Reduced Vehicle Import Restrictions:

Cost Benefit Analysis

FINAL REPORT

Report to the Commonwealth Government of Australia

Department of Infrastructure and Regional Development

March 2015

Acronyms and Abbreviations

AAA	Australian Automotive Association
AFLA	Australian Fleet Lessors Association
AUD	Australian Dollar
FCAI	Federal Chamber of Automotive Industries
NHTSA	National Highway Traffic Safety Authority (US)
NPV	Net Present Value
RAWS	Registered Automotive Workshop Scheme
RHD	Right Hand Drive
UK	United Kingdom
US	United States

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Executive Summary

Australia restricts personal imports of new and used vehicles. As a result almost all vehicles sold in Australia are imported by manufacturers or their authorised agents. A recent Productivity Commission[1] report stated that allowing personal imports of vehicles would lead to lower vehicle prices and greater vehicle variety.

The Commission's report has been contested by the vehicle manufacturing industry, which argues that personal imports would lead to lower safety standards and higher maintenance costs.

The Government is considering relaxing restrictions on personal imports. Castalia was initially engaged to assess the costs and benefits of deregulating the trade in used car imports to facilitate importation into Australia. That analysis found that a sizeable trade from Japan to Australia could emerge if deregulation was pursued and regulation was not too onerous. But while deregulation would have overall net benefits, it also has significant safety and environmental costs.

The Government has now engaged Castalia to evaluate the costs and benefits under 3 possible reduced vehicle import restriction policy changes. These changes would remove restrictions on:

- The personal importation of new vehicles
- The importation of used cars 3 years or younger
- The importation of used cars 5 years or younger

We find significant net benefits would accrue from deregulating the trade

Market analysis identifies that there are arbitrage opportunities in the Japanese and UK new car markets. These opportunities are not universally found across the market but rather in limited segments and models. Nevertheless a market share weighted analysis of these opportunities finds that there is the potential for 1.9% decrease in overall costs.

Market analysis also identifies that there are arbitrage opportunities for second hand imports in the 3 and 5 year age brackets from Japan. This is in line with our previous findings. However in this age bracket there is a limited supply of vehicles which limits the expected impacts.

Our ten year cost benefit analysis shows that de-regulating personal new imports only would result in net benefits of $703 million and would provide net safety and environmental benefits. Net benefits would increase to $1,166 million when de-regulating used imports up to the age of five years.

This result is driven by:

- Consumer welfare benefits from an expected fall in price and increase in model variant availability
- Low costs from changes due to muted fleet ageing effects under these scenarios and an increase in new car sales as prices fall

There are two key factors that limit adverse safety or environmental costs:

[1] Productivity Commission (2014) Australia's Automotive Manufacturing Industry, Inquiry Report, No. 70, 31 March

- Cars are cheaper so there is a tendency to retire them earlier
- Limiting the age to less than three or five years old reduces the ageing effect of used imports compared to the earlier study

The result is subject to some caveats

The Japanese used market has limited volumes less than 3 or 5 year old. A significant trade from Australia might lift this price over time and reduce arbitrage opportunities.

Safety costs might increase if cars have lower safety standards. However specific issues can be regulated where they are known about. One example of this is in the higher standard of some child restraint rules in Australia. In general we do not believe that there are consistently lower regulatory standards in the UK or Japan compared to Australia.

There would be no trade if the regulatory requirements are sufficiently high to eliminate the arbitrage.

The response to deregulation by incumbent dealers could be to lower price which would limit the eventual volume of trade. This would not mean that the consumer welfare benefits are lost. Therefore estimating volume is difficult but not critical to the analysis.

1 Introduction and Background

The Commonwealth Government is reviewing the *Motor Vehicle Standards Act 1989* (the Act). The Act delivers national standards for new motor vehicles and regulates the first supply of used imported vehicles to the Australian market.

The review is looking for options to reduce the regulatory burden on business and to improve the safety, environmental and anti-theft provisions of the Act. One potential option is to reduce current restrictions on used car imports. This option has been raised by the Productivity Commission, which found the policy rationale for this restriction was not strong.

1.1 Castalia Report of July 2014

Our previous report looked at the costs and benefits of deregulating used imports into Australia. This report showed that there are significant net welfare gains to be realised from deregulating the trade in used imported cars. Our analysis found that these gains are in the range of $805 million to $1,943 million in net present value terms.

The biggest driver of this result was gains in consumer welfare from an expected fall in price and increase in volume of used cars. The biggest cost was the increased safety risk from an ageing fleet.

Market analysis found that deregulation would lead to used import volume growth up to 100,000 per annum mostly from Japan

In that report, our estimate of the expected used import sales volumes was between 50,000 to 100,000 per annum. Our view was that it would take some time to build up the trade and that it would likely fluctuate as market conditions change, as has been the experience in other countries that import used cars.

Either price reductions or increased variety and choice would drive the demand for used cars, with price being the dominant factor. The Japanese market was found to be the likely source of the used imports. Auction price analysis showed arbitrage opportunities between Japanese and Australian used car prices. Arbitrage opportunities were shown to be sufficient to absorb regulatory costs and transport costs. No other markets showed significant promise as a source of used cars after considering standards, arbitrage opportunities and left hand drive requirements.

Our report found that the factors other than price that would influence the level of volumes included:

- The degree to which Australia adopts Japanese standards and facilitates pre-approval of these cars for Australian use
- The extent of competition for the purchase of used cars in Japan as other countries deregulate or market conditions fluctuate
- The extent that the Australian trade impacts the price of used cars in Japan (100,000 is around 10% of the Japanese export trade)
- Japanese economic factors (as any slowdown will shrink the available supply)
- Exchange rates (in particular, a fall in the AUD will make Japanese used car imports less attractive)

1.2 Limited Deregulation in this Report

Castalia has now been commissioned to evaluate the costs and benefits under 3 specific reduced vehicle import restriction policy changes. Respectively, these involve lifting restrictions on:

- The personal importation of new vehicles
- The importation of used cars 3 years or younger
- The importation of used cars 5 years or younger

The effect of lifting restrictions under any of these policy changes depends primarily on the degree of price differentials between Australian and relevant import car markets (i.e. price arbitrage opportunities), and whether other factors will conspire to undermine this opportunity (such as regulatory costs or market conditions).

This will require:

- A market assessment of price arbitrage opportunities in potential markets
- A predicted market response from Australian consumers and producers

We will then make an assessment of the costs and benefits on the basis of consumer welfare benefits, safety and environmental costs.

Our analysis is limited to an assessment of opportunities in the UK and Japanese markets due to similar RHD drive conditions and similar safety regulations. The previous report found that these were the only two markets that were likely to generate trade in any case.

2 Market Analysis

The price arbitrage opportunities for the importing of new cars into Australia are assessed with reference to listed prices in potential markets[2]. These price opportunities might exist if car manufacturers were to engage in differential pricing strategies in different markets. Allowing personal importation would undermine that strategy and increase competition, thereby reducing price. A further opportunity might exist if a wider range of models were available in foreign markets relative to Australia and an increase in choice would lead to a consumer welfare benefit.

Therefore for a personal import trade to occur the following conditions would need to be met:

- A price differential between the new car prices in different markets needs to be present
- Cars from markets that drive on the left hand side of the road and meet other standards and requirements for use on Australian roads must be available
- The costs of importation do not exceed the price arbitrage margin
- A regulatory environment that facilitates the trade and did not impose additional costs sufficient to remove the arbitrage opportunity

[2] A potential problem in data collection is that hidden discounts might vary systematically between markets. In this report we assume that discounts are likely to exist in all markets but that the level does not vary systematically between markets – in other words we assume the listed prices of like-for-like cars is a reliable indicator of the final price paid in each market

Car manufacturers might engage in price discrimination if a lack of competition allowed supernormal margins to be made from the practice. A manufacturer's response to the relaxation of import rules might be to pre-emptively reduce price and prevent the import competition. However, this would lead to the consumer welfare benefits in any case.

2.1 Arbitrage Opportunities for New Personal Imports

We have collected an extensive database comparing vehicle prices for top selling models in Australia and/or models that have been continuously nominated for Australia's Best Cars Awards across eight key vehicle segments. We have compared the prices of these vehicles with those in UK and Japanese markets, using the manufacturer's website where possible to ascertain pricing across model variants. Direct comparisons were made between models sold in Australia with those same models sold internationally to assess the extent of the price arbitrage opportunity[3].

There are variations in the options available for each model in different markets. Therefore, in addition to 'like-for-like' comparisons we have also collected pricing data on a wide range of variants on each model.

Our research indicates that arbitrage opportunities might exist in the following markets and models detailed in Table 2.1.

Table 2.1: Identified Source Markets and Model Ranges with Price Arbitrage Opportunity

Category	Segment	Model	Source Market
Mass Market	Small Sedan	Mazda 3	Japan
	Mid Sedan	Mazda 6	Japan
		Mitsubishi Lancer	Japan
		Hyundai i40	UK
	SUV	Mazda CX-5	Japan
		Toyota Prado	Japan
		Subaru Forester	Japan
		Honda CRV	Japan
Luxury	Luxury <100k	Mercedes B Class	Japan
		Volkswagen Golf	UK
		Mercedes A Class	Japan
		Audi A3 Hatch	UK
		Mercedes C Class	UK
		BMW 3 Series	Japan
		Lexus IS	UK/ Japan
		Infiniti Q50	UK/ Japan
		Audi A4 Saloon	UK

[3] Model and variant names deviated significantly across markets and thus we categorized 'like-for-like' vehicles as those that have almost identical specifications—particular attention was given to fuel type and engine size. We note that in some instances there may be very minor difference in 'like-for 'like' comparisons

Category	Segment	Model	Source Market
	Luxury Sports	BMW Z4	UK/ Japan
		Mercedes Benz SLK	Japan/ UK
		Audi RS	Japan/ UK
		Lexus RC	Japan / UK
		Porsche Cayman	UK/ Japan
	Luxury SUVs	Lexus RX	Japan
		Audi Q3	UK
		Mercedes M Class	UK
		BMW X5	UK
Commercial	Light Commercial	Toyota Hilux	UK
		Ford Ranger	UK

While arbitrage opportunities from Japan span all the segments, those from the UK tend to be limited to the luxury segments. We also find some limited arbitrage opportunities in new commercial vehicles. Of the nine commercial models analysed in both the UK and Japanese markets, only two models from the UK market (Toyota Hilux and Ford Ranger) were identified with 'like-for-like' variants and possible arbitrage opportunities.

