Risk rating - supplementary information

Levy Consultation 2015/16

PREVENTION. CARE. RECOVERY.
Te Kaporeihana Āwhina Hunga Whara

Risk rating light passenger vehicles

A report published by the US National Highway Traffic Safety Administration investigated the link between crash outcome in terms of fatal and serious injuries and the three system components – road user, vehicles and the road design. While all three components are present in many crashes, the investigation found the road design was the most important component in crashes with fatal outcomes, and the vehicle's design (especially safety features) was "the most important component to reduce serious injury outcomes and injuries leading to permanent medical impairment[1]".

A growing body of evidence is emerging on how vehicle safety technology can lower the severity of injury (or even avoid injury) and reduce the time required away from work, the cost of treatment and amount of rehabilitation required. We have used the following information when considering adopting risk rating based on how a vehicle's design impacts on injury outcome:

- The Insurance Institute for Highway Safety's July 2012 Status report which demonstrated the benefits seen from a number of safety technologies to both property and injury insurers. We would recommend having a look at the information on their website (www.iihs.org/crash_avoidance).
- Monash University's 2009 report which showed that improved secondary safety in New Zealand vehicles saved around 1,900 lives between 1991 and 2006.
- Adelaide University's 2011 report that looked at the cost benefit ratios of emerging safety technology.

Mistakes happen when we drive. The type of vehicle we drive can determine how much that mistake costs us.

Many of the conversations about vehicle safety focus on how well the vehicle protects its driver (safety experts call this crashworthiness). It is what the Government's advice for consumers focuses on and what many vehicle manufacturers talk about when discussing their vehicles. For us this is important but we are also interested in whether the vehicle is designed to reduce injury to other people involved in the crash whether they are in another vehicle, riding a cycle or just walking.

With vulnerable road users (cyclists, pedestrians and motorcyclists) forming a larger proportion of the deaths and serious injuries on NZ roads, we want our risk rating to take account of how vehicle design impacts this (safety experts call this the aggressivity of a vehicle).

Not all vehicles provide their occupants and other road users with the same level of protection when they are in a crash. In general newer vehicles have benefitted from advances in vehicle safety design and do a better job at absorbing the forces in a crash than older vehicles.

However, not all older vehicles have poor safety design. So we can't simply say that vehicles built from a certain date are safer. We have had to find a better way of working out how safe a vehicle is.

We approached Monash University who have a team of scientists that specialise in vehicle safety. They work out the safety ratings for used cars that are published on the Government's RightCar website and similar websites owned by different State Governments in Australia. They have recommended using the results of crashes in both Australia and New Zealand (there are similar vehicles in each country) to work out how the design of the vehicle impacts the outcome of injury severity, and therefore cost, to the Motor Vehicle Account.

[1] Use of car crashes resulting in injuries to identify system weaknesses. Stigson H, Kullgren A, Krafft M. Downloaded from http://www-nrd.nhtsa.dot.gov/pdf/esv/esv22/22ESV-000338.pdf

Over a number of years Monash University has developed the total secondary safety index (TSSI) measure that scores each vehicle on how well it protects its occupants and other people involved in the crash. This is referred to as a vehicles 'agressivity'. The algorithm used removes most of the other factors involved in the crash such as speed zone the crash occurred in, age and sex of the driver, and number of vehicles involved in the crash. This results in the most accurate indicator of vehicle crash outcomes as a risk based on existing information.

We have consulted with vehicle safety experts in the NZ Transport Agency about combining a vehicle's crashworthiness and aggressivity to provide the best view of the role vehicle design has in the outcome of a crash which may involve a number of vehicles or even pedestrians and cyclists.

We noted in last year's levy consultation that we considered some alternative options to the TSSI but believe that this is the best option to use in risk rating of light passenger vehicles. An overview of the options considered has been included in the appendix.

The proposed levy rates

Each year Monash University analyses crash information from NZ and Australia since 1991. They then determine the TSSI for approximately 600 groups of vehicles. If this proposal is accepted, this information will be passed to us to be included in the levy setting process each year.

The TSSI for each vehicle group may change between years as the crash information that informs the index changes. It is possible therefore, that the index can change significantly between years if the previous year has seen a lot of crashes involving a particular type of vehicle. As the number of crashes associated with each vehicle group increases, certainty of how the vehicle's design provides protection in the crash improves. This results in a reduced fluctuation of the TSSI for that vehicle group.

Having a different levy for each of the 600 groups of vehicles is not practicable, so we will aggregate the vehicle groups into a number of bands. Each band has a different levy rate.

