2 Injury Severity

The data on "injured drivers" covered 342,582 drivers who were injured in crashes in Victoria or NSW during 1987-2000 or Queensland during 1991-2000 (as described in Sections 2). Because of missing values of some of the associated crash factors, and the exclusion of pre-1964 vehicles and unknown years, logistic regression was performed on data relating to 330,945 injured drivers 76,101 of who were severely injured (killed or admitted to hospital).

The "covariate" model for injury severity was determined from the variables described in Section 4.2.1. The analysis identified a number of statistically significant covariate effects. These were:

Base effect terms	First order interactions
Sex	Speedzone*Nveh
Age	Sex*Age
Speedzone	Age*Nveh
Nveh	
State	
Year (of crash)	

No other variable or interaction term significantly improved the fit of the logistic model.

The overall (average) injury severity for injured drivers was 23.00%. In other words, the estimated probability that a driver injured in a crash was severely injured was 23.00%.

Appendix 7 gives the estimates of injury severity derived by logistic regression for the individual years of manufacture. The variability in the estimates of injury severity relative to year of manufacture can be seen from the width of the corresponding 95% confidence intervals.

5.4.3 Crashworthiness by Year of Manufacture

The crashworthiness estimates for each year of manufacture were obtained by multiplying the individual injury risk and injury severity estimates. Because each of the two components has been adjusted for the confounding factors, the resultant crashworthiness estimate is also adjusted for the influence of them.

Appendix 7 gives the crashworthiness estimates and the associated 95% confidence intervals for each of the 37 years of manufacture included in the analysis. Each estimate is expressed as a percentage, representing the number of drivers killed or admitted to hospital per 100 drivers involved in a tow-away crash.

The true risk of a driver being killed or admitted to hospital in a tow-away crash is only estimated by each figure, and as such each estimate has a level of uncertainty about it. This uncertainty is indicated by the confidence limits in Appendix 7. There is 95% probability that the confidence interval will cover the true risk of serious injury (death or hospital admission) to the driver of a vehicle of the particular year of manufacture.

The crashworthiness estimates and their confidence limits are plotted for each year of manufacture in Figure 2. The relatively wide confidence intervals observed on the estimates of crashworthiness for years of manufacture 1964 to 1969 and 2000 are a reflection of the smaller numbers of crashes involving vehicles manufactured in these years appearing in the data.

Figure 2 shows general and significant improvement in vehicle crashworthiness with increasing year of manufacture over the years considered. Specifically, little improvement can be seen in the years 1964 to 1969 followed by rapid improvement over the period 1970 to 1978 with a plateau from 1979 to 1984. There is visual evidence of a decreasing trend in the period after 1984 with vehicles manufactured over the period 1991 to 1999 being statistically significantly safer on average than those manufactured before 1986.

To summarise the magnitude of the improvement in crashworthiness seen in vehicles during the 1970s, the average crashworthiness estimate for the 1978-82 year vehicles was compared with the average for those manufactured during 1964-69. This showed a reduction of approximately 32% in the risk of serious injury for drivers involved in tow-away crashes between these two time periods. Further statistically significant improvements in crashworthiness have also been observed over the period 1986 to 1996. Comparing average crashworthiness of vehicles manufactured in the period 1978-82 with those manufactured from 1991-1998 showed a further 25% reduction. 2000 and 1999 years of manufacture have been excluded from these comparisons because of the relatively wide confidence limits on the crashworthiness estimate for these years.

The injury risk component of the crashworthiness estimate, together with its 95% confidence limits, is plotted in Figure 3. In a similar way, the injury severity component is plotted in Figure 4. Examination of these figures together shows the improvements in crashworthiness with year of manufacture observed in Figure 2 are due largely to a decrease in the probability of any injury given crash involvement (injury risk) with year of manufacture shown in Figure 3. There was a strong downward trend in injury risk with vehicle year of manufacture whilst Figure 4 shows a weaker, but still of the same general trend, effect of vehicle year of manufacture on injury severity.

Figure 2: Crashworthiness by year of manufacture (with 95% confidence limits)

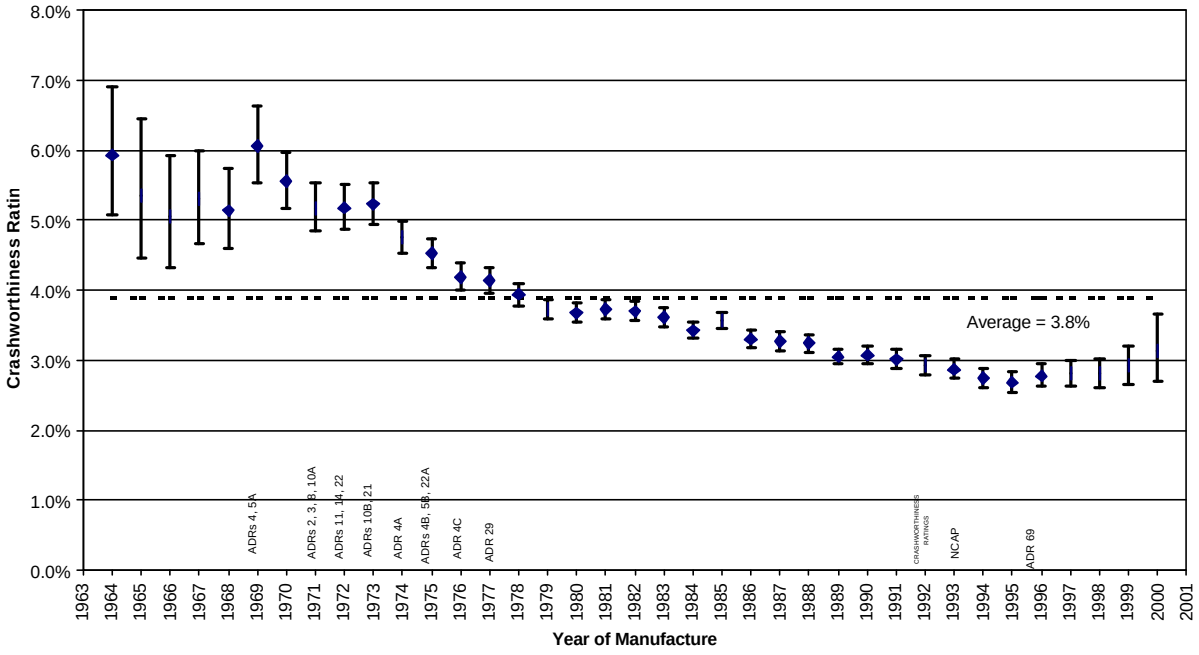


Figure 3: Injury risk by year of manufacture (with 95% confidence limits)

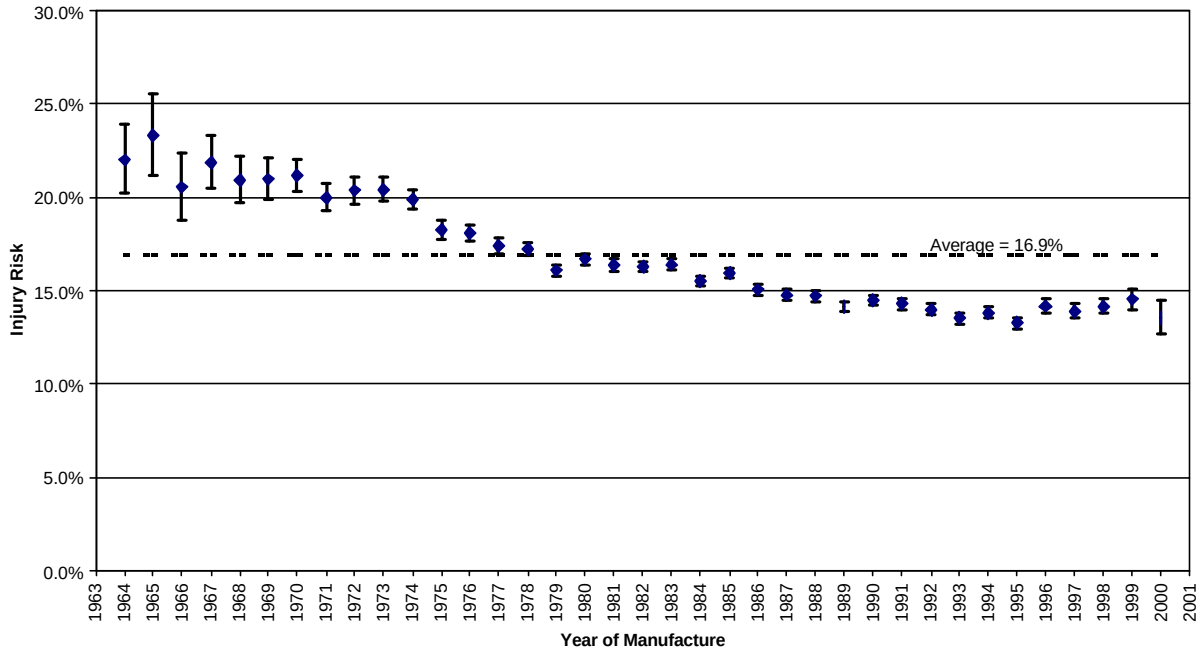
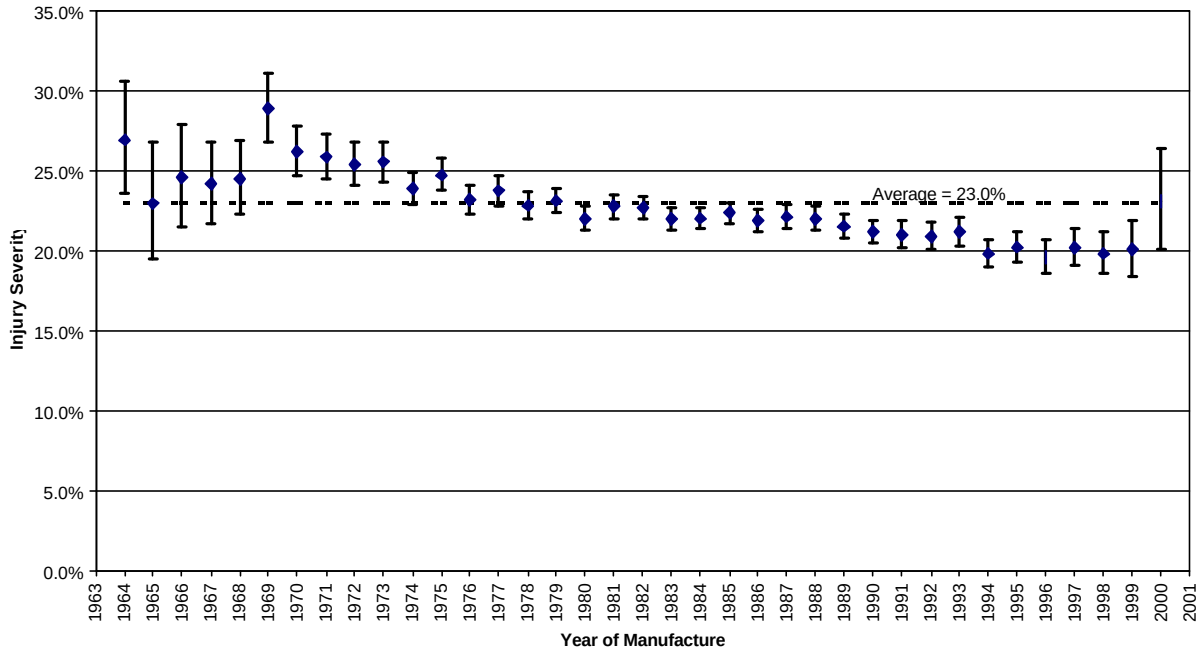


Figure 4: Injury severity by year of manufacture (with 95% confidence limits)



5.4.4 Discussion on the Analysis of Crashworthiness by Year of Manufacture

The findings of this research are closely consistent with those of the original study by Cameron et al (1994a). This is as expected given that the data used in the analysis here is an extension of that used in Cameron et al's study with the addition of crashes occurring in Victoria and NSW during

1993 to 2000 and Western Australia and Queensland during 1991-2000. As shown by Cameron et al, after a period of little change during the late 1960s, there was rapid improvement over the years from about 1970 to 1979. Drivers of vehicles manufactured during these years could be expected to have benefited from the implementation of a number of Australian Design Rules (ADRs) for motor vehicle safety which previous research has shown to be effective in providing occupant protection (Cameron 1987), namely:

- ADR 4 (seat belts fitted in front seats) from January 1969
- ADR 2 ("anti-burst" door latches and hinges) from January 1971
- ADR 10A ("energy-absorbing" steering columns) also from January 1971
- ADR 22 (head restraints) from January 1972
- ADR 10B (steering columns with limited rearward displacement) from January 1973
- ADR 4B (inertia reel seat belts fitted in front seats) from January 1975
- ADR 22A (minimum-height adjustable head restraints) from January 1975
- ADR 29 (side door strength) from January 1977.

In addition, the following ADRs introduced over the same period could also be expected to have provided increased injury protection for drivers:

- ADR 5A (seat belt anchorage points for front seats) from January 1969
- ADR 3 (strengthened seat anchorages) from January 1971
- ADR 8 (safety glass in windscreens and side windows) from July 1971
- ADR 11 ("padded" sun visors) from January 1972
- ADR 14 ("breakaway" rear vision mirrors) from January 1972
- ADR 21 ("padded" instrument panels) from January 1973
- ADR 4A (improved seat belt buckles), effective from April 1974
- ADR 5B (improved location of seat belt anchorages) from January 1975
- ADR 4C (dual-sensing locking retractor inertia reel seat belts) from January 1976.

The years of implementation of these ADRs are shown on Figure 2 for comparison with the crashworthiness estimates for the vehicles manufactured during the 1970s.

This study extends previous work to provide estimates of the relative crashworthiness of vehicles manufactured in 1999 and 2000. For a number of reasons, it may have been expected that these years of manufacture have shown an improvement in crashworthiness. Improvement may have stemmed from vehicle manufacturer reaction to two areas of activity in vehicle safety that emerged during the 1990s, namely;

- The introduction of programs to advise consumers of relative vehicle safety. Vehicle crashworthiness ratings ranking vehicles' relative driver protection based on real crash data were first published in 1992 and updated in 1994, 1996 and 1998 (Cameron, Newstead and Le (1998)). The Australian New Car Assessment Program (ANCAP), which rates relative driver and front left passenger protection based on controlled laboratory impact testing of vehicles, first published test results in April 1993 for 9 popular vehicle models. In the late 1990s, ANCAP was harmonised with EuroNCAP to provide a test protocol considering frontal offset and side impact tests as well as a pedestrian impact. The move to harmonisation with EuroNCAP has widened the range of models tested and increased the public profile of the test program, further emphasising safety as an issue for consumer vehicle choice.

- Drafting and implementation of Australian Design Rule (ADR) 69 specifying standards for frontal impact occupant protection in passenger cars as part of the Motor Vehicle Standards Act. The Minister for Land Transport approved ADR 69 as a national standard on 16th

December 1992, coming into effect for all newly released car models on 1st July 1995 and for all new passenger cars sold from 1st January 1996.

It might be expected that consumer vehicle safety advice such as crashworthiness ratings and NCAP, which rate a vehicle's relative occupant protection, may encourage vehicle manufacturers to consider safety as a top priority in vehicle design so as to have their product perform well in these safety ratings. The implementation of ADR 69 occurred in the mid 1990s but it is also possible that manufacturers worked towards meeting this standard in their new vehicles from its approval in December 1992, hence showing benefits over the period from 1993 onwards.

Figure 2 shows general and significant improvement in vehicle crashworthiness with increasing year of manufacture over the years considered. It should be noted that whilst the trend in crashworthiness during the 1990s was not statistically significant, vehicles manufactured over the period 1990 to 1999 have an average crashworthiness statistically significantly better than those manufactured in 1985 or before.

The last two points of Figure 2 seem to suggest the downward trend in crashworthiness observed in the early 1990s has reached a plateau or in fact reversed. This pattern has also been observed for the points in the latest years of manufacture in previous updates of the analysis of crashworthiness by year of vehicle manufacture. Comparison of successive updates shows that the last one or two years of manufacture in one update always tend to move down in a subsequent update. One possible reason for this phenomenon is that a high proportion of vehicles crashed within one or two years of purchased are likely to be owned by fleets. It is possible that fleet car drivers, who are often not financially responsible for the vehicle purchase or operation, may drive less carefully and have higher severity crashes than observed in crashes in general. The high injury severity estimated for year 2000 vehicles (Figure 4) support this claim. It should be noted that, based on the confidence limits on these points, there is no statistical support for this suggestion. Furthermore, it is not possible to adjust for age of vehicle at time of crash in the analysis as it is linearly related to year of crash and year of vehicle manufacture, both factors already included in the analysis. It is recommended other means of analysis be investigated to test the hypothesis that fleet vehicles, or vehicles newer at time of crash, have higher severity crashes.

Further updates of the study planned for the future and adding additional years' crash data will also improve the statistical accuracy of estimated crashworthiness for the years 1998 onwards. In this study, these years' estimates have relatively wide confidence limits reflecting the smaller quantities of crash data for vehicles manufactured in these years, particularly 2000.

5.5 Crashworthiness by Year of Manufacture by Market Group

Using the methods of Newstead and Cameron (2001), trends in vehicle crashworthiness by year of manufacture have been estimated separately for each vehicle market group. Unlike Newstead and Cameron (2001) who only estimated trends within four market groups of vehicle (small, medium, large and four wheel drive) analysis here has considered each of the 8 market groups into which vehicles are classified in the crashworthiness and aggressivity ratings presented above. Because vehicle model information was required to asign a market grouping, analysis of trends by year of manufacture within market group could only be carried out for vehicles manufactured from 1982 to 2000. In contrast to estimation of crashworthiness ratings by vehicle model, there was no minimum data requirement for a particular model to be included in the analysis. Hence all vehicle models for which a market group could be assigned were included.

In the analysis presented by Newstead and Cameron (2001), relative trends in crashworthiness by year of vehicle manufacture across market groups were presented after removing the overall trend in the combined data. A further difference in the analysis presented here compared to that of Newstead and Cameron (2001) is that the overall trend in the data has not been removed. This makes the analysis by market group presented here more directly comparable with the overall analysis by year of manufacture presented in Section 5.4 above.

5.5.1 Injury Risk

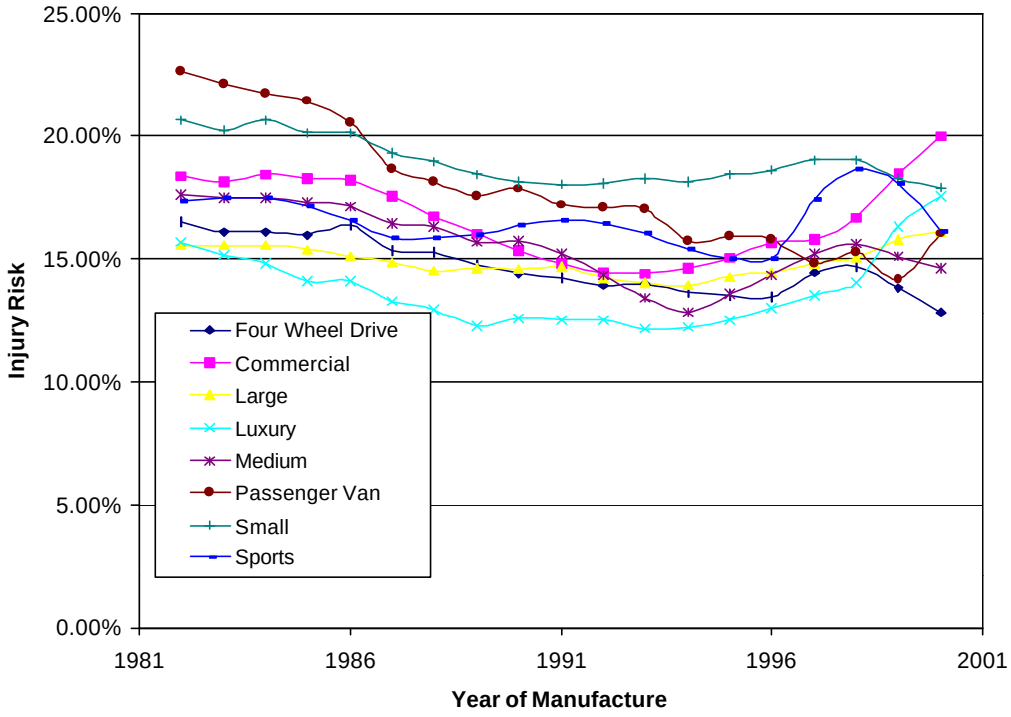
Injury risk was estimated from the data on 988,595 drivers of 1982 to 2000 vehicles with identified model and market group details involved in tow-away crashes in NSW, Western Australia and Queensland during 1987 to 2000. The "covariate" model for injury risk was determined from the variables described above. The following covariates and interactions were statistically significantly associated with injury risk and were included in the logistic regression model.

Base effect terms: driver sex (sex), driver age (age), number of vehicles involved (nveh), speed zone of crash (speedzone), state of crash (state), year of crash (year).
First order interaction terms: sex*speedzone, speedzone*nveh, sex*nveh, speedzone*age, age*sex, nveh*state, age*state, age*nveh, speedzone*state, sex*state, year*state.
Second order interaction terms: state*nveh*speedzone, sex*speedzone*nveh, age*speedzone*nveh, age*nveh*state.

No other variable or interaction term significantly improved the fit of the logistic covariate model. Terms for vehicle year of manufacture and market group, along with their interaction, were added to the covariate model and the model re-estimated.

Figure 5 shows the estimates of injury risk by year of vehicle manufacture for each of the 8 market groups considered. Estimates have been smoothed using a linear smoothing function over a window of three years (the central year and a year either side). Smoothing of the estimates was carried out to better identify the trends in the data. Smoothing in this way also compensates for known error in the recording of the year of vehicle manufacture, an error typically up to one year from the true date of manufacture.

Fig 5: Estimated injury risk by year of vehicle manufacture and market group



5.5.2 Injury Severity

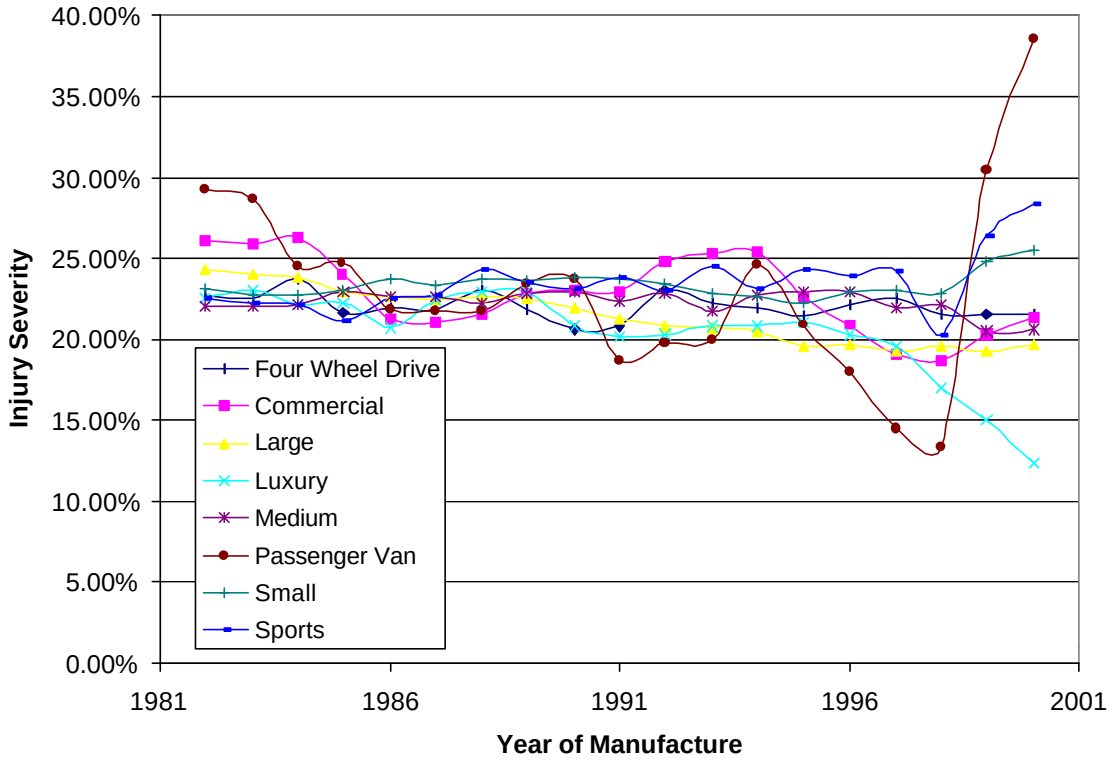
The data for computation of injury severity covered 194,841 drivers of 1982-2000 model vehicles who were injured in crashes in Victoria or NSW during 1987-2000 or Queensland or Western Australia during 1991-2000. The "covariate" model for injury severity was determined from the variables described above and identified a number of statistically significant covariate effects. These were:

Base effect terms: driver sex (sex), driver age (age), number of vehicles involved (nveh), speed zone of crash (speedzone), state of crash (state), year of crash (year).

First order interaction terms: speedzone*nveh, sex*age, age*state, nveh*state, age*nveh, speedzone*state, state*year.

No other variable or interaction term significantly improved the fit of the logistic covariate model. Terms for vehicle year of manufacture and market group, along with their interaction, were added to the covariate model and the model re-estimated. Figure 6 shows the estimates of injury severity by year of vehicle manufacture for each of the 8 market groups considered. Estimates have again been smoothed to better identify the trends in the data.

Fig 6: Estimated injury severity by year of vehicle manufacture and market group



5.5.3 Crashworthiness By Year Of Manufacture By Market Group

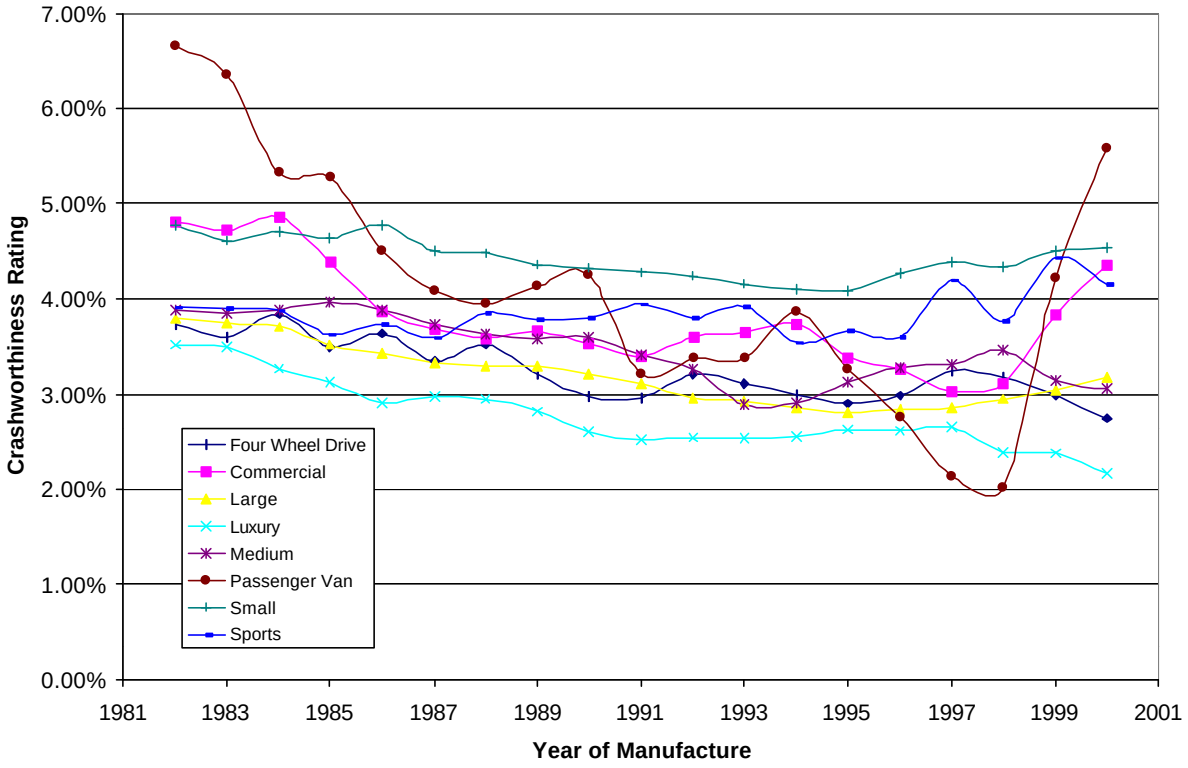
The crashworthiness estimates for each year of manufacture were obtained by multiplying the individual injury risk and injury severity estimates. Because each of the two components has been adjusted for the confounding factors, the resultant crashworthiness estimate is also adjusted for the influence of them.

Appendix 8 gives the crashworthiness estimates and the associated 95% confidence intervals (in brackets) for each of the years of manufacture from 1982 to 2000 by each of the 8 vehicle market groups considered. Each estimate is expressed as a percentage, representing the number of drivers killed or admitted to hospital per 100 drivers involved in a tow-away crash. The true risk of a driver being killed or admitted to hospital in a tow-away crash is only estimated by each figure, and as such each estimate has a level of uncertainty about it. This uncertainty is indicated by the 95% confidence limits. There is 95% probability that the confidence interval will cover the true risk of driver serious injury (death or hospital admission) in a vehicle of the particular year of manufacture and market group.

The crashworthiness estimates are plotted for each year of manufacture and vehicle market group in Figure 7. Again, the values in Figure 7 have been smoothed for reasons given above. Appendix 8 gives the unsmoothed estimates. There were differences in trends in each of the components of crashworthiness by year of manufacture between the eight market groups considered reflected in Figure 7. In the large, luxury, medium and 4WD vehicle categories, Figure 7 shows general improvement in vehicle crashworthiness with increasing year of manufacture over the years considered. In contrast, for small vehicles, sports cars and to some degree commercial vehicles, Figure 7 indicates general improvement in crashworthiness over the period to about 1993 and then a trend to worsening crashworthiness from then onwards. Reasons for the differential trends

between the groups will be discussed below. Trends in the passenger van segment are difficult to interpret due to the high variability in estimates for this market group (see Appendix 8).