There are modest arbitrage opportunities for 'like-for-like' new cars in mass market segments. Within each model sold in Australia there are a number of different variances which have different price points and different specifications. We have made comparisons between Australian sold model variants to those sold in Japan and the UK, but only where 'like-for-like' comparisons were possible. There are a number of Australian variants that could not be found in the UK or Japan.

The level of the opportunities found—where model variant comparisons were possible—is summarised in Table 2.2 below.

Table 2.2: Arbitrage Opportunities for a Range of Models

Brand	Model	Arbitrage Variants Found	Price in Australia (AUD)	Final Landed Import Price (AUD)	Price Differential (AUD)	Price Differential (%)[4]	Market Share in Australia (%)~
Mass Market							
Mazda	3	2	44,020 – 46,060	41,829 – 41,829	2,191 – 4,231	7.1	<0.1*
Mitsubishi	Lancer	2	55,990 – 61,990	52,408 – 57, 544	3,582 – 4,546	6.9	1.2
Mazda	6	3	51,646 - 54,636	45,191 – 53,955	6,455 – 681	7.2	<0.1*
Hyundai	i40	2	39,288 – 50,103	38,111 – 49,239	1,177 – 864	2.4	0.2
Mazda	CX-5	6	40,799 – 54,111	36,820 – 47,180	3,979 – 6,931	9.9	1.8
Toyota	Prado	3	59,406 – 80,009	44,416 – 68,411	14,989 – 11,598	16.7	1.3
Subaru	Forester	3	32,919 – 54,309	30,166 – 41,239	2753 – 13,070	12.9	1.2

[4] The price differential is the estimated average price discount across the variants found within each model

Brand	Model	Arbitrage Variants Found	Price in Australia (AUD)	Final Landed Import Price (AUD)	Price Differential (AUD)	Price Differential (%)[4]	Market Share in Australia (%)~
Honda	CRV	2	43,224 – 47,834	35,530 – 39,058	7,694 – 8,776	18.1	1.2
VW	Golf	2	58,089 – 60,714	57,723 – 60,310	366 - 404	0.6	1.2
Luxury/Speciality							
Mercedes Benz	B-Class	4	45,421 – 51,160	42,367 – 47,536	3,054 – 3,624	7.0	0.3
Mercedes Benz	A-Class	1	84,108	73,964	10,144	12.1	0.3
Audi	A3	7	43,378 – 67,332	42,288 – 60,633	1,090 – 6,693	4.9	<0.1**
Mercedes Benz	C-Class	3	66,674 -172,197	54,248 – 124,708	12,426 – 47,488	20.3	0.8
BMW	3 Series	2	66,254 -108,348	57,110 – 81,447	3,144 – 26,902	19.3	0.6
Lexus	IS	8	63,726 – 94,231	51,741 – 74,844	11,985 – 19,387	19.0	0.2
Infiniti	Q50	7	56,178 – 80,592	51,571 – 74,622	4,607 – 5,970	7.1	<0.1**
Audi	A4	6	61,307 – 115,781	54,074 – 77,002	7,233 – 38,778	14.1	0.2
BMW	Z4	3	88,099 - 129,374	69,901 – 104,005	18,198 – 25,369	18.2	<0.1**
Mercedes Benz	SLK	2	135,190 - 175,234	122,082 – 114,104	13,108 – 61,130	22.3	<0.1**
Audi	RS	7	91,070 - 256,617	90,335 – 252,337	735 – 4,279	20.3	<0.1**
Lexus	RC	4	145,415 - 160,115	126,410 – 143,090	19,005 – 17,025	7.1	<0.1**
Porsche	Cayman	12	118,809 - 182,429	89,105 – 146,867	29,704 – 35,562	20.9	<0.1**
Lexus	RX	2	85,644 - 94,044	78,969 – 80,672	6,675 – 13,372	11.0	<0.1**
Audi	Q3	1	60,776	57,805	2,971	4.9	0.3
Mercedes	M-Class	2	110,918 – 196,758	104,549 – 188,082	6,369 – 8,675	5.1	0.3
BMW	X5	6	92,438 – 160,164	85,104 – 134,979	7,334 – 25,185	12.3	0.3
Commercial							
Toyota	Hilux	2	56,569 - 59,454	48,670 – 50,864	7,899 – 8,590	14.2	3.5
Ford	Ranger	5	48,758 - 64,508	43,209 – 59,587	5,549 – 4,921	11.1	1.9

*Assumed market share as these variants are the most expensive variants and unlikely to be representative of mass market Mazda 3and 6 models

**Assumed market share as the 100th best-selling model represents 0.2% of the Australian market share and these models are not in the top 100 best-selling models in Australia

Source: Manufacturer's website in each market, http://focus2move.com/australia-top-100-best-selling-car-models-ranking/

Given that comparisons made in Table 2.2 do not cover all the possible variants sold in Australia, an assumption must be made about whether the arbitrage identified on a sample of model variants would extend to all variants where there is no direct 'like-for-like' information. There are two possible assumptions:

- Arbitrage opportunities only exist on the market share of the specific variants compared in Table 2.2

- Arbitrage opportunities found on the variant sample would be representative of the entire market share of that model range

If arbitrage opportunities only existed on the 'like-for-like' model variants found in Table 2.2—rather than the model range—the average arbitrage opportunity would be 0.8% i.e. there would be an average 0.8% net reduction in new car prices. This is calculated by multiplying the market share of each model by the number of possible arbitrage variants divided by the total number of model variants we found in Australia. This is a fairly small number and consistent with a market that is workably competitive in most segments. In our view, this represents a more conservative arbitrage opportunity and we use this approach for estimating import volumes in Section 3.2.

If arbitrage opportunities on the 'like-for-like' model variants are representative of the entire market share of that model the average arbitrage opportunity would be 1.9%. The total market share of these vehicles is approximately 17% of total market sales. We test the sensitivity of a higher 'like-for-like' arbitrage in our cost benefit analysis in Section 4.4.

We expect models that have arbitrage opportunities may gain market share if their price fell. This is especially true of the Toyota Prado, Toyota Hilux, Mazda CX-5 variants, the Mercedes A, B, and C and the BMW 3 Series. These vehicles all represent potential mass market models, as they can sometimes be positioned in the UK and Japanese markets.

A wider range of models are available in foreign markets

Our analysis shows that there is a substantial range of model variants in international markets that are not sold or readily available in Australia. This is particularly true of diesel, hybrid and luxury model cars in the UK and Japan.

In Table 2.3 we compare the price band of model variants found in Australia to different model variants sourced from the UK and Japan.

Table 2.3: Comparison with New Model Variants by Source Market for Models that have 'Like-for-like' Arbitrage Opportunity

Model	No. Variants in Australia	Price Range in Australia	No. of New Variants in Japan	Japan Landed Import Price Range	No. of New Variants in UK	UK Landed Import Price Range
Mass Market						
Mazda 3	26	25,513 – 46,060	12	25,226 – 35,380	19	33,839 – 46,183
Mitsubishi Lancer	11	20,485 – 61,990	14	27,023 – 74,461	-	-
Mazda 6	12	37,398 – 54,636	13	37,987 – 53,286	15	38,960 – 51,761
Hyundai i40	6	36,465 – 50,103	-	-	4	36,648 – 46,340
Mazda CX-5	13	31,650 – 54,111	6	33,939 – 44,299	13	42,562 – 54,998
Toyota Prado	10	56,781 – 92,084	3	46,376 – 58,399	-	-
Subaru Forester	10	32,919 – 54,309	5	35,654 – 38,810	1	50,764
Honda CRV	11	29,990 – 50,114	-	-	13	41,264 – 59,003
VW Golf	11	22,990 – 60,714	-	-	32	33,126 – 62,262
Luxury/Specialty						
Mercedes Benz B-Class	4	45,421 – 55,360	-	-	8	40,953 – 53,983

Model	No. Variants in Australia	Price Range in Australia	No. of New Variants in Japan	Japan Landed Import Price Range	No. of New Variants in UK	UK Landed Import Price Range
Mercedes Benz A-Class	5	40,271 – 84,108	-	-	8	39,517 – 55,089
Audi A3	8	40,700 – 67,332	-	-	6	35,649 – 42,233
Mercedes Benz C-Class	6	66,674 – 172,197	1	57,362	5	51,505 – 140,793
BMW 3 Series	6	58,169 – 108,348	-	-	13	45,552 – 81,709
Lexus IS	8	63,726 – 77,463	6	58,533 – 78,808	4	48,998 – 74,844
Infiniti Q50	8	56,178 – 80,592	4	61,615 – 79,270	14	52,604 – 93,685
Audi A4	8	61,307 – 115,781	-	-	8	52,154 – 74,155
BMW Z4	3	88.099 – 129,374	5	51,834 – 84,080	-	-
Mercedes Benz SLK	4	95,079 – 175,234	1	71,843	4	62,062 – 74,917
Audi RS	6	91,070 – 256,617	1	136,452	-	-
Lexus RC	5	72,965 – 160,115	4	78,510 – 89,105	1	124,027
Porsche Cayman	6	118,809 – 182,429	-	-	-	-
Lexus RX	7	72,965 – 109,610	8	59,314 – 89,015	2	88,819 – 98,351
Audi Q3	5	47,296 – 60,776	-	-	4	48,021 – 54,915
Mercedes M-Class	5	92,018 – 196,758	1	117,144	-	-
BMW X5	6	92,438 – 160,164	2	124,367 – 128,175	-	-
Commercial						
Toyota Hilux	23	31,416 – 59,454	4	38,795 – 44,921	-	-
Ford Ranger	24	28,492 – 64,508	-	-	5	36,507 – 46,621

* While we have attempted to find data on as many variants as possible this may not be a complete comparison of all possible variant in the market

Source: Manufacturer's website in each market

In the luxury segment there are some model variants that may offer consumers in Australia a lower pricing point—these are likely to be lower spec models. It may lead incumbent manufacturers to directly import a wider range of model variants themselves. Consumers may have a preference to import higher priced variants not currently available.