The greater the number of levy bands, the higher the likelihood that vehicles will move between bands in successive years. While some movement between bands is inevitable as the total secondary safety index stabilises, we would like to provide stable levies over time where possible. We have decided that four bands will provide reasonable differentiation of the levy across the 2.6 million vehicles and ensure that movement between bands occurs only when necessary.

The table below sets out the proposed levy bands, the range of TSSI scores within the band, the proportion of light passenger vehicles that are in the band and the proposed licence levy (assuming that the petrol levy remains unchanged from its current 9.9 cents per litre charge and based on our proposal to reduce the average Motor Vehicle Account levy). We are proposing to lower the licence levy for all passenger vehicles.

Band	Range of TSSI scores	% light passenger vehicles	Proposed licence levy rate (assuming no change in the petrol levy)	Change from 2014/15 levy
1	3.90% or higher	20%	$125.45	-$73.20
2	3.50% - 3.90%	18%	$90.45	-$108.20
3	3.10% - 3.50%	26%	$70.45	-$128.20
4	0 - 3.10%	35%	$35.45	-$163.20

The non-petrol driven vehicles pay the total levy when the vehicle is licenced each year. The proposed levy rates are set out in the table below. As we expect petrol consumption to decrease this year, we have adjusted the licence levy downward slightly to ensure non-petrol driven vehicles pay the same average levy as petrol driven vehicles. For this reason the reduction in levy rates is a little more for non-petrol driven vehicles.

Band	Range of TSSI scores	% light passenger vehicles	Proposed licence levy rate	Change from 2014/15 levy
1	3.90% or higher	20%	$244.52	-$77.07
2	3.50% - 3.90%	18%	$209.52	-$112.07
3	3.10% - 3.50%	26%	$189.52	-$132.07
4	0 - 3.10%	35%	$154.52	-$167.07

We are also consulting on reducing the petrol levy to ensure that our collection of levy, based on the amount of travel, reflects the risk that travel contributes in accident prediction models. If the petrol levy changes a balancing change must occur in the licence levy to ensure we collect the total levy required. Our proposal is to reduce the petrol levy which will result in an increase in the licence levy. The impact of the proposed petrol levy changes on the licence levies of petrol driven vehicles in each band is set out in the table below:

Band	Proposed licence levy rate		Change from 2014/15 levies	
	petrol levy @ 9.9 cents/ litre	petrol levy @ 5.9 cents/litre	petrol levy @ 9.9 cents/litre	petrol levy @ 5.9 cents/ litre
1	$125.45	$173.83	-$73.20	-$24.82
2	$90.45	$138.83	-$108.20	-$59.82
3	$70.45	$118.83	-$128.20	-$79.82
4	$35.45	$83.83	-$163.20	-$114.82

How do I know what levy band my vehicle is in?

Since we last consulted over this proposal we have been finalising the tools and analysis required to be able to provide a list of vehicles and the levy band they belong to. We have developed a document that contains all the vehicles by make, model and year that we have assigned to a levy band. The document can be found on our website by clicking here: www.acc.co.nz/levyconsultation

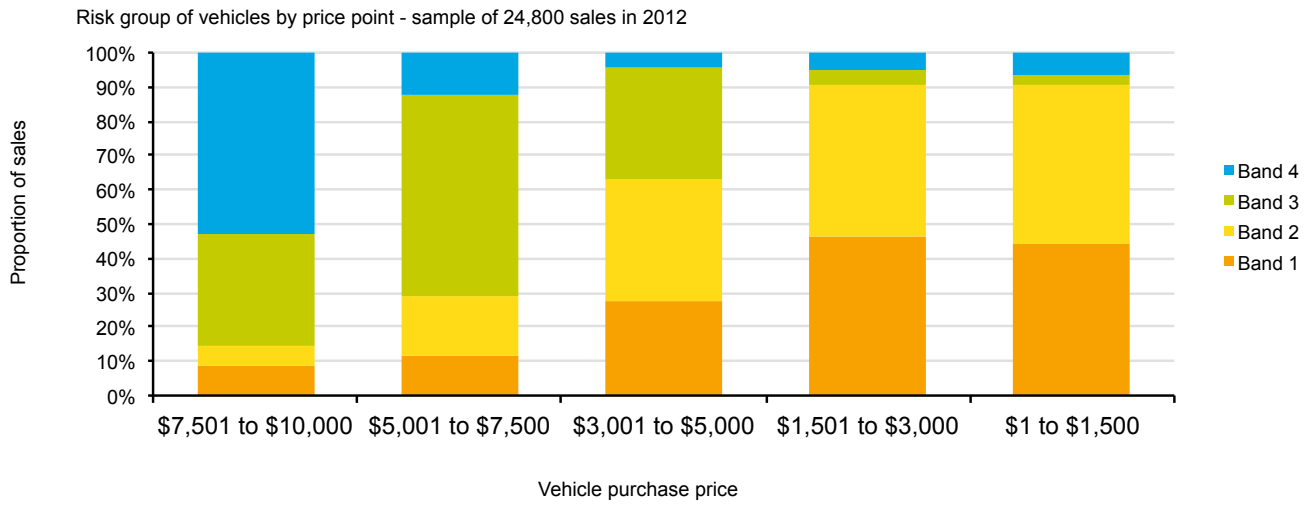
If you cannot find a vehicle in the document then it will be assigned to a levy band by using the default rules set out in the following pages.