Fig 7: Estimated crashworthiness by year of vehicle manufacture and market group



Analysis presented above has further demonstrated significant differences in the trends in crashworthiness by year of manufacture between market groups of Australian vehicles. Specifically, analysis has identified trends to poorer crashworthiness in the small car, sports car and commercial vehicle classes from 1993 onwards in contrast to consistent or slightly improving crashworthiness in the large, luxury, medium and 4WD vehicle classes.

Newstead and Cameron (2001) discussed reasons why similar improvements in vehicle crashworthiness have not been seen across all market segments during the 1990s. One of the primary reasons cited for trends to poorer crashworthiness in the small car segment was a trend to consumers choosing to purchase the cheapest but least safe small vehicles on the market, rather than the most safe, over that period. In contrast, purchases of large vehicles remained with the 4 locally manufactured models of large car that have generally improved in crashworthiness from the mid to late 1990s. A further possible reason for trends to poorer crashworthiness in small cars discussed by Newstead and Cameron (2001) was the polarisation of the Australian vehicle fleet in terms of size. In the second half of the 1990s, buyers moved away from the medium vehicle class to buy predominantly either large or small cars. It was thought possible this polarisation has had detrimental effects on the total safety of the Australian fleet by reducing vehicle compatibility in collisions. This is a particular problem for drivers of small vehicles and could also potentially explain the trend to poorer crashworthiness in the sports car class, which also typically includes lighter vehicles. Possible reasons for trends to poorer crashworthiness in the commercial vehicle sector need further investigation.

Again, results presented here have implications for those advocating replacement of older vehicles in the fleet on safety grounds. The results suggest that if older vehicles were replaced with predominantly low cost, small new vehicles with comparatively poor safety performance,

this could result in a net reduction in total safety of the Australian fleet as a whole. For such a replacement strategy to be effective, it would be necessary to ensure older vehicles were replaced with new vehicles with the best possible safety performance. The results here also show that those organisations producing vehicle safety information for consumer use, such as ANCAP, should be particularly vigilant in targeting buyers of small and sports vehicles. Legislation also has an important role to play. Further tightening of vehicle safety standards through legislation seems warranted to ensure all vehicles on the Australian market, including those at the cheapest end of the market, improve their safety performance in the future.

6. CONCLUSIONS

Additional crash data has enabled the crashworthiness ratings to be obtained for a larger range of car models than in previous studies, now covering 213 different vehicle models. The new data set has been able to produce more up-to-date and reliable estimates of the crashworthiness of individual car models than those published previously.

The rating scores estimate the risk of a driver being killed or admitted to hospital when involved in a tow-away crash, to a degree of accuracy represented by the confidence limits of the rating in each case. The estimates and their associated confidence limits are sufficiently sensitive that they are able to identify 95 models of passenger cars, four-wheel drive vehicles, passenger vans and light commercial vehicles that have superior or inferior crashworthiness characteristics compared with the average vehicle.

Additional crash data also allowed updated estimates of vehicle aggressivity ratings towards drivers of other passenger vehicles for individual makes and models of Australian passenger vehicles to be obtained. Using the methods developed by Cameron et al (1998), the ratings of aggressivity measure the risk of serious injury a vehicle poses to drivers of other cars with which it impacts in crashes of tow-away or greater severity.

Aggressivity ratings were calculated for 152 models of Australian passenger vehicles (passenger cars, four-wheel drive vehicles, passenger vans and light commercial vehicles) manufactured between the years 1982-98. The degree of accuracy of the aggressivity ratings is represented by the confidence limits of the rating in each case. The estimates and their associated confidence limits are sufficiently sensitive that they are able to identify 48 models of passenger cars, four-wheel drive vehicles, passenger vans and light commercial vehicles that have superior or inferior aggressivity characteristics compared with the average vehicle. Estimated vehicle aggressivity towards drivers of other vehicles was found to have a proportional relationship with vehicle mass. It was also found to have little or no relationship with ratings of vehicle crashworthiness, demonstrating the independence of the two complementary measures.

The crashworthiness of passenger vehicles (cars, station wagons, four wheel drives, vans and taxis), measured by the risk of the driver being killed or admitted to hospital as the result of involvement in a tow-away crash, has been estimated for the years of manufacture from 1964 to 2000. This study further updates the original one by Cameron et al (1994a) for years of manufacture 1964 to 1992. It shows similar patterns of improvements in crashworthiness with the greatest gains over the years 1970 to 1979 during which time a number of new Australian Design Rules aimed at occupant protection took effect. Further gains in crashworthiness have also been observed over the years 1986 to 2000. These results further suggest that the rating of vehicle crashworthiness through analysis of real crash data, as carried out here, and through crash tests carried out by consumer groups such as the Australian New Car Assessment Program has encouraged manufacturers to improve vehicle safety. Trends in crashworthiness by year of vehicle

manufacture from 1982 to 2000 and vehicle market group were also estimated. Significantly different trends were observed between market groups, with small, commercial, and sports vehicles as well as passenger vans showing evidence of trends towards poorer crashworthiness from 1995 onwards in contrast to generally improving trends in other market groups. Possible reasons for these differences have been discussed.

7. ASSUMPTIONS AND QUALIFICATIONS

The results and conclusions presented in this report are based on a number of assumptions and warrant a number of qualifications that the reader should note. These are listed in the following sections.

7.1 Assumptions

It has been assumed that:

- TAC claims records and, Victorian, NSW, Western Australian and Queensland Police crash reports accurately recorded driver injury, hospitalisation and death.
- There was no bias in the merging of TAC claims and Victorian Police crash reports related to the model of car and factors affecting the severity of the crash.
- Crashed vehicle registration numbers were recorded accurately on Police crash reports and that they correctly identified the crashed vehicles in the Victorian, NSW and Queensland vehicle registers.
- The adjustments for driver sex, age, speed zone, the number of vehicles involved and the state and year in which the crash occurred crash removed the influences of the other main factors available in the data that affected crash severity and injury susceptibility.
- The form of the logistic models used to relate injury risk and injury severity with the available factors influencing these outcomes (including the car models) was correct.
- Information contained in the Police crash records allowed accurate matching of both vehicles involved in crashes between two passenger cars for the purpose of calculating aggressivity ratings.

7.2 Qualifications

The results and conclusions warrant at least the following qualifications:

- Only driver crash involvements and injuries have been considered. Passengers occupying the same model cars may have had different injury outcomes.
- Some models with the same name through the 1982-2000 years of manufacture may have varied substantially in their construction and mass. Although there should be few such models in these updated results, the rating score calculated for these models may give a misleading impression and should be interpreted with caution.

- Other factors not collected in the data (eg. crash speed) may differ between the models and may affect the results. However, earlier analysis has suggested that the different rating scores are predominantly due to vehicle factors alone (Cameron et al 1992).

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APPENDIX 1

MAKES AND MODELS OF CARS INVOLVED IN VICTORIAN AND NSW CRASHES DURING 1987-2000 AND WESTERN AUSTRALIA AND QUEENSLAND CRASHES DURING 1991-2000

FREQUENCY FOR EACH MODEL FOR ALL TYPES OF CRASHES (NSW/VIC/QLD/WA)

MAKE/MODEL			MODEL CODE	No. of uninjured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of involved drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured (but not severely) drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of severely injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	ANALYSIS INCLUSION CRITERIA INV=100 INJ=20	MARKET GROUP
Alfa Romeo	164	89-92	AL01Z	46	5	51	5	3	8	0	
Alfa Romeo	33	83-92	AL02Z	458	82	540	63	19	82	1	Small
Alfa Romeo	75	86-92	AL03Z	119	15	134	13	3	16	0	
Alfa Romeo	90	85-88	AL04Z	59	7	66	5	2	7	0	
Alfa Romeo	GTV	82-84	AL05Z	121	13	134	6	8	14	0	
Alfa Romeo	Sprint	82-88	AL06Z	98	18	116	16	3	19	0	
Alfa Romeo	Alfasud	82-84	AL07Z	95	20	115	15	4	19	0	
Alfa Romeo	Alfetta	82-88	AL08Z	45	10	55	4	5	9	0	
Alfa Romeo	Guilietta	82-86	AL09Z	56	5	61	4	2	6	0	
Alfa Romeo	Quattro		AL10Z	1	0	1	1	0	1	0	
Alfa Romeo	156	99-00	AL13Z	25	4	29	3	0	3	0	
Alfa Romeo	166	99-00	AL14Z	4	3	7	1	1	2	0	
Alfa Romeo	GTV	98-00	AL15Z	11	0	11	.	.	.	0	
Alfa Romeo	Others		AL99Z	209	37	246	110	27	137	0	
Audi	A6/S6	95-00	AUD1Z	16	2	18	3	0	3	0	
Audi	A8	95-00	AUD2Z	1	0	1	.	.	.	0	
Audi	A4	95-00	AUD3Z	181	23	204	24	6	30	1	Luxury
Audi	A8/S8/A6		AUD4Z	14	0	14	1	0	1	0	
Audi	A3/S3	97-00	AUD5Z	31	2	33	2	0	2	0	
Audi	TT	99-00	AUD6Z	3	0	3	1	0	1	0	
Audi	Others		AUDIZ	850	126	976	111	36	147	0	
BMW	Z3	97-00	BM10Z	48	8	56	6	1	7	0	
BMW	3 Series	82-91	BM3 A	2150	314	2464	283	71	354	1	Luxury
BMW	3 Series	92-98	BM3 B	1854	275	2129	230	48	278	1	Luxury
BMW	3 Series	99-00	BM3 C	95	19	114	20	3	23	1	Luxury
BMW	5 Series	82-88	BM5 A	625	62	687	60	14	74	1	Luxury
BMW	5 Series	89-95	BM5 B	387	43	430	40	11	51	1	Luxury
BMW	5 Series	96-00	BM5 C	152	17	169	13	3	16	0	
BMW	6 Series	86-89	BM6 Z	5	0	5	.	.	.	0	
BMW	7 Series	82-88	BM7 A	182	16	198	18	6	24	1	Luxury
BMW	7 Series	89-94	BM7 B	100	13	113	15	3	18	0	

MAKE/MODEL			MODEL CODE	No. of uninjured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of involved drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured (but not severely) drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of severely injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	ANALYSIS INCLUSION CRITERIA INV=100 INJ=20	MARKET GROUP
BMW	7 Series	95-00	BM7 C	38	3	41	3	1	4	0	
BMW	7 Series Others		BM7 Z	25	1	26	1	0	1	0	
BMW	8 Series	90-99	BM8 Z	10	1	11	1	0	1	0	
BMW	Others		BM99Z	1181	177	1358	209	52	261	0	
Chrysler	Voyager	97-00	CHR1Z	86	11	97	12	1	13	0	
Chrysler	Neon	96-99	CHR2Z	165	32	197	29	3	32	1	Medium
Chrysler	Others		CHRYZ	16	1	17	9	0	9	0	
Citroen	BX	86-94	CI1 Z	65	4	69	5	3	8	0	
Citroen	XM	91-00	CI2 Z	3	0	3	.	.	.	0	
Citroen	AX	91-93	CI3 Z	4	1	5	1	0	1	0	
Citroen	Xanitia	94-00	CI4 Z	21	4	25	3	1	4	0	
Citroen	Berlingo	99-00	CI5 Z	2	0	2	.	.	.	0	
Citroen	Xsara	00-00	CI6 Z	6	2	8	2	0	2	0	
Citroen	XM	91-00	CI7 Z	2	0	2	.	.	.	0	
Citroen	Others		CI99Z	61	3	64	2	1	3	0	
Daihatsu	Charade	82-86	D1 A	1551	472	2023	419	132	551	1	Small
Daihatsu	Charade	87	D1 B	250	71	321	70	11	81	0	
Daihatsu	Charade	88-92	D1 C	4322	1144	5466	871	264	1135	1	Small
Daihatsu	Charade	93-00	D1 D	3059	761	3820	521	164	685	1	Small
Daihatsu	Feroza	89-97	D11 Z	536	109	645	90	28	118	1	4WD
Daihatsu	Handivan	82-90	D12 Z	488	208	696	156	40	196	1	Commercial
Daihatsu	Hi-Jet	82-90	D13 Z	116	67	183	45	18	63	1	Commercial
Daihatsu	Rocky	84-99	D14 Z	377	114	491	73	41	114	1	4WD
Daihatsu	Pyzar	97-00	D15 Z	98	21	119	16	2	18	0	
Daihatsu	Move	97-99	D16 Z	29	9	38	5	2	7	0	
Daihatsu	Sirion	98-00	D17 Z	158	54	212	33	7	40	1	Small
Daihatsu	Terios	97-00	D18 Z	78	32	110	24	10	34	1	4WD
Daihatsu	Handivan / Cuore	99-00	D19 Z	8	1	9	1	0	1	0	
Daihatsu	Applause	89-99	D2 Z	1620	380	2000	291	73	364	1	Small
Daihatsu	Mira	90-96	D3 Z	384	185	569	127	42	169	1	Small
Daihatsu	Delta		D4 Z	1057	166	1223	108	39	147	0	
Daihatsu	F20/25/50/55/60/65		D5 Z	64	25	89	16	8	24	0	
Daihatsu	Others		D99 Z	1143	297	1440	306	83	389	0	
Daewoo	1.5i	94-95	DA01Z	250	62	312	55	7	62	1	Small
Daewoo	Cielo	95-97	DA03Z	989	309	1298	272	61	333	1	Small
Daewoo	Espero	95-97	DA05Z	237	62	299	41	16	57	1	Medium

MAKE/MODEL			MODEL CODE	No. of uninjured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of involved drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured (but not severely) drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of severely injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	ANALYSIS INCLUSION CRITERIA INV=100 INJ=20	MARKET GROUP
Daewoo	Nubira	97-00	DA06Z	380	81	461	65	20	85	1	Small
Daewoo	Lanos	97-00	DA07Z	648	160	808	131	37	168	1	Medium
Daewoo	Leganza	97-00	DA08Z	128	22	150	13	7	20	1	Medium
Daewoo	Musso	98-00	DA09Z	41	5	46	9	3	12	0	
Daewoo	Matiz	99-00	DA10Z	23	11	34	10	2	12	0	
Daewoo	Others		DA99Z	35	2	37	2	0	2	0	
Ford	Laser/Met	90	F01 B	3682	820	4502	735	165	900	0	
Ford	Laser	91-94	F01 C	7024	1547	8571	1357	350	1707	1	Small
Ford	Laser	95-98	F01 D	1318	285	1603	248	67	315	1	Small
Ford	Laser/Met Others		F01 Z	2	0	2	.	.	.	0	
Ford	Cortina	82-82	F02 Z	24	11	35	36	6	42	0	
Ford	Escort	82-82	F05 Z	18	1	19	1	0	1	0	
Ford	Falcon XE/XF	82-88	F06 Z	50483	7954	58437	7360	2274	9634	1	Large
Ford	Fairlane Z & LTD F	82-87	F07 Z	3397	571	3968	591	191	782	1	Luxury
Ford	Falcon EA/Falcon EB Series I	88-Mar 92	F08 C	29885	4600	34485	4308	1111	5419	1	Large
Ford	Falcon EB Series II/Falcon ED	Apr 92-94	F08 D	11614	1733	13347	1554	444	1998	1	Large
Ford	Fairlane N & LTD D	88-94	F09 A	3254	428	3682	421	136	557	1	Luxury
Ford	Fairlane N & LTD D	95-98	F09 B	712	99	811	100	35	135	1	Luxury
Ford	Fairlane & LTD AU	99-00	F09 C	69	12	81	7	3	10	0	
Ford	Mondeo	95-00	F10 Z	647	105	752	97	24	121	1	Medium
Ford	Capri	89-94	F43 Z	864	206	1070	199	46	245	1	Sports
Ford	Festiva WD/WD/WH/WF	94-00	F44 B	2526	891	3417	654	230	884	1	Small
Ford	Falcon Panel Van	82-95	F45 A	3408	420	3828	339	86	425	1	Commercial
Ford	Falcon Panel Van	96-99	F45 B	409	37	446	39	5	44	1	Commercial
Ford/Nissan	Falcon Ute/XFN Ute	82-95/88-90	F46 A	7604	1110	8714	808	269	1077	1	Commercial
Ford	Falcon Ute	96-99	F46 B	818	126	944	109	31	140	1	Commercial
Ford	Falcon Ute	99	F46 C	105	21	126	17	6	23	0	
Ford	Falcon Ute AU	00-00	F46 D	68	9	77	10	3	13	0	
Ford	Ford F-Series	82-92	F47 Z	646	93	739	73	19	92	1	Commercial
Ford	Trader		F53 Z	388	52	440	34	14	48	0	
Ford	Commercials		F54 Z	7250	1454	8704	1093	328	1421	0	
Ford	Sierra		F55 Z	3	1	4	1	0	1	0	
Ford	Bronco	82-87	F56 Z	112	17	129	12	6	18	0	
Ford	Probe	94-98	F61 Z	80	21	101	16	3	19	0	
Ford	Falcon EF/EL	94-98	F62 Z	17658	2840	20498	2464	676	3140	1	Large
Ford	Transit	94-00	F64 Z	286	40	326	35	10	45	1	Commercial

MAKE/MODEL			MODEL CODE	No. of uninjured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of involved drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured (but not severely) drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of severely injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	ANALYSIS INCLUSION CRITERIA INV=100 INJ=20	MARKET GROUP
Ford	Explorer		F65 Z	101	20	121	14	10	24	0	
Ford	Falcon AU	98-00	F66 Z	2027	370	2397	289	61	350	1	Large
Ford	Taurus	96-98	F67 Z	170	31	201	26	6	32	1	Large
Ford	Ka	99-00	F68 Z	14	2	16	3	1	4	0	
Ford	Cougar	99-00	F69 Z	23	7	30	4	0	4	0	
Ford	Courier	98-00	F70 Z	43	11	54	6	3	9	0	
Ford	Others		F99 Z	16068	3599	19667	5949	1915	7864	0	
Ferrari			FERAZ	3	0	3	1	0	1	0	
Fiat	Argenta	83-85	FI01Z	6	4	10	3	1	4	0	
Fiat	Croma	88-89	FI02Z	19	4	23	3	0	3	0	
Fiat	Regata	84-89	FI03Z	208	26	234	17	7	24	1	Small
Fiat	Superbrava	82-85	FI04Z	39	12	51	7	6	13	0	
Fiat	X-1/9	82-83	FI11Z	2	0	2	.	.	.	0	
Fiat	Others		FI99Z	58	10	68	31	7	38	0	
Fsm			FSM Z	11	2	13	6	0	6	0	
Holden/Toyota	Commodore VN/VP/Lexcen	89-93	H1 Z	32360	5773	38133	5072	1652	6724	1	Large
Holden	Calibra	91-97	H12 Z	190	24	214	22	2	24	1	Sports
Holden	Statesman/Caprice WB	82-85	H14 A	151	20	171	27	19	46	1	Luxury
Holden	Stateman/Caprice VQ	90-93	H14 B	683	95	778	87	37	124	1	Luxury
Holden	Stateman/Caprice VR/VS	94-98	H14 C	1095	174	1269	152	58	210	1	Luxury
Holden	Commodore Ute VG/VP	90-93	H18 Z	1011	177	1188	122	49	171	1	Commercial
Holden	Camira	82-89	H2 Z	11462	2677	14139	2718	740	3458	1	Medium
Holden	Jackaroo	82-91	H21 A	504	112	616	104	17	121	1	4WD
Holden	Jackaroo	92-97	H21 B	272	54	326	52	17	69	1	4WD
Holden	Jackaroo	98-00	H21 C	76	19	95	16	7	23	0	
Holden	Kingswood		H22 Z	14	5	19	2	3	5	0	
Holden	Piazza	86-88	H23 Z	40	9	49	9	0	9	0	
Holden	Rodeo	82-85	H24 A	631	108	739	72	22	94	1	Commercial
Holden	Rodeo	86-88	H24 B	328	57	385	47	8	55	1	Commercial
Holden	Rodeo	89-95	H24 C	3795	614	4409	429	171	600	1	Commercial
Holden	Rodeo	96-98	H24 D	908	194	1102	138	34	172	1	Commercial
Holden	Rodeo	99-00	H24 E	296	70	366	50	8	58	1	Commercial
Holden	Rodeo Others		H24 Z	1	0	1	.	.	.	0	
Holden	Shuttle	82-87	H26 Z	440	95	535	65	23	88	1	Commercial
Holden	WB Series	82-85	H27 Z	1477	230	1707	139	80	219	1	Commercial
Holden	Torana/Sunbird		H28 Z	5	0	5	1	0	1	0	

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Holden	Gemini	82-84	H3 A	5713	1309	7022	1319	323	1642	1	Small
Holden	Gemini	85	H3 B	1230	302	1532	296	73	369	0	
Holden	Gemini RB	86-87	H3 C	647	197	844	167	37	204	1	Small
Holden	Gemini Others		H3 Z	1	0	1	.	.	.	0	
Holden	Commodore Others		H31 Z	21	0	21	2	0	2	0	
Holden/Toyota	Commodore VR/VS/Lexcen	93-97	H33 Z	20472	3461	23933	3054	821	3875	1	Large
Holden	Commodore Ute VR/VS	94-00	H34 Z	2629	439	3068	311	132	443	1	Commercial
Holden	Frontera	95-00	H35 Z	39	5	44	2	6	8	0	
Holden	Vectra	97-00	H36 Z	440	86	526	71	13	84	1	Medium
Holden	Commodore VT/VX	97-00	H37 Z	5049	945	5994	793	182	975	1	Large
Holden	Suburban	98-00	H38 Z	2	1	3	1	0	1	0	
Holden	Statesman/Caprice WH	99-00	H39 Z	101	27	128	20	3	23	1	Luxury
Holden	Astra Jap	87	H4 B	693	127	820	147	39	186	0	
Holden	Astra TR	96-98	H4 D	384	75	459	73	10	83	1	Small
Holden	Astra TS	98-00	H4 E	164	47	211	22	10	32	1	Small
Holden	Astra Others		H4 Z	2	1	3	1	0	1	0	
Holden	Commodore VU Ute	00-00	H41 Z	14	3	17	2	1	3	0	
Holden	Barina SB	95-00	H5 D	2041	573	2614	444	117	561	1	Small
Holden	Barina Others		H5 Z	380	108	488	87	28	115	0	
Holden	Commodore VB-VL	82-88	H6 Z	43673	7699	51372	6633	2081	8714	1	Large
Holden	Others		H99 Z	6987	1559	8546	4596	1564	6160	0	
Hyundai	Excel	82-89	HY1 A	2174	599	2773	604	167	771	1	Small
Hyundai	Excel	90-94	HY1 B	5943	1591	7534	1394	342	1736	1	Small
Hyundai	Excel	95-00	HY1 C	8105	2323	10428	1862	436	2298	1	Small
Hyundai	Elantra	00-00	HY11Z	1	0	1	.	.	.	0	
Hyundai	Sonata	98-00	HY15Z	49	12	61	6	5	11	0	
Hyundai	Sonata	89-97	HY2 Z	1661	345	2006	288	62	350	1	Large
Hyundai	S Coupe	90-96	HY4 Z	608	173	781	146	38	184	1	Small
Hyundai	Lantra	91-95	HY5 A	1106	255	1361	228	55	283	1	Small
Hyundai	Lantra	96-00	HY5 B	1233	239	1472	197	37	234	1	Small
Hyundai	Lantra Others		HY5 Z	1	0	1	.	.	.	0	
Hyundai	Coupe	96-00	HY7 Z	232	50	282	33	16	49	1	Sports
Hyundai	Grandeur	99-00	HY8 Z	24	4	28	5	0	5	0	
Hyundai	Accent	00-00	HY9 Z	41	16	57	8	6	14	0	
Hyundai	Others		HY99Z	564	143	707	142	21	163	0	
Mitsubishi	Colt	82-88	I01 Z	9845	2662	12507	2384	604	2988	1	Small

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Mitsubishi	Sigma/Scorpion	82-86	I02 Z	11585	2028	13613	2146	552	2698	1	Medium
Mitsubishi	Magna TM/TN/TP	85-90	I04 Z	16516	2869	19385	2717	838	3555	1	Large
Mitsubishi	Charger/Valiant		I05 Z	30	2	32	1	1	2	0	
Mitsubishi	Magna TE/TF/TH/TJ/Verada KE/KF/KH/KJ	96-00	I06 A	11490	1868	13358	1772	304	2076	1	Large
Mitsubishi	Starion	82-87	I07 Z	131	31	162	16	15	31	1	Sports
Mitsubishi	Lancer CA	88-90	I09 A	3955	852	4807	737	162	899	1	Small
Mitsubishi	Lancer CC	93-95	I09 C	2685	577	3262	522	138	660	1	Small
Mitsubishi	Lancer CE/Mirage	96-00	I09 D	3168	685	3853	539	130	669	1	Small
Mitsubishi	Nimbus	84-91	I10 A	426	84	510	82	16	98	1	Medium
Mitsubishi	Nimbus	92-98	I10 B	286	54	340	35	7	42	1	Medium
Mitsubishi	Nimbus	99-00	I10 C	205	35	240	33	2	35	1	Medium
Mitsubishi	Cordia	82-89	I12 Z	1476	291	1767	268	70	338	1	Small
Mitsubishi	Verada KR/KS/Magna TR/TS	91-96	I15 Z	8003	1318	9321	1330	372	1702	1	Large
Mitsubishi	Galant	89-94	I16 A	9	0	9	.	.	.	0	
Mitsubishi	Galant	95-96	I16 B	785	145	930	120	34	154	1	Medium
Mitsubishi	Canter		I21 Z	637	80	717	92	31	123	0	
Mitsubishi	Starwagon/L300	82-86	I23 A	2721	635	3356	448	152	600	1	Passenger Van
Mitsubishi	Starwagon	87-94	I23 B	3158	664	3822	481	153	634	1	Passenger Van
Mitsubishi	Starwagon	95-00	I23 C	859	130	989	101	24	125	1	Passenger Van
Mitsubishi	Commercials		I24 Z	2344	492	2836	364	125	489	0	
Mitsubishi	Pajero	82-90	I25 A	1291	245	1536	191	69	260	1	4WD
Mitsubishi	Pajero	91	I25 B	252	28	280	28	9	37	0	
Mitsubishi	Pajero	92-99	I25 C	1411	197	1608	189	50	239	1	4WD
Mitsubishi	3000GT	92-97	I26 Z	2	2	4	3	1	4	0	
Mitsubishi	Challenger	98-00	I30 Z	37	5	42	7	1	8	0	
Mitsubishi	Pajero iO	99-00	I34 Z	4	1	5	2	0	2	0	
Mitsubishi	Pajero NM	00-00	I35 Z	12	1	13	2	0	2	0	
Mitsubishi	Others		I99 Z	5716	1051	6767	2222	610	2832	0	
Isuzu	NKR Series		IS01Z	393	68	461	45	12	57	0	
Isuzu	NPR Series		IS02Z	609	38	647	28	9	37	0	
Isuzu	Others		IS99Z	1076	119	1195	99	27	126	0	
Jaguar	XJ6	82-86	J01 A	231	28	259	16	11	27	1	Luxury
Jaguar	XJ6	87-94	J01 B	270	26	296	18	6	24	1	Luxury
Jaguar	XJ6	95-97	J01 C	41	2	43	1	0	1	0	
Jaguar	XJ8	98-00	J01 D	6	0	6	.	.	.	0	

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Jaguar	V12 Saloon		J02 Z	11	2	13	2	0	2	0	
Jaguar	XJS	82-96	J04 Z	56	8	64	7	1	8	0	
Jaguar	XJR	94-00	J05 Z	3	0	3	.	.	.	0	
Jaguar	XK8	96-00	J07 Z	11	1	12	.	.	.	0	
Jaguar	S-Type	99-00	J08 Z	5	1	6	.	.	.	0	
Jaguar	Others		J99 Z	178	24	202	36	12	48	0	
Jaguar			JAG Z	2	1	3	1	0	1	0	
Jeep	Cherokee	82-00	JE01Z	423	49	472	61	16	77	1	4WD
Jeep	Grand Cherokee	96-99	JE02Z	52	6	58	8	2	10	0	
Jeep	Wrangler	96-00	JE03Z	51	6	57	7	3	10	0	
Jeep	Others		JEEPZ	131	17	148	24	6	30	0	
Kia	Sportage	98-00	K01 Z	72	8	80	8	0	8	0	
Kia	Ceres	92-00	K02 Z	111	30	141	30	0	30	1	Commercial
Kia	Mentor	97-00	K03 Z	2	0	2	.	.	.	0	
Kia	Credos	98-00	K04 Z	1	0	1	.	.	.	0	
Kia	Rio	00-00	K05 Z	3	1	4	1	0	1	0	
Kia	Carnival	99-00	K07 Z	4	0	4	.	.	.	0	
Lada			LADAZ	210	65	275	67	21	88	0	
Lancia			LANCZ	21	2	23	1	2	3	0	
Leyland			LEY Z	34	7	41	6	5	11	0	
Land Rover	Defender	92-00	LRO1Z	65	21	86	13	8	21	0	
Land Rover	Discovery	91-00	LRO2Z	159	42	201	32	10	42	1	4WD
Land Rover	Others		LROVZ	293	29	322	40	10	50	0	
Ford/Mazda	Laser/323	82-88	M01 A	32704	7898	40602	7615	1894	9509	1	Small
Mazda	323	89	M01 B	324	94	418	77	29	106	0	
Mazda	323	90-93	M01 C	2022	417	2439	386	81	467	1	Small
Mazda	323	94	M01 D	501	98	599	94	25	119	0	
Mazda	323	95-98	M01 E	1555	310	1865	247	72	319	1	Small
Ford/Mazda	Laser/323	99-00	M01 F	269	64	333	38	6	44	1	Small
Ford/Mazda	Telstar/626/MX6	82	M02 A	9926	2028	11954	1986	595	2581	0	
Ford/Mazda	Telstar/626/MX6	83-86	M02 B	6797	1266	8063	1216	312	1528	1	Medium
Ford/Mazda	Telstar/626/MX6	87	M02 C	1307	177	1484	174	46	220	0	
Ford/Mazda	Telstar/626/MX6	88-91	M02 D	2491	434	2925	393	104	497	1	Medium
Ford/Mazda	Telstar/626/MX6	92-97	M02 E	2476	348	2824	300	99	399	1	Medium
Mazda	626	98-00	M02 F	161	29	190	25	7	32	1	Medium
Mazda	929	82-90	M03 A	2527	472	2999	429	126	555	1	Luxury