In Table 2.4 below we compare the least cost variant in the foreign markets with the least cost variant in Australia. This highlights that there are cheaper variants available outside Australia. The price advantage that this would provide represents a potential saving for Australian consumers only if they have wanted those variants but been unable to purchase them.

Table 2.4: Maximum Price Arbitrage from Least Cost Variant Pricing

Model	Minimum variant price in Australia	Minimum price of variant in UK & Japan	Max arbitrage	Market share in Australia*
Mass Market				
Toyota Corolla	23,498	20,855	-11%	3.8%
Toyota Yaris	18,345	17,542	-4%	1.3%
Toyota Prado	56,781	44,416	-22%	1.3%
Toyota Land cruiser	80,479	60,359	-25%	1.6%
Subaru Forester	32,919	30,166	-8%	1.2%
Holden Captiva	24,990	17,437	-30%	1.2%
Luxury				
Mercedes B-Class	45,421	40,953	-10%	0.3%
BMW 1-Series	35,600	33,940	-5%	0.3%
Mercedes A-Class	40,271	39,517	-2%	0.3%
Audi A3 Hatch	40,700	35,649	-12%	<0.1**
Mercedes C-Class	66,674	51,505	-23%	0.8%
BMW 3 Series	58,169	45,552	-22%	0.6%
Lexus IS	63,726	48,998	-23%	0.2%
Infiniti Q50	56,178	51,571	-8%	<0.1**
Audi A4 Saloon	61,307	48,323	-21%	0.2%
BMW Z4	88,009	51,834	-41%	<0.1**
Mercedes SLK	95,079	62,062	-35%	<0.1**
Audi RS	91,070	90,335	-1%	<0.1**
Porsche Cayman	118,809	89,105	-25%	<0.1**
Lexus RX	72,965	59,314	-19%	<0.1**
BMW X5	92,438	85,104	-8%	0.3%
Commercial				
Toyota Hiace	37,081	28,831	-22%	0.6%

* Market shares represent the share of all variants under this model

Source: Manufacturer's website in each market

Using the lowest variant price to set the maximum price arbitrage in Australia, we estimate the market share weighted price arbitrage opportunity could be as much as 2.3%. This means that if the lowest variant prices were to be applied in the Australian market there would be an overall **net 2.3% reduction in new car prices**. From our discussion above, we believe this would be an unlikely outcome for the Australian market.

There could be many reasons why model variants are restricted in Australia including:

- The scale of the Australian market is insufficient to sell the full range
- Australia consumer tastes are different
- Manufacturer's restrict supply

A deliberate restriction of variants would imply that competition has not eliminated this practice, which is a strong assumption. However, if it was a reason then an opportunity to create arbitrage through importing a wider range of variants would be possible.

We consider the deliberate restriction of variants to be a strong assumption, and therefore believe that a net 2.3% reduction in new car prices would be an unlikely outcome for the Australian market. A wider model range thus may or may not lead to an increase in personal imports. Without a 'like-for-like' price advantage it is likely that this trade would remain specialty and niche.

Diesel variants could substitute for petrol models, although volumes will be limited

A significant portion of model variants found in the UK are diesel variants. Diesel vehicles have more efficient engine cycles and therefore have higher fuel efficiencies than their petrol counterparts. Although diesel variants are usually more expensive, they provide additional fuel saving benefits.

In Table 2.5 we compare the price points and fuel efficiency of petrol variants in the Australian market to diesel variants in the UK.

Our analysis shows that diesel variants do provide additional fuel saving benefits that may warrant higher purchase prices. With the exception of a few specific models such as the BMW 3 Series and the Toyota Hilux, these savings do not generally offer fuel saving benefits to justify higher purchase costs. However, there is a wide discrepancy across models on how diesel variants are priced relative to their petrol equivalent. For example, a low cost diesel variant of the Toyota Hilux has a significantly cheaper purchase price than a low cost petrol equivalent sold in Australia.

Table 2.5: Comparison of Petrol to Diesel Model Variants between the Australian and UK Market

Model	Petrol Variants in Australia		Diesel Variants from the UK		Comparisons	
	Price Range in Australia	Average Fuel Economy L/100km	Price Range of landed imports	Average Fuel Economy L/100km	Price Difference AUD	PV of Lifecycle Fuel Savings*
Mazda 6 Sedan	37,398 – 51,646	6.6	50,236 – 62,149	4.8	10,503 - 12,838	2,260
BMW 3 Series (Sedan)	58,169 – 101,764	6.2	59,409 – 102,253	4.7	489 – 1,240	1,828
VW Golf	22,990 – 60,714	6.1	43,434 – 63,836	4.2	3,122 – 20,534	2,453
Toyota Hilux	38,035 – 73,005	9.6	40,175 – 51,696	6.3	(21,309) – 2,140	4,339

* Using petrol and diesel retail prices of $1.49 and $1.57 per litre respectively—(according to the Australian Petroleum Institute, average national fuel price in 2014), an ownership period of 10 years, a discount rate of 7% and an annual travel distance of 14,000km per year

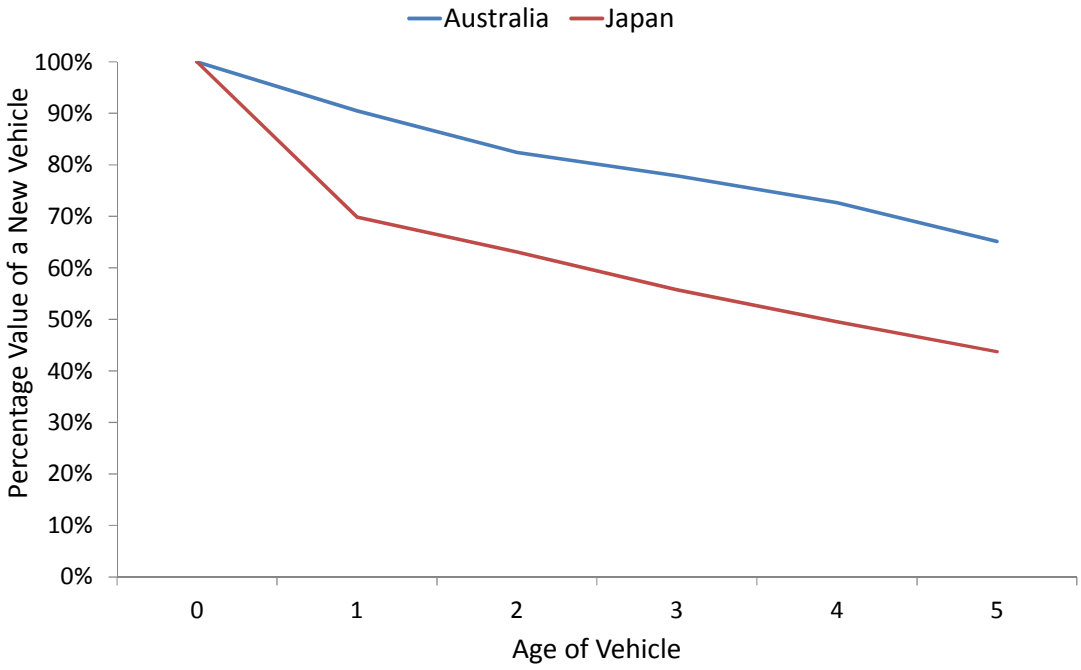
We also recognise that consumers may not choose these variants even if they offer a clear cost advantage when all the costs are considered. We expect that there will be some degree of substitution in the market for diesel variants, although we expect overall volumes will be limited.

We note that New Zealand has a relatively large number of diesel vehicles in the passenger car market. This is because New Zealand has quite different regulatory procedures for pricing diesel with a resulting pump price around $0.50 cents per litre below that of petrol.

2.2 Arbitrage Opportunities for Used Models

Japan is likely to be the major potential source for used imports. In our previous report we found substantial differences in depreciation rates that open up arbitrage opportunities as cars age, as reflected in Figure 2.1. Based on our review of used car prices in the UK and US in our previous report, other markets can be ruled out as potential significant sources of used imports.