Do only new car owners benefit from lower levies?

Last year we reviewed a sample of 24,800 vehicle sales with a price of $10,000 or less.

We found that 80% of vehicles priced between $5,001 and $10,000 would be classified in two of our bands with the lowest levies (bands 3 and 4). As the purchase price of the vehicle gets lower than $5,000 there are fewer vehicles in bands 3 and 4. However, even in vehicle sales from $1 to $1,500 there were five types of vehicles that would be placed into band 4 and will have lower annual licence levies.

The graph below summarises ACC's findings from its sample of 24,800 vehicles sales under $10,000.



Approach to vehicles with little or no crash involvement

There are a number of situations where a total secondary safety score cannot be assigned to a vehicle. Some examples are rare and exotic vehicles, a new make of vehicle entering the country (either new or used imports) or a new model from a manufacturer (either a brand new model to NZ like the Ford Kuga introduced in 2013, or a model

update like the 2014 Honda Accord). To cope with these situations we have developed a series of rules to allocate these vehicles to a levy band.

Inheritance

Where possible a new model will inherit the TSSI from the previous model and be allocated to the appropriate levy band. We have adopted this rule as ,in general, manufacturers strive to improve safety in a model line over time.

We understand there continues to be exceptions to the general trend to improve safety in a model over time. However, adopting this approach provides a stronger basis for determining the levy band than the alternative which is to apply the default rule discussed below only.

Default

In situations where insufficient crash data is available for a TSSI to be developed, we are proposing to default those vehicles to bands which best reflect the crash data for the year of manufacture. The default rules will apply to cars which have had a small manufacturing run including rare or exotic cars and new cars.

Where there is no TSSI available:

- and the year of manufacture is prior to 2003 the vehicle will default to band 3
- and the year of manufacture is 2003 or more recent the vehicle will default to band 4.

The use of new vehicle crash test star ratings

We are considering whether there is value in using the ANCAP star rating to inform the levy band for new vehicles only. There are a number of challenges to consider in this proposal:

- Not all vehicles are crash tested - it is not compulsory
- Not all vehicles have a crash test rating when they are introduced to the market – what approach should be adopted while we wait for the test results?
- How long do the crash tests apply for – do we keep them for a defined period (2 or 3 years) or until a total secondary safety index score is determined for the vehicle?
- Does the benefit (ensuring new vehicles with poor crash test results get charged a higher levy) outweigh the complexity and cost of implementing this approach?

The 5-star crash testing rating could be mapped to the four levy bands in the following way:

5 star vehicles	-	band 4
4 star vehicles	-	band 3
3 star vehicles	-	band 2
1 and 2 star vehicles	-	band 1

We would like to hear from you as to whether you would prefer us to use the new car crash testing outcomes to place new vehicles into levy bands rather than rely on a combination of the inheritance and default rules outlined above. We are still working through how this could be implemented if it gains your support so your thoughts on this proposal will be of great value.

Managing vehicles moving between levy bands

As we mentioned above, vehicles are likely to move between levy bands over time. Ideally we believe this movement should only occur when there is confidence the change in bands is necessary and enduring.

We have developed the following principles to govern the movement of vehicles between levy bands:

- for a vehicle to transition to a new levy band, it should move at least halfway into the new levy band;
- vehicles should not jump levy bands (i.e., a vehicle should only ever transition to an adjacent levy band);
- upward transitions should not be immediately followed by downward transitions, and vice versa.

We would appreciate your feedback as to whether these principles make sense and work in the way you would expect.

Is the levy rate providing safety information to consumers?

Our use of the TSSI for risk rating does differentiate between vehicles designed with safety in mind from those where safety is a lesser design consideration. We have designed the risk rating to recognise the lower cost of injuries that occur when travelling in vehicles where high levels of safety have been considered when the vehicle is designed and manufactured.

Prioritising safety when you consider buying a vehicle is something we want to encourage. We believe that to continue to see the personal, community and workplace cost from road crashes reduce, choosing a safer vehicle to drive is something we all should do.