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Mazda	929	91	M03 B	111	13	124	13	4	17	0	
Mazda	929	92-97	M03 C	98	18	116	19	2	21	1	Luxury
Ford/Mazda	Festiva WA/121	91-93/87-90	M09 A	4793	1338	6131	1123	291	1414	1	Small
Mazda	121	94-96	M09 B	1331	355	1686	292	63	355	1	Small
Mazda	121 Metro	97-00	M09 C	467	123	590	105	28	133	1	Small
Mazda	RX7	82-85	M10 A	460	75	535	80	25	105	1	Sports
Mazda	RX7	86-91	M10 B	213	23	236	27	6	33	1	Sports
Mazda	RX7	92-98	M10 C	33	7	40	9	1	10	0	
Mazda	MX5	89-97	M11 A	351	58	409	51	10	61	1	Sports
Mazda	MX5	98-00	M11 B	42	9	51	7	2	9	0	
Mazda	Commercials		M14 Z	3508	746	4254	585	212	797	0	
Mazda	MPV	93-99	M15 A	114	9	123	7	1	8	0	
Mazda	MPV	00-00	M15 B	1	0	1	.	.	.	0	
Mazda	Eunos 30X	96-97	M16 Z	141	32	173	30	5	35	1	Sports
Mazda	Eunos 500	96-99	M17 Z	69	20	89	19	4	23	0	
Mazda	Eunos 800	96-99	M18 Z	20	2	22	1	1	2	0	
Mazda	Others		M99 Z	5179	908	6087	1505	349	1854	0	
Maserati			MASRZ	2	0	2	1	0	1	0	
Mercedes	100 Series		ME1 Z	211	28	239	33	7	40	0	
Mercedes	C180		ME10Z	43	9	52	8	1	9	0	
Mercedes Benz	C-Class W201	87-94	ME11Z	286	53	339	47	17	64	1	Luxury
Mercedes Benz	C-Class W202	95-00	ME12Z	398	52	450	39	12	51	1	Luxury
Mercedes Benz	CLK C208	97-00	ME13Z	24	1	25	2	1	3	0	
Mercedes Benz	E-Class W123	82-85	ME14Z	217	30	247	22	8	30	1	Luxury
Mercedes Benz	E-Class W124	86-95	ME15Z	567	72	639	71	19	90	1	Luxury
Mercedes Benz	E-Class W201	96-00	ME16Z	189	22	211	21	3	24	1	Luxury
Mercedes Benz	S-Class W107		ME17Z	18	3	21	3	0	3	0	
Mercedes Benz	S-Class W126	82-92	ME18Z	438	51	489	43	14	57	1	Luxury
Mercedes Benz	S-Class R129	93-00	ME19Z	44	4	48	3	0	3	0	
Mercedes Benz	200 Series		ME2 Z	343	27	370	40	17	57	0	
Mercedes Benz	S-Class C140	93-99	ME20Z	95	3	98	4	0	4	0	
Mercedes Benz	SLK R170	97-00	ME21Z	39	6	45	3	0	3	0	
Mercedes Benz	A-Class W168	98-00	ME22Z	13	3	16	2	3	5	0	
Mercedes Benz	MB100 / MB140	99-00	ME24Z	5	1	6	2	0	2	0	
Mercedes Benz	S-Class W220	99-00	ME25Z	5	0	5	.	.	.	0	
Mercedes Benz	Vito	99-00	ME26Z	47	6	53	2	1	3	0	

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Mercedes Benz	M-Class W163	98-00	ME27Z	10	1	11	1	0	1	0	
Mercedes Benz	300 Series		ME3 Z	458	39	497	43	11	54	0	
Mercedes Benz	Sprinter	98-00	ME30Z	14	5	19	9	0	9	0	
Mercedes Benz	G-Class	83-88	ME31Z	1	0	1	.	.	.	0	
Mercedes Benz	400 Series		ME4 Z	70	11	81	10	5	15	0	
Mercedes Benz	500 Series		ME5 Z	38	5	43	4	1	5	0	
Mercedes Benz	Others		ME99Z	855	112	967	166	34	200	0	
Holden/Nissan	Astra/Pulsar/Vector	84-86	N01 A	8190	2003	10193	2046	529	2575	1	Small
Nissan	Pulsar/Vector	87	N01 B	1131	229	1360	218	43	261	0	
Holden/Nissan	Astra/Pulsar/Vector	88-90	N01 C	8371	1779	10150	1563	414	1977	1	Small
Nissan	Pulsar/Vector	91	N01 D	1810	359	2169	323	84	407	0	
Nissan	Pulsar	92-95	N01 E	3022	586	3608	527	138	665	1	Small
Nissan	Pulsar	96-99	N01 F	1891	433	2324	312	99	411	1	Small
Nissan	Pulsar Others		N01 Z	1	0	1	.	.	.	0	
Nissan	Pintara	86-88	N02 A	3491	640	4131	587	164	751	1	Medium
Nissan/Ford	Pintara/Corsair	89-92	N02 B	5653	1090	6743	907	282	1189	1	Medium
Nissan	Bluebird	82-86	N03 Z	11028	2152	13180	1864	569	2433	1	Medium
Nissan	Skyline	82-90	N04 Z	3748	631	4379	583	182	765	1	Large
Nissan	180B/200B		N05 Z	52	7	59	6	1	7	0	
Nissan	300ZX	86-97	N09 Z	306	42	348	40	16	56	1	Sports
Nissan	Stanza	82-83	N10 Z	481	99	580	86	21	107	1	Medium
Nissan	280C	82-84	N11 Z	56	9	65	7	3	10	0	
Nissan	Gazelle	84-88	N12 Z	341	60	401	269	109	378	1	Medium
Nissan	280ZX	82-84	N13 Z	74	13	87	15	5	20	0	
Nissan	Prairie	84-86	N14 Z	305	64	369	58	14	72	1	Medium
Nissan	Maxima	90-94	N15 A	404	60	464	66	18	84	1	Luxury
Nissan	Maxima	95-99	N15 B	302	59	361	51	10	61	1	Luxury
Nissan	Maxima	00-00	N15 C	13	3	16	3	0	3	0	
Nissan	Exa	83-86	N16 A	382	102	484	77	19	96	1	Sports
Nissan	Exa	87-91	N16 B	206	29	235	29	8	37	1	Sports
Nissan	NX/NX-R	91-96	N17 Z	325	90	415	65	31	96	1	Sports
Nissan	300C	84-88	N20 Z	79	16	95	12	4	16	0	
Nissan	720 Ute	82-85	N21 Z	1320	243	1563	171	56	227	1	Commercial
Nissan	B120		N22 Z	95	24	119	15	8	23	0	
Nissan	H40		N23 Z	16	3	19	2	1	3	0	
Nissan	Navara	86-91	N24 A	2677	412	3089	309	113	422	1	Commercial

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Nissan	Navara	92-96	N24 B	816	118	934	100	27	127	1	Commercial
Nissan	Navara	97-00	N24 C	154	13	167	18	1	19	0	
Nissan	Navara Others		N24 Z	67	14	81	12	1	13	0	
Nissan	Vans (Nomad/Urvan/C22/E24/Vanette)		N25 Z	2495	562	3057	409	127	536	0	
Nissan	Patrol	82-87	N26 A	1129	143	1272	111	37	148	1	4WD
Nissan/Ford	Patrol/Maverick	88-97	N26 B	4015	547	4562	500	152	652	1	4WD
Nissan	Patrol	98-00	N26 C	302	48	350	40	15	55	1	4WD
Nissan	Pathfinder	88-94	N27 Z	190	33	223	40	11	51	1	4WD
Nissan	Serena	92-95	N30 Z	63	10	73	8	3	11	0	
Nissan	Infiniti	93-97	N31 Z	2	0	2	.	.	.	0	
Nissan	Bluebird	93-97	N32 Z	475	67	542	63	16	79	1	Medium
Nissan	200SX	94-00	N33 Z	202	36	238	16	7	23	1	Sports
Nissan	Micra	95-97	N34 Z	330	92	422	72	26	98	1	Small
Nissan	Pathfinder	95-00	N36 Z	185	28	213	25	11	36	1	4WD
Nissan	Terrano II	97-99	N38 Z	3	2	5	2	0	2	0	
Nissan	Pulsar	00-00	N39 Z	24	4	28	2	3	5	0	
Nissan	Others		N99 Z	5251	1075	6326	2413	742	3155	0	
FSM			NIKIZ	15	12	27	12	6	18	0	
Lada	Niva	83-98	NIVAZ	225	51	276	50	10	60	1	4WD
Honda	Civic	82-83	O1 A	590	133	723	107	29	136	1	Small
Honda	Civic	84-87	O1 B	2021	407	2428	349	115	464	1	Small
Honda	Civic	88-91	O1 C	2566	457	3023	400	136	536	1	Small
Honda	Civic	92-95	O1 D	2345	406	2751	363	85	448	1	Small
Honda	Civic	96-00	O1 E	1304	244	1548	187	38	225	1	Small
Honda	CRX	87-91	O10 A	242	49	291	34	17	51	1	Sports
Honda	CRX	92-98	O10 B	100	16	116	13	7	20	1	Sports
Honda	Odyssey	95-00	O17 A	121	14	135	6	0	6	0	
Honda	Odyssey	00-00	O17 B	10	1	11	1	0	1	0	
Honda	CR-V	97-00	O18 Z	197	27	224	44	10	54	1	4WD
Honda	HR-V	99-00	O19 Z	59	9	68	9	3	12	0	
Honda	Legend	86-95	O2 B	500	50	550	58	13	71	1	Luxury
Honda	Legend	96-98	O2 C	24	1	25	1	0	1	0	
Honda	Legend	99-00	O2 D	5	1	6	1	0	1	0	
Honda	S2000	99-00	O20 Z	9	0	9	.	.	.	0	
Honda	Civic	01-Jan	O21 Z	4	0	4	.	.	.	0	

MAKE/MODEL			MODEL CODE	No. of uninjured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of involved drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured (but not severely) drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of severely injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	ANALYSIS INCLUSION CRITERIA INV=100 INJ=20	MARKET GROUP
Honda	Accord	82-85	O3 A	1564	323	1887	269	64	333	1	Luxury
Honda	Accord	86-90	O3 B	1351	188	1539	187	35	222	1	Luxury
Honda	Accord	91-93	O3 C	684	85	769	79	16	95	1	Luxury
Honda	Accord	94-98	O3 D	1098	140	1238	128	38	166	1	Luxury
Honda	Accord	99-00	O3 E	51	9	60	12	0	12	0	
Honda	Prelude	82-82	O4 A	180	31	211	24	5	29	1	Sports
Honda	Prelude	83-91	O4 B	2217	347	2564	313	81	394	1	Sports
Honda	Prelude	92-96	O4 C	688	91	779	81	35	116	1	Sports
Honda	Prelude	97-00	O4 D	126	22	148	21	2	23	1	Sports
Honda	Integra	86-88	O5 A	463	71	534	64	16	80	1	Sports
Honda	Integra	89	O5 B	219	48	267	38	4	42	0	
Honda	Integra	90-92	O5 C	348	52	400	60	13	73	1	Sports
Honda	Integra	93	O5 D	101	16	117	14	4	18	0	
Honda	Integra	93-00	O5 E	328	34	362	36	7	43	1	Sports
Honda	Concerto	88-93	O6 Z	290	56	346	48	14	62	1	Small
Honda	NSX	91-00	O7 Z	8	0	8	1	0	1	0	
Honda	Acty	83-86	O8 Z	273	59	332	43	16	59	1	Commercial
Honda	City	83-86	O9 Z	264	97	361	74	22	96	1	Small
Honda	Others		O99 Z	1161	290	1451	570	162	732	0	
Peugoet	205	87-94	PE1 Z	150	22	172	19	4	23	1	Small
Peugeot	405	89-97	PE2 Z	273	47	320	46	14	60	1	Medium
Peugeot	505	82-93	PE3 Z	516	60	576	68	26	94	1	Medium
Peugeot	306	94-00	PE4 Z	362	61	423	60	7	67	1	Small
Peugeot	605	94-96	PE5 Z	34	4	38	4	0	4	0	
Peugeot	406	96-00	PE7 Z	50	4	54	3	1	4	0	
Peugeot	206	99-00	PE8 Z	15	1	16	1	3	4	0	
Peugeot	Others		PE99Z	203	27	230	44	13	57	0	
Porsche	944	82-91	PO1 Z	74	9	83	9	4	13	0	
Porsche	911	82-00	PO2 Z	14	1	15	3	0	3	0	
Porsche	968	92-95	PO4 Z	1	0	1	.	.	.	0	
Porsche	Others		PO99Z	245	26	271	26	17	43	0	
Proton	Wira	95-96	PRO1Z	69	30	99	36	13	49	0	
Proton	Satria	97-00	PRO2Z	4	0	4	1	1	2	0	
Renault	20	82-83	RE1 Z	13	4	17	3	2	5	0	
Renault	Feugo	82-87	RE2 Z	285	41	326	43	9	52	1	Sports
Renault	21	87-91	RE3 Z	10	1	11	3	0	3	0	

MAKE/MODEL			MODEL CODE	No. of uninjured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of involved drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured (but not severely) drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of severely injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	ANALYSIS INCLUSION CRITERIA INV=100 INJ=20	MARKET GROUP
Renault	25	85-91	RE4 Z	28	7	35	6	2	8	0	
Renault	19	91-96	RE5 Z	104	20	124	18	5	23	1	Small
Renault	Laguna	95-96	RE7 Z	19	4	23	1	2	3	0	
Renault	Others		RE99Z	190	32	222	35	6	41	0	
Rover	3500	82-87	RO Z	127	25	152	25	2	27	1	Luxury
Rover	416i/827		RO1 Z	195	26	221	21	5	26	0	
Rover	Quintet	82-86	RO2 Z	180	43	223	54	16	70	1	Small
Rover	825	87-88	RO3 Z	25	4	29	5	1	6	0	
Rover	MGF	99-00	RO4 Z	43	6	49	3	1	4	0	
Landrover	Freelander	98-00	RO5 Z	4	0	4	.	.	.	0	
Rover	Others		RO99Z	253	48	301	89	21	110	0	
Rolls Royce			ROLLZ	21	4	25	2	2	4	0	
Land Rover	Range Rover	82-94	RROV1	674	70	744	97	32	129	1	4WD
Land Rover	Range Rover	95-00	RROV2	31	8	39	15	2	17	0	
Saab	Others		SA00Z	480	84	564	98	21	119	0	
Saab	900 Series	82-93	SA1 A	632	94	726	101	28	129	1	Luxury
Saab	900/9-3	94-00	SA1 B	387	43	430	45	5	50	1	Luxury
Saab	9000	86-98	SA2 Z	494	65	559	67	9	76	1	Luxury
Saab	09-May	97-00	SA3 Z	31	9	40	5	1	6	0	
Saab	900/9000		SA99Z	127	18	145	17	3	20	0	
Seat	Ibiza	95-99	SE01Z	4	2	6	4	1	5	0	
Seat	Cordoba	95-99	SE02Z	3	3	6	3	1	4	0	
Seat	Others		SEATZ	81	12	93	9	3	12	0	
Subaru	1800/ Leone	82-95	SU1 Z	4318	1053	5371	846	304	1150	1	Medium
Subaru	Liberty	89-94	SU2 A	2388	412	2800	374	103	477	1	Medium
Subaru	Liberty	95-98	SU2 B	750	143	893	90	27	117	1	Medium
Subaru	Liberty	99-00	SU2 C	138	31	169	19	6	25	1	Medium
Subaru	Liberty Others		SU2 Z	1	2	3	2	0	2	0	
Subaru	Vortex	85-89	SU3 Z	45	12	57	8	3	11	0	
Subaru	Sherpa/Fiori	89-92	SU4 Z	476	240	716	176	50	226	1	Small
Subaru	SVX	92-97	SU5 Z	14	2	16	1	0	1	0	
Subaru	Brumby	82-93	SU6 Z	1117	360	1477	223	129	352	1	Commercial
Subaru	Impreza	93-00	SU7 A	810	160	970	112	51	163	1	Small
Subaru	Impreza	01-Jan	SU7 B	4	1	5	.	.	.	0	
Subaru	Forester	97-00	SU8 Z	125	18	143	27	6	33	1	Medium
Subaru	Others		SU99Z	2036	445	2481	563	153	716	0	

MAKE/MODEL			MODEL CODE	No. of uninjured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of involved drivers in NSW (87-2000) and QLD, WA (91-2000)	No. of injured (but not severely) drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of severely injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	No. of injured drivers in NSW, Victoria (87-2000) and QLD, WA (91-2000)	ANALYSIS INCLUSION CRITERIA INV=100 INJ=20	MARKET GROUP
Suzuki	Swift	82-85	SZ01A	162	53	215	39	13	52	1	Small
Holden/Suzuki	Barina/Swift	85-88	SZ01B	2877	931	3808	770	224	994	1	Small
Holden/Suzuki	Barina/Swift	89-93/89-99	SZ01C	8237	2137	10374	1794	435	2229	1	Small
Suzuki	Vitara	88-98	SZ02A	1067	267	1334	219	66	285	1	4WD
Suzuki	Grand Vitara	99-00	SZ02B	18	4	22	1	0	1	0	
Suzuki	Hatch	82-85	SZ03Z	670	318	988	238	73	311	1	Small
Holden/Suzuki	Scurry/Carry	85-87/82-00	SZ04Z	356	148	504	108	33	141	1	Commercial
Suzuki	Alto	85-98	SZ05Z	95	58	153	46	12	58	1	Small
Suzuki	Mighty Boy	85-88	SZ06Z	364	154	518	117	33	150	1	Commercial
Holden/Suzuki	Drover/Sierra	85-87/82-00	SZ07Z	2844	862	3706	665	183	848	1	4WD
Suzuki	Baleno	95-00	SZ08Z	376	100	476	71	13	84	1	Small
Suzuki	Carry	99-00	SZ09Z	8	1	9	1	0	1	0	
Suzuki	Jimny	98-00	SZ11Z	10	6	16	6	1	7	0	
Suzuki	Others		SZ99Z	1305	470	1775	450	142	592	0	
Toyota	Corolla	82-84	T01 A	8003	1810	9813	1751	399	2150	1	Small
Toyota	Corolla	85	T01 B	3041	720	3761	703	189	892	0	
Toyota	Corolla	86-88	T01 C	11228	2523	13751	2108	560	2668	1	Small
Toyota	Corolla	89	T01 D	2261	432	2693	382	111	493	0	
Toyota/Holden	Corolla/Nova	89-93	T01 E	12823	2876	15699	2435	699	3134	1	Small
Toyota/Holden	Corolla/Nova	94-98/94-96	T01 F	6541	1354	7895	1090	291	1381	1	Small
Toyota	Corolla	98-00	T01 G	271	55	326	45	9	54	1	Small
Toyota	Corona	82-87	T03 Z	14578	2820	17398	2485	626	3111	1	Medium
Toyota	Camry	83-86	T04 Z	3487	593	4080	517	132	649	1	Medium
Holden/Toyota	Apollo JK/JL/Camry	89-92/88-92	T05 A	18216	3299	21515	2823	811	3634	1	Medium
Holden/Toyota	Apollo JM / JP/Camry	93-97	T05 B	11502	2057	13559	1695	446	2141	1	Large
Toyota	Camry	98-00	T05 C	2105	366	2471	250	73	323	1	Large
Toyota	Celica	81-85	T06 A	2032	359	2391	313	68	381	1	Sports
Toyota	Celica	86-89	T06 B	1476	249	1725	211	55	266	1	Sports
Toyota	Celica	90-93	T06 C	1170	178	1348	159	36	195	1	Sports
Toyota	Celica	94-99	T06 D	419	85	504	75	18	93	1	Sports
Toyota	Celica	00-00	T06 E	15	5	20	1	1	2	0	
Toyota	Celica Others		T06 Z	5	2	7	.	.	.	0	
Toyota	Crown/Cressida	82-85	T07 A	1752	311	2063	288	79	367	1	Luxury
Toyota	Crown/Cressida	86-88	T07 B	786	99	885	69	25	94	1	Luxury
Toyota	Cressida	89-93	T07 C	1374	186	1560	156	46	202	1	Luxury
Toyota	Tercel	83-88	T09 Z	383	74	457	58	22	80	1	Small

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Toyota	Lexcen Others		T10 Z	1	0	1	.	.	.	0	
Toyota	Supra	82-90	T11 Z	322	61	383	46	16	62	1	Sports
Toyota	MR2	87-90	T12 A	129	36	165	20	12	32	1	Sports
Toyota	MR2	91-00	T12 B	88	16	104	15	6	21	1	Sports
Toyota	MR2 Others		T12 Z	5	1	6	1	0	1	0	
Toyota	Paseo	91-99	T13 Z	644	149	793	146	36	182	1	Sports
Toyota	Bundera		T14 Z	10	4	14	3	1	4	0	
Toyota	Hiace/Liteace	82-86	T15 A	3842	718	4560	527	168	695	1	Commercial
Toyota	Hiace/Liteace	87-89	T15 B	1880	313	2193	234	59	293	1	Commercial
Toyota	Hiace/Liteace	90-00	T15 C	3589	541	4130	369	113	482	1	Commercial
Toyota	Hiace/Liteace Others		T15 Z	1	0	1	.	.	.	0	
Toyota	4Runner/Hilux	82-85	T16 A	4002	790	4792	515	223	738	1	4WD
Toyota	4Runner/Hilux	86-88	T16 B	3116	564	3680	416	146	562	1	4WD
Toyota	Hilux	89-97	T16 C	8713	1588	10301	1196	450	1646	1	4WD
Toyota	Hilux	98-00	T16 D	525	118	643	79	30	109	1	4WD
Toyota	4Runner/Hilux Others		T16 Z	1	0	1	.	.	.	0	
Lexus	ES300	92-00	T17 Z	218	28	246	26	5	31	1	Luxury
Toyota	Tarago	83-89	T18 A	3735	905	4640	639	183	822	1	Passenger Van
Toyota	Tarago	90	T18 B	192	28	220	25	3	28	0	
Toyota	Tarago	91-99	T18 C	1343	190	1533	137	34	171	1	Passenger Van
Toyota	Tarago	00-00	T18 D	2	2	4	1	0	1	0	
Toyota	Tarago Others		T18 Z	117	31	148	23	8	31	0	
Toyota	Commercials		T19 Z	2665	409	3074	286	88	374	0	
Toyota	Landcruiser	82-89	T20 A	5373	867	6240	621	254	875	1	4WD
Toyota	Landcruiser	90-97	T20 B	4878	682	5560	558	235	793	1	4WD
Toyota	Landcruiser	98-00	T20 C	578	123	701	117	43	160	1	4WD
Toyota	Landcruiser Others		T20 Z	2	0	2	.	.	.	0	
Toyota	RAV4	94-00	T21 A	466	72	538	99	18	117	1	4WD
Toyota	RAV4	01-Jan	T21 B	1	0	1	.	.	.	0	
Toyota	Starlet	96-99	T22 Z	1263	320	1583	240	69	309	1	Small
Lexus	LS400	90-00	T25 Z	42	8	50	6	1	7	0	
Lexus	IS200	99-00	T26 Z	23	1	24	.	.	.	0	
Toyota	Echo	99-00	T27 Z	134	25	159	23	5	28	1	Small
Lexus	GS300	97-00	T28 Z	21	2	23	3	0	3	0	
Toyota	Avalon	00-00	T29 Z	18	1	19	3	2	5	0	
Toyota	Corolla 4WD Wagon	92-96	T32 Z	44	15	59	10	3	13	0	

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Toyota	Spacia	93-00	T33 Z	16	7	23	6	0	6	0	
Toyota	Others		T99 Z	7302	1509	8811	3180	1055	4235	0	
Volvo	850/S70/V70/C70	92-00	V877Z	544	79	623	63	13	76	1	Luxury
Volvo	200 Series	82-93	VO02Z	2392	293	2685	246	69	315	1	Luxury
Volvo	300 Series	84-88	VO03Z	148	16	164	14	4	18	0	
Volvo	700/900 Series	84-92	VO07Z	1334	184	1518	171	29	200	1	Luxury
Volvo	960/S90/V90	90-98	VO10Z	37	10	47	9	1	10	0	
Volvo	S80	98-00	VO11Z	4	0	4	.	.	.	0	
Volvo	S40/V40	97-00	VO40Z	128	17	145	12	5	17	0	
Volvo	Others		VO99Z	1343	222	1565	295	68	363	0	
Volkswagen			VOLKZ	9	2	11	1	1	2	0	
Volkswagon	Caravelle / Transporter	88-00	VS01Z	595	75	670	55	11	66	1	Commercial
Volkswagen	Golf	82-94	VS02A	107	15	122	13	2	15	0	
Volkswagen	Golf	95-98	VS02B	398	47	445	36	10	46	1	Small
Volkswagen	Golf / Bora	99-00	VS02C	79	5	84	4	3	7	0	
Volkswagen	Kombi		VS03Z	6	4	10	3	1	4	0	
Volkswagen	Passat	95-97	VS04A	16	6	22	5	0	5	0	
Volkswagen	Passat	98-00	VS04B	37	6	43	7	0	7	0	
Volkswagen	70E Pick Up		VS07Z	24	1	25	5	1	6	0	
Volkswagen	Polo	96-00	VS08A	81	25	106	13	6	19	0	
Volkswagen	New Beetle	00-00	VS10Z	1	0	1	.	.	.	0	
Volkswagen	Others		VS99Z	207	29	236	24	10	34	0	
			Total	**843633**	**163412**	**1007045**	**155244**	**44432**	**199676**	**254**	

APPENDIX 2

LOGISTIC REGRESSION ESTIMATES OF INJURY RISK BY MODEL AND MARKET GROUP

CRASHWORTHINESS INJURY RISK RATINGS

NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**16.24**			
4-Wheel Drive Vehicles			**14.67**	**14.38**	**14.97**	**0.60**
Daihatsu	Feroza	89-97	16.53	13.78	19.69	5.91
Daihatsu	Rocky	84-99	20.41	17.06	24.21	7.15
Holden	Jackaroo	82-91	18.04	15.11	21.38	6.27
Holden	Jackaroo	92-97	15.30	11.77	19.66	7.89
Mitsubishi	Pajero	82-90	16.40	14.55	18.43	3.88
Mitsubishi	Pajero	92-99	11.39	9.92	13.03	3.11
Jeep	Cherokee	82-00	9.60	7.26	12.59	5.33
Land Rover	Discovery	91-00	10.69	7.73	14.59	6.86
Nissan	Patrol	82-87	12.43	10.61	14.50	3.89
Nissan / Ford	Patrol / Maverick	88-97	11.23	10.34	12.20	1.86
Nissan	Patrol	98-00	11.39	8.59	14.95	6.36
Nissan	Pathfinder	88-94	14.81	10.61	20.29	9.69
Nissan	Pathfinder	95-00	13.17	9.16	18.56	9.40
Lada	Niva	83-98	17.75	13.58	22.86	9.28
Honda	CR-V	97-00	10.99	7.58	15.67	8.09
Land Rover	Range Rover	82-94	10.31	8.20	12.88	4.67
Suzuki	Vitara	88-98	20.08	17.92	22.42	4.50
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	23.57	22.14	25.06	2.92
Toyota	4Runner/Hilux	82-85	17.56	16.42	18.76	2.34
Toyota	4Runner/Hilux	86-88	16.31	15.07	17.64	2.57
Toyota	Hilux	89-97	15.22	14.49	15.98	1.49
Toyota	Hilux	98-00	16.65	13.95	19.76	5.81
Toyota	Landcruiser	82-89	14.25	13.35	15.19	1.84
Toyota	Landcruiser	90-97	11.52	10.69	12.40	1.71
Toyota	Landcruiser	98-00	13.37	11.19	15.92	4.73
Toyota	RAV4	94-00	12.46	9.94	15.50	5.55
Commercial Vehicles			**16.30**	**15.97**	**16.64**	**0.67**
Daihatsu	Handivan	82-90	31.63	28.06	35.44	7.37
Ford	Falcon Panel Van	82-95	14.87	13.59	16.24	2.65
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	14.77	13.95	15.63	1.68
Ford	Falcon Ute	96-99	13.74	11.60	16.19	4.59
Ford	Ford F-Series	82-92	14.31	11.77	17.29	5.52
Ford	Transit	94-00	14.37	10.69	19.04	8.35
Holden	Commodore Ute VG/VP	90-93	15.21	13.19	17.47	4.29
Holden	Rodeo	82-85	18.44	15.48	21.81	6.33
Holden	Rodeo	86-88	18.89	14.87	23.70	8.83
Holden	Rodeo	89-95	15.16	14.05	16.35	2.30
Holden	Rodeo	96-98	16.37	14.26	18.72	4.46