Figure 2.1: Average Depreciation Rates in the Australian and Japanese Market

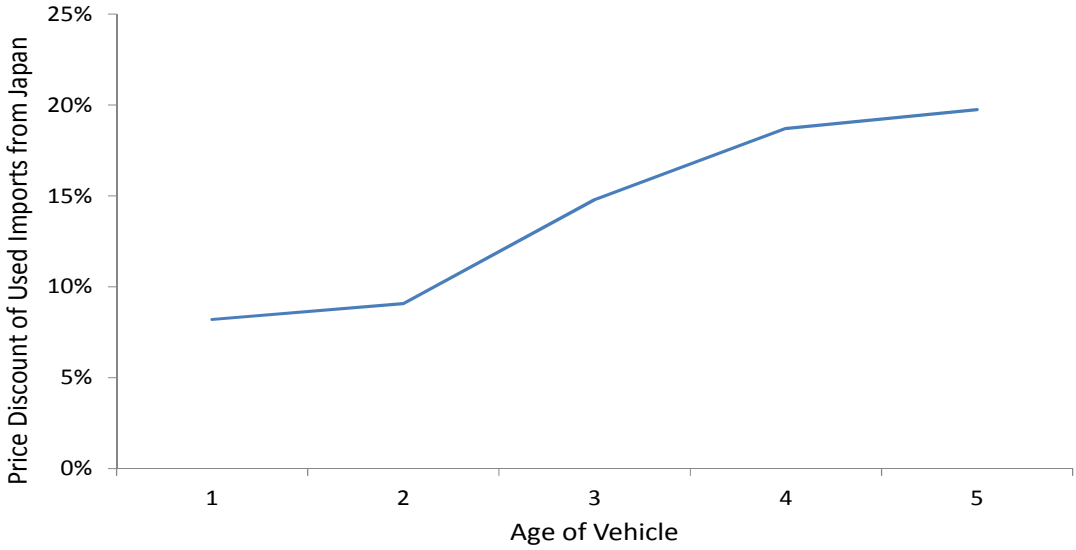


Source: Castalia Analysis based on weighted market prices of top selling European and Japanese models in the Australian and Japanese market

The price differential is sufficient to generate a profitable trade in used cars. The discount in the Australian market is shown in Figure 2.2 below. As cars age the arbitrage opportunity increases due to regulatory settings in Japan, and range from 7% for a one year old car to 20% for a five year old car.

This is based on average prices for the top selling European and Japanese cars in the Australian market.

Figure 2.2: Average Price Reduction of Landed Used Imports from Japan by Vehicle Age



Source: Castalia Analysis based on weighted landed import prices of top selling European and Japanese models from the Japanese market

As outlined in our previous report, our analysis is based on current market prices of used cars from Japan using current exchange rates. The actual price arbitrage at the point of de-regulation might be different. This is because the arbitrage available in the Japanese used vehicle market is subject to a range of factors including competition, exchange rates and regulatory factors in other destination markets.

Price differentials and the volume available will determine the impact on the Australian market

The largest market supply for used imports is between the vehicle ages of 7 and 10 years. Only 5 to 10 percent of the used vehicle trade in Japan is in the 0-5 year age bracket. Restricting used imports to less than three and five years of age would thus restrict the pool of qualifying vehicles to between five and ten percent of the total market supply in Japan of 0.5-1.0 million. There are a range of reasons for this but the dominant reason is the regulatory settings in Japan which become increasingly onerous as cars age.

We conclude that while the arbitrage opportunity detailed in Figure 2.2 is significant, this opportunity would be constrained by the volume of vehicles available in this 3 to 5 year age bracket. Thus, the marginal effect on prices in the Australian used vehicle market would be lower than if there were no constraint on the age of imported vehicles.

We expect the additional net reduction in the average Australian car price from the de-regulation of used imports would be 0.4% when restricted to three years of age and 1.1% when restricted to five years of age. This compares to a potential reduction of about 10% with no age restrictions.

2.3 Industry Views on Arbitrage Opportunities

The Department of Infrastructure and Regional Development received several submissions from key industry stakeholders regarding the review of the Act. As part of our analysis, we reviewed some of these submissions, including:

- Australian Automobile Association (AAA)—Review of the Motor Vehicle Standards Act 1989
- Federal Chamber of Automotive Industries (FCAI)—Response to the 2014 Review of the Motor Vehicle Standards Act
- Pegasus Economics—Implications of Parallel Imports of Passenger Motor Vehicles
- Australian Fleet Lessors Association (AFLA)—Review of the Motor Vehicle Standards Act 1989

We summarise their findings below.

Submissions found limited arbitrage opportunities for importing personal new vehicles

All submissions concluded that there were arbitrage opportunities in the luxury segments, which is consistent with our market analysis above. The submissions did not in general find that there were arbitrage opportunities in any other segments. This is broadly consistent with our findings, which showed that there were only a minority of mainstream models that had arbitrage opportunities. But, our market analysis does find a small but significant range that do have arbitrage opportunities and this finding was also shared by the AAA, who also found a small but significant range of mainstream models with arbitrage opportunities[5].

The AAA found that a majority of models in the Japanese market were cheaper than Australian models. Their analysis showed that 18 of the 23 models (or 18 like-to-like variants) were cheaper in the Japanese market. Differences in model definitions and the scope of analysis could account for the variations in our market analysis; however, the conclusions are similar[6].

Submissions found that a competitive Australian market limits the opportunity for arbitrage

The FCAI and AFLA stated that Australia has one of the world's most competitive car markets, with a wide range of brand choice and competitive pricing. Pegasus Economics supports this view stating:

"…there is little evidence to suggest that Australian consumers are victims of any widespread international price discrimination in relation to passenger vehicles"

Our analysis broadly agrees with this as the arbitrage opportunities we found were limited and the majority of cars were similarly priced which is consistent with a competitive market. There might still be opportunities for incremental gains as our analysis has found.

The submission by AFLA also stated that their analysis of used cars from Japan did not show lower prices for vehicles made between 2007 and 2013. AFLA found that used cars in Australia were consistently $4,000-$5,000 lower than the calculated price for a second hand equivalent car imported from Japan. Our analysis does not support that view and actual market outcomes in other jurisdictions do not support that view either.

[5] Federal Chamber of Automotive Industries, November 2014, Response to the 2014 Review of the Motor Vehicle Standards Act

[6] The AAA limited its 'like-for-like' comparison to only one variant in the 23 models they assessed. In the 58 models we assessed in the Japanese market, we found 96 'like-for-like' variants. Thirty-one of these variants were ***Mass Market*** models and only 14 of these presented potential arbitrage opportunities

3 Market Response

In this section we detail the market responses to personal new and used car imports.

For personal new imports, we expect there will be two **net** fleet outcomes; either

- The fleet size will increase as more new cars are sold
- Retirements of older cars will increase

The final result will be a combination of these effects. If new personal imports replaced new cars sold from dealers then there is no net change to the fleet, even if the source of supply changed and the share of incumbent dealers fell.

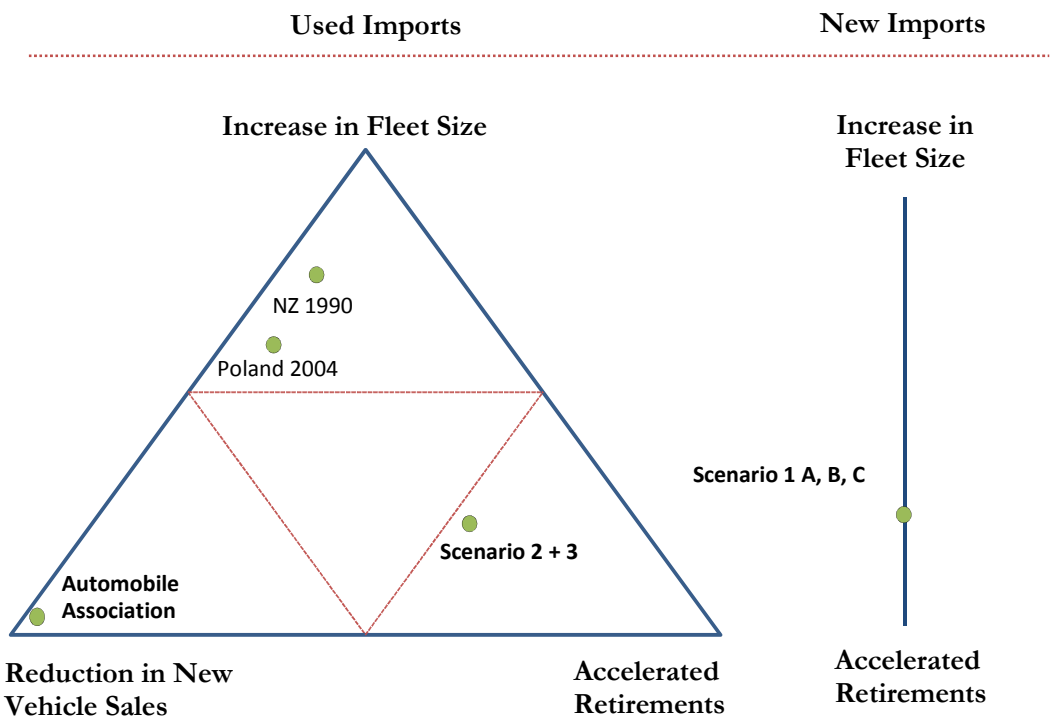
In the used vehicle market, there are three net fleet outcomes in response to the trade. These are:

- An increase in vehicle ownership rates
- A reduction in new car sales
- An increase in the scrappage rate of older cars

The net fleet outcome in this case might also include an increase in used car sales at the expense of new car sales.

We summarise the likely market response under five scenarios in Figure 3.1 below.

Figure 3.1: Market Response Scenarios



We have estimated import volumes based on these market responses for the five scenarios shown in Figure 3.1:

New personal imports

- **Scenario 1A**—personal new imports on the basis of a 'like-for-like' price arbitrage of 0.8% (this is the price reduction from direct imports of existing models sold in Australia)
- **Scenario 1B**—personal new imports on the basis of lowest variant price arbitrage of 2.3% (this is the maximum, albeit unlikely, price arbitrage in the market if consumers were to import lower cost variants in each model segment)
- **Scenario 1C**—personal new imports on the basis of the mid-point price arbitrage of Scenario 1A and 1B of 1.6% (this represents a balanced market response whereby price opportunities are driven equally by 'like-for-like imports' and lower cost variants)

New and used personal imports

We estimate import volumes from de-regulating both new and personal used imports in Scenarios 2 and 3, using the mid-point price arbitrage under Scenario 1C.

- **Scenario 2**—used imports up to three years of age and personal new vehicle imports using the mid-point price arbitrage in Scenario 1C
- **Scenario 3**—used imports up to three years of age and personal new vehicle imports using the mid-point price arbitrage in Scenario 1C

We expect personal imports will lead to a price drop in Australia for cars that compete with those imports. This might mean that the volume of imports is not high but the consumer welfare gain is achieved regardless. The strategy of car manufacturers will determine how they respond in each case.