Not everyone can afford a newer vehicle which has the latest safety technology. However, everyone can make a choice to select the safest vehicle they can afford. When you choose to do that, we want to ensure that what we charge you to cover the risk of injury to you and the people who travel in your vehicle, reflects your choice of vehicle.

The best information on the safety of vehicles and the different technologies that provide safety benefits can be found on the Government's RightCar website. If you want to know about the safety of the car you drive now, or are thinking about changing your car we encourage you to visit the RightCar website (www.rightcar.govt.nz) and look through the great information there.

When we determine our levy bands we consider the consumer vehicle safety advice available and set our bands in such a way to maximise the alignment of the levy bands with the consumer advice.

The table below shows how our proposed levy bands align with the vehicle safety star ratings available through the RightCar website.

How ACC's risk groups align with the UCSR

Used car safety ratings	ACC levy band 1	2	3	4	
1	81%	19%	0%	0%	100%
2	40%	50%	10%	0%	100%
3	7%	42%	46%	5%	100%
4	3%	10%	41%	46%	100%
5	0%	1%	28%	71%	100%

Of the 1.27m vehicles with a RightCar star rating, around 84% (1,060,000) are assigned to an ACC levy band that would be expected from the RightCar star rating result (given the difference in numbers of groups between the two systems – 5 stars vs 4 bands).

Where there is not alignment it is generally small affordable cars that have lower aggressivity that benefit from a better levy band (lower levy) than expected. It is generally heavier vehicles with fairly blunt front-ends that are found to be more aggressive and so have been assigned to a lower levy band (higher levy) than expected.

Risk rating - supplementary information appendix

Levy Consultation 2015/16

Risk rating of vehicle design's influence on crash outcomes

International research has demonstrated the value of improved vehicle safety design on both crash avoidance and harm minimisation to vehicle occupants. For example the presence of side curtain airbags reduces the risk of a catastrophic brain injury by 30%. The field of vehicle safety engineering is showing rapid progress with exemplar vehicles now able to take over control of the steering, braking and acceleration of a vehicle when the risk of collision is high. It has been estimated by Monash University that 30% of the reduction in fatal and serious injuries in New Zealand between 1991 and 2006 was due to improving vehicle safety standards.

In response to this information and the large group of vehicles (approximately 2.6 million) that basically get charged the same levy, we started work on a proposal to use impact of vehicle design on the outcome of vehicle crashes as a risk rating factor within the Motor Vehicle Account. As we don't identify crashes or the vehicles involved in our claim data an external source for this data is required.

We considered a number of options on how to use available data as an input to the risk rating process. The options we considered are outlined below:

Use of ANCAP star rating for vehicle risk rating

We evaluated the use of the ANCAP rating system against the requirements for the risk rating proposal. While the ANCAP rating system is suitable for new cars, not every vehicle is tested (it is a voluntary scheme) and the system itself evolves over time. This evolution results in an ever increasing standard of safety being required to meet the 5 star rating.

The cost of crash testing vehicles is expensive. As such it is rare for a vehicle to be tested over multiple years to assess its current safety relative to the evolving standard. The use of the ANCAP rating system on its own was rejected as an option for our risk rating proposal as it was not possible to use the system to assess current relative safety of the vehicles across the fleet. Without this ability a risk rating approach cannot be implemented.

ANCAP star rating remains the best source of information for new vehicles that have not been involved in many crashes. We are considering whether we could use ANCAP star rating as the risk factor until real world crash data is available for the vehicle in question.

Use of the Used Car Safety Rating (UCSR) data for vehicle risk rating

The UCSR system is designed to provide relative vehicle safety information by using real world crash data that is refreshed each year.

However, as the primary use for this data is consumer information programmes such as RightCar in NZ, the data only focuses on impacts to the drivers of vehicles (crashworthiness) and a high credibility score is required for the vehicle to be included in the programme. The high credibility score removes over 50% of the light vehicle fleet in New Zealand from the programme.

The limited scope of the UCSR programme and its focus on only driver outcomes meant the programme was not an optimal fit for the objectives of our risk rating proposal.

Use of total secondary safety index for risk rating

Monash University (Melbourne, Australia) works with six State Governments in Australia and the New Zealand Government to provide data for the Used Car Safety Rating scheme which supports each Government's consumer information programme on vehicles safety.

We approached Monash University to develop an approach to analysing the crash data they had available to them that would allow ACC to implement risk rating for the impact vehicle design has on crash outcome. They proposed the use of the total secondary safety index and a hierarchical grouping system that allowed 95% of the target fleet to be allocated to a total secondary safety index score.

The approach developed by Monash University represents the best alignment with the objectives and constraints associated with ACC's desire to increase the use of risk rating in the Motor Vehicle Account.