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Holden	Rodeo	99-00	17.87	14.24	22.18	7.93
Holden	Shuttle	82-87	21.97	18.30	26.15	7.85
Holden	WB Series	82-85	15.18	13.42	17.12	3.70
Holden	Commodore Ute VR/VS	94-00	13.94	12.71	15.26	2.55
Nissan	720 Ute	82-85	17.31	15.37	19.43	4.06
Nissan	Navara	86-91	15.43	14.08	16.89	2.80
Nissan	Navara	92-96	13.08	10.99	15.51	4.52
Honda	Acty	83-86	14.40	11.20	18.32	7.13
Subaru	Brumby	82-93	20.20	18.26	22.29	4.03
Holden / Suzuki	Scurry / Carry	85-87 / 82-00	31.74	27.55	36.25	8.70
Suzuki	Mighty Boy	85-88	32.89	28.70	37.37	8.67
Toyota	Hiace/Liteace	82-86	20.49	19.16	21.88	2.72
Toyota	Hiace/Liteace	87-89	19.20	17.36	21.18	3.83
Toyota	Hiace/Liteace	90-00	16.94	15.67	18.30	2.63
Volkswagon	Caravelle / Transporter	88-00	13.35	10.76	16.45	5.70
Large Cars			**14.53**	**14.38**	**14.69**	**0.32**
Ford	Falcon XE/XF	82-88	15.18	14.81	15.56	0.75
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	14.52	14.08	14.97	0.88
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	13.35	12.74	13.99	1.26
Ford	Falcon EF/EL	94-98	13.57	13.06	14.09	1.03
Ford	Falcon AU	98-00	13.52	12.22	14.93	2.71
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	15.06	14.64	15.49	0.84
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	13.78	13.30	14.26	0.96
Holden	Commodore VT/VX	97-00	14.29	13.41	15.21	1.81
Holden	Commodore VB-VL	82-88	16.23	15.83	16.63	0.80
Hyundai	Sonata	89-97	16.60	15.01	18.33	3.32
Mitsubishi	Magna TM/TN/TP	85-90	15.81	15.24	16.40	1.16
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	15.08	14.42	15.77	1.35
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	13.56	12.85	14.30	1.45
Nissan	Skyline	82-90	15.49	14.37	16.67	2.30
Holden / Toyota	Apollo JM / JP / Camry	93-97	14.85	14.23	15.50	1.28
Toyota	Camry	98-00	14.00	12.68	15.44	2.76
Luxury Cars			**13.36**	**13.04**	**13.68**	**0.64**
BMW	3 Series	82-91	14.60	13.15	16.19	3.04
BMW	3 Series	92-98	13.53	12.08	15.12	3.04
BMW	5 Series	82-88	10.83	8.53	13.66	5.13
BMW	5 Series	89-95	11.08	8.30	14.64	6.34

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Ford	Fairlane Z & LTD F	82-87	15.97	14.77	17.25	2.48
Ford	Fairlane N & LTD D	88-94	11.68	10.65	12.80	2.15
Ford	Fairlane N & LTD D	95-98	11.92	9.84	14.39	4.55
Holden	Statesman/Caprice WB	82-85	12.43	8.13	18.56	10.43
Holden	Stateman/Caprice VQ	90-93	12.82	10.55	15.49	4.94
Holden	Stateman/Caprice VR/VS	94-98	13.24	11.46	15.25	3.79
Jaguar	XJ6	82-86	13.04	9.12	18.30	9.18
Mazda	929	82-90	17.68	16.24	19.21	2.97
Mercedes Benz	C-Class W201	87-94	14.47	11.14	18.60	7.46
Mercedes Benz	C-Class W202	95-00	10.89	8.34	14.11	5.77
Mercedes Benz	E-Class W123	82-85	11.07	7.78	15.53	7.75
Mercedes Benz	E-Class W124	86-95	11.60	9.28	14.41	5.13
Mercedes Benz	S-Class W126	82-92	11.32	8.68	14.64	5.96
Nissan	Maxima	90-94	14.01	10.99	17.69	6.70
Nissan	Maxima	95-99	16.55	12.95	20.89	7.94
Honda	Legend	86-95	10.23	7.82	13.27	5.45
Honda	Accord	82-85	19.16	17.31	21.16	3.84
Honda	Accord	86-90	13.96	12.20	15.94	3.75
Honda	Accord	91-93	12.40	10.13	15.10	4.98
Honda	Accord	94-98	12.50	10.67	14.59	3.92
Saab	900 Series	82-93	14.18	11.69	17.09	5.40
Saab	9000	86-98	12.74	10.09	15.97	5.88
Toyota	Crown/Cressida	82-85	16.28	14.65	18.04	3.39
Toyota	Crown/Cressida	86-88	12.51	10.36	15.04	4.68
Toyota	Cressida	89-93	12.54	10.92	14.37	3.45
Volvo	850/S70/V70/C70	92-00	12.29	9.92	15.13	5.21
Volvo	200 Series	82-93	11.42	10.22	12.74	2.52
Volvo	700/900 Series	84-92	12.94	11.26	14.82	3.55
Medium Cars			**16.50**	**16.28**	**16.73**	**0.45**
Daewoo	Espero	95-97	17.05	13.35	21.53	8.18
Daewoo	Nubira	97-00	14.81	11.96	18.21	6.25
Ford	Mondeo	95-00	12.64	10.48	15.17	4.69
Holden	Camira	82-89	20.60	19.85	21.37	1.52
Holden	Vectra	97-00	15.47	12.62	18.82	6.20
Mitsubishi	Sigma/Scorpion	82-86	17.67	16.94	18.42	1.48
Mitsubishi	Nimbus	84-91	18.59	15.26	22.45	7.20
Mitsubishi	Nimbus	92-98	15.64	12.10	19.98	7.89
Mitsubishi	Galant	95-96	16.14	13.83	18.76	4.93
Ford / Mazda	Telstar / 626/MX6	83-86	16.98	16.10	17.89	1.78
Ford / Mazda	Telstar / 626/MX6	88-91	15.32	14.01	16.74	2.73
Ford / Mazda	Telstar / 626/MX6	92-97	12.84	11.61	14.19	2.58
Nissan	Pintara	86-88	16.22	15.06	17.46	2.39

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Nissan / Ford	Pintara / Corsair	89-92	16.77	15.84	17.74	1.90
Nissan	Bluebird	82-86	17.92	17.19	18.66	1.47
Nissan	Stanza	82-83	18.85	15.68	22.49	6.81
Nissan	Gazelle	84-88	17.27	13.60	21.69	8.09
Nissan	Prairie	84-86	19.19	15.27	23.83	8.56
Nissan	Bluebird	93-97	11.40	9.02	14.32	5.31
Peugeot	405	89-97	13.57	10.25	17.76	7.51
Peugeot	505	82-93	10.76	8.41	13.66	5.25
Subaru	1800/ Leone	82-95	18.27	17.22	19.37	2.14
Subaru	Liberty	89-94	14.79	13.48	16.20	2.72
Subaru	Liberty	95-98	14.27	12.16	16.68	4.52
Toyota	Corona	82-87	17.68	17.05	18.34	1.29
Toyota	Camry	83-86	16.19	15.01	17.45	2.44
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	15.77	15.23	16.33	1.09
Passenger Vans			**19.09**	**18.47**	**19.71**	**1.24**
Mitsubishi	Starwagon/L300	82-86	23.17	21.59	24.82	3.22
Mitsubishi	Starwagon	87-94	20.87	19.46	22.37	2.91
Mitsubishi	Starwagon	95-00	14.69	12.47	17.22	4.74
Toyota	Tarago	83-89	20.14	18.94	21.40	2.45
Toyota	Tarago	91-99	12.20	10.63	13.96	3.33
Small Cars			**18.85**	**18.65**	**19.05**	**0.40**
Alfa Romeo	33	83-92	17.63	14.37	21.43	7.05
Daihatsu	Charade	82-86	24.79	22.85	26.84	3.99
Daihatsu	Charade	88-92	20.85	19.74	22.00	2.26
Daihatsu	Charade	93-00	19.78	18.50	21.13	2.63
Daihatsu	Applause	89-99	18.14	16.48	19.92	3.44
Daihatsu	Mira	90-96	30.89	27.13	34.93	7.80
Daewoo	1.5i	94-95	20.75	16.47	25.79	9.32
Daewoo	Cielo	95-97	18.85	16.88	20.98	4.10
Daewoo	Lanos	97-00	16.03	13.77	18.59	4.81
Ford	Laser	91-94	17.23	16.41	18.08	1.67
Ford	Laser	95-98	16.77	15.01	18.69	3.68
Ford	Festiva WD/WD/WH/WF	94-00	21.07	19.75	22.44	2.69
Holden	Gemini	82-84	20.06	19.06	21.11	2.05
Holden	Gemini RB	86-87	24.00	21.13	27.13	6.00
Holden	Astra TR	96-98	15.02	12.06	18.56	6.51
Holden	Barina SB	95-00	19.51	18.02	21.08	3.06
Hyundai	Excel	82-89	21.56	20.01	23.19	3.19
Hyundai	Excel	90-94	20.07	19.14	21.04	1.90
Hyundai	Excel	95-00	20.34	19.53	21.16	1.63
Hyundai	S Coupe	90-96	21.19	18.41	24.26	5.85
Hyundai	Lantra	91-95	18.47	16.45	20.67	4.22

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Hyundai	Lantra	96-00	15.70	13.91	17.68	3.77
Mitsubishi	Colt	82-88	21.17	20.40	21.96	1.56
Mitsubishi	Lancer CA	88-90	17.89	16.78	19.06	2.28
Mitsubishi	Lancer CC	93-95	16.14	14.91	17.46	2.55
Mitsubishi	Lancer CE/Mirage	96-00	16.85	15.67	18.10	2.42
Mitsubishi	Cordia	82-89	19.91	17.92	22.06	4.14
Ford / Mazda	Laser / 323	82-88	20.61	20.13	21.11	0.98
Mazda	323	90-93	16.96	15.48	18.55	3.07
Mazda	323	95-98	16.63	14.96	18.44	3.47
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	21.17	20.12	22.26	2.14
Mazda	121	94-96	19.33	17.51	21.29	3.78
Mazda	121 Metro	97-00	18.23	15.39	21.46	6.07
Holden / Nissan	Astra / Pulsar/Vector	84-86	20.73	19.88	21.61	1.73
Holden / Nissan	Astra / Pulsar/Vector	88-90	18.33	17.52	19.16	1.64
Nissan	Pulsar	92-95	15.98	14.78	17.25	2.47
Nissan	Pulsar	96-99	16.76	15.29	18.33	3.04
Nissan	Micra	95-97	18.72	15.32	22.67	7.35
Honda	Civic	82-83	19.55	16.68	22.77	6.09
Honda	Civic	84-87	19.21	17.57	20.97	3.40
Honda	Civic	88-91	16.22	14.88	17.66	2.79
Honda	Civic	92-95	15.68	14.30	17.16	2.87
Honda	Civic	96-00	16.38	14.55	18.39	3.84
Honda	Concerto	88-93	14.80	11.46	18.90	7.44
Honda	City	83-86	27.99	23.38	33.12	9.74
Rover	Quintet	82-86	18.97	14.25	24.80	10.55
Subaru	Sherpa/Fiori	89-92	34.56	31.00	38.30	7.30
Subaru	Impreza	93-00	15.42	13.27	17.84	4.57
Holden / Suzuki	Barina / Swift	85-88	25.48	24.03	26.98	2.95
Holden / Suzuki	Barina / Swift	89-93 / 89-99	20.65	19.82	21.51	1.68
Suzuki	Hatch	82-85	33.17	30.15	36.34	6.18
Suzuki	Baleno	95-00	19.53	16.21	23.34	7.13
Toyota	Corolla	82-84	19.63	18.78	20.51	1.73
Toyota	Corolla	86-88	18.73	18.02	19.46	1.43
Toyota / Holden	Corolla / Nova	89-93	17.10	16.47	17.73	1.26
Toyota / Holden	Corolla / Nova	94-98 / 94-96	15.91	15.10	16.76	1.66
Toyota	Corolla	98-00	12.78	9.81	16.50	6.68
Toyota	Tercel	83-88	17.09	13.77	21.01	7.24
Toyota	Starlet	96-99	17.91	16.11	19.85	3.74
Volkswagen	Golf	95-98	10.95	8.30	14.31	6.02

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Sports Cars			**16.43**	**15.91**	**16.96**	**1.05**
Ford	Capri	89-94	20.87	18.41	23.57	5.17
Hyundai	Coupe	96-00	16.33	12.46	21.11	8.64
Mazda	RX7	82-85	16.48	13.32	20.22	6.90
Mazda	MX5	89-97	16.08	12.61	20.29	7.67
Nissan	300ZX	86-97	13.71	10.26	18.09	7.83
Nissan	Exa	83-86	25.33	21.29	29.85	8.56
Nissan	Exa	87-91	14.94	10.58	20.69	10.11
Nissan	NX/NX-R	91-96	22.56	18.62	27.06	8.43
Nissan	200SX	94-00	14.26	10.32	19.39	9.07
Honda	CRX	87-91	20.60	15.89	26.28	10.39
Honda	Prelude	83-91	16.21	14.69	17.85	3.16
Honda	Prelude	92-96	13.77	11.34	16.63	5.30
Honda	Integra	86-88	15.93	12.80	19.64	6.84
Honda	Integra	90-92	14.57	11.24	18.68	7.44
Renault	Feugo	82-87	15.40	11.53	20.28	8.75
Toyota	Celica	81-85	17.30	15.70	19.02	3.32
Toyota	Celica	86-89	16.88	15.03	18.90	3.87
Toyota	Celica	90-93	14.81	12.89	16.97	4.08
Toyota	Celica	94-99	17.68	14.47	21.43	6.96
Toyota	Supra	82-90	18.73	14.83	23.37	8.54
Toyota	Paseo	91-99	18.64	16.01	21.58	5.57

APPENDIX 3

LOGISTIC REGRESSION ESTIMATES OF INJURY SEVERITY BY MODEL AND MARKET GROUP

CRASHWORTHINESS INJURY SEVERITY RATINGS

Victoria and NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Pr(Severity) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**22.27**			
4-Wheel Drive Vehicles			**21.72**	**20.89**	**22.58**	**1.69**
Daihatsu	Feroza	89-97	23.10	16.17	31.88	15.71
Daihatsu	Rocky	84-99	28.95	21.53	37.70	16.17
Holden	Jackaroo	82-91	13.85	8.66	21.42	12.77
Holden	Jackaroo	92-97	21.93	13.64	33.31	19.66
Mitsubishi	Pajero	82-90	26.08	20.94	31.96	11.02
Mitsubishi	Pajero	92-99	19.86	15.18	25.56	10.37
Jeep	Cherokee	82-00	21.64	13.40	33.01	19.61
Land Rover	Discovery	91-00	15.99	8.47	28.12	19.64
Nissan	Patrol	82-87	24.49	18.01	32.38	14.36
Nissan / Ford	Patrol / Maverick	88-97	21.13	18.11	24.51	6.40
Nissan	Patrol	98-00	23.15	13.95	35.88	21.93
Nissan	Pathfinder	88-94	18.17	10.12	30.45	20.34
Nissan	Pathfinder	95-00	36.08	21.06	54.41	33.35
Lada	Niva	83-98	18.18	9.82	31.21	21.39
Honda	CR-V	97-00	24.98	14.04	40.43	26.39
Land Rover	Range Rover	82-94	19.86	14.03	27.34	13.30
Suzuki	Vitara	88-98	23.11	18.45	28.55	10.10
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	21.10	18.36	24.13	5.77
Toyota	4Runner/Hilux	82-85	24.82	21.86	28.04	6.18
Toyota	4Runner/Hilux	86-88	21.80	18.62	25.36	6.74
Toyota	Hilux	89-97	22.12	20.15	24.23	4.07
Toyota	Hilux	98-00	22.17	15.48	30.72	15.24
Toyota	Landcruiser	82-89	24.76	21.96	27.79	5.83
Toyota	Landcruiser	90-97	24.69	21.77	27.86	6.10
Toyota	Landcruiser	98-00	21.77	16.20	28.59	12.39
Toyota	RAV4	94-00	18.84	12.10	28.12	16.02
Commercial Vehicles			**22.96**	**22.02**	**23.92**	**1.89**
Daihatsu	Handivan	82-90	24.03	18.10	31.17	13.07
Ford	Falcon Panel Van	82-95	21.06	17.24	25.46	8.22
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	23.11	20.59	25.84	5.24
Ford	Falcon Ute	96-99	19.53	13.81	26.87	13.07
Ford	Ford F-Series	82-92	18.64	11.98	27.82	15.83
Ford	Transit	94-00	22.32	12.10	37.50	25.40
Holden	Commodore Ute VG/VP	90-93	24.03	18.33	30.83	12.50
Holden	Rodeo	82-85	23.30	15.61	33.28	17.67
Holden	Rodeo	86-88	14.71	7.36	27.25	19.89

Make	Model of Car	Years of Manufacture	Pr(Severity) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Holden	Rodeo	89-95	26.74	23.21	30.60	7.38
Holden	Rodeo	96-98	17.00	12.18	23.21	11.03
Holden	Rodeo	99-00	11.93	5.94	22.51	16.56
Holden	Shuttle	82-87	25.62	17.38	36.07	18.70
Holden	WB Series	82-85	32.69	26.73	39.27	12.54
Holden	Commodore Ute VR/VS	94-00	26.14	22.23	30.48	8.26
Nissan	720 Ute	82-85	21.51	16.71	27.25	10.54
Nissan	Navara	86-91	24.75	20.77	29.21	8.45
Nissan	Navara	92-96	18.81	12.97	26.47	13.51
Honda	Acty	83-86	23.26	14.35	35.42	21.07
Subaru	Brumby	82-93	30.34	25.77	35.34	9.56
Holden / Suzuki	Scurry / Carry	85-87 / 82-00	27.00	19.79	35.66	15.87
Suzuki	Mighty Boy	85-88	25.48	18.67	33.74	15.08
Toyota	Hiace/Liteace	82-86	25.31	22.01	28.92	6.91
Toyota	Hiace/Liteace	87-89	21.99	17.33	27.49	10.16
Toyota	Hiace/Liteace	90-00	24.17	20.36	28.43	8.08
Volkswagon	Caravelle / Transporter	88-00	15.27	8.47	25.97	17.50
Large Cars			**21.43**	**20.97**	**21.89**	**0.92**
Ford	Falcon XE/XF	82-88	23.60	22.52	24.71	2.19
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	21.00	19.75	22.31	2.56
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	22.22	20.29	24.27	3.98
Ford	Falcon EF/EL	94-98	20.66	19.14	22.27	3.13
Ford	Falcon AU	98-00	15.69	12.26	19.87	7.60
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	23.19	22.01	24.42	2.42
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	20.25	18.88	21.70	2.82
Holden	Commodore VT/VX	97-00	18.87	16.40	21.62	5.22
Holden	Commodore VB-VL	82-88	24.20	23.07	25.37	2.30
Hyundai	Sonata	89-97	19.92	15.73	24.90	9.17
Mitsubishi	Magna TM/TN/TP	85-90	23.04	21.52	24.62	3.10
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	21.11	18.97	23.41	4.44
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	20.31	18.39	22.38	3.99
Nissan	Skyline	82-90	23.92	20.86	27.27	6.41
Holden / Toyota	Apollo JM / JP / Camry	93-97	21.85	19.97	23.86	3.89
Toyota	Camry	98-00	25.99	21.08	31.59	10.51
Luxury Cars			**21.03**	**20.08**	**22.02**	**1.94**
BMW	3 Series	82-91	22.85	18.46	27.92	9.45
BMW	3 Series	92-98	18.98	14.52	24.42	9.90

Make	Model of Car	Years of Manufacture	Pr(Severity) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
BMW	5 Series	82-88	19.65	11.84	30.83	18.99
BMW	5 Series	89-95	22.26	12.62	36.22	23.60
Ford	Fairlane Z & LTD F	82-87	22.89	20.01	26.07	6.06
Ford	Fairlane N & LTD D	88-94	22.82	19.43	26.61	7.18
Ford	Fairlane N & LTD D	95-98	23.86	17.32	31.91	14.59
Holden	Statesman/Caprice WB	82-85	45.35	30.68	60.87	30.18
Holden	Stateman/Caprice VQ	90-93	27.03	19.84	35.68	15.85
Holden	Stateman/Caprice VR/VS	94-98	27.54	21.64	34.34	12.71
Jaguar	XJ6	82-86	41.01	23.87	60.65	36.79
Mazda	929	82-90	24.15	20.53	28.17	7.64
Mercedes Benz	C-Class W201	87-94	26.57	17.00	38.99	21.99
Mercedes Benz	C-Class W202	95-00	23.20	13.39	37.12	23.72
Mercedes Benz	E-Class W123	82-85	22.65	11.40	39.99	28.59
Mercedes Benz	E-Class W124	86-95	20.79	13.45	30.72	17.27
Mercedes Benz	S-Class W126	82-92	26.94	16.46	40.83	24.37
Nissan	Maxima	90-94	20.15	12.80	30.26	17.46
Nissan	Maxima	95-99	15.87	8.55	27.56	19.01
Honda	Legend	86-95	19.80	11.75	31.40	19.65
Honda	Accord	82-85	21.25	16.90	26.36	9.46
Honda	Accord	86-90	18.18	13.27	24.39	11.11
Honda	Accord	91-93	19.77	12.31	30.18	17.87
Honda	Accord	94-98	27.21	20.35	35.34	14.99
Saab	900 Series	82-93	21.43	15.02	29.62	14.60
Saab	9000	86-98	12.76	6.74	22.86	16.13
Toyota	Crown/Cressida	82-85	21.44	17.38	26.14	8.77
Toyota	Crown/Cressida	86-88	26.46	18.26	36.70	18.44
Toyota	Cressida	89-93	20.22	15.24	26.31	11.07
Volvo	850/S70/V70/C70	92-00	17.82	10.54	28.53	17.99
Volvo	200 Series	82-93	22.65	18.16	27.88	9.73
Volvo	700/900 Series	84-92	15.78	11.14	21.89	10.75
Medium Cars			**21.91**	**21.33**	**22.51**	**1.18**
Daewoo	Espero	95-97	32.91	21.10	47.36	26.26
Daewoo	Nubira	97-00	27.86	18.48	39.68	21.20
Ford	Mondeo	95-00	19.85	13.50	28.22	14.73
Holden	Camira	82-89	22.45	20.90	24.08	3.19
Holden	Vectra	97-00	17.56	10.38	28.17	17.79
Mitsubishi	Sigma/Scorpion	82-86	22.72	20.95	24.60	3.64
Mitsubishi	Nimbus	84-91	18.06	11.30	27.61	16.31
Mitsubishi	Nimbus	92-98	16.94	8.19	31.80	23.61
Mitsubishi	Galant	95-96	22.22	16.11	29.83	13.71
Ford / Mazda	Telstar / 626/MX6	83-86	21.60	19.43	23.95	4.52
Ford / Mazda	Telstar / 626/MX6	88-91	21.62	18.03	25.70	7.67

Make	Model of Car	Years of Manufacture	Pr(Severity) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Ford / Mazda	Telstar / 626/MX6	92-97	26.08	21.74	30.94	9.21
Nissan	Pintara	86-88	23.16	20.07	26.57	6.50
Nissan / Ford	Pintara / Corsair	89-92	25.23	22.61	28.04	5.43
Nissan	Bluebird	82-86	24.79	22.91	26.77	3.87
Nissan	Stanza	82-83	20.73	13.80	29.92	16.12
Nissan	Gazelle	84-88	28.05	23.55	33.04	9.48
Nissan	Prairie	84-86	22.20	13.58	34.13	20.55
Nissan	Bluebird	93-97	19.99	12.43	30.55	18.11
Peugeot	405	89-97	22.03	13.20	34.42	21.22
Peugeot	505	82-93	23.79	16.34	33.30	16.96
Subaru	1800/ Leone	82-95	23.77	21.32	26.39	5.07
Subaru	Liberty	89-94	19.98	16.56	23.89	7.33
Subaru	Liberty	95-98	21.72	15.05	30.29	15.24
Toyota	Corona	82-87	22.18	20.54	23.91	3.36
Toyota	Camry	83-86	23.12	19.74	26.88	7.13
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	23.32	21.77	24.95	3.18
Passenger Vans			**23.26**	**21.69**	**24.90**	**3.20**
Mitsubishi	Starwagon/L300	82-86	27.85	24.15	31.88	7.73
Mitsubishi	Starwagon	87-94	23.18	19.96	26.74	6.78
Mitsubishi	Starwagon	95-00	20.87	14.24	29.53	15.29
Toyota	Tarago	83-89	24.09	21.05	27.40	6.35
Toyota	Tarago	91-99	21.41	15.56	28.71	13.15
Small Cars			**22.73**	**22.24**	**23.23**	**0.98**
Alfa Romeo	33	83-92	23.87	15.61	34.72	19.11
Daihatsu	Charade	82-86	28.41	24.43	32.76	8.33
Daihatsu	Charade	88-92	27.06	24.25	30.07	5.82
Daihatsu	Charade	93-00	28.47	24.83	32.42	7.59
Daihatsu	Applause	89-99	21.25	17.11	26.07	8.95
Daihatsu	Mira	90-96	27.26	20.66	35.04	14.38
Daewoo	1.5i	94-95	21.56	10.83	38.36	27.53
Daewoo	Cielo	95-97	18.82	14.79	23.64	8.84
Daewoo	Lanos	97-00	25.32	18.82	33.16	14.34
Ford	Laser	91-94	22.76	20.60	25.07	4.47
Ford	Laser	95-98	24.95	20.05	30.58	10.54
Ford	Festiva WD/WD/WH/WF	94-00	25.58	22.68	28.72	6.03
Holden	Gemini	82-84	22.92	20.68	25.32	4.65
Holden	Gemini RB	86-87	21.41	15.87	28.22	12.35
Holden	Astra TR	96-98	14.92	8.15	25.74	17.59
Holden	Barina SB	95-00	23.30	19.68	27.35	7.67
Hyundai	Excel	82-89	26.29	22.90	29.99	7.08
Hyundai	Excel	90-94	23.62	21.38	26.03	4.65
Hyundai	Excel	95-00	22.08	20.18	24.10	3.92
Hyundai	S Coupe	90-96	23.66	17.62	31.00	13.38
Hyundai	Lantra	91-95	21.88	17.09	27.55	10.46

Make	Model of Car	Years of Manufacture	Pr(Severity) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Hyundai	Lantra	96-00	20.39	15.10	26.93	11.83
Mitsubishi	Colt	82-88	23.89	22.12	25.74	3.62
Mitsubishi	Lancer CA	88-90	22.32	19.34	25.60	6.26
Mitsubishi	Lancer CC	93-95	22.19	18.97	25.78	6.81
Mitsubishi	Lancer CE/Mirage	96-00	22.91	19.56	26.65	7.09
Mitsubishi	Cordia	82-89	23.64	19.05	28.93	9.88
Ford / Mazda	Laser / 323	82-88	23.41	22.28	24.57	2.28
Mazda	323	90-93	19.60	15.97	23.82	7.85
Mazda	323	95-98	25.87	20.95	31.48	10.53
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	26.54	23.91	29.35	5.45
Mazda	121	94-96	19.70	15.61	24.55	8.94
Mazda	121 Metro	97-00	24.20	17.11	33.06	15.95
Holden / Nissan	Astra / Pulsar/Vector	84-86	24.72	22.81	26.74	3.93
Holden / Nissan	Astra / Pulsar/Vector	88-90	24.01	21.92	26.22	4.30
Nissan	Pulsar	92-95	22.04	18.83	25.62	6.79
Nissan	Pulsar	96-99	27.94	23.38	33.01	9.63
Nissan	Micra	95-97	30.34	21.38	41.10	19.71
Honda	Civic	82-83	23.97	17.12	32.48	15.36
Honda	Civic	84-87	29.83	25.40	34.67	9.26
Honda	Civic	88-91	28.90	24.90	33.27	8.37
Honda	Civic	92-95	22.33	18.35	26.89	8.54
Honda	Civic	96-00	21.58	16.10	28.30	12.21
Honda	Concerto	88-93	22.03	13.18	34.44	21.26
Honda	City	83-86	25.12	17.02	35.42	18.40
Rover	Quintet	82-86	24.09	15.11	36.13	21.02
Subaru	Sherpa/Fiori	89-92	25.69	19.98	32.37	12.40
Subaru	Impreza	93-00	28.04	21.68	35.42	13.74
Holden / Suzuki	Barina / Swift	85-88	27.34	24.30	30.60	6.30
Holden / Suzuki	Barina / Swift	89-93 / 89-99	23.66	21.66	25.79	4.13
Suzuki	Hatch	82-85	25.33	20.53	30.81	10.27
Suzuki	Baleno	95-00	18.33	10.88	29.22	18.34
Toyota	Corolla	82-84	22.07	20.11	24.17	4.07
Toyota	Corolla	86-88	23.77	21.96	25.69	3.74
Toyota / Holden	Corolla / Nova	89-93	23.35	21.70	25.08	3.38
Toyota / Holden	Corolla / Nova	94-98 / 94-96	22.78	20.43	25.31	4.88
Toyota	Corolla	98-00	15.85	8.33	28.09	19.76
Toyota	Tercel	83-88	29.10	19.77	40.61	20.84
Toyota	Starlet	96-99	25.73	20.74	31.43	10.69
Volkswagen	Golf	95-98	22.10	12.08	36.92	24.84

Make	Model of Car	Years of Manufacture	Pr(Severity) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Sports Cars			**22.66**	**21.26**	**24.13**	**2.88**
Ford	Capri	89-94	22.31	17.08	28.60	11.53
Hyundai	Coupe	96-00	36.11	23.20	51.40	28.20
Mazda	RX7	82-85	24.73	17.10	34.35	17.25
Mazda	MX5	89-97	18.70	10.29	31.54	21.25
Nissan	300ZX	86-97	26.04	16.17	39.12	22.95
Nissan	Exa	83-86	22.94	15.08	33.29	18.22
Nissan	Exa	87-91	27.74	14.34	46.80	32.46
Nissan	NX/NX-R	91-96	33.81	24.65	44.37	19.72
Nissan	200SX	94-00	27.89	13.52	48.91	35.40
Honda	CRX	87-91	31.34	20.06	45.36	25.29
Honda	Prelude	83-91	23.46	19.21	28.32	9.11
Honda	Prelude	92-96	33.14	24.64	42.90	18.26
Honda	Integra	86-88	23.90	15.10	35.67	20.57
Honda	Integra	90-92	19.73	11.70	31.31	19.60
Renault	Feugo	82-87	17.17	9.04	30.18	21.14
Toyota	Celica	81-85	20.12	16.09	24.86	8.77
Toyota	Celica	86-89	23.48	18.39	29.48	11.09
Toyota	Celica	90-93	21.09	15.49	28.03	12.54
Toyota	Celica	94-99	23.07	15.01	33.73	18.72
Toyota	Supra	82-90	28.60	18.15	41.98	23.82
Toyota	Paseo	91-99	22.05	16.25	29.20	12.95