3.1 Modelling the Demand for Personal Imports

This section details our modelling approach to estimating the market responses in each of the five scenarios. The price arbitrage from personal car imports will increase the rate at which vehicles retire and also the level at which vehicle ownership saturates. For used imports, we expect there will be some capture of new vehicle sales and thus a reduction in the market for new cars.

The primary market response from a reduction in car prices will be faster retirements

We have shown that new and used personal imports are likely to result in a reduction in the average price of new vehicles. This will flow into a price reduction across the used vehicle market.

Based on demand elasticities developed by Jacobsen and Bentham (2013)[7] and Litman (2013)[8], the main response from reduced prices will be an increase in the rate at which vehicles retire from the fleet. According to Jacobsen and Bentham, the retirement or scrap rate in the used vehicle market increases by about 0.57% on average for every 1% reduction in the vehicle price—with the highest sensitivity found in used vehicles less than five years old.

[7] Jacobsen M., Benthem A. (2013) Vehicle Scrappage and Gasoline Policy. Department of Business Economics and Public Policy. The Wharton school, University of Pennsylvania and NBER

[8] Litman T. (2013) Understanding Transport Demands and Elasticities: How Prices and Other Factor affect Travel Behaviour. Victoria Transport Policy Institute

Vehicle ownership—or the average car ownership per capita—is also likely to increase but consumer response will be muted. Research by Litman shows that for mature economies, the elasticity between vehicle ownership and vehicle price is small.

Higher vehicle turnover will reduce the ageing of the fleet and result in positive net benefits. This is called the value chain effect. As vehicle prices reduce, consumers tend to spend some of the savings upgrading to newer models. We have used this result to determine the expected demand responses.

In Table 3.1 we compare the percentage change in the rate of vehicle retirements and vehicle ownership to the average percentage change in vehicle price.

Table 3.1: Demand Response to Changes in Vehicle Prices

Age	2-5	5-10	11-20+
Increased Vehicle Scrappage if vehicle prices fall 1% (%)	0.57*	0.492	0.477
Increased vehicle ownership if vehicle prices fall 1% (%)	0.1**		

* We have reduced the elasticity for 2-5 year old vehicles to match the fleet average elasticity of 0.57 given that the average age of the Australia vehicle fleet is lower than the United States we expect a lower demand response

** Research suggests an elasticity of between 0-0.2, for a response to lower gasoline price and about 1.0 for a response to higher income—we have selected 0.1 as a best estimate of the likely demand response in Australia

Sources: Adapted from Litman (2013) and Jacobsen and Benthem (2013)

Age restrictions on used imports will limit the substitution of new vehicle sales

In Section 2.2 we showed that age restrictions on used imports significantly reduce the available supply pool. Age restrictions that limit used imports to less than 3 and 5 years of age would limit imports to 5% and 10% of available used vehicle imports.

We were not able to find conclusive research on consumer preferences for used imports at the expense of purchasing new vehicles. In our previous report, assuming no age restrictions, we estimated that new vehicle sales could fall by about 5% (~50,000)—on the basis that used import volumes were 150,000.

Restricting the age of used imports will restrict the market capture of new vehicle sales. This is complicated by the fact the used imports that compete with new vehicle sales are likely to be near new imports. Using these offsetting factors, we have estimated a plausible new vehicle market capture when used imports are restricted to three and five years in Table 3.2. In both scenarios we expect new vehicle sales would fall by less than 1% on the basis of low import volumes.

Table 3.2: Expected Capture of the New Vehicle Market from Used Imports

Scenario	New Vehicle Market Capture
Used Imports (three years and less)	0.4%
Used Imports (five years and less)	0.8%

3.2 Scenarios of Change

In Table 3.3 we estimate market impacts in each of the three scenarios; personal imports of new cars, used imports up to three years old, and, used imports up to five years old. We have revised the fleet accounting model and estimate volumes based on our expected demand response to a reduction in the market price of vehicles. In each scenario we assume a three year 'ramp up' period to reach equilibrium market volumes and by year five import volumes are close to steady state levels.

Increased demand for Japanese (and UK) vehicles from Australian importers might impact the price of these vehicles, and thus reduce the arbitrage opportunities available. This effect will be minimal for new vehicle imports given the relatively deep pool of new vehicles from which to draw upon. The effect could be more significant for used cars in Japan that are less than three or five years old, due to their relatively limited volumes. We have not been able to quantify this effect, but we have assumed that it will not be sufficient to deter the trade entirely.

Table 3.3 shows our estimation of the likely import volumes under our five scenarios, showing each of the different market effects. This shows the total number of import volumes and what market responses are likely to drive the demand—as detailed in Section 3.1.

Less restrictive scenarios have bigger market impacts. However, we expect import volumes will be relatively moderate under all five scenarios. The key points to note are:

- We expect new car sales will increase if personal imports are de-regulated and used import volumes are small. Sales are likely to increase because vehicle prices fall either from the threat of competition or actual personal vehicle imports
- New vehicle personal import volumes are comparatively higher than used imports because there is a limited supply of used vehicles under five years—see Section 2.2
- New personal import volumes are higher under 'lowest variant pricing' because the arbitrage opportunities are greater; but, this result relies on consumers being prepared to switch variants
- The market share of incumbent new car dealers versus new personal imports will depend partly on the strategic response of incumbents – see further discussion in 3.4 below
- While there is no way to predict how specific incumbent dealers will react to the trade, price competition is the most obvious response in a competitive market. Our base case assumption is that we expect any potential loss in dealership sales would be offset by the increase in demand for new vehicles as a result of the average reduction in new car prices, which impact both fleet size and fleet turnover. The net loss/(gain) in incumbent sales is thus considered to be zero for all personal new car imports scenarios

[redacted]

Table 3.3: Predicted Import Volumes

		Y1	Y2	Y3	Y4	Y5
Scenario 1A- Personal new car imports *('like-for-like' arbitrage)*	**Total Imports**	**6,000**	**8,000**	**11,000**	**11,000**	**12,000**
	Net loss/(gain) in incumbent sales	0	0	0	0	0
	Uplift in Fleet Size	1,000	2,000	3,000	3,000	3,000
	Increase in Fleet Turnover	5,000	6,000	8,000	8,000	9,000
Scenario 1B- Personal new car imports *(lowest variant arbitrage)*	**Total Imports**	**16,000**	**23,000**	**31,000**	**32,000**	**33,000**
	Net loss/(gain) in incumbent sales	0	0	0	0	0
	Uplift in Fleet Size	4,000	6,000	8,000	8,000	8,000
	Increase in Fleet Turnover	12,000	17,000	23,000	24,000	25,000
Scenario 1C- Personal new car imports *(mid-point of 'like-for-like' and lowest variant arbitrage)*	**Total Imports**	**11,000**	**16,000**	**22,000**	**22,000**	**23,000**
	Net loss/(gain) in incumbent sales	0	0	0	0	0
	Uplift in Fleet Size	3,000	4,000	6,000	6,000	6,000
	Increase in Fleet Turnover	8,000	12,000	16,000	16,000	17,000
Scenario 2 – Used imports up to three years old and personal new imports from Scenario 1C	**Total Imports** *(including personal new imports from 1C)*	**14,000**	**20,000**	**28,000**	**29,000**	**31,000**
	Used Vehicle Imports (1-3 yrs)	**3,000**	**4,000**	**6,000**	**7,000**	**8,000**
	Reduction in New Car Sales	0	1,000	2,000	3,000	4,000
	Uplift in Fleet Size	1,000	1,000	1,000	1,000	1,000
	Increase in Fleet Turnover	2,000	2,000	3,000	3,000	3,000
Scenario 3 – Used imports up to five years old and personal new imports from Scenario 1C	**Total Imports** *(including personal new imports from 1C)*	**18,000**	**27,000**	**38,000**	**41,000**	**55,000**
	Used Vehicle Imports (1-5 yrs)	**7,000**	**11,000**	**16,000**	**19,000**	**21,000**
	Reduction in New Car Sales	1,000	2,000	4,000	6,000	8,000
	Uplift in Fleet Size	2,000	3,000	4,000	4,000	4,000
	Increase in Fleet Turnover	4,000	6,000	8,000	9,000	9,000

3.3 Impacts on Industry Structure

Cost benefit analysis only measures net economic effects—it does not quantify economic transfers between suppliers or consumers. It does however acknowledge that any change that generates consumer welfare gains will often have accompanying transfers between suppliers as they adapt to new market conditions—this is what delivers the gains in many situations. Thus, our cost benefit analysis does not quantify the impacts of transfers between new and used car suppliers. However, New Zealand provides a useful example of what market changes are likely to occur (Box 3.1).

Box 3.1: Effect of used import de-regulation on dealerships in New Zealand

New Zealand undertook a significant regulatory change by de-regulating used imports in the mid-1990s. This change was more substantial than the limited regulatory changes Australia is contemplating.

Following de-regulation, there was a significant increase in car sales and an increase in the fleet size on the back of a fall in price in the used vehicle market. There was naturally a shift in favour of used car sales at the expense of incumbent new car dealerships. This was due to the surge in used car imports between 7 and 12 years old that increased used car sales and provided opportunities for salespeople to enter the used car market.

Given that Australia is not contemplating this particular change, the extent of transfers between industry sales groups will be much less significant. We also note that recently the share of new car sales sold by dealerships has surged in New Zealand, due to a range of market factors and some regulatory tightening.

There is unlikely to be any significant net loss in employment in dealerships from personal imports

We foresee little change in industry-wide dealership employment, given that we expect overall sales volumes would increase with personal imports, and since volumes are not predicted to be large. Vehicle price reductions may not reduce dealership margins—although we expect there will be both winners and losers across the industry. There are three potential market responses that reduce vehicle price:

- Manufacturers may lower prices to incumbent dealerships on certain models where international markets provide clear arbitrage opportunities—this would apply only to new car sales
- New and used car incumbent dealers could seek to facilitate the trade in personal imports and thereby maintain their margins through providing additional services
- New and used car incumbent dealers could reduce margins to gain or maintain market share

Only the last effect would result a loss in profit for incumbent new car dealers and in reality all three effects will occur to some degree. With the competition from personal imports some industry groups will benefit more than others:

- **Incumbent new car dealerships**—may see a small loss in market share and employment with second hand imports, and also from new vehicle imports. We expect employment losses will be small should manufacturers reduce

prices to prevent a loss in market share, or even neutral if they facilitate the trade in new car imports

- **Incumbent used car salespeople**—are likely to see an employment gain if used car imports capture a share of the new vehicle market, or the fleet expands, and are also likely to gain with the personal new car imports if they facilitate the trade
- **New entrant salespeople**—will compete with existing dealerships, and will enter the market to trade in both new and used personal imports if this is permitted. The extent to which there is change in the industry of this nature, with new dealers emerging, and incumbent dealers disappearing, depends on the magnitude of the change (and the degree of consumer benefit). A significant change is more likely to be disruptive than a small incremental change, which is more likely to generate an adaptive response

3.4 Modelling Changes in Industry Structure

In Table 3.3 above we explained that the most likely market outcome from reducing restrictions on personal new vehicle imports is that any potential loss in incumbent dealership sales would be offset by the increase in demand for new vehicles as a result of the price reduction. This happens because it is assumed that the most likely response by incumbent dealers is to compete strongly to prevent the trade. The result is an average reduction in car prices that increases demand for new vehicles, as reflected in the uplift in fleet size and increase in fleet turnover.

The response of manufacturer's and dealerships to the threat of competition will determine market outcomes

In reality, the strategy and market response of incumbent dealers and manufacturers is uncertain. A variety of responses could occur ranging from doing nothing (as manufacturer's sales are made in foreign markets in any case) to adjusting the price to remove any arbitrage from the trade as in our base case.

An alternative assumption—one which we view as less likely—is that manufacturers and incumbent dealers' response is to maintain margins by limiting their price reduction on new car sales. This would likely result in incumbents losing sales volumes. Although determining the extent of overall sales losses among incumbents is difficult, a plausible assumption is that 50% of estimated import volumes could replace the sales of incumbent dealers. We illustrate this effect in Table 3.4 for Scenarios 1A and 1B. In both scenarios, the uplift in fleet size and increase in fleet turnover is lower than previously, since the "maintain margins" strategy limits the average reduction in new vehicle prices.

Import volumes and incumbent losses may be even larger under a "maintain margins" approach, given that consumers would have more incentive to facilitate the trade. We have not sought to quantify this effect, which will depend on the consumer willingness to engage in the trade (and the development of trade support services in the market). There will be some limiting factors to the trade such as consumer risk aversion for sourcing vehicles from international markets, warranty issues, and a bias for supporting Australian dealerships.

Table 3.4: Alternative Outcome Under a "Maintain Margins" Dealership Response

		Y1	Y2	Y3	Y4	Y5
Scenario 1A- Personal new car imports *('like-for-like' arbitrage)*	**Total Imports**	**6,000**	**8,000**	**11,000**	**11,000**	**12,000**
	Net loss/(gain) in incumbent sales	3,000	4,000	6,000	6,000	6,000
	Uplift in Fleet Size	1,000	1,000	2,000	2,000	2,000
	Increase in Fleet Turnover	2,000	3,000	3,000	3,000	4,000
Scenario 1B- Personal new car imports *(lowest variant arbitrage)*	**Total Imports**	**16,000**	**23,000**	**31,000**	**32,000**	**33,000**
	Net loss/(gain) in incumbent sales	8,000	12,000	16,000	16,000	17,000
	Uplift in Fleet Size	2,000	3,000	4,000	4,000	4,000
	Increase in Fleet Turnover	6,000	8,000	11,000	12,000	12,000

4 Cost Benefit Analysis

The expected increase in consumer welfare due to personal imports is the primary benefit from relaxing import restrictions. This will be compared with the costs that might occur should import volumes lead to an ageing of the fleet or increases in other costs. An ageing fleet leads to increased environmental costs and increased safety costs.

The ratio of the present value of benefits to costs provides a relative net benefit assessment for different scenarios of change. We will deal in turn with economic benefits, economic costs and cost benefit ratios for the different scenarios of change.

4.1 Economic Benefits of Personal Imports

Relaxing restrictions on personal imports is expected to increase competition and reduce price in the car market. A reduction in price leads to consumer welfare benefits. The expected level of the price reduction is determined by analysing the market data to identify arbitrage opportunities in both personal new and used imports and then making an assessment of the market impact of this opportunity.

The assessment of price impacts is made within a range that assumes on the one hand that a price arbitrage available on some cars will lead to a market wide reduction in price for all or most cars and at the other extreme that it will lead to a price reduction on those vehicles only. The two extremes are:

- **Market wide price reduction**—this represents the maximum consumer benefit in a competitive market where the profit margin levels of sellers would be bid down and consumers will receive most of the benefit from the reduction in costs. This approach would be most relevant where access to imports have little or no restrictions

- **Margin on imported volumes only**—this is the minimum consumer benefits that would accrue from the margin on imported volumes. This approach assumes imports result in no price reduction on vehicle purchases made from a dealer in Australia. Given the limited supply of used imports and arbitrage limitations on model variants in the new import market, this assumption is more representative on the benefits we expect from personal imports

For both personal new and used imports we compare the estimated market wide price reduction benefits in Table 4.1 below:

Table 4.1: Estimated Consumer Welfare Effects – Market-wide Price Reduction

Scenario	Market wide Price Reduction Potential	Average per Vehicle Market Wide Consumer Benefit[9]	Estimated Annual Consumer Benefit[10]
Scenario 1A	0.8%	$200	$111,490,000
Scenario 1B	2.3%	$575	$320,520,000
Scenario 1C	1.6%	$400	$222,970,000
Scenario 2	2.0%	$500	$278,710,000
Scenario 3	2.7%	$675	$376,260,000

In Table 4.2 below we estimate the benefit on the volume of imports only:

Table 4.2: Estimated Consumer Welfare Effects – Margin on Import Volumes Only

Scenario	Average Import Margin	Estimated Annual Import Volumes[11]	Estimated Annual Consumer Benefit
Scenario 1A	6,200	12,000	$37,200,000
Scenario 1B	7,800	33,000	$128,700,000
Scenario 1C	7,000	23,000	$80,500,000
Scenario 2A	6,100	31,000	$94,600,000
Scenario 3A	5,200	55,000	$143,000,000

[9] Assuming an average new car purchase price of 25,000 AUD and 2013 vehicle sales volumes

[10] The calculation for consumer welfare gains is based on a 'rule of one half' which states that the price difference and the quantity difference are multiplied and then halved to represent the net gain to consumer (surplus) welfare

[11] Volumes after ramp up period

For the cost benefit analysis we use the import margin approach as a more conservative view on potential benefits—although we anticipate net benefits will be marginally higher over time.

4.2 Potential Economic Costs of Personal Imports

A decision to deregulate based on economic welfare alone would be clear cut. However, public policy objectives of reducing the social cost of road accidents and reducing the environmental cost of vehicle emissions are also relevant. The net impact of all costs and benefits provides a sound basis for policy assessment.

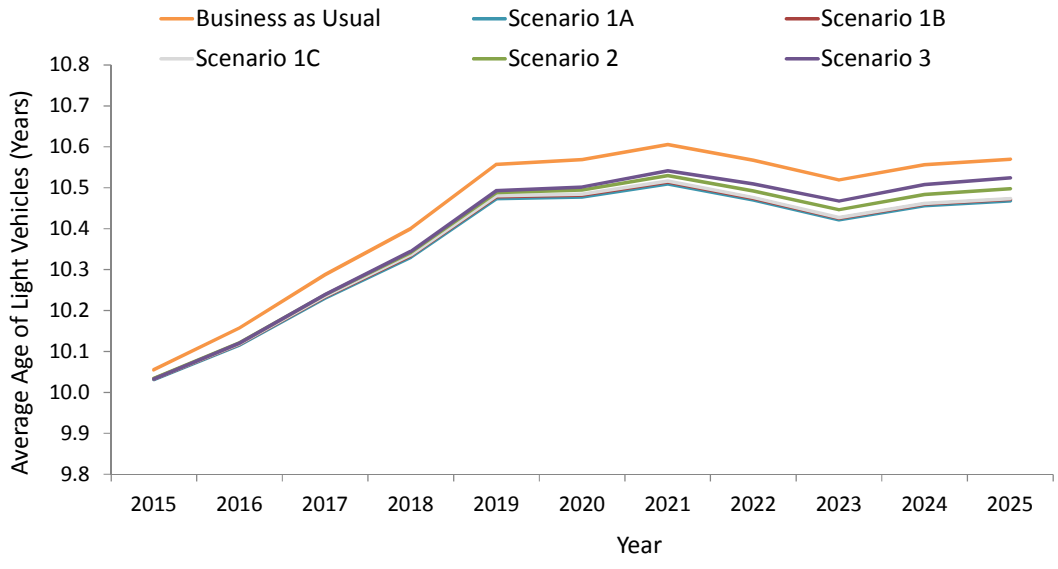
New and used imports may change the composition of the fleet. Used imports in particular will lead to an ageing of the fleet. Older cars are likely to have higher accident rates and have higher severity risks in the event of an accident. There are known relationships between car age and safety risks. These relationships may vary by country as different standards prevail in different markets at different times. The size of the database provides a more robust relationship, however, and this also affects the choice of dataset to use when estimating safety impacts.

4.2.1 Used Imports will Change the Composition of the Fleet

Our fleet model determines the expected age and composition of the fleet over ten years. This model allows various scenarios of market outcomes from deregulation and provides expected fleet age outcomes. Details of the fleet model are outlined in Appendix A.