CRASHWORTHINESS RATINGS OF 1982-2000 MODELS OF CARS INVOLVED IN CRASHES DURING 1987-2000 with (1) 95 % CONFIDENCE LIMITS (2) 90 % CONFIDENCE LIMITS

CRASHWORTHINESS RATINGS
(WITH 95% CONFIDENCE LIMITS)
Victoria and NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**3.93**			
4-Wheel Drive Vehicles			**3.19**	**3.05**	**3.33**	**0.28**
Daihatsu	Feroza	89-97	3.82	2.60	5.61	3.01
Daihatsu	Rocky	84-99	5.91	4.24	8.23	3.98
Holden	Jackaroo	82-91	2.50	1.53	4.07	2.53
Holden	Jackaroo	92-97	3.36	2.00	5.63	3.63
Mitsubishi	Pajero	82-90	4.28	3.36	5.45	2.09
Mitsubishi	Pajero	92-99	2.26	1.69	3.04	1.35
Jeep	Cherokee	82-00	2.08	1.22	3.53	2.31
Land Rover	Discovery	91-00	1.71	0.86	3.39	2.52
Nissan	Patrol	82-87	3.04	2.18	4.25	2.06
Nissan / Ford	Patrol / Maverick	88-97	2.37	2.00	2.82	0.82
Nissan	Patrol	98-00	2.64	1.52	4.57	3.06
Nissan	Pathfinder	88-94	2.69	1.41	5.12	3.71
Nissan	Pathfinder	95-00	4.75	2.62	8.62	6.00
Lada	Niva	83-98	3.23	1.70	6.12	4.42
Honda	CR-V	97-00	2.74	1.44	5.24	3.80
Land Rover	Range Rover	82-94	2.05	1.37	3.06	1.70
Suzuki	Vitara	88-98	4.64	3.63	5.93	2.30
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	4.97	4.28	5.78	1.50
Toyota	4Runner/Hilux	82-85	4.36	3.78	5.02	1.24
Toyota	4Runner/Hilux	86-88	3.56	2.99	4.23	1.24
Toyota	Hilux	89-97	3.37	3.03	3.74	0.70
Toyota	Hilux	98-00	3.69	2.51	5.43	2.92
Toyota	Landcruiser	82-89	3.53	3.08	4.04	0.95
Toyota	Landcruiser	90-97	2.84	2.46	3.28	0.82
Toyota	Landcruiser	98-00	2.91	2.08	4.07	1.99
Toyota	RAV4	94-00	2.35	1.45	3.79	2.33
Commercial Vehicles			**3.74**	**3.57**	**3.92**	**0.34**
Daihatsu	Handivan	82-90	7.60	5.65	10.23	4.57
Ford	Falcon Panel Van	82-95	3.13	2.53	3.88	1.35
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	3.41	3.01	3.88	0.87
Ford	Falcon Ute	96-99	2.68	1.85	3.90	2.05
Ford	Ford F-Series	82-92	2.67	1.68	4.25	2.57

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Ford	Transit	94-00	3.21	1.69	6.09	4.40
Holden	Commodore Ute VG/VP	90-93	3.65	2.72	4.91	2.20
Holden	Rodeo	82-85	4.30	2.83	6.52	3.69
Holden	Rodeo	86-88	2.78	1.38	5.60	4.23
Holden	Rodeo	89-95	4.06	3.46	4.75	1.28
Holden	Rodeo	96-98	2.78	1.96	3.95	1.99
Holden	Rodeo	99-00	2.13	1.05	4.32	3.27
Holden	Shuttle	82-87	5.63	3.74	8.47	4.73
Holden	WB Series	82-85	4.96	3.95	6.23	2.28
Holden	Commodore Ute VR/VS	94-00	3.64	3.04	4.37	1.34
Nissan	720 Ute	82-85	3.72	2.84	4.89	2.05
Nissan	Navara	86-91	3.82	3.15	4.63	1.49
Nissan	Navara	92-96	2.46	1.65	3.66	2.01
Honda	Acty	83-86	3.35	2.00	5.62	3.62
Subaru	Brumby	82-93	6.13	5.08	7.39	2.30
Holden / Suzuki	Scurry / Carry	85-87 / 82-00	8.57	6.19	11.87	5.68
Suzuki	Mighty Boy	85-88	8.38	6.06	11.60	5.54
Toyota	Hiace/Liteace	82-86	5.19	4.46	6.04	1.58
Toyota	Hiace/Liteace	87-89	4.22	3.28	5.43	2.15
Toyota	Hiace/Liteace	90-00	4.09	3.41	4.92	1.52
Volkswagon	Caravelle / Transporter	88-00	2.04	1.11	3.73	2.61
Large Cars			**3.11**	**3.04**	**3.19**	**0.15**
Ford	Falcon XE/XF	82-88	3.58	3.40	3.78	0.38
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	3.05	2.85	3.26	0.41
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	2.97	2.68	3.28	0.60
Ford	Falcon EF/EL	94-98	2.80	2.58	3.05	0.48
Ford	Falcon AU	98-00	2.12	1.63	2.75	1.12
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	3.49	3.29	3.71	0.41
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	2.79	2.58	3.02	0.44
Holden	Commodore VT/VX	97-00	2.70	2.32	3.14	0.82
Holden	Commodore VB-VL	82-88	3.93	3.72	4.14	0.42
Hyundai	Sonata	89-97	3.31	2.57	4.25	1.68
Mitsubishi	Magna TM/TN/TP	85-90	3.64	3.37	3.93	0.56
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	3.18	2.84	3.57	0.73
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	2.75	2.46	3.08	0.62
Nissan	Skyline	82-90	3.70	3.18	4.32	1.14
Holden / Toyota	Apollo JM / JP / Camry	93-97	3.25	2.94	3.58	0.64
Toyota	Camry	98-00	3.64	2.91	4.56	1.65

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Luxury Cars			**2.81**	**2.67**	**2.96**	**0.29**
BMW	3 Series	82-91	3.34	2.65	4.21	1.56
BMW	3 Series	92-98	2.57	1.93	3.41	1.48
BMW	5 Series	82-88	2.13	1.25	3.64	2.40
BMW	5 Series	89-95	2.47	1.35	4.51	3.16
Ford	Fairlane Z & LTD F	82-87	3.66	3.14	4.26	1.13
Ford	Fairlane N & LTD D	88-94	2.67	2.22	3.20	0.98
Ford	Fairlane N & LTD D	95-98	2.84	1.98	4.08	2.10
Holden	Statesman/Caprice WB	82-85	5.64	3.29	9.66	6.36
Holden	Stateman/Caprice VQ	90-93	3.47	2.44	4.93	2.49
Holden	Stateman/Caprice VR/VS	94-98	3.65	2.78	4.79	2.01
Jaguar	XJ6	82-86	5.35	2.98	9.60	6.62
Mazda	929	82-90	4.27	3.57	5.11	1.54
Mercedes Benz	C-Class W201	87-94	3.84	2.35	6.28	3.92
Mercedes Benz	C-Class W202	95-00	2.53	1.42	4.50	3.09
Mercedes Benz	E-Class W123	82-85	2.51	1.22	5.17	3.96
Mercedes Benz	E-Class W124	86-95	2.41	1.51	3.86	2.35
Mercedes Benz	S-Class W126	82-92	3.05	1.80	5.17	3.37
Nissan	Maxima	90-94	2.82	1.72	4.63	2.90
Nissan	Maxima	95-99	2.62	1.39	4.96	3.58
Honda	Legend	86-95	2.02	1.15	3.55	2.40
Honda	Accord	82-85	4.07	3.19	5.20	2.01
Honda	Accord	86-90	2.54	1.82	3.54	1.72
Honda	Accord	91-93	2.45	1.50	4.02	2.52
Honda	Accord	94-98	3.40	2.47	4.67	2.20
Saab	900 Series	82-93	3.04	2.06	4.49	2.43
Saab	9000	86-98	1.63	0.84	3.14	2.30
Toyota	Crown/Cressida	82-85	3.49	2.77	4.39	1.62
Toyota	Crown/Cressida	86-88	3.31	2.23	4.93	2.70
Toyota	Cressida	89-93	2.54	1.87	3.45	1.58
Volvo	850/S70/V70/C70	92-00	2.19	1.27	3.77	2.50
Volvo	200 Series	82-93	2.59	2.03	3.29	1.26
Volvo	700/900 Series	84-92	2.04	1.42	2.94	1.53
Medium Cars			**3.62**	**3.51**	**3.73**	**0.22**
Daewoo	Espero	95-97	5.61	3.50	9.00	5.50
Daewoo	Nubira	97-00	4.13	2.66	6.40	3.73
Ford	Mondeo	95-00	2.51	1.66	3.80	2.14
Holden	Camira	82-89	4.62	4.27	5.01	0.74
Holden	Vectra	97-00	2.72	1.58	4.67	3.09

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Mitsubishi	Sigma/Scorpion	82-86	4.01	3.67	4.39	0.73
Mitsubishi	Nimbus	84-91	3.36	2.06	5.48	3.42
Mitsubishi	Nimbus	92-98	2.65	1.28	5.51	4.23
Mitsubishi	Galant	95-96	3.59	2.54	5.06	2.52
Ford / Mazda	Telstar / 626/MX6	83-86	3.67	3.26	4.12	0.86
Ford / Mazda	Telstar / 626/MX6	88-91	3.31	2.72	4.04	1.32
Ford / Mazda	Telstar / 626/MX6	92-97	3.35	2.73	4.10	1.37
Nissan	Pintara	86-88	3.76	3.21	4.40	1.20
Nissan / Ford	Pintara / Corsair	89-92	4.23	3.75	4.78	1.03
Nissan	Bluebird	82-86	4.44	4.07	4.85	0.78
Nissan	Stanza	82-83	3.91	2.55	6.00	3.45
Nissan	Gazelle	84-88	4.85	3.63	6.47	2.84
Nissan	Prairie	84-86	4.26	2.55	7.13	4.58
Nissan	Bluebird	93-97	2.28	1.37	3.79	2.42
Peugeot	405	89-97	2.99	1.71	5.21	3.50
Peugeot	505	82-93	2.56	1.66	3.94	2.28
Subaru	1800/ Leone	82-95	4.34	3.84	4.90	1.06
Subaru	Liberty	89-94	2.95	2.41	3.63	1.22
Subaru	Liberty	95-98	3.10	2.11	4.56	2.45
Toyota	Corona	82-87	3.92	3.61	4.27	0.66
Toyota	Camry	83-86	3.74	3.15	4.45	1.29
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	3.68	3.41	3.97	0.56
Passenger Vans			**4.44**	**4.11**	**4.79**	**0.68**
Mitsubishi	Starwagon/L300	82-86	6.45	5.52	7.54	2.01
Mitsubishi	Starwagon	87-94	4.84	4.12	5.69	1.57
Mitsubishi	Starwagon	95-00	3.07	2.05	4.57	2.52
Toyota	Tarago	83-89	4.85	4.20	5.61	1.41
Toyota	Tarago	91-99	2.61	1.87	3.66	1.79
Small Cars			**4.28**	**4.18**	**4.39**	**0.21**
Alfa Romeo	33	83-92	4.21	2.69	6.59	3.91
Daihatsu	Charade	82-86	7.04	5.96	8.33	2.37
Daihatsu	Charade	88-92	5.64	5.00	6.36	1.36
Daihatsu	Charade	93-00	5.63	4.85	6.54	1.69
Daihatsu	Applause	89-99	3.85	3.06	4.86	1.80
Daihatsu	Mira	90-96	8.42	6.28	11.29	5.02
Daewoo	1.5i	94-95	4.47	2.27	8.82	6.55
Daewoo	Cielo	95-97	3.55	2.74	4.59	1.86
Daewoo	Lanos	97-00	4.06	2.94	5.60	2.65
Ford	Laser	91-94	3.92	3.51	4.38	0.86
Ford	Laser	95-98	4.18	3.30	5.31	2.01
Ford	Festiva WD/WD/WH/WF	94-00	5.39	4.71	6.16	1.45
Holden	Gemini	82-84	4.60	4.10	5.15	1.05
Holden	Gemini RB	86-87	5.14	3.75	7.04	3.28

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Holden	Astra TR	96-98	2.24	1.21	4.16	2.95
Holden	Barina SB	95-00	4.55	3.79	5.45	1.67
Hyundai	Excel	82-89	5.67	4.86	6.61	1.75
Hyundai	Excel	90-94	4.74	4.25	5.29	1.04
Hyundai	Excel	95-00	4.49	4.07	4.95	0.88
Hyundai	S Coupe	90-96	5.01	3.66	6.87	3.21
Hyundai	Lantra	91-95	4.04	3.10	5.27	2.17
Hyundai	Lantra	96-00	3.20	2.34	4.38	2.04
Mitsubishi	Colt	82-88	5.06	4.65	5.50	0.85
Mitsubishi	Lancer CA	88-90	3.99	3.42	4.66	1.23
Mitsubishi	Lancer CC	93-95	3.58	3.01	4.26	1.24
Mitsubishi	Lancer CE/Mirage	96-00	3.86	3.26	4.58	1.32
Mitsubishi	Cordia	82-89	4.71	3.72	5.94	2.22
Ford / Mazda	Laser / 323	82-88	4.82	4.57	5.09	0.52
Mazda	323	90-93	3.32	2.67	4.14	1.47
Mazda	323	95-98	4.30	3.42	5.41	1.99
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	5.62	5.01	6.30	1.29
Mazda	121	94-96	3.81	2.97	4.87	1.90
Mazda	121 Metro	97-00	4.41	3.05	6.39	3.34
Holden / Nissan	Astra / Pulsar/Vector	84-86	5.12	4.68	5.61	0.92
Holden / Nissan	Astra / Pulsar/Vector	88-90	4.40	3.98	4.86	0.88
Nissan	Pulsar	92-95	3.52	2.96	4.18	1.22
Nissan	Pulsar	96-99	4.68	3.85	5.69	1.84
Nissan	Micra	95-97	5.68	3.88	8.33	4.45
Honda	Civic	82-83	4.69	3.28	6.70	3.42
Honda	Civic	84-87	5.73	4.79	6.85	2.06
Honda	Civic	88-91	4.69	3.96	5.55	1.59
Honda	Civic	92-95	3.50	2.83	4.33	1.50
Honda	Civic	96-00	3.53	2.60	4.80	2.20
Honda	Concerto	88-93	3.26	1.89	5.62	3.73
Honda	City	83-86	7.03	4.68	10.57	5.89
Rover	Quintet	82-86	4.57	2.72	7.68	4.96
Subaru	Sherpa/Fiori	89-92	8.88	6.82	11.56	4.74
Subaru	Impreza	93-00	4.32	3.24	5.76	2.52
Holden / Suzuki	Barina / Swift	85-88	6.97	6.12	7.92	1.80
Holden / Suzuki	Barina / Swift	89-93 / 89-99	4.89	4.44	5.38	0.94
Suzuki	Hatch	82-85	8.40	6.72	10.51	3.79
Suzuki	Baleno	95-00	3.58	2.11	6.08	3.97
Toyota	Corolla	82-84	4.33	3.91	4.80	0.89
Toyota	Corolla	86-88	4.45	4.08	4.86	0.78
Toyota / Holden	Corolla / Nova	89-93	3.99	3.68	4.33	0.65
Toyota /	Corolla / Nova	94-98 / 94-	3.62	3.22	4.08	0.87

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Holden		96				
Toyota	Corolla	98-00	2.03	1.04	3.95	2.91
Toyota	Tercel	83-88	4.97	3.27	7.56	4.29
Toyota	Starlet	96-99	4.61	3.65	5.81	2.17
Volkswagen	Golf	95-98	2.42	1.29	4.53	3.24
Sports Cars			**3.72**	**3.47**	**4.00**	**0.53**
Ford	Capri	89-94	4.66	3.50	6.20	2.71
Hyundai	Coupe	96-00	5.90	3.65	9.53	5.87
Mazda	RX7	82-85	4.08	2.71	6.13	3.42
Mazda	MX5	89-97	3.01	1.63	5.55	3.92
Nissan	300ZX	86-97	3.57	2.11	6.05	3.95
Nissan	Exa	83-86	5.81	3.77	8.96	5.19
Nissan	Exa	87-91	4.14	2.08	8.24	6.16
Nissan	NX/NX-R	91-96	7.63	5.38	10.82	5.44
Nissan	200SX	94-00	3.98	1.93	8.22	6.30
Honda	CRX	87-91	6.46	3.99	10.45	6.47
Honda	Prelude	83-91	3.80	3.06	4.72	1.67
Honda	Prelude	92-96	4.56	3.25	6.40	3.14
Honda	Integra	86-88	3.81	2.35	6.17	3.82
Honda	Integra	90-92	2.87	1.65	5.02	3.37
Renault	Feugo	82-87	2.64	1.35	5.17	3.82
Toyota	Celica	81-85	3.48	2.74	4.42	1.67
Toyota	Celica	86-89	3.96	3.05	5.15	2.11
Toyota	Celica	90-93	3.12	2.25	4.33	2.08
Toyota	Celica	94-99	4.08	2.60	6.41	3.81
Toyota	Supra	82-90	5.36	3.32	8.65	5.34
Toyota	Paseo	91-99	4.11	2.96	5.71	2.76

CRASHWORTHINESS RATINGS
(WITH 90% CONFIDENCE LIMITS)
Victoria and NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**3.93**			
4-Wheel Drive Vehicles			**3.19**	**3.07**	**3.31**	**0.23**
Daihatsu	Feroza	89-97	3.82	2.77	5.27	2.50
Daihatsu	Rocky	84-99	5.91	4.48	7.79	3.32
Holden	Jackaroo	82-91	2.50	1.66	3.76	2.09
Holden	Jackaroo	92-97	3.36	2.18	5.17	3.00
Mitsubishi	Pajero	82-90	4.28	3.49	5.24	1.75
Mitsubishi	Pajero	92-99	2.26	1.77	2.89	1.13
Jeep	Cherokee	82-00	2.08	1.33	3.24	1.91
Land Rover	Discovery	91-00	1.71	0.96	3.03	2.06
Nissan	Patrol	82-87	3.04	2.30	4.02	1.72
Nissan / Ford	Patrol / Maverick	88-97	2.37	2.05	2.74	0.69
Nissan	Patrol	98-00	2.64	1.66	4.18	2.52
Nissan	Pathfinder	88-94	2.69	1.57	4.61	3.04
Nissan	Pathfinder	95-00	4.75	2.89	7.82	4.93
Lada	Niva	83-98	3.23	1.89	5.51	3.62
Honda	CR-V	97-00	2.74	1.60	4.71	3.12
Land Rover	Range Rover	82-94	2.05	1.46	2.87	1.41
Suzuki	Vitara	88-98	4.64	3.78	5.70	1.92
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	4.97	4.39	5.64	1.25
Toyota	4Runner/Hilux	82-85	4.36	3.87	4.91	1.03
Toyota	4Runner/Hilux	86-88	3.56	3.08	4.11	1.04
Toyota	Hilux	89-97	3.37	3.09	3.67	0.59
Toyota	Hilux	98-00	3.69	2.67	5.10	2.43
Toyota	Landcruiser	82-89	3.53	3.15	3.95	0.80
Toyota	Landcruiser	90-97	2.84	2.52	3.21	0.69
Toyota	Landcruiser	98-00	2.91	2.20	3.85	1.65
Toyota	RAV4	94-00	2.35	1.57	3.50	1.93
Commercial Vehicles			**3.74**	**3.60**	**3.89**	**0.29**
Daihatsu	Handivan	82-90	7.60	5.93	9.74	3.81
Ford	Falcon Panel Van	82-95	3.13	2.62	3.75	1.13
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	3.41	3.07	3.80	0.73
Ford	Falcon Ute	96-99	2.68	1.96	3.67	1.70
Ford	Ford F-Series	82-92	2.67	1.81	3.93	2.13
Ford	Transit	94-00	3.21	1.88	5.48	3.61
Holden	Commodore Ute VG/VP	90-93	3.65	2.85	4.68	1.83
Holden	Rodeo	82-85	4.30	3.03	6.09	3.06
Holden	Rodeo	86-88	2.78	1.55	5.00	3.45

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Holden	Rodeo	89-95	4.06	3.55	4.63	1.07
Holden	Rodeo	96-98	2.78	2.08	3.73	1.66
Holden	Rodeo	99-00	2.13	1.18	3.85	2.67
Holden	Shuttle	82-87	5.63	4.00	7.92	3.92
Holden	WB Series	82-85	4.96	4.10	6.00	1.90
Holden	Commodore Ute VR/VS	94-00	3.64	3.13	4.25	1.12
Nissan	720 Ute	82-85	3.72	2.97	4.67	1.71
Nissan	Navara	86-91	3.82	3.25	4.49	1.24
Nissan	Navara	92-96	2.46	1.76	3.43	1.67
Honda	Acty	83-86	3.35	2.17	5.16	2.99
Subaru	Brumby	82-93	6.13	5.24	7.16	1.92
Holden / Suzuki	Scurry / Carry	85-87 / 82-00	8.57	6.53	11.25	4.73
Suzuki	Mighty Boy	85-88	8.38	6.38	11.00	4.61
Toyota	Hiace/Liteace	82-86	5.19	4.57	5.89	1.32
Toyota	Hiace/Liteace	87-89	4.22	3.42	5.21	1.79
Toyota	Hiace/Liteace	90-00	4.09	3.51	4.78	1.27
Volkswagon	Caravelle / Transporter	88-00	2.04	1.23	3.38	2.15
Large Cars			**3.11**	**3.05**	**3.18**	**0.13**
Ford	Falcon XE/XF	82-88	3.58	3.43	3.74	0.32
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	3.05	2.88	3.23	0.35
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	2.97	2.73	3.23	0.50
Ford	Falcon EF/EL	94-98	2.80	2.61	3.01	0.40
Ford	Falcon AU	98-00	2.12	1.70	2.64	0.94
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	3.49	3.32	3.67	0.35
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	2.79	2.61	2.98	0.36
Holden	Commodore VT/VX	97-00	2.70	2.37	3.06	0.69
Holden	Commodore VB-VL	82-88	3.93	3.75	4.11	0.35
Hyundai	Sonata	89-97	3.31	2.68	4.08	1.40
Mitsubishi	Magna TM/TN/TP	85-90	3.64	3.42	3.88	0.47
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	3.18	2.89	3.50	0.61
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	2.75	2.51	3.02	0.52
Nissan	Skyline	82-90	3.70	3.26	4.21	0.95
Holden / Toyota	Apollo JM / JP / Camry	93-97	3.25	2.99	3.53	0.54
Toyota	Camry	98-00	3.64	3.01	4.40	1.38
Luxury Cars			**2.81**	**2.69**	**2.93**	**0.24**
BMW	3 Series	82-91	3.34	2.75	4.05	1.30
BMW	3 Series	92-98	2.57	2.03	3.26	1.23

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
BMW	5 Series	82-88	2.13	1.36	3.34	1.98
BMW	5 Series	89-95	2.47	1.49	4.09	2.60
Ford	Fairlane Z & LTD F	82-87	3.66	3.22	4.16	0.94
Ford	Fairlane N & LTD D	88-94	2.67	2.29	3.11	0.82
Ford	Fairlane N & LTD D	95-98	2.84	2.10	3.85	1.74
Holden	Statesman/Caprice WB	82-85	5.64	3.59	8.84	5.25
Holden	Stateman/Caprice VQ	90-93	3.47	2.58	4.65	2.07
Holden	Stateman/Caprice VR/VS	94-98	3.65	2.90	4.58	1.67
Jaguar	XJ6	82-86	5.35	3.28	8.73	5.45
Mazda	929	82-90	4.27	3.67	4.96	1.28
Mercedes Benz	C-Class W201	87-94	3.84	2.55	5.80	3.24
Mercedes Benz	C-Class W202	95-00	2.53	1.56	4.10	2.54
Mercedes Benz	E-Class W123	82-85	2.51	1.37	4.60	3.23
Mercedes Benz	E-Class W124	86-95	2.41	1.63	3.58	1.95
Mercedes Benz	S-Class W126	82-92	3.05	1.96	4.74	2.78
Nissan	Maxima	90-94	2.82	1.87	4.27	2.40
Nissan	Maxima	95-99	2.62	1.54	4.47	2.93
Honda	Legend	86-95	2.02	1.27	3.24	1.97
Honda	Accord	82-85	4.07	3.32	5.00	1.68
Honda	Accord	86-90	2.54	1.92	3.35	1.43
Honda	Accord	91-93	2.45	1.62	3.70	2.08
Honda	Accord	94-98	3.40	2.61	4.44	1.83
Saab	900 Series	82-93	3.04	2.19	4.21	2.02
Saab	9000	86-98	1.63	0.94	2.82	1.88
Toyota	Crown/Cressida	82-85	3.49	2.88	4.23	1.35
Toyota	Crown/Cressida	86-88	3.31	2.37	4.62	2.24
Toyota	Cressida	89-93	2.54	1.96	3.28	1.31
Volvo	850/S70/V70/C70	92-00	2.19	1.39	3.45	2.06
Volvo	200 Series	82-93	2.59	2.11	3.17	1.05
Volvo	700/900 Series	84-92	2.04	1.50	2.77	1.27
Medium Cars			**3.62**	**3.53**	**3.71**	**0.18**
Daewoo	Espero	95-97	5.61	3.78	8.33	4.55
Daewoo	Nubira	97-00	4.13	2.86	5.95	3.09
Ford	Mondeo	95-00	2.51	1.77	3.55	1.77
Holden	Camira	82-89	4.62	4.33	4.94	0.62
Holden	Vectra	97-00	2.72	1.73	4.27	2.54
Mitsubishi	Sigma/Scorpion	82-86	4.01	3.72	4.33	0.61
Mitsubishi	Nimbus	84-91	3.36	2.23	5.06	2.83
Mitsubishi	Nimbus	92-98	2.65	1.44	4.89	3.45
Mitsubishi	Galant	95-96	3.59	2.69	4.79	2.10
Ford / Mazda	Telstar / 626/MX6	83-86	3.67	3.33	4.04	0.72
Ford / Mazda	Telstar / 626/MX6	88-91	3.31	2.81	3.91	1.11
Ford / Mazda	Telstar / 626/MX6	92-97	3.35	2.83	3.97	1.14
Nissan	Pintara	86-88	3.76	3.29	4.29	1.00
Nissan / Ford	Pintara / Corsair	89-92	4.23	3.82	4.68	0.86
Nissan	Bluebird	82-86	4.44	4.13	4.78	0.66

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Nissan	Stanza	82-83	3.91	2.73	5.59	2.86
Nissan	Gazelle	84-88	4.85	3.81	6.17	2.36
Nissan	Prairie	84-86	4.26	2.77	6.55	3.79
Nissan	Bluebird	93-97	2.28	1.49	3.49	2.00
Peugeot	405	89-97	2.99	1.88	4.76	2.88
Peugeot	505	82-93	2.56	1.78	3.67	1.89
Subaru	1800/ Leone	82-95	4.34	3.92	4.81	0.89
Subaru	Liberty	89-94	2.95	2.49	3.51	1.02
Subaru	Liberty	95-98	3.10	2.25	4.28	2.03
Toyota	Corona	82-87	3.92	3.66	4.21	0.55
Toyota	Camry	83-86	3.74	3.24	4.32	1.08
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	3.68	3.45	3.92	0.47
Passenger Vans			**4.44**	**4.16**	**4.73**	**0.57**
Mitsubishi	Starwagon/L300	82-86	6.45	5.66	7.35	1.68
Mitsubishi	Starwagon	87-94	4.84	4.23	5.54	1.32
Mitsubishi	Starwagon	95-00	3.07	2.19	4.28	2.09
Toyota	Tarago	83-89	4.85	4.30	5.48	1.18
Toyota	Tarago	91-99	2.61	1.97	3.46	1.49
Small Cars			**4.28**	**4.20**	**4.37**	**0.17**
Alfa Romeo	33	83-92	4.21	2.89	6.13	3.24
Daihatsu	Charade	82-86	7.04	6.12	8.10	1.98
Daihatsu	Charade	88-92	5.64	5.10	6.24	1.14
Daihatsu	Charade	93-00	5.63	4.97	6.38	1.41
Daihatsu	Applause	89-99	3.85	3.18	4.68	1.50
Daihatsu	Mira	90-96	8.42	6.59	10.77	4.18
Daewoo	1.5i	94-95	4.47	2.53	7.90	5.36
Daewoo	Cielo	95-97	3.55	2.86	4.40	1.55
Daewoo	Lanos	97-00	4.06	3.10	5.31	2.21
Ford	Laser	91-94	3.92	3.58	4.30	0.72
Ford	Laser	95-98	4.18	3.43	5.11	1.68
Ford	Festiva WD/WD/WH/WF	94-00	5.39	4.82	6.03	1.21
Holden	Gemini	82-84	4.60	4.18	5.06	0.87
Holden	Gemini RB	86-87	5.14	3.95	6.68	2.73
Holden	Astra TR	96-98	2.24	1.34	3.76	2.43
Holden	Barina SB	95-00	4.55	3.90	5.29	1.39
Hyundai	Excel	82-89	5.67	4.98	6.45	1.46
Hyundai	Excel	90-94	4.74	4.33	5.20	0.87
Hyundai	Excel	95-00	4.49	4.14	4.87	0.73
Hyundai	S Coupe	90-96	5.01	3.85	6.53	2.67
Hyundai	Lantra	91-95	4.04	3.24	5.04	1.81
Hyundai	Lantra	96-00	3.20	2.46	4.16	1.70
Mitsubishi	Colt	82-88	5.06	4.71	5.43	0.71
Mitsubishi	Lancer CA	88-90	3.99	3.51	4.54	1.03