The fleet age under each scenario is represented in Figure 4.1 below. We find all five scenarios would reduce the average age of the fleet. For used imports we note that the impact from faster retirements rates will outweigh substitution of new car sales in the near to mid-term.

Figure 4.1: Fleet Ageing Comparisons under Import Scenarios



4.2.2 Safety Implications of Personal Imports

The social costs of road accidents are enormous. Our estimate of the total economic cost of fatalities and life threating injuries is $7.0 billion per annum. This is based on the Commonwealth Governments statistical value of life of $4,200,000[12]. One year of lost life is $182,000. Any small percentage change in this cost is a significant impact.

We have assessed the safety risks based on a three tier classification of road accidents:

- Fatalities—$4,200,000 per event
- Life threatening accidents—one statistical life year lost
- Serious Injuries—1/10th of a statistical life year lost

Vehicle age and safety outcomes

Vehicle age affects safety performance. Newer cars perform better in terms of the likelihood of having an accident and the consequences of the accident. Another key risk will be the difference in crashworthiness with vehicle age. A recent US study by the National Highway Traffic Safety Administration (NHTSA)[13], concluded that compared to vehicles three years and under, fatality rates are approximately 10% higher for vehicles between 4 and 7 years of age and 71% higher for vehicles older than 17 years of age.

We have modelled this relationship using this data from the US. This is described in Table 4.3 below.

Table 4.3: Car Age and Increased Likelihood of a Fatality when in an Accident

Car Age	0-3	4-7	8-11	12-14	15-17	>17
Increase in Risk of a fatality Compared to New Vehicles	0%	10%	19%	32%	50%	71%

Source: NHTSA

This data is relevant for other jurisdictions if the standard of cars over the decades under analysis is similar in each jurisdiction. This in turn is most likely if the cars are the same, or similar, in their manufacturing standards. The US imports a significant amount of cars which are the same or only slight variants. However, the regulatory environment varies over the period also. We consider that the size of the dataset, the length of time under analysis, and the strength of the empirical analysis of the relationship outweigh any variation between jurisdictions. We have therefore used the relationship estimated by this study as our core assumption for the age related safety risk.

Regulations and safety performance

Empirical research by Monash University sought to understand the relationship between the safety risks of various concessionary schemes for importing cars into Australia[14]. This study compared cars sold new in Australia and therefore compliant with Australian

[12] Department of the Prime Minster and Cabinet (2014) Best Practice Regulation Guidance Note—Value of statistical life, December 2014

[13] U.S. Department of Transportation—National Highway Traffic Safety Administration (2013) *How Vehicle Age and Model Year Relate to Driver Injury Severity in Fatal Crashes.* http://www-nrd.nhtsa.dot.gov/Pubs/811825.pdf

[14] Newstead S., Watson L., and Budd L. (2014) Safety Analysis of Australia's Concessional Vehicle Imports (Unpublished). Monash University Accident Research Centre

Standards and cars brought in under various concession schemes which therefore may not comply with Australian Standards.

Results for the relative safety performance were mixed. Some categories showed increased risk and some showed a decreased risk and some could not determine a significant relationship. Concessional vehicles in Australia imported under the Registered Automotive Workshop Scheme (RAWS) for used cars and the Low Volume Scheme for new cars had between 13.7% and 24.7% higher crash risks than non-concessional vehicles.[15] 'Pre 1989' categories showed a reduced risk. We note that there is no causative explanation on why personal imports should have a higher crash rate frequency.

According to Brown et al,[16] one of the key severity risks of personal imports will be from non-harmonized safety standards on child restraints. The severity of accidents for children who require restraints—children primarily under the age of five— is estimated to have a 10% higher severity risk in the event of an accident. However, if cars are only imported if they are either retrofitted with acceptable restraints, or comply in any case, then this risk does not occur.

On balance we do not find that this research provides any compelling reasons to use a different safety risk for new cars imported under the proposed schemes. Most models would be very similar in this case and specific safety factors can be controlled directly such as child restraint conformance. We have however run a sensitivity analysis on this assumption to test the consequences of the newly sourced cars exhibiting different safety outcomes than Australian new cars. Table 4.4 below describes the safety effects of an ageing fleet under our five scenarios:

Table 4.4: Safety (Costs)/Benefits from a Change in the Age of the Fleet

NPV (7% discount rate, $ m)	Fatalities	Serious Injuries	Total
Scenario 1A	$19.0	$8.8	$27.8
Scenario 1B	$13.5	$7.0	$20.5
Scenario 1C	$16.1	$7.9	$24.0
Scenario 2	$7.4	$4.2	$11.6
Scenario 3	($3.1)	($0.5)	($3.6)

4.2.3 Environmental Implications of an Ageing Fleet

With increasing fleet age the level of emissions increases. Older cars are generally built to previous standards which allowed higher emissions. Modern cars seek to be more fuel efficient which reduces emissions. Our fleet model predicts fuel efficiency as the fleet ages.

The environmental costs of an ageing fleet are twofold. There are externalities within Australia that lead to health effects such as respiratory problems. There is also the climate change externality across the entire world.

[15] This implies that the rate of fatalities and serious injuries per crash would increase accordingly

[16] Brown, J., Griffiths, M., and Paine, M., The effectiveness of child restraints the Australian experience, Research report RR 06/02 for ANCAP, June 2002

The social cost of health effects of emissions have been studied in Australia. The cost of these health effects, inflated for inflation and the size of the existing fleet is estimated at $3,800,000,000[17]. Incremental increase in health costs from an ageing fleet is assumed to incrementally increase this cost.

Quantifying the externality of climate change costs is difficult. A carbon tax was used to internalise that externality but is not to be continued. If the tax was in place then no double counting of that cost is required here. If the tax is not in place then the carbon tax can be used a as a proxy for this externality cost. Table 4.5 below describes the health effects of an ageing fleet under our five scenarios:

Table 4.5: Environmental (Costs)/Benefits from a Change in Fuel Efficiency

NPV (7% discount rate, $ m)	Health Costs	Carbon Tax	Total
Scenario 1A	$6.8	$3.9	$10.7
Scenario 1B	$1.6	$1.0	$2.6
Scenario 1C	$4.1	$2.3	$6.4
Scenario 2	($0.5)	($0.3)	($0.8)
Scenario 3	($4.4)	($2.6)	($7.0)

4.3 Net Benefit Assessments

The total net benefit of our five scenarios is shown in Table 4.6 below:

Table 4.6: Cost Benefit Ratios and Total Net Benefit

$ m	Costs	Benefits	Total Net Benefit
Scenario 1A	0	$382.6	$382.6
Scenario 1B	($0.5)	$980.3	$979.8
Scenario 1C	0	$703.2	$703.2
Scenario 2	($2.8)	$883.3	$885.5
Scenario 3	($29.2)	$1,195.3	$1,166.1

Our analysis shows a positive net benefit for all five deregulation scenarios. In all cases there is a considerable consumer welfare benefit. Costs are small as there is limited change in the vehicle fleet age and therefore limited change in safety and environmental outcomes. A detailed summary of the costs and benefit for each of the five scenarios under different discount rates for each of the first ten years is shown in Table 4.7 through Table 4.11.

[17] Department of Transport and Regional Services (2005) Health Impacts of Transport Emissions in Australia: Economic Costs. Working Paper 63, Bureau of Transport and Regional Economics. http://www.bitre.gov.au/publications/2005/files/wp_063.pdf

Table 4.7: Scenario 1A —Cost Benefit Analysis

$m	Costs	Benefits	Annual Net Benefit	Annual Discounted Value		
				3%	7%	10%
Year 0	0.0	0.0	0.0	0	0	0
Year 1	0.0	21.4	21.4	20.7	19.9	19.4
Year 2	0.0	31.7	31.7	29.8	27.6	26.1
Year 3	0.0	42.5	42.5	38.8	34.6	31.8
Year 4	0.0	43.7	43.7	38.6	33.2	29.7
Year 5	0.0	44.9	44.9	38.5	31.8	27.7
Year 6	0.0	36.2	36.2	30.0	23.9	20.2
Year 7	0.0	38.5	38.5	30.9	23.6	19.5
Year 8	0.0	39.8	39.8	31.0	22.8	18.3
Year 9	0.0	41.3	41.3	31.2	22.1	17.3
Year 10	0.0	42.5	42.5	31.1	21.2	16.1
TOTAL	**0.0**	**382.6**	**382.6**			
NPV				**320.4**	**260.7**	**226.0**

Table 4.8: Scenario 1B —Cost Benefit Analysis

$m	Costs	Benefits	Annual Net Benefit	Net Present Value		
				3%	7%	10%
Year 0	0.0	0.0	0.0	0	0	0
Year 1	0.0	58.9	58.9	57.2	55.1	53.6
Year 2	0.0	85.6	85.6	80.7	74.7	70.7
Year 3	0.0	113.9	113.9	104.3	93.0	85.6
Year 4	0.0	115.6	115.6	102.7	88.2	78.9
Year 5	0.0	117.2	117.1	101.0	83.5	72.7
Year 6	0.0	90.9	90.9	75.7	60.2	51.0
Year 7	-0.4	95.6	95.2	77.4	59.3	48.9
Year 8	-0.1	98.1	98.0	77.3	57.0	45.7
Year 9	0.0	101.3	101.3	77.7	55.1	43.0
Year 10	0.0	103.2	103.2	76.8	52.5	39.8
TOTAL	**(0.5)**	**980.3**	**979.8**			
NPV				**830.7**	**678.6**	**589.9**

Table 4.9: Scenario 1C —Cost Benefit Analysis

$m	Costs	Benefits	Annual Net Benefit	Net Present Value		
				3%	7%	10%
Year 0	0.0	0.0	0.0	0	0	0
Year 1	0.0	41.4	41.4	40.2	38.7	37.6
Year 2	0.0	60.5	60.5	57.0	52.8	50.0
Year 3	0.0	80.8	80.8	73.9	65.9	60.7
Year 4	0.0	82.3	82.3	73.1	62.8	56.2
Year 5	0.0	83.7	83.7	72.2	59.7	52.0
Year 6	0.0	65.4	65.4	54.8	43.6	36.9
Year 7	0.0	69.1	69.1	56.2	43.0	35.4
Year 8	0.0	71.2	71.2	56.2	41.4	33.2
Year 9	0.0	73.7	73.7	56.5	40.1	31.2
Year 10	0.0	75.2	75.2	56.0	38.2	29.0
TOTAL	**0.0**	**703.2**	**703.2**			
NPV				**596.0**	**486.2**	**422.3**

Table 4.10: Scenario 2 —Cost Benefit Analysis

$ m	Costs	Benefits	Annual Net Benefit	Net Present Value		
				3%	7%	10%
Year 0	0.0	0.0	0.0	0	0	0
Year 1	0.0	49.1	49.1	47.6	45.9	44.6
Year 2	0.0	73.0	73.0	68.8	63.8	60.4
Year 3	0.0	98.9	98.9	90.5	80.7	74.3
Year 4	0.0	102.4	102.4	91.0	78.2	70.0
Year 5	-0.3	106.7	106.4	91.8	75.9	66.1
Year 6	0.0	85.0	85.0	70.4	56.0	47.5
Year 7	-0.8	89.7	88.9	72.3	55.4	45.6
Year 8	-0.7	91.9	91.3	72.1	53.1	42.6
Year 9	-0.6	95.2	94.6	72.5	51.5	40.1
Year 10	-0.4	96.2	95.8	71.3	48.7	36.9
TOTAL	**(2.8)**	**888.3**	**885.5**			
NPV				**748.4**	**609.1**	**528.1**

Table 4.11: Scenario 3 —Cost Benefit Analysis

$ m	Costs	Benefits	Annual Net Benefit	Net Present Value		
				3%	7%	10%
Year 0	0.0	0.0	0.0	0	0	0
Year 1	0.0	63.8	63.8	61.9	59.6	58.0
Year 2	0.0	95.0	95.0	89.6	83.0	78.5
Year 3	-0.2	130.3	130.1	119.1	106.2	97.7
Year 4	-0.9	136.1	135.2	120.1	103.2	92.3
Year 5	-2.9	144.1	141.2	121.8	100.6	87.6
Year 6	0.0	115.7	115.7	92.5	73.6	62.4
Year 7	-5.9	122.9	117.0	95.2	72.9	60.1
Year 8	-5.9	125.6	119.7	94.5	69.7	55.8
Year 9	-6.6	130.4	123.7	94.8	67.3	52.5
Year 10	-6.7	131.4	124.6	92.7	63.4	48.1
TOTAL	**(29.2)**	**1,195.3**	**1,166.1**			
NPV				**982.2**	**799.5**	**693.1**

4.4 Sensitivity Analysis

In this section we examine how the net benefits would change under two sensitivities:

- **Higher crash severity risk**—this is the proposed risk severity from non-harmonised child restraints. We have stated that this risk could be removed through regulation
- **Larger 'like-for-like' arbitrage**—we assume that the 'like-for-like' variant comparisons found, are representative of the arbitrage over the entire model range—thus increasing the market arbitrage from 0.8% to 1.9%

Sensitivity testing shows the dependence of results on particular assumptions. By holding all other assumptions constant and letting one variable change we can show the relationship between that variable and the outcome. We use Scenario 1A as a basis from which to test the sensitivity of net benefits.

Higher crash severity risk

According to Brown et al, the severity of accidents for children who require restraints—children primarily under the age of five— is estimated to have a 10% higher severity risk in the event of an accident. Given that about 50% of serious road accidents involved car occupants (other than the driver) and that the 6.4% of the population are under the age of five, we expect that the 10% higher severity risk will apply to 3.2% of total accidents. In these events we have elevated the accident severity by 10% to estimate safety consequences as shown in Table 4.12.

Table 4.12: Potential Safety Risk from Non-harmonized Child Restraints

Annual Crash Statistics (people per million registered motor vehicles)	Existing Motor Vehicle Fleet	Personal New Imports (if child restraint risks are not regulated)
Fatalities	69	71
Life Threatening Injury	512	515
Serious Injury	1477	1511

Source: BITRE, AIHW

We test the significance of this below in Table 4.13. We find there are small safety costs from severity risks as a result of the non-harmonization in child restraints.

Table 4.13: Scenario 1A Safety Sensitivity

	With child restraint risk	**Scenario 1A**
Sensitivity	10% higher for children	No difference
Total Net Benefits ($ millions)	$378.7	$382.6
Variance ($ millions)	($3.9)	0

Higher 'like-for-like' arbitrage opportunity

Increasing the arbitrage opportunity will increase the expected import volumes and thus the consumer welfare benefit. Table 4.14 shows the estimated consumer benefit and import volumes based on a 'like-for-like' arbitrage of 1.9%. Under this scenario we expect import volumes would approach 27,000 vehicles per year after initial ramp up.

Table 4.14: Estimated Consumer Welfare Effects – Margin on Import Volumes Only

Scenario	**Average Import Margin**	**Estimated Annual Import Volumes**	**Estimated Annual Consumer Benefit**
Scenario 1A	6,200	27,000	$83,700,000

We test the significance of this on the net benefits in Table 4.15. This shows that net benefits are highly sensitive to the market price arbitrage.

Table 4.15: Scenario 1A Safety Sensitivity

	Higher 'like-for-like' arbitrage	**Scenario 1A**
Sensitivity	1.9% market price arbitrage	0.8% market price arbitrage
Total Net Benefits ($ millions)	$812.9	$382.6
Variance ($ millions)	$430.3	0

Appendix A Castalia Fleet Model Description

Overview of the fleet model

Our fleet model is disaggregated into three primary light vehicle categories – light passenger cars, light SUVs and light commercial vehicle. For each of these vehicles we further disaggregate these into Australian New (imported and domestic) and Used Imports.

Our model uses a calibration period between 1980 and 2013 to estimate the number of vehicles by age of manufacture at our base year in 2013. The calibration period uses the historical data of:

- Light vehicle ownership
- Market share of each light vehicle type
- Population
- Average age of the fleet at our base year in 2013

Using these factors we estimate the survival curve of the fleet or the percentage of vehicles that retire from the fleet based upon their age. For example, there will be relatively few retirements in vehicles between ages 0-10, however retirements accelerate in older vehicles – as older vehicles age, an increasing share of their original numbers are retired or scraped. This survival curve is determined by modelling the number of retirements over the initialisation run from 1980 that leads to the average age of the fleet equalling the average age today – about 10 years old.

Projecting future sales and trends in the vehicle fleet

New vehicle sales are a function of the number of retirements that occur in any given year plus the growth in the vehicle fleet. How the demand for new vehicles evolves over time has an important influence on how the existing fleet will age over time. A reduction in the sales of new vehicles relative to the fleet size will naturally result in the average age increasing.

To calculate how vehicle sales will evolve we estimate how the influencing factors will change in time – these include:

- **How vehicle ownership will change** – we estimate this by linking future growth in the fleet to either population growth (constant vehicle ownership) or a combination of population growth and growth in per capita income (increasing vehicle ownership)
- **The saturation point of vehicle ownership** – We estimate saturation will occur at around 750 vehicles per 1000) – this is the point where vehicles per capita de-couple from income growth and vehicle price.
- **Forecasting the make-up of vehicle sales** - We assume the market shares of vehicle types in 2013 will remain the same – although the ratio between Australian new and used imports will change depending on the scenario and regulatory constraints specified
- **Population and per capita income –** These are projected from statistics published by international agencies

- **Vehicle survival curve (the percentage of vehicles left at each age)** – We assume the survival curve remains constant unless used imports are introduced in which case we test these sensitivities in our scenarios.

Assumptions and Sensitivities

While the fleet model has a high degree of accuracy in calculating fleet outcomes, these are dependent upon on highly uncertain assumptions. The most uncertain assumptions include:

- How the survival curve will change in time
- How vehicle ownership will change in future
- Consumer reaction to lower used car prices
  - Impact on the fleet size
  - Impact on the new vehicle market
  - Impact to the rate of older vehicle retirements

The assumption on these factors will determine the trajectory of the fleet model and the expected outcomes.

Running the model and outputs

The 'Run Scenario' button will calibrate the model to the assumptions entered on the *Key Assumption* tab and the fleet composition and macroeconomic inputs entered on the *Key Inputs* tab.

The *Outputs* tab details how a number of outputs which are used in the cost benefit analysis as well as providing useful information on how the fleet will evolve under the policies and assumptions specified. These outputs include:

- The average age of the fleet
- The composition of the fleet by age
- Average fuel economy of the fleet
- Safety risk profile of the fleet

T: +1 (202) 466-6790
F: +1 (202) 466-6797
1747 Pennsylvania Avenue
NW 12th Floor
WASHINGTON DC 20006
United States of America

T: +1 (646) 632-3770
F: +1 (212) 682-0278
200 Park Avenue Suite 1744
NEW YORK NY 10166
United States of America

T: +61 (2) 9231 6862
F: +61 (2) 9231 3847
36 – 38 Young Street
SYDNEY NSW 2000
Australia

T: +64 (4) 913 2800
F: +64 (4) 913 2808
Level 2, 88 The Terrace
PO Box 10-225
WELLINGTON 6143
New Zealand

T: +57 (1) 646 6626
F: +57 (1) 646 6850
Calle 100 No. 7-33
Torre 1, Piso 14
BOGOTÁ
Colombia

T: +33 (1) 45 27 24 55
F: +33 (1) 45 20 17 69
7 Rue Claude Chahu
PARIS 75116
France

---------- www.castalia-advisors.com