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Mitsubishi	Lancer CC	93-95	3.58	3.10	4.14	1.04
Mitsubishi	Lancer CE/Mirage	96-00	3.86	3.35	4.45	1.11
Mitsubishi	Cordia	82-89	4.71	3.87	5.72	1.85
Ford / Mazda	Laser / 323	82-88	4.82	4.61	5.05	0.44
Mazda	323	90-93	3.32	2.77	4.00	1.23
Mazda	323	95-98	4.30	3.55	5.21	1.66
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	5.62	5.11	6.18	1.08
Mazda	121	94-96	3.81	3.10	4.68	1.58
Mazda	121 Metro	97-00	4.41	3.24	6.01	2.78
Holden / Nissan	Astra / Pulsar/Vector	84-86	5.12	4.75	5.52	0.77
Holden / Nissan	Astra / Pulsar/Vector	88-90	4.40	4.05	4.78	0.74
Nissan	Pulsar	92-95	3.52	3.05	4.07	1.02
Nissan	Pulsar	96-99	4.68	3.98	5.51	1.54
Nissan	Micra	95-97	5.68	4.13	7.82	3.70
Honda	Civic	82-83	4.69	3.48	6.32	2.84
Honda	Civic	84-87	5.73	4.93	6.66	1.72
Honda	Civic	88-91	4.69	4.07	5.40	1.33
Honda	Civic	92-95	3.50	2.93	4.18	1.25
Honda	Civic	96-00	3.53	2.74	4.57	1.83
Honda	Concerto	88-93	3.26	2.07	5.14	3.08
Honda	City	83-86	7.03	5.00	9.89	4.89
Rover	Quintet	82-86	4.57	2.96	7.06	4.10
Subaru	Sherpa/Fiori	89-92	8.88	7.12	11.07	3.95
Subaru	Impreza	93-00	4.32	3.40	5.50	2.10
Holden / Suzuki	Barina / Swift	85-88	6.97	6.25	7.76	1.51
Holden / Suzuki	Barina / Swift	89-93 / 89-99	4.89	4.51	5.30	0.79
Suzuki	Hatch	82-85	8.40	6.97	10.13	3.16
Suzuki	Baleno	95-00	3.58	2.30	5.58	3.28
Toyota	Corolla	82-84	4.33	3.98	4.72	0.74
Toyota	Corolla	86-88	4.45	4.14	4.79	0.65
Toyota / Holden	Corolla / Nova	89-93	3.99	3.73	4.27	0.54
Toyota / Holden	Corolla / Nova	94-98 / 94-96	3.62	3.28	4.00	0.72
Toyota	Corolla	98-00	2.03	1.16	3.54	2.38
Toyota	Tercel	83-88	4.97	3.50	7.06	3.56
Toyota	Starlet	96-99	4.61	3.79	5.60	1.81
Volkswagen	Golf	95-98	2.42	1.43	4.09	2.66
Sports Cars			**3.72**	**3.51**	**3.95**	**0.44**
Ford	Capri	89-94	4.66	3.66	5.92	2.26
Hyundai	Coupe	96-00	5.90	3.95	8.81	4.86
Mazda	RX7	82-85	4.08	2.90	5.73	2.84
Mazda	MX5	89-97	3.01	1.80	5.02	3.22
Nissan	300ZX	86-97	3.57	2.30	5.55	3.26
Nissan	Exa	83-86	5.81	4.05	8.35	4.30

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Nissan	Exa	87-91	4.14	2.33	7.37	5.03
Nissan	NX/NX-R	91-96	7.63	5.70	10.22	4.52
Nissan	200SX	94-00	3.98	2.17	7.30	5.14
Honda	CRX	87-91	6.46	4.32	9.66	5.35
Honda	Prelude	83-91	3.80	3.17	4.56	1.39
Honda	Prelude	92-96	4.56	3.44	6.05	2.61
Honda	Integra	86-88	3.81	2.54	5.70	3.16
Honda	Integra	90-92	2.87	1.80	4.58	2.78
Renault	Feugo	82-87	2.64	1.51	4.64	3.13
Toyota	Celica	81-85	3.48	2.85	4.25	1.40
Toyota	Celica	86-89	3.96	3.18	4.94	1.76
Toyota	Celica	90-93	3.12	2.37	4.11	1.73
Toyota	Celica	94-99	4.08	2.79	5.95	3.16
Toyota	Supra	82-90	5.36	3.59	8.00	4.42
Toyota	Paseo	91-99	4.11	3.12	5.41	2.30

AGGRESSIVITY INJURY RISK
AGGRESSIVITY INJURY SEVERITY AND
RATINGS OF VEHICLE AGGRESSIVITY
(with 95% and 90% CONFIDENCE LIMITS),
TOWARDS OTHER VEHICLE DRIVERS

AGGRESSIVITY INJURY RISK RATINGS

NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**14.67**			
4-Wheel Drive Vehicles			17.43	16.96	17.91	0.95
Daihatsu	Feroza	89-97	17.03	13.18	21.74	8.56
Holden	Jackaroo	82-91	21.01	16.62	26.19	9.57
Mitsubishi	Pajero	82-90	19.50	16.62	22.74	6.12
Mitsubishi	Pajero	92-99	17.11	14.81	19.68	4.87
Jeep	Cherokee	82-00	17.70	13.89	22.29	8.40
Nissan	Patrol	82-87	19.19	16.21	22.58	6.36
Nissan / Ford	Patrol / Maverick	88-97	18.14	16.66	19.72	3.06
Nissan	Patrol	98-00	20.96	16.30	26.52	10.21
Nissan	Pathfinder	95-00	22.07	15.84	29.88	14.04
Land Rover	Range Rover	82-94	19.78	15.81	24.45	8.64
Suzuki	Vitara	88-98	16.42	13.22	20.21	6.98
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	14.38	12.61	16.36	3.75
Toyota	4Runner/Hilux	82-85	18.18	16.26	20.27	4.01
Toyota	4Runner/Hilux	86-88	16.97	15.04	19.10	4.06
Toyota	Hilux	89-97	16.27	15.19	17.41	2.22
Toyota	Hilux	98-00	15.07	11.67	19.23	7.56
Toyota	Landcruiser	82-89	20.63	19.17	22.17	3.00
Toyota	Landcruiser	90-97	19.88	18.49	21.35	2.87
Toyota	Landcruiser	98-00	19.10	15.50	23.30	7.79
Commercial Vehicles			**16.32**	**15.83**	**16.82**	**1.00**
Ford	Falcon Panel Van	82-95	15.34	13.62	17.23	3.61
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	16.61	15.35	17.95	2.60
Ford	Falcon Ute	96-99	16.13	13.11	19.69	6.58
Ford	Ford F-Series	82-92	22.87	18.61	27.78	9.16
Ford	Transit	94-00	15.20	11.49	19.84	8.35
Holden	Commodore Ute VG/VP	90-93	14.11	11.11	17.77	6.66
Holden	Rodeo	82-85	17.91	13.50	23.38	9.88
Holden	Rodeo	89-95	16.69	15.12	18.38	3.25
Holden	Rodeo	96-98	16.31	13.47	19.60	6.13
Holden	Rodeo	99-00	17.12	12.40	23.17	10.77
Holden	WB Series	82-85	18.18	15.37	21.38	6.02
Holden	Commodore Ute VR/VS	94-00	14.50	12.78	16.41	3.63
Nissan	720 Ute	82-85	17.95	14.76	21.66	6.90
Nissan	Navara	86-91	16.10	14.19	18.22	4.03
Nissan	Navara	92-96	16.23	13.27	19.69	6.42
Subaru	Brumby	82-93	14.01	11.02	17.65	6.63
Toyota	Hiace/Liteace	82-86	18.75	16.80	20.87	4.06
Toyota	Hiace/Liteace	87-89	18.49	15.95	21.34	5.39

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Toyota	Hiace/Liteace	90-00	19.17	17.41	21.07	3.66
Volkswagon	Caravelle / Transporter	88-00	16.27	12.49	20.92	8.42
Large Cars			**14.42**	**14.17**	**14.66**	**0.49**
Ford	Falcon XE/XF	82-88	15.70	15.15	16.27	1.12
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	15.38	14.76	16.02	1.26
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	16.07	15.14	17.04	1.90
Ford	Falcon EF/EL	94-98	14.67	13.95	15.42	1.47
Ford	Falcon AU	98-00	14.98	13.08	17.10	4.02
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	14.29	13.71	14.90	1.19
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	13.76	13.10	14.46	1.36
Holden	Commodore VT/VX	97-00	15.09	13.82	16.45	2.63
Holden	Commodore VB-VL	82-88	14.89	14.34	15.47	1.13
Hyundai	Sonata	89-97	14.28	12.26	16.57	4.32
Mitsubishi	Magna TM/TN/TP	85-90	14.19	13.33	15.08	1.75
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	14.80	14.00	15.64	1.64
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	14.97	13.87	16.14	2.27
Nissan	Skyline	82-90	15.31	13.68	17.10	3.42
Holden / Toyota	Apollo JM / JP / Camry	93-97	14.80	13.94	15.71	1.77
Toyota	Camry	98-00	13.53	11.81	15.45	3.64
Luxury Cars			**13.34**	**12.85**	**13.85**	**1.00**
BMW	3 Series	82-91	13.20	11.08	15.66	4.59
BMW	3 Series	92-98	11.92	9.96	14.21	4.24
Ford	Fairlane Z & LTD F	82-87	14.97	13.04	17.14	4.09
Ford	Fairlane N & LTD D	88-94	12.92	11.35	14.66	3.31
Ford	Fairlane N & LTD D	95-98	14.78	11.70	18.50	6.79
Holden	Stateman/Caprice VQ	90-93	13.95	10.52	18.26	7.74
Holden	Stateman/Caprice VR/VS	94-98	13.57	11.03	16.57	5.54
Mazda	929	82-90	15.29	13.30	17.51	4.21
Mercedes Benz	E-Class W124	86-95	14.52	10.89	19.10	8.21
Honda	Legend	86-95	20.12	15.46	25.76	10.30
Honda	Accord	82-85	13.77	11.37	16.59	5.23
Honda	Accord	86-90	12.02	9.70	14.79	5.09
Honda	Accord	91-93	11.54	8.72	15.13	6.41
Honda	Accord	94-98	14.94	12.33	18.00	5.67
Toyota	Crown/Cressida	82-85	14.82	12.51	17.48	4.96
Toyota	Cressida	89-93	13.83	11.35	16.74	5.39
Volvo	850/S70/V70/C70	92-00	13.48	9.91	18.08	8.16

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Volvo	200 Series	82-93	13.06	11.06	15.36	4.30
Volvo	700/900 Series	84-92	13.05	10.55	16.04	5.49
Medium Cars			**13.72**	**13.42**	**14.03**	**0.61**
Daewoo	Nubira	97-00	14.76	10.96	19.58	8.62
Ford	Cortina	82-82	15.32	13.67	17.13	3.46
Ford	Mondeo	95-00	15.22	12.02	19.09	7.08
Holden	Camira	82-89	15.26	14.19	16.39	2.20
Holden	Vectra	97-00	15.97	12.17	20.69	8.51
Mitsubishi	Sigma/Scorpion	82-86	13.68	12.87	14.54	1.68
Mitsubishi	Galant	95-96	12.41	9.49	16.07	6.58
Ford / Mazda	Telstar / 626/MX6	83-86	13.78	12.58	15.07	2.50
Ford / Mazda	Telstar / 626/MX6	88-91	14.12	12.30	16.17	3.87
Ford / Mazda	Telstar / 626/MX6	92-97	13.14	11.40	15.10	3.70
Nissan	Pintara	86-88	14.82	13.18	16.62	3.44
Nissan / Ford	Pintara / Corsair	89-92	15.07	13.79	16.43	2.64
Nissan	Bluebird	82-86	13.57	12.61	14.60	2.00
Subaru	1800/ Leone	82-95	12.90	11.39	14.59	3.20
Subaru	Liberty	89-94	13.64	11.81	15.71	3.89
Subaru	Liberty	95-98	14.03	11.08	17.61	6.54
Toyota	Corona	82-87	13.90	13.16	14.67	1.51
Toyota	Camry	83-86	14.07	12.47	15.83	3.37
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	14.74	14.00	15.51	1.51
Passenger Vans			**16.55**	**15.65**	**17.48**	**1.83**
Mitsubishi	Starwagon/L300	82-86	19.19	16.81	21.81	5.01
Mitsubishi	Starwagon	87-94	18.31	16.26	20.55	4.29
Mitsubishi	Starwagon	95-00	16.67	13.66	20.19	6.53
Toyota	Tarago	83-89	16.21	14.49	18.09	3.60
Toyota	Tarago	91-99	14.43	12.04	17.21	5.18
Small Cars			**12.57**	**12.33**	**12.80**	**0.47**
Daihatsu	Charade	82-86	12.13	9.84	14.85	5.01
Daihatsu	Charade	88-92	11.77	10.50	13.17	2.67
Daihatsu	Charade	93-00	13.04	11.50	14.74	3.23
Daihatsu	Applause	89-99	14.25	12.13	16.67	4.53
Daewoo	Cielo	95-97	12.77	10.57	15.34	4.77
Daewoo	Lanos	97-00	16.08	13.02	19.69	6.67
Ford	Laser	91-94	12.51	11.49	13.61	2.12
Ford	Laser	95-98	13.33	11.14	15.89	4.75
Ford	Festiva WD/WD/WH/WF	94-00	14.42	12.81	16.18	3.36
Holden	Gemini	82-84	11.18	10.02	12.45	2.43
Holden	Gemini RB	86-87	12.53	9.55	16.28	6.73
Holden	Astra TR	96-98	13.38	9.73	18.13	8.40
Holden	Barina SB	95-00	14.00	12.22	15.99	3.77

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Hyundai	Excel	82-89	14.74	12.87	16.82	3.95
Hyundai	Excel	90-94	12.96	11.91	14.08	2.17
Hyundai	Excel	95-00	13.62	12.70	14.60	1.90
Hyundai	Lantra	91-95	14.20	11.68	17.16	5.48
Hyundai	Lantra	96-00	13.34	11.13	15.90	4.77
Mitsubishi	Colt	82-88	13.11	12.18	14.10	1.92
Mitsubishi	Lancer CA	88-90	11.99	10.70	13.41	2.71
Mitsubishi	Lancer CC	93-95	12.42	10.87	14.14	3.27
Mitsubishi	Lancer CE/Mirage	96-00	14.07	12.61	15.67	3.06
Mitsubishi	Cordia	82-89	14.86	12.27	17.88	5.61
Ford / Mazda	Laser / 323	82-88	13.10	12.53	13.69	1.16
Mazda	323	90-93	12.62	10.74	14.78	4.03
Mazda	323	95-98	12.56	10.57	14.87	4.29
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	13.27	12.09	14.56	2.47
Mazda	121	94-96	10.89	8.92	13.23	4.31
Holden / Nissan	Astra / Pulsar/Vector	84-86	11.73	10.74	12.79	2.05
Holden / Nissan	Astra / Pulsar/Vector	88-90	12.92	11.93	13.97	2.04
Nissan	Pulsar	92-95	13.11	11.55	14.84	3.29
Nissan	Pulsar	96-99	14.34	12.46	16.44	3.99
Honda	Civic	84-87	13.45	11.28	15.96	4.68
Honda	Civic	88-91	12.81	11.09	14.76	3.67
Honda	Civic	92-95	12.79	11.02	14.79	3.78
Honda	Civic	96-00	16.06	13.68	18.75	5.07
Subaru	Impreza	93-00	15.34	12.18	19.14	6.96
Holden / Suzuki	Barina / Swift	85-88	12.43	10.82	14.24	3.43
Holden / Suzuki	Barina / Swift	89-93 / 89-99	11.81	10.88	12.80	1.92
Toyota	Corolla	82-84	12.07	11.12	13.09	1.97
Toyota	Corolla	86-88	12.85	11.96	13.80	1.84
Toyota / Holden	Corolla / Nova	89-93	13.08	12.29	13.92	1.63
Toyota / Holden	Corolla / Nova	94-98 / 94-96	14.23	13.14	15.41	2.27
Toyota	Starlet	96-99	14.73	12.49	17.29	4.79
Sports Cars			**13.80**	**13.05**	**14.58**	**1.52**
Ford	Capri	89-94	12.65	10.01	15.87	5.87
Nissan	Exa	83-86	20.10	14.56	27.07	12.51
Nissan	NX/NX-R	91-96	17.88	13.01	24.07	11.06
Honda	Prelude	83-91	12.62	10.65	14.89	4.24
Honda	Prelude	92-96	12.39	9.19	16.51	7.32
Honda	Integra	93-00	12.89	8.54	19.00	10.46
Toyota	Celica	81-85	16.63	14.49	19.02	4.54
Toyota	Celica	86-89	14.84	12.26	17.84	5.58

Make	Model of Car	Years of Manufacture	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Toyota	Celica	90-93	12.55	10.03	15.61	5.58
Toyota	Supra	82-90	28.25	20.60	37.40	16.80

AGGRESSIVITY INJURY SEVERITY RATINGS
Victoria and NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Pr(Severe) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**16.18**			
4-Wheel Drive Vehicles			**0.95**	**18.40**	**17.29**	**19.56**
Daihatsu	Feroza	89-97	8.56	16.93	8.30	31.45
Holden	Jackaroo	82-91	9.57	25.44	15.69	38.48
Mitsubishi	Pajero	82-90	6.12	17.34	11.71	24.92
Mitsubishi	Pajero	92-99	4.87	18.30	13.26	24.70
Jeep	Cherokee	82-00	8.40	18.04	10.52	29.17
Nissan	Patrol	82-87	6.36	19.99	13.13	29.22
Nissan / Ford	Patrol / Maverick	88-97	3.06	20.15	16.89	23.86
Nissan	Patrol	98-00	10.21	26.19	16.74	38.51
Nissan	Pathfinder	95-00	14.04	22.25	11.53	38.60
Land Rover	Range Rover	82-94	8.64	26.30	16.92	38.48
Suzuki	Vitara	88-98	6.98	15.06	8.88	24.39
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	3.75	9.70	6.09	15.10
Toyota	4Runner/Hilux	82-85	4.01	16.85	12.81	21.86
Toyota	4Runner/Hilux	86-88	4.06	17.05	12.55	22.74
Toyota	Hilux	89-97	2.22	16.61	14.16	19.39
Toyota	Hilux	98-00	7.56	16.48	9.24	27.66
Toyota	Landcruiser	82-89	3.00	22.44	19.08	26.19
Toyota	Landcruiser	90-97	2.87	21.38	18.38	24.72
Toyota	Landcruiser	98-00	7.79	22.56	16.14	30.62
Commercial Vehicles			**1.00**	**17.33**	**16.14**	**18.59**
Ford	Falcon Panel Van	82-95	3.61	17.46	12.92	23.16
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	2.60	18.13	15.07	21.65
Ford	Falcon Ute	96-99	6.58	21.14	14.37	29.97
Ford	Ford F-Series	82-92	9.16	27.32	18.59	38.23
Ford	Transit	94-00	8.35	20.73	11.50	34.49
Holden	Commodore Ute VG/VP	90-93	6.66	19.18	11.24	30.77
Holden	Rodeo	82-85	9.88	21.47	10.89	37.94
Holden	Rodeo	89-95	3.25	22.66	18.60	27.32
Holden	Rodeo	96-98	6.13	14.03	8.98	21.25
Holden	Rodeo	99-00	10.77	17.99	9.03	32.64
Holden	WB Series	82-85	6.02	16.52	10.91	24.22
Holden	Commodore Ute VR/VS	94-00	3.63	20.74	16.13	26.24
Nissan	720 Ute	82-85	6.90	10.19	5.65	17.67
Nissan	Navara	86-91	4.03	16.80	12.40	22.35
Nissan	Navara	92-96	6.42	14.78	9.24	22.82
Subaru	Brumby	82-93	6.63	17.56	10.26	28.43

Make	Model of Car	Years of Manufacture	Pr(Severe) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Toyota	Hiace/Liteace	82-86	4.06	12.92	9.28	17.70
Toyota	Hiace/Liteace	87-89	5.39	17.64	12.05	25.07
Toyota	Hiace/Liteace	90-00	3.66	13.94	10.76	17.87
Volkswagon	Caravelle / Transporter	88-00	8.42	28.82	18.29	42.28
Large Cars			**0.49**	**16.76**	**16.10**	**17.44**
Ford	Falcon XE/XF	82-88	1.12	16.74	15.35	18.22
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	1.26	18.26	16.63	20.01
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	1.90	19.78	17.38	22.41
Ford	Falcon EF/EL	94-98	1.47	17.45	15.63	19.42
Ford	Falcon AU	98-00	4.02	15.40	11.44	20.41
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	1.19	16.72	15.16	18.40
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	1.36	17.72	15.90	19.71
Holden	Commodore VT/VX	97-00	2.63	16.96	14.02	20.38
Holden	Commodore VB-VL	82-88	1.13	17.33	15.80	18.99
Hyundai	Sonata	89-97	4.32	15.52	10.34	22.64
Mitsubishi	Magna TM/TN/TP	85-90	1.75	15.14	13.07	17.48
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	1.64	16.59	14.34	19.11
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	2.27	16.61	14.21	19.32
Nissan	Skyline	82-90	3.42	17.37	13.15	22.60
Holden / Toyota	Apollo JM / JP / Camry	93-97	1.77	15.41	13.26	17.84
Toyota	Camry	98-00	3.64	20.01	15.16	25.96
Luxury Cars			**1.00**	**16.85**	**15.49**	**18.30**
BMW	3 Series	82-91	4.59	16.05	10.52	23.73
BMW	3 Series	92-98	4.24	23.05	16.07	31.91
Ford	Fairlane Z & LTD F	82-87	4.09	16.11	11.96	21.37
Ford	Fairlane N & LTD D	88-94	3.31	16.42	12.43	21.38
Ford	Fairlane N & LTD D	95-98	6.79	18.15	11.58	27.31
Holden	Stateman/Caprice VQ	90-93	7.74	21.49	11.76	35.99
Holden	Stateman/Caprice VR/VS	94-98	5.54	18.01	12.12	25.92
Mazda	929	82-90	4.21	12.57	8.60	18.02
Mercedes Benz	E-Class W124	86-95	8.21	25.12	15.54	37.95
Honda	Legend	86-95	10.30	16.15	8.20	29.34
Honda	Accord	82-85	5.23	21.35	13.40	32.26
Honda	Accord	86-90	5.09	17.14	10.49	26.74
Honda	Accord	91-93	6.41	18.91	9.85	33.24

Make	Model of Car	Years of Manufacture	Pr(Severe) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Honda	Accord	94-98	5.67	16.28	10.01	25.37
Toyota	Crown/Cressida	82-85	4.96	23.82	16.63	32.90
Toyota	Cressida	89-93	5.39	13.51	8.09	21.72
Volvo	850/S70/V70/C70	92-00	8.16	25.73	15.55	39.44
Volvo	200 Series	82-93	4.30	16.02	10.37	23.93
Volvo	700/900 Series	84-92	5.49	16.23	9.88	25.51
Medium Cars			**0.61**	**15.06**	**14.23**	**15.94**
Daewoo	Nubira	97-00	8.62	21.51	11.33	37.01
Ford	Cortina	82-82	3.46	14.18	9.73	20.22
Ford	Mondeo	95-00	7.08	17.11	9.76	28.26
Holden	Camira	82-89	2.20	12.90	10.66	15.52
Holden	Vectra	97-00	8.51	13.13	6.61	24.41
Mitsubishi	Sigma/Scorpion	82-86	1.68	14.79	12.39	17.57
Mitsubishi	Galant	95-96	6.58	16.98	9.16	29.34
Ford / Mazda	Telstar / 626/MX6	83-86	2.50	15.72	12.47	19.64
Ford / Mazda	Telstar / 626/MX6	88-91	3.87	23.85	18.19	30.61
Ford / Mazda	Telstar / 626/MX6	92-97	3.70	14.08	9.75	19.90
Nissan	Pintara	86-88	3.44	16.63	12.57	21.66
Nissan / Ford	Pintara / Corsair	89-92	2.64	16.53	13.29	20.38
Nissan	Bluebird	82-86	2.00	14.83	12.14	17.99
Subaru	1800/ Leone	82-95	3.20	10.78	7.51	15.25
Subaru	Liberty	89-94	3.89	15.74	11.17	21.72
Subaru	Liberty	95-98	6.54	22.48	13.74	34.56
Toyota	Corona	82-87	1.51	15.17	13.01	17.62
Toyota	Camry	83-86	3.37	19.05	14.28	24.95
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	1.51	15.40	13.52	17.48
Passenger Vans			**1.83**	**15.01**	**12.95**	**17.33**
Mitsubishi	Starwagon/L300	82-86	5.01	15.46	10.72	21.78
Mitsubishi	Starwagon	87-94	4.29	15.25	11.35	20.20
Mitsubishi	Starwagon	95-00	6.53	13.65	8.00	22.32
Toyota	Tarago	83-89	3.60	17.52	12.92	23.32
Toyota	Tarago	91-99	5.18	11.96	6.86	20.05
Small Cars			**0.47**	**14.21**	**13.54**	**14.92**
Daihatsu	Charade	82-86	5.01	12.33	6.44	22.31
Daihatsu	Charade	88-92	2.67	12.02	8.33	17.05
Daihatsu	Charade	93-00	3.23	11.94	7.70	18.07
Daihatsu	Applause	89-99	4.53	14.20	8.92	21.86
Daewoo	Cielo	95-97	4.77	14.34	8.72	22.70
Daewoo	Lanos	97-00	6.67	16.09	9.62	25.67
Ford	Laser	91-94	2.12	16.90	13.67	20.71
Ford	Laser	95-98	4.75	23.42	16.61	31.95
Ford	Festiva WD/WD/WH/WF	94-00	3.36	14.22	10.37	19.20

Make	Model of Car	Years of Manufacture	Pr(Severe) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Holden	Gemini	82-84	2.43	13.77	10.20	18.33
Holden	Gemini RB	86-87	6.73	17.05	8.56	31.10
Holden	Astra TR	96-98	8.40	24.37	12.62	41.81
Holden	Barina SB	95-00	3.77	18.13	12.92	24.83
Hyundai	Excel	82-89	3.95	12.18	8.03	18.06
Hyundai	Excel	90-94	2.17	13.38	10.34	17.15
Hyundai	Excel	95-00	1.90	16.73	13.97	19.90
Hyundai	Lantra	91-95	5.48	19.20	11.84	29.58
Hyundai	Lantra	96-00	4.77	12.19	7.01	20.37
Mitsubishi	Colt	82-88	1.92	14.50	11.79	17.72
Mitsubishi	Lancer CA	88-90	2.71	14.40	10.39	19.63
Mitsubishi	Lancer CC	93-95	3.27	12.04	8.25	17.24
Mitsubishi	Lancer CE/Mirage	96-00	3.06	15.78	11.84	20.72
Mitsubishi	Cordia	82-89	5.61	21.82	14.33	31.77
Ford / Mazda	Laser / 323	82-88	1.16	12.74	11.21	14.45
Mazda	323	90-93	4.03	6.97	3.77	12.54
Mazda	323	95-98	4.29	14.72	9.25	22.61
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	2.47	13.68	10.23	18.07
Mazda	121	94-96	4.31	15.82	8.67	27.14
Holden / Nissan	Astra / Pulsar/Vector	84-86	2.05	14.45	11.40	18.14
Holden / Nissan	Astra / Pulsar/Vector	88-90	2.04	17.28	14.12	20.97
Nissan	Pulsar	92-95	3.29	16.48	12.19	21.90
Nissan	Pulsar	96-99	3.99	21.06	15.63	27.77
Honda	Civic	84-87	4.68	20.95	13.75	30.59
Honda	Civic	88-91	3.67	17.15	11.92	24.05
Honda	Civic	92-95	3.78	17.01	11.66	24.15
Honda	Civic	96-00	5.07	7.55	3.96	13.91
Subaru	Impreza	93-00	6.96	15.65	9.18	25.40
Holden / Suzuki	Barina / Swift	85-88	3.43	16.64	11.26	23.90
Holden / Suzuki	Barina / Swift	89-93 / 89-99	1.92	12.61	9.84	16.02
Toyota	Corolla	82-84	1.97	11.63	8.92	15.03
Toyota	Corolla	86-88	1.84	14.55	11.79	17.84
Toyota / Holden	Corolla / Nova	89-93	1.63	15.74	13.43	18.36
Toyota / Holden	Corolla / Nova	94-98 / 94-96	2.27	13.53	10.70	16.97
Toyota	Starlet	96-99	4.79	13.99	8.62	21.90
Sports Cars			**1.52**	**16.21**	**14.13**	**18.52**
Ford	Capri	89-94	5.87	15.13	8.66	25.11
Nissan	Exa	83-86	12.51	25.96	12.83	45.51
Nissan	NX/NX-R	91-96	11.06	33.91	19.52	52.04
Honda	Prelude	83-91	4.24	9.89	5.68	16.68

Make	Model of Car	Years of Manufacture	Pr(Severe) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Honda	Prelude	92-96	7.32	23.11	13.57	36.52
Honda	Integra	93-00	10.46	30.90	16.00	51.22
Toyota	Celica	81-85	4.54	17.24	11.82	24.47
Toyota	Celica	86-89	5.58	19.73	12.84	29.08
Toyota	Celica	90-93	5.58	19.70	12.23	30.18
Toyota	Supra	82-90	16.80	21.65	10.39	39.71

AGGRESSIVITY RATINGS
(WITH 95% CONFIDENCE LIMITS)
Victoria and NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**2.37**			
4-Wheel Drive Vehicles			**3.21**	**3.00**	**3.43**	**0.43**
Daihatsu	Feroza	89-97	2.88	1.40	5.92	4.52
Holden	Jackaroo	82-91	5.34	3.22	8.87	5.64
Mitsubishi	Pajero	82-90	3.38	2.24	5.10	2.85
Mitsubishi	Pajero	92-99	3.13	2.22	4.41	2.19
Jeep	Cherokee	82-00	3.19	1.81	5.62	3.81
Nissan	Patrol	82-87	3.84	2.48	5.93	3.44
Nissan / Ford	Patrol / Maverick	88-97	3.66	3.02	4.43	1.42
Nissan	Patrol	98-00	5.49	3.38	8.91	5.53
Nissan	Pathfinder	95-00	4.91	2.46	9.79	7.32
Land Rover	Range Rover	82-94	5.20	3.26	8.30	5.04
Suzuki	Vitara	88-98	2.47	1.42	4.29	2.87
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	1.39	0.87	2.24	1.37
Toyota	4Runner/Hilux	82-85	3.06	2.29	4.09	1.80
Toyota	4Runner/Hilux	86-88	2.89	2.10	3.99	1.89
Toyota	Hilux	89-97	2.70	2.28	3.21	0.93
Toyota	Hilux	98-00	2.48	1.35	4.55	3.20
Toyota	Landcruiser	82-89	4.63	3.89	5.51	1.62
Toyota	Landcruiser	90-97	4.25	3.60	5.01	1.41
Toyota	Landcruiser	98-00	4.31	2.95	6.30	3.36
Commercial Vehicles			**2.83**	**2.62**	**3.05**	**0.44**
Ford	Falcon Panel Van	82-95	2.68	1.95	3.67	1.72
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	3.01	2.47	3.67	1.20
Ford	Falcon Ute	96-99	3.41	2.24	5.20	2.96
Ford	Ford F-Series	82-92	6.25	4.13	9.46	5.33
Ford	Transit	94-00	3.15	1.70	5.85	4.15
Holden	Commodore Ute VG/VP	90-93	2.71	1.55	4.73	3.19
Holden	Rodeo	82-85	3.85	1.93	7.66	5.73
Holden	Rodeo	89-95	3.78	3.05	4.69	1.65
Holden	Rodeo	96-98	2.29	1.43	3.67	2.24
Holden	Rodeo	99-00	3.08	1.50	6.34	4.84
Holden	WB Series	82-85	3.00	1.95	4.63	2.68
Holden	Commodore Ute VR/VS	94-00	3.01	2.29	3.95	1.67
Nissan	720 Ute	82-85	1.83	1.00	3.35	2.35

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Nissan	Navara	86-91	2.70	1.96	3.73	1.76
Nissan	Navara	92-96	2.40	1.46	3.94	2.48
Subaru	Brumby	82-93	2.46	1.40	4.33	2.93
Toyota	Hiace/Liteace	82-86	2.42	1.72	3.41	1.68
Toyota	Hiace/Liteace	87-89	3.26	2.20	4.84	2.65
Toyota	Hiace/Liteace	90-00	2.67	2.04	3.50	1.47
Volkswagon	Caravelle / Transporter	88-00	4.69	2.86	7.69	4.83
Large Cars			**2.42**	**2.31**	**2.52**	**0.21**
Ford	Falcon XE/XF	82-88	2.63	2.39	2.88	0.49
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	2.81	2.54	3.11	0.57
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	3.18	2.76	3.66	0.89
Ford	Falcon EF/EL	94-98	2.56	2.27	2.88	0.61
Ford	Falcon AU	98-00	2.31	1.68	3.17	1.50
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	2.39	2.15	2.65	0.51
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	2.44	2.17	2.75	0.58
Holden	Commodore VT/VX	97-00	2.56	2.08	3.15	1.06
Holden	Commodore VB-VL	82-88	2.58	2.34	2.85	0.51
Hyundai	Sonata	89-97	2.22	1.45	3.38	1.92
Mitsubishi	Magna TM/TN/TP	85-90	2.15	1.83	2.52	0.68
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	2.46	2.10	2.86	0.76
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	2.49	2.10	2.95	0.86
Nissan	Skyline	82-90	2.66	1.98	3.57	1.58
Holden / Toyota	Apollo JM / JP / Camry	93-97	2.28	1.94	2.68	0.73
Toyota	Camry	98-00	2.71	2.00	3.66	1.66
Luxury Cars			**2.25**	**2.05**	**2.46**	**0.41**
BMW	3 Series	82-91	2.12	1.36	3.30	1.94
BMW	3 Series	92-98	2.75	1.87	4.05	2.18
Ford	Fairlane Z & LTD F	82-87	2.41	1.75	3.33	1.58
Ford	Fairlane N & LTD D	88-94	2.12	1.57	2.86	1.29
Ford	Fairlane N & LTD D	95-98	2.68	1.65	4.37	2.73
Holden	Stateman/Caprice VQ	90-93	3.00	1.60	5.62	4.02
Holden	Stateman/Caprice VR/VS	94-98	2.44	1.59	3.77	2.18
Mazda	929	82-90	1.92	1.29	2.85	1.56
Mercedes Benz	E-Class W124	86-95	3.65	2.15	6.20	4.05
Honda	Legend	86-95	3.25	1.62	6.50	4.87
Honda	Accord	82-85	2.94	1.82	4.76	2.94

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Honda	Accord	86-90	2.06	1.23	3.45	2.22
Honda	Accord	91-93	2.18	1.11	4.28	3.17
Honda	Accord	94-98	2.43	1.47	4.03	2.56
Toyota	Crown/Cressida	82-85	3.53	2.41	5.17	2.76
Toyota	Cressida	89-93	1.87	1.10	3.19	2.09
Volvo	850/S70/V70/C70	92-00	3.47	1.99	6.06	4.07
Volvo	200 Series	82-93	2.09	1.33	3.28	1.95
Volvo	700/900 Series	84-92	2.12	1.26	3.57	2.31
Medium Cars			**2.07**	**1.94**	**2.20**	**0.25**
Daewoo	Nubira	97-00	3.17	1.63	6.17	4.54
Ford	Cortina	82-82	2.17	1.48	3.19	1.71
Ford	Mondeo	95-00	2.60	1.45	4.67	3.22
Holden	Camira	82-89	1.97	1.61	2.41	0.80
Holden	Vectra	97-00	2.10	1.03	4.27	3.24
Mitsubishi	Sigma/Scorpion	82-86	2.02	1.68	2.44	0.75
Mitsubishi	Galant	95-96	2.11	1.11	4.01	2.91
Ford / Mazda	Telstar / 626/MX6	83-86	2.17	1.70	2.77	1.07
Ford / Mazda	Telstar / 626/MX6	88-91	3.37	2.51	4.52	2.01
Ford / Mazda	Telstar / 626/MX6	92-97	1.85	1.26	2.72	1.46
Nissan	Pintara	86-88	2.46	1.83	3.31	1.48
Nissan / Ford	Pintara / Corsair	89-92	2.49	1.98	3.14	1.16
Nissan	Bluebird	82-86	2.01	1.63	2.48	0.85
Subaru	1800/ Leone	82-95	1.39	0.95	2.03	1.07
Subaru	Liberty	89-94	2.15	1.49	3.09	1.59
Subaru	Liberty	95-98	3.15	1.88	5.30	3.43
Toyota	Corona	82-87	2.11	1.80	2.48	0.68
Toyota	Camry	83-86	2.68	1.98	3.63	1.66
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	2.27	1.98	2.61	0.63
Passenger Vans			**2.48**	**2.13**	**2.90**	**0.78**
Mitsubishi	Starwagon/L300	82-86	2.97	2.03	4.33	2.30
Mitsubishi	Starwagon	87-94	2.79	2.04	3.81	1.77
Mitsubishi	Starwagon	95-00	2.28	1.31	3.95	2.64
Toyota	Tarago	83-89	2.84	2.07	3.90	1.83
Toyota	Tarago	91-99	1.73	0.98	3.05	2.07
Small Cars			**1.79**	**1.70**	**1.88**	**0.19**
Daihatsu	Charade	82-86	1.50	0.77	2.89	2.12
Daihatsu	Charade	88-92	1.42	0.97	2.06	1.09
Daihatsu	Charade	93-00	1.56	1.00	2.43	1.43
Daihatsu	Applause	89-99	2.02	1.26	3.26	2.01
Daewoo	Cielo	95-97	1.83	1.09	3.07	1.98
Daewoo	Lanos	97-00	2.59	1.51	4.42	2.90

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Ford	Laser	91-94	2.12	1.69	2.65	0.96
Ford	Laser	95-98	3.12	2.15	4.54	2.39
Ford	Festiva WD/WD/WH/WF	94-00	2.05	1.47	2.85	1.38
Holden	Gemini	82-84	1.54	1.13	2.11	0.98
Holden	Gemini RB	86-87	2.14	1.06	4.32	3.27
Holden	Astra TR	96-98	3.26	1.65	6.45	4.80
Holden	Barina SB	95-00	2.54	1.78	3.62	1.84
Hyundai	Excel	82-89	1.80	1.17	2.75	1.58
Hyundai	Excel	90-94	1.73	1.33	2.26	0.94
Hyundai	Excel	95-00	2.28	1.88	2.76	0.87
Hyundai	Lantra	91-95	2.73	1.65	4.49	2.84
Hyundai	Lantra	96-00	1.63	0.92	2.86	1.94
Mitsubishi	Colt	82-88	1.90	1.53	2.36	0.83
Mitsubishi	Lancer CA	88-90	1.73	1.23	2.42	1.19
Mitsubishi	Lancer CC	93-95	1.49	1.01	2.21	1.20
Mitsubishi	Lancer CE/Mirage	96-00	2.22	1.64	3.00	1.36
Mitsubishi	Cordia	82-89	3.24	2.08	5.05	2.96
Ford / Mazda	Laser / 323	82-88	1.67	1.46	1.91	0.45
Mazda	323	90-93	0.88	0.47	1.64	1.17
Mazda	323	95-98	1.85	1.14	2.99	1.85
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	1.82	1.35	2.45	1.11
Mazda	121	94-96	1.72	0.94	3.17	2.23
Holden / Nissan	Astra / Pulsar/Vector	84-86	1.69	1.32	2.17	0.85
Holden / Nissan	Astra / Pulsar/Vector	88-90	2.23	1.80	2.76	0.96
Nissan	Pulsar	92-95	2.16	1.57	2.97	1.40
Nissan	Pulsar	96-99	3.02	2.19	4.16	1.97
Honda	Civic	84-87	2.82	1.82	4.37	2.55
Honda	Civic	88-91	2.20	1.50	3.21	1.71
Honda	Civic	92-95	2.17	1.47	3.23	1.76
Honda	Civic	96-00	1.21	0.63	2.32	1.69
Subaru	Impreza	93-00	2.40	1.37	4.20	2.83
Holden / Suzuki	Barina / Swift	85-88	2.07	1.38	3.09	1.71
Holden / Suzuki	Barina / Swift	89-93 / 89-99	1.49	1.15	1.93	0.78
Toyota	Corolla	82-84	1.40	1.07	1.85	0.78
Toyota	Corolla	86-88	1.87	1.50	2.33	0.83
Toyota / Holden	Corolla / Nova	89-93	2.06	1.74	2.44	0.70
Toyota / Holden	Corolla / Nova	94-98 / 94-96	1.93	1.51	2.46	0.95
Toyota	Starlet	96-99	2.06	1.25	3.38	2.13

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Sports Cars			**2.24**	**1.93**	**2.59**	**0.66**
Ford	Capri	89-94	1.91	1.07	3.43	2.36
Nissan	Exa	83-86	5.22	2.56	10.65	8.10
Nissan	NX/NX-R	91-96	6.06	3.38	10.86	7.48
Honda	Prelude	83-91	1.25	0.71	2.20	1.49
Honda	Prelude	92-96	2.86	1.60	5.11	3.50
Honda	Integra	93-00	3.98	1.95	8.13	6.18
Toyota	Celica	81-85	2.87	1.94	4.23	2.29
Toyota	Celica	86-89	2.93	1.86	4.60	2.74
Toyota	Celica	90-93	2.47	1.49	4.10	2.61
Toyota	Supra	82-90	6.11	2.91	12.86	9.95

AGGRESSIVITY RATINGS
(WITH 90% CONFIDENCE LIMITS)
Victoria and NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
ALL MODEL AVERAGE			**2.37**			
4-Wheel Drive Vehicles			**3.21**	**3.03**	**3.39**	**0.36**
Daihatsu	Feroza	89-97	2.88	1.58	5.26	3.68
Holden	Jackaroo	82-91	5.34	3.50	8.16	4.66
Mitsubishi	Pajero	82-90	3.38	2.40	4.77	2.37
Mitsubishi	Pajero	92-99	3.13	2.35	4.17	1.82
Jeep	Cherokee	82-00	3.19	1.99	5.13	3.14
Nissan	Patrol	82-87	3.84	2.67	5.52	2.85
Nissan / Ford	Patrol / Maverick	88-97	3.66	3.11	4.29	1.18
Nissan	Patrol	98-00	5.49	3.66	8.24	4.58
Nissan	Pathfinder	95-00	4.91	2.76	8.75	5.99
Land Rover	Range Rover	82-94	5.20	3.52	7.69	4.18
Suzuki	Vitara	88-98	2.47	1.56	3.92	2.36
Holden / Suzuki	Drover / Sierra	85-87 / 82-00	1.39	0.94	2.07	1.13
Toyota	4Runner/Hilux	82-85	3.06	2.40	3.91	1.50
Toyota	4Runner/Hilux	86-88	2.89	2.21	3.79	1.57
Toyota	Hilux	89-97	2.70	2.34	3.12	0.78
Toyota	Hilux	98-00	2.48	1.49	4.12	2.63
Toyota	Landcruiser	82-89	4.63	4.00	5.36	1.36
Toyota	Landcruiser	90-97	4.25	3.70	4.88	1.18
Toyota	Landcruiser	98-00	4.31	3.13	5.92	2.79
Commercial Cars			**2.83**	**2.65**	**3.02**	**0.36**
Ford	Falcon Panel Van	82-95	2.68	2.06	3.49	1.43
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90	3.01	2.55	3.55	1.00
Ford	Falcon Ute	96-99	3.41	2.40	4.85	2.46
Ford	Ford F-Series	82-92	6.25	4.42	8.84	4.42
Ford	Transit	94-00	3.15	1.88	5.29	3.41
Holden	Commodore Ute VG/VP	90-93	2.71	1.69	4.32	2.63
Holden	Rodeo	82-85	3.85	2.16	6.85	4.69
Holden	Rodeo	89-95	3.78	3.16	4.53	1.37
Holden	Rodeo	96-98	2.29	1.54	3.39	1.85
Holden	Rodeo	99-00	3.08	1.68	5.64	3.95
Holden	WB Series	82-85	3.00	2.09	4.32	2.22
Holden	Commodore Ute VR/VS	94-00	3.01	2.39	3.78	1.39
Nissan	720 Ute	82-85	1.83	1.10	3.03	1.93
Nissan	Navara	86-91	2.70	2.07	3.54	1.47

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Nissan	Navara	92-96	2.40	1.58	3.63	2.05
Subaru	Brumby	82-93	2.46	1.53	3.95	2.41
Toyota	Hiace/Liteace	82-86	2.42	1.82	3.22	1.40
Toyota	Hiace/Liteace	87-89	3.26	2.34	4.54	2.20
Toyota	Hiace/Liteace	90-00	2.67	2.13	3.35	1.22
Volkswagon	Caravelle / Transporter	88-00	4.69	3.10	7.09	3.99
Large Cars			**2.42**	**2.33**	**2.50**	**0.17**
Ford	Falcon XE/XF	82-88	2.63	2.43	2.84	0.41
Ford	Falcon EA / Falcon EB Series I	88-Mar 92	2.81	2.58	3.06	0.47
Ford	Falcon EB Series II / Falcon ED	Apr 92-94	3.18	2.83	3.57	0.75
Ford	Falcon EF/EL	94-98	2.56	2.32	2.83	0.51
Ford	Falcon AU	98-00	2.31	1.77	3.01	1.25
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93	2.39	2.19	2.61	0.42
Holden / Toyota	Commodore VR/VS / Lexcen	93-97	2.44	2.21	2.69	0.48
Holden	Commodore VT/VX	97-00	2.56	2.15	3.04	0.89
Holden	Commodore VB-VL	82-88	2.58	2.38	2.81	0.43
Hyundai	Sonata	89-97	2.22	1.56	3.15	1.60
Mitsubishi	Magna TM/TN/TP	85-90	2.15	1.88	2.45	0.57
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00	2.46	2.16	2.79	0.63
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96	2.49	2.15	2.87	0.72
Nissan	Skyline	82-90	2.66	2.08	3.40	1.32
Holden / Toyota	Apollo JM / JP / Camry	93-97	2.28	2.00	2.61	0.61
Toyota	Camry	98-00	2.71	2.10	3.48	1.38
Luxury Cars			**2.25**	**2.08**	**2.43**	**0.34**
BMW	3 Series	82-91	2.12	1.46	3.07	1.61
BMW	3 Series	92-98	2.75	1.99	3.80	1.81
Ford	Fairlane Z & LTD F	82-87	2.41	1.84	3.16	1.31
Ford	Fairlane N & LTD D	88-94	2.12	1.65	2.73	1.08
Ford	Fairlane N & LTD D	95-98	2.68	1.78	4.04	2.25
Holden	Stateman/Caprice VQ	90-93	3.00	1.77	5.07	3.30
Holden	Stateman/Caprice VR/VS	94-98	2.44	1.70	3.51	1.81
Mazda	929	82-90	1.92	1.38	2.68	1.29
Mercedes Benz	E-Class W124	86-95	3.65	2.34	5.69	3.35
Honda	Legend	86-95	3.25	1.82	5.80	3.98

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Honda	Accord	82-85	2.94	1.97	4.40	2.43
Honda	Accord	86-90	2.06	1.34	3.17	1.83
Honda	Accord	91-93	2.18	1.24	3.84	2.59
Honda	Accord	94-98	2.43	1.59	3.71	2.12
Toyota	Crown/Cressida	82-85	3.53	2.57	4.86	2.29
Toyota	Cressida	89-93	1.87	1.20	2.92	1.72
Volvo	850/S70/V70/C70	92-00	3.47	2.18	5.53	3.35
Volvo	200 Series	82-93	2.09	1.43	3.05	1.62
Volvo	700/900 Series	84-92	2.12	1.37	3.28	1.91
Medium Cars			**2.07**	**1.96**	**2.17**	**0.21**
Daewoo	Nubira	97-00	3.17	1.82	5.54	3.72
Ford	Cortina	82-82	2.17	1.58	3.00	1.42
Ford	Mondeo	95-00	2.60	1.60	4.24	2.65
Holden	Camira	82-89	1.97	1.66	2.33	0.67
Holden	Vectra	97-00	2.10	1.16	3.80	2.64
Mitsubishi	Sigma/Scorpion	82-86	2.02	1.73	2.36	0.63
Mitsubishi	Galant	95-96	2.11	1.23	3.61	2.38
Ford / Mazda	Telstar / 626/MX6	83-86	2.17	1.77	2.66	0.89
Ford / Mazda	Telstar / 626/MX6	88-91	3.37	2.63	4.31	1.68
Ford / Mazda	Telstar / 626/MX6	92-97	1.85	1.34	2.55	1.21
Nissan	Pintara	86-88	2.46	1.92	3.16	1.23
Nissan / Ford	Pintara / Corsair	89-92	2.49	2.05	3.02	0.97
Nissan	Bluebird	82-86	2.01	1.69	2.40	0.71
Subaru	1800/ Leone	82-95	1.39	1.02	1.91	0.89
Subaru	Liberty	89-94	2.15	1.59	2.91	1.32
Subaru	Liberty	95-98	3.15	2.04	4.87	2.83
Toyota	Corona	82-87	2.11	1.84	2.41	0.57
Toyota	Camry	83-86	2.68	2.08	3.46	1.38
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92	2.27	2.02	2.55	0.53
Passenger Vans			**2.48**	**2.18**	**2.83**	**0.65**
Mitsubishi	Starwagon/L300	82-86	2.97	2.16	4.07	1.91
Mitsubishi	Starwagon	87-94	2.79	2.15	3.62	1.47
Mitsubishi	Starwagon	95-00	2.28	1.43	3.61	2.18
Toyota	Tarago	83-89	2.84	2.18	3.70	1.52
Toyota	Tarago	91-99	1.73	1.07	2.78	1.71
Small Cars			**1.79**	**1.71**	**1.87**	**0.16**
Daihatsu	Charade	82-86	1.50	0.86	2.59	1.73
Daihatsu	Charade	88-92	1.42	1.03	1.94	0.91
Daihatsu	Charade	93-00	1.56	1.07	2.26	1.19
Daihatsu	Applause	89-99	2.02	1.36	3.02	1.66
Daewoo	Cielo	95-97	1.83	1.19	2.82	1.63

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Daewoo	Lanos	97-00	2.59	1.65	4.05	2.40
Ford	Laser	91-94	2.12	1.75	2.55	0.80
Ford	Laser	95-98	3.12	2.29	4.27	1.98
Ford	Festiva WD/WD/WH/WF	94-00	2.05	1.56	2.70	1.15
Holden	Gemini	82-84	1.54	1.18	2.00	0.82
Holden	Gemini RB	86-87	2.14	1.18	3.85	2.67
Holden	Astra TR	96-98	3.26	1.84	5.77	3.93
Holden	Barina SB	95-00	2.54	1.89	3.41	1.53
Hyundai	Excel	82-89	1.80	1.25	2.57	1.31
Hyundai	Excel	90-94	1.73	1.39	2.17	0.78
Hyundai	Excel	95-00	2.28	1.94	2.67	0.73
Hyundai	Lantra	91-95	2.73	1.80	4.14	2.34
Hyundai	Lantra	96-00	1.63	1.01	2.61	1.60
Mitsubishi	Colt	82-88	1.90	1.59	2.28	0.69
Mitsubishi	Lancer CA	88-90	1.73	1.30	2.29	0.99
Mitsubishi	Lancer CC	93-95	1.49	1.08	2.08	1.00
Mitsubishi	Lancer CE/Mirage	96-00	2.22	1.73	2.85	1.13
Mitsubishi	Cordia	82-89	3.24	2.24	4.69	2.45
Ford / Mazda	Laser / 323	82-88	1.67	1.49	1.87	0.38
Mazda	323	90-93	0.88	0.52	1.48	0.96
Mazda	323	95-98	1.85	1.24	2.76	1.53
Ford / Mazda	Festiva WA / 121	91-93 / 87-90	1.82	1.41	2.33	0.92
Mazda	121	94-96	1.72	1.04	2.87	1.83
Holden / Nissan	Astra / Pulsar/Vector	84-86	1.69	1.38	2.09	0.71
Holden / Nissan	Astra / Pulsar/Vector	88-90	2.23	1.87	2.67	0.80
Nissan	Pulsar	92-95	2.16	1.65	2.82	1.17
Nissan	Pulsar	96-99	3.02	2.31	3.95	1.64
Honda	Civic	84-87	2.82	1.95	4.06	2.11
Honda	Civic	88-91	2.20	1.60	3.02	1.42
Honda	Civic	92-95	2.17	1.56	3.02	1.46
Honda	Civic	96-00	1.21	0.70	2.09	1.39
Subaru	Impreza	93-00	2.40	1.50	3.83	2.33
Holden / Suzuki	Barina / Swift	85-88	2.07	1.48	2.90	1.42
Holden / Suzuki	Barina / Swift	89-93 / 89-99	1.49	1.20	1.85	0.65
Toyota	Corolla	82-84	1.40	1.12	1.76	0.65
Toyota	Corolla	86-88	1.87	1.56	2.25	0.69
Toyota / Holden	Corolla / Nova	89-93	2.06	1.79	2.37	0.58
Toyota / Holden	Corolla / Nova	94-98 / 94-96	1.93	1.57	2.36	0.79
Toyota	Starlet	96-99	2.06	1.36	3.12	1.76

Make	Model of Car	Years of Manufacture	Serious injury rate per 100 drivers involved	Lower 90% Confidence Limit	Upper 90% Confidence Limit	Width of Confidence Interval
Sports Cars			**2.24**	**1.98**	**2.53**	**0.55**
Ford	Capri	89-94	1.91	1.17	3.12	1.94
Nissan	Exa	83-86	5.22	2.87	9.48	6.61
Nissan	NX/NX-R	91-96	6.06	3.72	9.88	6.15
Honda	Prelude	83-91	1.25	0.78	2.01	1.23
Honda	Prelude	92-96	2.86	1.76	4.65	2.88
Honda	Integra	93-00	3.98	2.19	7.24	5.04
Toyota	Celica	81-85	2.87	2.07	3.97	1.90
Toyota	Celica	86-89	2.93	2.01	4.27	2.27
Toyota	Celica	90-93	2.47	1.62	3.78	2.16
Toyota	Supra	82-90	6.11	3.28	11.39	8.11

APPENDIX 6

PRESENTATION OF CRASHWORTHINESS AND AGGRESSIVITY RATINGS FOR CONSUMER INFORMATION

CRASHWORTHINESS AND AGGRESSIVITY RATINGS
Victoria and NSW Data (1987-2000), Queensland and Western Australia Data (1991-2000)

			CRASHWORTHINESS					AGGRESSIVITY
Make	**Model of Car**	**Years of Manufacture**	**Significantly less than 20% better than average**	**Significantly better than average but not significantly less than 20% better than average**	**Not significantly different from average**	**Significantly worse than average but not significantly greater than 20% worse than average**	**Significantly greater than 20% worse than average**	**✓✓ = Much better than average ✓ = Better than average o = Average x = Worse than average xx = Much worse than average**
4-Wheel Drive Vehicles								xx
Daihatsu	Feroza	89-97						o
Daihatsu	Rocky	84-99						
Holden	Jackaroo	82-91						xx
Holden	Jackaroo	92-97						
Mitsubishi	Pajero	82-90						x
Mitsubishi	Pajero	92-99						o
Jeep	Cherokee	82-00						o
Land Rover	Discovery	91-00						
Nissan	Patrol	82-87						x
Nissan / Ford	Patrol / Maverick	88-97						xx
Nissan	Patrol	98-00						xx
Nissan	Pathfinder	88-94						
Nissan	Pathfinder	95-00						x
Lada	Niva	83-98						
Honda	CR-V	97-00						
Land Rover	Range Rover	82-94						xx
Suzuki	Vitara	88-98						o
Holden / Suzuki	Drover / Sierra	85-87 / 82-00						✓
Toyota	4Runner/Hilux	82-85						x
Toyota	4Runner/Hilux	86-88						o
Toyota	Hilux	89-97						o
Toyota	Hilux	98-00						o
Toyota	Landcruiser	82-89						xx
Toyota	Landcruiser	90-97						xx
Toyota	Landcruiser	98-00						xx
Toyota	RAV4	94-00						
Commercial Vehicles								x
Daihatsu	Handivan	82-90						
Ford	Falcon Panel Van	82-95						o

			CRASHWORTHINESS					AGGRESSIVITY
Make	**Model of Car**	**Years of Manufacture**	**Significantly less than 20% better than average**	**Significantly better than average but not significantly less than 20% better than average**	**Not significantly different from average**	**Significantly worse than average but not significantly greater than 20% worse than average**	**Significantly greater than 20% worse than average**	**✓✓ = Much better than average ✓ = Better than average o = Average x = Worse than average xx = Much worse than average**
Ford / Nissan	Falcon Ute / XFN Ute	82-95 / 88-90						x
Ford	Falcon Ute	96-99						x
Ford	Ford F-Series	82-92						xx
Ford	Transit	94-00						o
Holden	Commodore Ute VG/VP	90-93						o
Holden	Rodeo	82-85						o
Holden	Rodeo	86-88						
Holden	Rodeo	89-95						xx
Holden	Rodeo	96-98						o
Holden	Rodeo	99-00						o
Holden	Shuttle	82-87						
Holden	WB Series	82-85						
Holden	Commodore Ute VR/VS	94-00						x
Nissan	720 Ute	82-85						o
Nissan	Navara	86-91						o
Nissan	Navara	92-96						o
Honda	Acty	83-86						
Subaru	Brumby	82-93						o
Holden / Suzuki	Scurry / Carry	85-87 / 82-00						
Suzuki	Mighty Boy	85-88						
Toyota	Hiace/Liteace	82-86						o
Toyota	Hiace/Liteace	87-89						o
Toyota	Hiace/Liteace	90-00						o
Volkswagon	Caravelle / Transporter	88-00						xx
Large Cars								o
Ford	Falcon XE/XF	82-88						x
Ford	Falcon EA / Falcon EB Series I	88-Mar 92						x
Ford	Falcon EB Series II / Falcon ED	Apr 92-94						x
Ford	Falcon EF/EL	94-98						o
Ford	Falcon AU	98-00						o
Holden / Toyota	Commodore VN/VP / Lexcen	89-93 / 89-93						o
Holden /	Commodore	93-97						o

			CRASHWORTHINESS					AGGRESSIVITY
Make	**Model of Car**	**Years of Manufacture**	**Significantly less than 20% better than average**	**Significantly better than average but not significantly less than 20% better than average**	**Not significantly different from average**	**Significantly worse than average but not significantly greater than 20% worse than average**	**Significantly greater than 20% worse than average**	**✓✓ = Much better than average ✓ = Better than average o = Average x = Worse than average xx = Much worse than average**
Toyota	VR/VS / Lexcen							
Holden	Commodore VT/VX	97-00						o
Holden	Commodore VB-VL	82-88						x
Hyundai	Sonata	89-97						o
Mitsubishi	Magna TM/TN/TP	85-90						o
Mitsubishi	Magna TE/TF/TH/TJ / Verada KE/KF/KH/KJ	96-00						o
Mitsubishi	Verada KR/KS / Magna TR/TS	91-96						o
Nissan	Skyline	82-90						o
Holden / Toyota	Apollo JM / JP / Camry	93-97						o
Toyota	Camry	98-00						o
Luxury Cars								o
BMW	3 Series	82-91						o
BMW	3 Series	92-98						o
BMW	5 Series	82-88						
BMW	5 Series	89-95						
Ford	Fairlane Z & LTD F	82-87						o
Ford	Fairlane N & LTD D	88-94						o
Ford	Fairlane N & LTD D	95-98						o
Holden	Statesman/Caprice WB	82-85						
Holden	Stateman/Caprice VQ	90-93						o
Holden	Stateman/Caprice VR/VS	94-98						o
Jaguar	XJ6	82-86						
Mazda	929	82-90						o
Mercedes	C-Class W201	87-94						

			CRASHWORTHINESS					AGGRESSIVITY
Make	**Model of Car**	**Years of Manufacture**	**Significantly less than 20% better than average**	**Significantly better than average but not significantly less than 20% better than average**	**Not significantly different from average**	**Significantly worse than average but not significantly greater than 20% worse than average**	**Significantly greater than 20% worse than average**	**✓✓ = Much better than average ✓ = Better than average o = Average x = Worse than average xx = Much worse than average**
Benz								
Mercedes Benz	C-Class W202	95-00						
Mercedes Benz	E-Class W123	82-85						
Mercedes Benz	E-Class W124	86-95						o
Mercedes Benz	S-Class W126	82-92						
Nissan	Maxima	90-94						
Nissan	Maxima	95-99						
Honda	Legend	86-95						o
Honda	Accord	82-85						o
Honda	Accord	86-90						o
Honda	Accord	91-93						o
Honda	Accord	94-98						o
Saab	900 Series	82-93						
Saab	9000	86-98						
Toyota	Crown/Cressida	82-85						x
Toyota	Crown/Cressida	86-88						
Toyota	Cressida	89-93						o
Volvo	850/S70/V70/C70	92-00						o
Volvo	200 Series	82-93						o
Volvo	700/900 Series	84-92						o
Medium Cars								✓
Daewoo	Espero	95-97						
Daewoo	Nubira	97-00						o
Ford	Mondeo	95-00						o
Holden	Camira	82-89						✓
Holden	Vectra	97-00						o
Mitsubishi	Sigma/Scorpion	82-86						✓
Mitsubishi	Nimbus	84-91						
Mitsubishi	Nimbus	92-98						
Mitsubishi	Galant	95-96						o
Ford / Mazda	Telstar / 626/MX6	83-86						o
Ford / Mazda	Telstar / 626/MX6	88-91						x
Ford / Mazda	Telstar / 626/MX6	92-97						o
Nissan	Pintara	86-88						o
Nissan / Ford	Pintara / Corsair	89-92						o
Nissan	Bluebird	82-86						o

			CRASHWORTHINESS					AGGRESSIVITY
Make	**Model of Car**	**Years of Manufacture**	**Significantly less than 20% better than average**	**Significantly better than average but not significantly less than 20% better than average**	**Not significantly different from average**	**Significantly worse than average but not significantly greater than 20% worse than average**	**Significantly greater than 20% worse than average**	**✓✓ = Much better than average ✓ = Better than average o = Average x = Worse than average xx = Much worse than average**
Nissan	Stanza	82-83						
Nissan	Gazelle	84-88						
Nissan	Prairie	84-86						
Nissan	Bluebird	93-97						
Peugeot	405	89-97						
Peugeot	505	82-93						
Subaru	1800/ Leone	82-95						✓
Subaru	Liberty	89-94						o
Subaru	Liberty	95-98						o
Toyota	Corona	82-87						o
Toyota	Camry	83-86						o
Holden / Toyota	Apollo JK/JL / Camry	89-92 / 88-92						o
Passenger Vans								o
Mitsubishi	Starwagon/L300	82-86						o
Mitsubishi	Starwagon	87-94						o
Mitsubishi	Starwagon	95-00						o
Toyota	Tarago	83-89						o
Toyota	Tarago	91-99						o
Small Cars								✓✓
Alfa Romeo	33	83-92						
Daihatsu	Charade	82-86						o
Daihatsu	Charade	88-92						✓
Daihatsu	Charade	93-00						✓
Daihatsu	Applause	89-99						o
Daihatsu	Mira	90-96						
Daewoo	1.5i	94-95						
Daewoo	Cielo	95-97						o
Daewoo	Lanos	97-00						o
Ford	Laser	91-94						o
Ford	Laser	95-98						o
Ford	Festiva WD/WD/WH/WF	94-00						o
Holden	Gemini	82-84						✓
Holden	Gemini RB	86-87						o
Holden	Astra TR	96-98						o
Holden	Barina SB	95-00						o

			CRASHWORTHINESS					AGGRESSIVITY
Make	**Model of Car**	**Years of Manufacture**	**Significantly less than 20% better than average**	**Significantly better than average but not significantly less than 20% better than average**	**Not significantly different from average**	**Significantly worse than average but not significantly greater than 20% worse than average**	**Significantly greater than 20% worse than average**	**✓✓ = Much better than average ✓ = Better than average o = Average x = Worse than average xx = Much worse than average**
Hyundai	Excel	82-89						o
Hyundai	Excel	90-94						✓
Hyundai	Excel	95-00						o
Hyundai	S Coupe	90-96						
Hyundai	Lantra	91-95						o
Hyundai	Lantra	96-00						o
Mitsubishi	Colt	82-88						✓
Mitsubishi	Lancer CA	88-90						✓
Mitsubishi	Lancer CC	93-95						✓
Mitsubishi	Lancer CE/Mirage	96-00						o
Mitsubishi	Cordia	82-89						o
Ford / Mazda	Laser / 323	82-88						✓✓
Mazda	323	90-93						✓✓
Mazda	323	95-98						o
Ford / Mazda	Festiva WA / 121	91-93 / 87-90						✓
Mazda	121	94-96						o
Mazda	121 Metro	97-00						
Holden / Nissan	Astra / Pulsar/Vector	84-86						✓
Holden / Nissan	Astra / Pulsar/Vector	88-90						o
Nissan	Pulsar	92-95						o
Nissan	Pulsar	96-99						o
Nissan	Micra	95-97						
Honda	Civic	82-83						
Honda	Civic	84-87						o
Honda	Civic	88-91						o
Honda	Civic	92-95						o
Honda	Civic	96-00						✓
Honda	Concerto	88-93						
Honda	City	83-86						
Rover	Quintet	82-86						
Subaru	Sherpa/Fiori	89-92						
Subaru	Impreza	93-00						o
Holden / Suzuki	Barina / Swift	85-88						o
Holden / Suzuki	Barina / Swift	89-93 / 89-99						✓✓
Suzuki	Hatch	82-85						
Suzuki	Baleno	95-00						
Toyota	Corolla	82-84						✓✓

			CRASHWORTHINESS					AGGRESSIVITY
Make	**Model of Car**	**Years of Manufacture**	**Significantly less than 20% better than average**	**Significantly better than average but not significantly less than 20% better than average**	**Not significantly different from average**	**Significantly worse than average but not significantly greater than 20% worse than average**	**Significantly greater than 20% worse than average**	**✓✓ = Much better than average ✓ = Better than average o = Average x = Worse than average xx = Much worse than average**
Toyota	Corolla	86-88						✓
Toyota / Holden	Corolla / Nova	89-93						✓
Toyota / Holden	Corolla / Nova	94-98 / 94-96						✓
Toyota	Corolla	98-00						
Toyota	Tercel	83-88						
Toyota	Starlet	96-99						o
Volkswagen	Golf	95-98						
Sports Cars								o
Ford	Capri	89-94						o
Hyundai	Coupe	96-00						
Mazda	RX7	82-85						
Mazda	MX5	89-97						
Nissan	300ZX	86-97						
Nissan	Exa	83-86						xx
Nissan	Exa	87-91						
Nissan	NX/NX-R	91-96						xx
Nissan	200SX	94-00						
Honda	CRX	87-91						
Honda	Prelude	83-91						✓
Honda	Prelude	92-96						o
Honda	Integra	86-88						
Honda	Integra	90-92						
Renault	Feugo	82-87						
Toyota	Celica	81-85						o
Toyota	Celica	86-89						o
Toyota	Celica	90-93						o
Toyota	Celica	94-99						
Toyota	Supra	82-90						xx
Toyota	Paseo	91-99						

APPENDIX 7

CRASHWORTHINESS, INJURY RISK AND INJURY SEVERITY ESTIMATES BY YEAR OF VEHICLE MANUFACTURE

INJURY RISK BY YEAR OF VEHICLE MANUFACTURE

Year of Manufacture	Coefficient of Car Model	Standard Error of Coefficient	Pr(Risk) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
AVERAGE CAR	**-1.5941**		**16.88**			
1964	0.3283	0.0554	22.00	20.19	23.92	3.73
1965	0.4037	0.0625	23.32	21.20	25.58	4.38
1966	0.2420	0.0559	20.55	18.82	22.40	3.58
1967	0.3211	0.0434	21.87	20.46	23.36	2.91
1968	0.2649	0.0384	20.93	19.71	22.20	2.49
1969	0.2680	0.0341	20.98	19.89	22.11	2.22
1970	0.2800	0.0256	21.18	20.35	22.03	1.68
1971	0.2064	0.0231	19.98	19.26	20.71	1.45
1972	0.2303	0.0218	20.36	19.68	21.06	1.39
1973	0.2353	0.0201	20.44	19.81	21.09	1.28
1974	0.2016	0.0160	19.90	19.41	20.41	1.00
1975	0.0959	0.0162	18.27	17.80	18.75	0.95
1976	0.0830	0.0146	18.08	17.66	18.51	0.85
1977	0.0371	0.0150	17.41	16.99	17.83	0.85
1978	0.0258	0.0131	17.25	16.88	17.62	0.73
1979	-0.0575	0.0123	16.09	15.77	16.42	0.65
1980	-0.0136	0.0119	16.69	16.37	17.02	0.65
1981	-0.0365	0.0114	16.37	16.07	16.68	0.61
1982	-0.0429	0.0109	16.29	16.00	16.58	0.58
1983	-0.0332	0.0114	16.42	16.12	16.73	0.61
1984	-0.1002	0.0105	15.52	15.25	15.79	0.54
1985	-0.0680	0.00996	15.95	15.69	16.21	0.52
1986	-0.1353	0.0112	15.07	14.79	15.35	0.56
1987	-0.1585	0.0119	14.77	14.48	15.07	0.59
1988	-0.1631	0.0112	14.71	14.44	14.99	0.55
1989	-0.2083	0.0108	14.16	13.90	14.42	0.51
1990	-0.1811	0.0112	14.49	14.22	14.76	0.54
1991	-0.1961	0.0123	14.30	14.01	14.60	0.59
1992	-0.2210	0.0126	14.00	13.71	14.30	0.59
1993	-0.2608	0.0130	13.53	13.23	13.83	0.60
1994	-0.2366	0.0129	13.82	13.52	14.12	0.60
1995	-0.2836	0.0139	13.27	12.96	13.58	0.63
1996	-0.2060	0.0152	14.18	13.83	14.55	0.73
1997	-0.2286	0.0162	13.91	13.54	14.30	0.76
1998	-0.2071	0.0171	14.17	13.77	14.58	0.82
1999	-0.1774	0.0215	14.54	14.02	15.07	1.05
2000	-0.2580	0.0400	13.56	12.67	14.51	1.84

INJURY SEVERITY BY YEAR OF VEHICLE MANUFACTURE

Year of Manufacture	Coefficient of Car Model	Standard Error of Coefficient	Pr(Severity) %	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
AVERAGE CAR	**-1.2086**		**23.00**			
1964	0.2119	0.0899	26.96	23.63	30.57	6.93
1965	-0.0016	0.1050	22.97	19.53	26.81	7.28
1966	0.0893	0.0881	24.61	21.55	27.96	6.40
1967	0.0676	0.0707	24.21	21.76	26.85	5.08
1968	0.0844	0.0629	24.52	22.31	26.88	4.56
1969	0.3085	0.0529	28.90	26.82	31.08	4.26
1970	0.1742	0.0415	26.22	24.68	27.83	3.15
1971	0.1561	0.0381	25.87	24.47	27.33	2.86
1972	0.1321	0.0363	25.42	24.09	26.79	2.70
1973	0.1403	0.0330	25.57	24.36	26.82	2.46
1974	0.0504	0.0277	23.90	22.93	24.90	1.97
1975	0.0973	0.0274	24.76	23.78	25.78	2.00
1976	0.0114	0.0256	23.20	22.32	24.10	1.79
1977	0.0428	0.0264	23.76	22.84	24.71	1.87
1978	-0.0088	0.0235	22.84	22.04	23.66	1.62
1979	0.00933	0.0221	23.16	22.40	23.94	1.54
1980	-0.0554	0.0220	22.03	21.30	22.78	1.48
1981	-0.0117	0.0212	22.79	22.07	23.53	1.46
1982	-0.0162	0.0202	22.71	22.02	23.41	1.39
1983	-0.0568	0.0213	22.00	21.30	22.73	1.43
1984	-0.0531	0.0198	22.07	21.41	22.74	1.33
1985	-0.0335	0.0190	22.41	21.77	23.06	1.29
1986	-0.0631	0.0214	21.90	21.19	22.62	1.43
1987	-0.0473	0.0228	22.17	21.41	22.95	1.54
1988	-0.0555	0.0219	22.03	21.30	22.77	1.47
1989	-0.0833	0.0215	21.55	20.85	22.27	1.42
1990	-0.1036	0.0223	21.21	20.49	21.95	1.46
1991	-0.1135	0.0254	21.05	20.23	21.89	1.65
1992	-0.1198	0.0263	20.94	20.10	21.81	1.71
1993	-0.1031	0.0272	21.22	20.34	22.13	1.78
1994	-0.1874	0.0279	19.85	18.99	20.73	1.74
1995	-0.1628	0.0302	20.24	19.30	21.21	1.91
1996	-0.2030	0.0341	19.60	18.57	20.67	2.11
1997	-0.1641	0.0370	20.22	19.07	21.41	2.34
1998	-0.1875	0.0419	19.84	18.57	21.18	2.61
1999	-0.1719	0.0550	20.09	18.42	21.88	3.46
2000	0.00669	0.0904	23.11	20.12	26.41	6.30

CRASHWORTHINESS BY YEAR OF VEHICLE MANUFACTURE

Year of Manufacture	Pr(Risk) %	Pr(Severity) %	Serious injury rate per 100 drivers involved	Overall rank order	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
AVERAGE CAR	**3.88**		**3.88**				
1964	22.00	26.96	5.93	36	5.08	6.92	1.83
1965	23.32	22.97	5.36	34	4.45	6.44	1.98
1966	20.55	24.61	5.06	28	4.33	5.92	1.59
1967	21.87	24.21	5.30	33	4.68	6.00	1.32
1968	20.93	24.52	5.13	29	4.60	5.73	1.14
1969	20.98	28.90	6.06	37	5.54	6.64	1.10
1970	21.18	26.22	5.55	35	5.17	5.97	0.80
1971	19.98	25.87	5.17	30	4.84	5.52	0.68
1972	20.36	25.42	5.18	31	4.86	5.51	0.65
1973	20.44	25.57	5.23	32	4.94	5.54	0.60
1974	19.90	23.90	4.76	27	4.53	4.99	0.46
1975	18.27	24.76	4.52	26	4.31	4.75	0.43
1976	18.08	23.20	4.19	25	4.01	4.39	0.38
1977	17.41	23.76	4.14	24	3.95	4.33	0.38
1978	17.25	22.84	3.94	23	3.78	4.11	0.33
1979	16.09	23.16	3.73	21	3.58	3.87	0.29
1980	16.69	22.03	3.68	19	3.54	3.82	0.29
1981	16.37	22.79	3.73	22	3.60	3.87	0.28
1982	16.29	22.71	3.70	20	3.57	3.83	0.26
1983	16.42	22.00	3.61	18	3.48	3.75	0.27
1984	15.52	22.07	3.43	16	3.31	3.55	0.24
1985	15.95	22.41	3.57	17	3.46	3.69	0.24
1986	15.07	21.90	3.30	15	3.18	3.43	0.25
1987	14.77	22.17	3.27	14	3.15	3.41	0.26
1988	14.71	22.03	3.24	13	3.12	3.37	0.25
1989	14.16	21.55	3.05	10	2.94	3.17	0.23
1990	14.49	21.21	3.07	11	2.96	3.20	0.24
1991	14.30	21.05	3.01	9	2.88	3.15	0.27
1992	14.00	20.94	2.93	8	2.80	3.07	0.27
1993	13.53	21.22	2.87	6	2.74	3.01	0.27
1994	13.82	19.85	2.74	2	2.61	2.88	0.27
1995	13.27	20.24	2.68	1	2.55	2.83	0.28
1996	14.18	19.60	2.78	3	2.62	2.95	0.33
1997	13.91	20.22	2.81	5	2.64	3.00	0.36
1998	14.17	19.84	2.81	4	2.62	3.02	0.40
1999	14.54	20.09	2.92	7	2.66	3.21	0.55
2000	13.56	23.11	3.13	12	2.69	3.65	0.96

APPENDIX 8

CRASHWORTHINESS, INJURY RISK AND INJURY SEVERITY ESTIMATES BY YEAR OF VEHICLE MANUFACTURE BY MARKET GROUP

CRASHWORTHINESS BY YEAR OF VEHICLE MANUFACTURE BY MARKET GROUP

Year of Manufacture	Pr(Risk) %	Pr(Severity) %	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
Four Wheel Drives						
1982	17.70%	21.65%	3.83%	3.73%	3.93%	0.20%
1983	15.27%	23.71%	3.62%	3.53%	3.72%	0.19%
1984	15.26%	22.03%	3.36%	3.31%	3.42%	0.11%
1985	17.77%	25.43%	4.52%	4.47%	4.56%	0.09%
1986	14.92%	17.44%	2.60%	2.54%	2.67%	0.13%
1987	16.48%	22.98%	3.79%	3.69%	3.89%	0.20%
1988	14.69%	25.02%	3.68%	3.62%	3.73%	0.11%
1989	14.65%	21.00%	3.08%	3.04%	3.12%	0.08%
1990	14.89%	19.33%	2.88%	2.84%	2.92%	0.08%
1991	13.72%	21.55%	2.96%	2.90%	3.01%	0.11%
1992	14.11%	21.57%	3.04%	3.00%	3.09%	0.09%
1993	14.00%	25.91%	3.63%	3.58%	3.68%	0.10%
1994	13.93%	19.27%	2.68%	2.63%	2.74%	0.11%
1995	12.91%	20.61%	2.66%	2.59%	2.74%	0.15%
1996	13.65%	24.48%	3.34%	3.25%	3.43%	0.18%
1997	13.88%	21.32%	2.96%	2.87%	3.06%	0.19%
1998	15.89%	21.68%	3.45%	3.34%	3.55%	0.22%
1999	14.39%	21.64%	3.11%	2.93%	3.32%	0.39%
2000	11.21%	21.29%	2.39%	1.76%	3.23%	1.47%
Commercial						
1982	18.03%	23.76%	4.28%	4.21%	4.37%	0.16%
1983	18.70%	28.59%	5.35%	5.25%	5.45%	0.20%
1984	17.73%	25.48%	4.52%	4.45%	4.58%	0.13%
1985	18.96%	24.86%	4.71%	4.65%	4.78%	0.13%
1986	18.09%	21.77%	3.94%	3.87%	4.00%	0.13%
1987	17.63%	16.91%	2.98%	2.90%	3.07%	0.17%
1988	16.91%	24.42%	4.13%	4.06%	4.19%	0.13%
1989	15.77%	23.13%	3.65%	3.59%	3.70%	0.11%
1990	15.41%	20.92%	3.22%	3.16%	3.29%	0.13%
1991	14.80%	25.02%	3.70%	3.62%	3.79%	0.16%
1992	14.23%	22.91%	3.26%	3.18%	3.34%	0.17%
1993	14.39%	26.63%	3.83%	3.74%	3.93%	0.19%
1994	14.62%	26.44%	3.86%	3.78%	3.96%	0.18%
1995	14.93%	23.32%	3.48%	3.40%	3.57%	0.17%
1996	15.53%	18.22%	2.83%	2.73%	2.94%	0.21%
1997	16.63%	20.73%	3.45%	3.32%	3.58%	0.26%
1998	15.33%	18.32%	2.81%	2.65%	2.98%	0.33%
1999	18.07%	17.11%	3.09%	2.80%	3.41%	0.61%
2000	22.02%	25.49%	5.61%	4.32%	7.29%	2.97%
Large						
1982	15.28%	23.91%	3.65%	3.64%	3.67%	0.03%
1983	15.86%	24.72%	3.92%	3.90%	3.94%	0.04%
1984	15.62%	23.38%	3.65%	3.64%	3.67%	0.03%
1985	15.31%	23.30%	3.57%	3.56%	3.58%	0.02%

Year of Manufacture	Pr(Risk) %	Pr(Severity) %	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
1986	15.26%	21.92%	3.34%	3.33%	3.35%	0.02%
1987	14.75%	22.71%	3.35%	3.34%	3.36%	0.02%
1988	14.58%	22.52%	3.28%	3.27%	3.29%	0.02%
1989	14.25%	22.73%	3.24%	3.23%	3.25%	0.02%
1990	15.00%	22.24%	3.34%	3.33%	3.35%	0.02%
1991	14.55%	20.88%	3.04%	3.03%	3.05%	0.03%
1992	14.46%	20.51%	2.97%	2.95%	2.98%	0.03%
1993	13.67%	21.14%	2.89%	2.88%	2.90%	0.02%
1994	14.10%	20.55%	2.90%	2.89%	2.91%	0.02%
1995	14.03%	19.73%	2.77%	2.76%	2.78%	0.03%
1996	14.74%	18.58%	2.74%	2.72%	2.76%	0.03%
1997	14.54%	20.75%	3.02%	3.00%	3.04%	0.05%
1998	15.12%	18.47%	2.79%	2.76%	2.82%	0.06%
1999	15.50%	19.66%	3.05%	3.00%	3.10%	0.10%
2000	16.73%	19.74%	3.30%	3.15%	3.47%	0.32%
Luxury						
1982	15.86%	22.96%	3.64%	3.59%	3.70%	0.11%
1983	15.46%	22.01%	3.40%	3.34%	3.47%	0.13%
1984	14.15%	24.17%	3.42%	3.36%	3.48%	0.12%
1985	14.88%	20.13%	2.99%	2.94%	3.05%	0.10%
1986	13.34%	22.26%	2.97%	2.90%	3.04%	0.15%
1987	14.04%	19.67%	2.76%	2.67%	2.86%	0.19%
1988	12.55%	25.25%	3.17%	3.09%	3.24%	0.15%
1989	12.30%	23.70%	2.92%	2.86%	2.97%	0.11%
1990	11.97%	19.71%	2.36%	2.31%	2.41%	0.11%
1991	13.51%	18.87%	2.55%	2.46%	2.64%	0.18%
1992	12.04%	22.15%	2.67%	2.58%	2.75%	0.17%
1993	12.08%	19.94%	2.41%	2.31%	2.51%	0.20%
1994	12.43%	20.39%	2.54%	2.45%	2.63%	0.18%
1995	12.28%	22.20%	2.73%	2.64%	2.82%	0.18%
1996	12.80%	20.41%	2.61%	2.48%	2.75%	0.27%
1997	13.86%	18.20%	2.52%	2.33%	2.72%	0.39%
1998	13.89%	20.20%	2.81%	2.53%	3.12%	0.59%
1999	14.45%	12.63%	1.82%	1.20%	2.77%	1.56%
2000	20.64%	12.06%	2.49%	0.93%	6.67%	5.74%
Medium						
1982	17.78%	22.74%	4.04%	4.03%	4.06%	0.03%
1983	17.51%	21.32%	3.73%	3.72%	3.75%	0.03%
1984	17.22%	22.00%	3.79%	3.77%	3.80%	0.03%
1985	17.83%	23.13%	4.12%	4.11%	4.14%	0.03%
1986	16.90%	23.60%	3.99%	3.96%	4.02%	0.06%
1987	16.79%	21.06%	3.53%	3.50%	3.57%	0.07%
1988	15.73%	23.29%	3.66%	3.64%	3.69%	0.05%
1989	16.49%	22.21%	3.66%	3.64%	3.68%	0.04%
1990	14.91%	22.95%	3.42%	3.40%	3.44%	0.04%
1991	15.78%	23.52%	3.71%	3.68%	3.74%	0.06%
1992	15.02%	20.58%	3.09%	3.06%	3.13%	0.07%
1993	12.20%	24.19%	2.95%	2.86%	3.04%	0.18%
1994	12.98%	20.21%	2.62%	2.53%	2.72%	0.18%
1995	13.35%	23.66%	3.16%	3.04%	3.28%	0.23%

Year of Manufacture	Pr(Risk) %	Pr(Severity) %	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
1996	14.39%	24.91%	3.58%	3.44%	3.73%	0.29%
1997	15.21%	20.29%	3.09%	2.93%	3.26%	0.33%
1998	16.06%	20.43%	3.28%	3.11%	3.46%	0.34%
1999	15.63%	25.56%	4.00%	3.74%	4.27%	0.53%
2000	13.59%	15.62%	2.12%	1.49%	3.02%	1.52%
Passenger Vans						
1982	23.53%	33.00%	7.77%	7.45%	8.09%	0.64%
1983	21.76%	25.48%	5.54%	5.41%	5.68%	0.28%
1984	21.03%	27.38%	5.76%	5.63%	5.88%	0.25%
1985	22.46%	20.85%	4.68%	4.53%	4.84%	0.31%
1986	20.84%	25.87%	5.39%	5.13%	5.67%	0.54%
1987	18.44%	18.65%	3.44%	3.04%	3.88%	0.84%
1988	16.69%	20.54%	3.43%	3.21%	3.66%	0.45%
1989	19.24%	25.84%	4.97%	4.79%	5.16%	0.37%
1990	16.69%	23.93%	3.99%	3.70%	4.31%	0.61%
1991	17.73%	21.32%	3.78%	3.51%	4.07%	0.56%
1992	17.14%	10.87%	1.86%	1.56%	2.22%	0.66%
1993	16.35%	27.35%	4.47%	4.09%	4.89%	0.79%
1994	17.58%	21.67%	3.81%	3.42%	4.25%	0.83%
1995	13.32%	24.95%	3.32%	2.80%	3.95%	1.15%
1996	16.96%	15.82%	2.68%	1.99%	3.61%	1.61%
1997	17.10%	13.20%	2.26%	1.37%	3.73%	2.37%
1998	10.42%	14.31%	1.49%	0.72%	3.09%	2.36%
1999	18.35%	12.67%	2.33%	0.88%	6.15%	5.27%
2000	13.74%	64.43%	8.85%	2.48%	31.57%	29.09%
Small						
1982	20.34%	24.02%	4.88%	4.87%	4.90%	0.03%
1983	20.97%	22.26%	4.67%	4.65%	4.68%	0.03%
1984	19.52%	21.84%	4.26%	4.25%	4.28%	0.03%
1985	21.47%	24.16%	5.19%	5.17%	5.20%	0.03%
1986	19.41%	23.00%	4.46%	4.45%	4.48%	0.03%
1987	19.47%	24.10%	4.69%	4.67%	4.71%	0.04%
1988	19.13%	22.70%	4.34%	4.33%	4.36%	0.03%
1989	18.25%	24.21%	4.42%	4.40%	4.43%	0.03%
1990	17.96%	24.06%	4.32%	4.31%	4.34%	0.03%
1991	18.28%	23.25%	4.25%	4.24%	4.26%	0.03%
1992	17.83%	23.85%	4.25%	4.24%	4.27%	0.03%
1993	18.23%	23.23%	4.24%	4.22%	4.25%	0.03%
1994	18.71%	21.27%	3.98%	3.96%	4.00%	0.03%
1995	17.57%	23.32%	4.10%	4.08%	4.11%	0.03%
1996	18.98%	22.11%	4.20%	4.18%	4.22%	0.04%
1997	19.23%	23.41%	4.50%	4.48%	4.53%	0.05%
1998	18.86%	23.59%	4.45%	4.42%	4.48%	0.06%
1999	18.93%	21.48%	4.07%	4.01%	4.12%	0.12%
2000	16.93%	29.55%	5.00%	4.83%	5.19%	0.36%
Sports						
1982	17.16%	22.54%	3.87%	3.72%	4.02%	0.30%
1983	17.58%	22.43%	3.94%	3.78%	4.11%	0.33%
1984	17.83%	21.71%	3.87%	3.71%	4.04%	0.33%
1985	17.19%	22.17%	3.81%	3.63%	4.00%	0.37%

Year of Manufacture	Pr(Risk) %	Pr(Severity) %	Serious injury rate per 100 drivers involved	Lower 95% Confidence Limit	Upper 95% Confidence Limit	Width of Confidence Interval
1986	16.47%	19.31%	3.18%	3.00%	3.37%	0.37%
1987	16.09%	26.18%	4.21%	3.96%	4.48%	0.51%
1988	15.02%	22.55%	3.39%	3.23%	3.55%	0.33%
1989	16.40%	24.17%	3.96%	3.82%	4.11%	0.29%
1990	16.59%	23.92%	3.97%	3.85%	4.09%	0.23%
1991	16.25%	21.33%	3.47%	3.30%	3.64%	0.33%
1992	16.79%	26.14%	4.39%	4.24%	4.55%	0.31%
1993	16.36%	21.64%	3.54%	3.33%	3.76%	0.43%
1994	14.93%	25.76%	3.85%	3.59%	4.12%	0.53%
1995	14.84%	21.86%	3.24%	2.79%	3.77%	0.99%
1996	15.32%	25.35%	3.88%	3.48%	4.33%	0.84%
1997	15.02%	24.58%	3.69%	3.22%	4.23%	1.01%
1998	22.06%	22.66%	5.00%	3.84%	6.51%	2.67%
1999	19.00%	13.78%	2.62%	0.92%	7.45%	6.53%
2000	13.27%	42.91%	5.70%	1.78%	18.28%	16.51%